Towards Polycentric Regionalism: Sino-Russian Geo-Economic Relations and The Formation of The Pacific Arctic Region

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Acknowledgement & Dedication

This thesis is dedicated to the memory of

Helen Clare Reilly

13 December 1960

23rd May 2011

Declaration

This thesis is the result of my own work and includes nothing which is the outcome of work done in collaboration except as declared in the preface and specified in the text.

It is not substantially the same as any work that has already been submitted before for any degree or other qualification except as declared in the preface and specified in the text.

It does not exceed the prescribed word limit for the Earth Sciences & Geography Degree Committee.

Timothy Reilly

9th June 2021

Abstract

Title: Towards Polycentric Regionalism; Sino-Russian Geo-economic Relations and the Formation of the Pacific Arctic Region.

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The post-Cold War unipolar world order is being challenged in both North East Asia and the broader Eurasian Arctic not by the emergence of multilateral political institutions, but rather by what I conceptualise as a geo-economic process of Polycentric Regionalism. The rising great power ambitions of Russia and China - with substantial economic spheres of overlapping regional interests (i.e. their neighbouring Dongbei / Russian Far East and Arctic territories), has led to their adoption of a geo-economic strategy to begin to alter the present international system by creating two new physical and geopolitically relevant, regional "spaces" in the Arctic: the terrestrial Pacific Arctic, and via the instrumentalization of technology, the fourth dimension of (celestial) Space. Both activities (the Pacific Arctic/Space) now strategically link North East Asia with Europe, physically and virtually, via combination of Russia's North East Arctic corridor maritime access, Sino-Russian joint Space /cyberspace activities, and China's Belt and Road Initiative platform.

Through original case studies of the natural gas/ Liquefied Natural Gas (LNG) industry, situated in Russia's Arctic, as well as joint Sino-Russian technology Research and Development initiatives, I argue that the gas/LNG industry's geo-economic power - transmitted through capital, infrastructure build-out capabilities, and economic influence over institutions - is the key determinant in facilitating the physical connectivity and virtual linkage aspects of Polycentric Regionalism. By generating new economic dynamism in the shared space(s) and thereby building trust for

bilateral commitments, Russia and China can create the Pacific Arctic region as an experimental step in establishing a viable alternative to the economic and security order in Asia, shaped largely to date by the U.S. The significant Sino-Russian trust gained via the Sino-Russian gas play acts as a strategic Confidence Building Measure for more sensitive collaboration in dual-use technologies, that may in turn progress the relationship from one of geo-economic partnership (gas/LNG) in the Pacific Arctic space, to possible geostrategic alliance (via technology-based activities) in the Arctic's fourth dimensional arena – the domain of Space and Cyberspace. It is by these means that China and Russia can convert geo-economic, geostrategic, and associated econo-governance processes, into the crucial underpinnings of their geopolitical aim; a new, multiregional-based international order for the 21st century.

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Abbreviations and Glossary

A. Abbreviations

AGM Annual General Meeting

BMD Ballistic Missile Defence

CNPC Chinese National Petroleum Company

EU European Union

FEED Front End Engineering Design

FID Final Investment Decision

GDP Gross Domestic Product

GVC Global Value Chain

IEA International Energy Agency

IMO International Maritime Organization

IOT Internet of Things

IPE International Political Economy

LNG Liquid Natural Gas

MENA Middle East North Africa

MTPA Million Tonne per Annum

NATO North Atlantic Treaty Organization

OPEC Organization of Petroleum Exporting Countries

PLA People's Liberation Army

PLAN People's Liberation Army Navy

PRC People's Republic of China

ROI Return on Investment

SAR Search and Rescue

SCS South China Sea

SIIS Shanghai Institute of International Studies

SREB Silk Road Economic Belt

STEM Science Technology Engineering Mathematics

UAV Unmanned Aerial Vehicle

UK United Kingdom

USA United States of America

USSR Union of Soviet Socialist Republics

B. Glossary

Arctic Council (AC)	The Arctic Council is a high-level intergovernmental forum that addresses issues faced by the Arctic governments and the indigenous people of the Arctic Membership: Canada; Denmark; Finland; Iceland; Norway; Russia; Sweden; United States, and the Indigenous peoples of the Arctic. It was founded in 1996 under the Ottawa Declaration. The AC's headquarters is in Tromsø, Norway (since 2012)
Artificial Intelligence (AI)	Artificial Intelligence - is machine intelligence, as opposed to human intelligence.
Asian Infrastructure Investment Bank (AIIB)	Asian Infrastructure Investment Bank. China's first foray into creating an Asia-specific investment bank to cater to the region's particular development requirements. The U.S. is the only major OECD country that refuses to work with it, as it views it as an institutional move, challenging established Western, Bretton-Woods' style financial institutions
Asia-Pacific Economic Cooperation (APEC)	The Asia-Pacific Economic Cooperation is an inter-governmental forum. It consists of 21 economies in the Asia Pacific Rim (APR) promoting regional free trade; it's significance is now global. APEC was created in 1989, in response to major regional

	growth and competition from other global trade blocs (ie the U.S. and EU). It is headquartered in Singapore
Bastion Concept	The Bastion Defence in Russia's Arctic is an anti-access homeland defence strategy to protect both the strategic submarines of the Northern Fleet and access to the Atlantic. In addition, its role is to ringfence Russia's European Arctic, and its right flank in the event of a flank, denying access to the Murmansk and Kola areas including associated infrastructure such as harbours, airports, logistical facilities. It is the basis from which Russia can project power towards Europe, the U.S. / NATO. The Bastion's aim is main goal of an anti-access strategy is to deter him through physical defence while also leveraging softer instruments of power such as cyber, statecraft, intelligence/data, and economic means.
Beidou	China's own GPS/ navigation system
Belt & Road Initiative (BRI)	Belt and Road Initiative is a global infrastructure development strategy adopted by the Chinese government in 2013 to invest in nearly 70 countries and international organizations. It is considered a centre piece of the China's foreign policy. Its Arctic subsidiary is called the "Polar Silk Route".

Blue Economic Corridor	According to the World Bank, the blue economy is the "sustainable use of ocean resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystem." China identifies two key maritime corridors: the Pacific and Atlantic; recently they have stated that the Arctic's NSR is their third "blue economic corridor"
Ballistic Missile Early Warning System (BMEWS)	Ballistic Missile Early Warning System: Only two countries operate such a nuclear defence system today: U.S. and Russia. It is a system of early warning capabilities, targeting systems, and land/air/Sea-launched nuclear weapons, that was set up by the USSR and U.S. during the Cold War period. The U.S. and Russia are the only countries that still possess such strategic BMEWS – of global scale, today. See also NORAD and SOSUS
Capital Expenditure (CAPEX)	Capital Expenditure (CAPEX) is a business terms referring to the one-off outlay of capital equipment and initial investment costs (including services, staff hiring, offices, etc) when building a new business and/or a new sector, of an established business/service
Confidence Building Measure (CBM)	CBMs are commonly established as part of international negotiations, as vehicles to build and/or restore trust between parties, and thus facilitate the subsequent building of good

	faith in the negotiations and their outcome - future cooperation
Cyberspace	A global domain within the information environment consisting of the interdependent network of information systems infrastructures including the Internet, telecommunications networks, computer systems, and embedded processors and controllers.
Deductive / Inductive thinking	In attempting to understand the Sino-Russian partnership, most contemporary Western analyses see S-R "positioning" primarily through a Descartes framework of deductive thinking. Such reasoning assumes a linear transition from broad generalizations, concerning say a situation/problem, to specific observations. Unsurprisingly deductive reasoning is linked to the *testing* of an *existing* theory. In this context therefore, the broadly accepted generalization that the flagging Unipolar world and its attendant Western institutions, financing, social structure, and economic orientation, etc, can only result in a linear outcome/observation: the emergence of multipolarity. This is a widely predicted outcome which tests (apparently successfully), existing Western theory about the global order and is based on the following assumptions: Globalization will continue; the centre of global economic gravity will remain in the mid-Atlantic;

	labour will still be the key factor in commerce; and Bretton Woods' institutions will continue to determine/direct, trade and economic power. By contrast inductive reasoning transitions from specific observations to broad generalizations, and is logically, more associated with *developing a theory*. The S-R vision is to bring about a specific objective – the creation of the Pacific Arctic (a regional zone of power, capable of virtual linkage with other non-contiguous regions). This S-R inductive objective, unlike the assumptions (above) underpinning the Western deductive approach, is *informed and facilitated* by observation and application of real-time global developments in the IPE, including digital technologies – automation (replacing Labour), 3-D printing, de-globalization alongside shrinking logistical chains, new regional forums, the co-location of regional manufacturing centres and markets, and new, Asian economic institutions. With the specific objective achieved – largely by harnessing these *non-linear* developments - the more general and subsequent outcome - a fledgling multi-regional order that undermines the U.S,' unipolar world, and the Western vision of a subsequent multipolar world, is possible.

	The S-R adoption of an inductive way of thinking, *addresses firstly* in temporal terms, the achievement of the *specific objective* - the creation of the PA. Having met that specific objective the necessary, non-linear fashion (because of the differing rates and impacts of uneven global IPE changes) of the subsequent roll-out of multi-regionalism in NE Asia (ie the broader generalization), a la Polycentric Regionalism theory is now clearer. It is almost a case now of "back-filling" various necessary multiregional measures, having *firstly* established the new citadel of multi-regionalism, the Pacific Arctic region. The *subsequent processes* needed to transition to broader generalizations, via an inductive thinking process (i.e., pursuit of geopolitical opportunities ((spaces) brought about by changes in the IPE) are now clearer, quicker, and more certain of success. Such inductive thinking influenced by global economic alterations is alone, stealing a march on deductive thinking, still enslaved by the idea that the demise of unipolarity will inevitably lead in a linear fashion – and irrespective of new developments in technology and the IPE - to the specific objective - of multipolarity in C21. In short, applied S-R inductive thinking gets you there faster, because one *begins at the end*

	(specific objective) and work backwards (broad generalist steps) to consolidate/backfill and align with that which is already established. This is precisely why for example, unlike established regionalism theory, P-R theory notes (and accommodates) S-R *regional institution building* occurring in the Pacific Arctic *before* broader generalization (of multiregionalism) occurs. One obvious example is the introduction of the Polar Code (to govern the NSR), immediately heavily targeted and invested in (and effectively "owned") by Russia - in order that *subsequent* Sino-Russian infrastructure build out along it, could be monetized, and facilitate *later* broader multiregionalism across the Arctic region.
De-globalization	A process in which there is a gradual contraction in interdependence between businesses (declining growth of trade in goods and services and investments), and therefore a reduction in integration between states, as well. Part of the reason for it, is for example the emergence of technologies such as 3D printing which has encouraged re-shoring (i.e. manufacturing at home now), as cheap overseas Labour is being replaced by automation. According to Livesey (2017, p.11) the key index of globalization/integration is the ratio of world trade to global

	GDP. At its height in 2007, it was at 52%; global trade growth stood at 6.5%. Since 2008, trade and growth have both crashed significantly and the trade/GDP ratio dropped by 10%. Trade has slowly recovered since, but the ratio (trade/GDP) has flatlined ever since. The cry for sustainable development which circumscribes the "space" for manufacturing, as well as environmental pressures on transport means (vital for trade), has exacerbate the de-globalization trade and encouraged a shift from the global to the local. De-globalization is what the Sino-Russian partnership - it is argued here in this dissertation, is capitalising upon in NE Asia, by developing a local Regionalization approach to trade and political power instead, framed within a broader polycentric regional framework.
Digital Silk Route (DSR)	China's Digital Silk Road is a strategy to catalyse global digitalization. It was launched in 2015 as a component of China's vision for global connectivity, the Belt and Road Initiative (BRI). Like the BRI, it involves many actors at all levels across Chinese society. The DSR aims to improve digital connectivity in with China. DSR is about the development and interoperability of critical digital infrastructure such as terrestrial and submarine data

	cables, 5G cellular networks, data storage centres, and global satellite navigation systems. A recent example is the launch of its global satellite system, BeiDou; China's own GPS system.
Dongbei Region	This region in NE China, consists of three provinces: Liaoning, Jilin, and Heilongjiang. The latter, northern province borders Russia's Far East regions, whilst Jilin borders North Korea.
Downstream Sector	An Oil and Gas industry functional classification – concerned with the Refining, Distribution, Marketing, and Sales activities of the oil/gas company
Eurasian Economic Union (EAEU)	Eurasian Economic Union: The EAEU is an economic union of post-Soviet states located in Eastern Europe, and Western / Central Asia. The EAEU Treaty was signed on 29 May 2014 by the leaders of Belarus, Kazakhstan, and Russia, and came into force on 1st January 2015.
Exclusive Economic Zone (EEZ)	Exclusive Economic Zone: the maritime region over which a sovereign country has special rights over use and production from the Sea. It is part of the United Nations Convention on Law of the Sea (UNCLOS); it extends 200NM from a state's coastline

Exploration and Production (E+P)	Exploration and Production; the two main activities of the Upstream sector of the Oil & Gas industry
“Floating pipeline”	A gas industry term to explain the (initially Japanese) basic contract content of international pipeline (not LNG) gas deliveries; gas delivery from region/country A to a single, fixed delivery point - in region/country B, at a fixed price, over a fixed period of time (usually long-term), with a fixed volume of gas. The economic power under such a model was always with the gas supplier and not the customer. This was the basis for the mutual security of supply/demand relationship between gas contracting nations and consumer countries
Greater Eurasian Partnership (GEP)	The Greater Eurasian Partnership concept -introducing the idea of Eurasian integration, was introduced by Putin in 2015. The partnership stipulates that the priority was/is economic and not military or political. This is because (wished for) stability is more associated with an economic approach, than via a military or political alliance across the continent. In general, these economic aspects are more rational and less subject to political influence, and trade is seen as a more unifying instrument in the region than multiple military alliances.

	The GEP aims to create a network of free trade areas and inter-regional economic/trade alliances, via connecting integration projects across the Eurasian space.
GLONASS	Russia's own GPS / navigation system
GPN (Global Production Network)	Global Production Network approach focuses on the relationship between the geographic extensification of an economic activity and its organizational integration and coordination. Initially developed as a tool for understanding a) changes in the geographic organization of manufacturing and services and b) examining the implications for regional development of the internationalization of economic activity. The GPN approach aims to understand how existing interactions—around gas pricing formulation or product substitution outputs, for example—are outcomes of the distribution of power within a LNG production network and how these interactions create new organizational and geographic forms. The GPN approach's capacity for understanding both spatial configuration and network organization interaction, makes it well suited to analysing economic sectors whose organizational and geographic structures are undergoing change, such as the Arctic's various LNG projects.

	GPN's geographic sensitivity has the capacity to generate novel insights about the evolution of the LNG sector that make an original contribution to energy studies. GPN's utility as a distinctively *geographic* mode of analysis is apposite and is especially applicable in the case of Arctic LNG and the applicability of GPN's factors: territoriality; materiality and material transformation; and network practices. Application of these factors in a GPN analysis of LNG, illuminates the international partners' inter-relationship regarding the organization, territoriality, and materiality of LNG operations in the Arctic region
Gravity Based Structure *or* Platform (GBS)	A gravity-based structure is a support structure held in place by gravity, most notably offshore oil platforms. These structures are now being used by Novatek LNG on the Yamal Peninsula, as they partly overcome the increasing problem of permafrost melt (onshore) in the region. Success has however - to date, been limited in the Arctic/Novatek environment. Its development is part of Russia's technology substitution policy, resulting from the ban on Western LNG technology transfer under sanctions' rules.
Hypersonic Missiles (e.g., Russia's "Kinzhal")	A hypersonic missile travels at speeds of Mach 5 (around 1 mile per second). Some missiles, such

	as Russia's upcoming Kh-47M2 Kinzhal air-launched ballistic missile, is capable of reaching Mach 10 speeds and a range of 1200 miles. At present there is no missile defence system capable of intercepting a hypersonic missile.
Independent Oil/Gas Company	Any Russian gas/ LNG company other than Gazprom / state-owned or private-owned
Inductive /Deductive Thinking	See Deductive / Inductive thinking above
Mercantilism	A state whose exports deliberately exceed its imports and prosecutes a "beggar thy neighbour" trade policy with other nations; this can include advocating government regulation of international trade, to strengthen the power of the state and its wealth.
Midstream Sector	The sector classification in the oil industry which is primarily concerned with transportation of product activities (tanker, pipelines, LNG vessels, ship, barrel, and rail means)
North American Free Trade Agreement (NAFTA)	The North American Free Trade Agreement was signed by Canada, Mexico, and the United States in 1994, creating a trilateral trade bloc in North America. The agreement superseded the 1988 Canada–United States Free Trade Agreement between the United States and Canada
Northern Sea Route (NSR)	Northern Sea Route is a shipping route officially defined by Russian

	legislation as lying east of Novaya Zemlya and along the Russian Arctic coast from the Kara Sea, along Siberia, to the Bering Strait. The entire route lies in Arctic waters and within Russia's exclusive economic zone (EEZ). Since the mid-1930s the Northern Sea Route has been an officially managed and administered shipping route along the northern/Arctic coast of Russia. In 2018 the Russian government transferred the main responsibility for the Northern Sea Route to Rosatom which through its ROSATOMFLOT subsidiary manages the Russian nuclear powered icebreaker fleet based in Murmansk.
New World Order (NWO)	New World Order: a theoretical concept that envisages an altering world order in C21, reflecting the rise of Asia/China, and an evolving international (service/technology-driven) economy that will challenge western led neo-liberalism, U.S. hegemony and see the emergence of alternative/additional centres of global power (multipolarity).
Oil Field Service (OFS)	Oil Field Service companies provide services to the oil and gas industry including Drilling and formation evaluation, well construction, and completion services. They are usually sub-contracted by major private/state oil

	companies, but they do not usually produce petroleum themselves. Examples are OFS companies such as Schlumberger
Operating System (OS system)	The operating system inside a mobile phone - and linked to its management/mobile network
Pacific Arctic (PA)	A region in NE Asia geographically consisting of Russia's Asian Arctic and Pacific RFE provinces and China's coastal Dongbei regions. In reference to gas/LNG and /or commercial activities **only**, it also includes Japan, and South Korea
Polar Code	The International code of safety for ships operating in polar waters. The Polar Code covers the full range of design, equipment, operational, training, search and rescue and environmental protection matters relevant to ships operating in the inhospitable waters surrounding the two poles. Its creation was by the IMO at the behest of the Arctic Council in recognition of the maritime hazards along the Northern Sea Route, resulting from global warming
Polar Silk Road (PSR)	The Polar Silk Road (PSR) refers to the Arctic's shipping route (the Northern Sea Route) connecting-up Eurasia via the Arctic Circle. In China's recent 14th Five Year Plan, China intends to complete the PSR by 2025.

PoS1 *or* Power of Siberia 1 project	Gazprom's natural gas pipeline project transporting Siberian pipeline gas to China under a 30 year £400Bn agreement signed by the Chinese and Russian governments in May 2014
PoS2 *or* Power of Siberia 2 project *or* "Altai" project	Gazprom's additional Siberian gas pipeline into western China from the western Siberian "Altai" region under a further agreement in November 2014
Production Sharing Agreement (PSA)	Production Sharing Agreement; common form of contract between international oil companies (IOC) and the host country's national oil/gas industry. Development costs are normally borne by the IOC, but profits from subsequent production are shared
Rent/Rentier/Rentier state	A state that derives its wealth from one primary source. However, in the case of Russia its primary international fee earners/sources, in order of descending value are in fact: agriculture; defence sales; and finally, oil and gas revenues. Nonetheless, Gazprom is hamstrung domestically by the government: Moscow for instance caps Gazprom's domestic gas prices and insists that it remains the country's (gas) supplier of last resort. As discussed in Chapter Three (Part Two) Gazprom is both the primary "agent" of such a quasi-rentier arrangement (with incomes often claimed as local "consultancy" work/rent by corrupt

	officials), but also the commercial victim, as it is still additionally burdened by the Soviet legacy of subsidizing the social contract with Russian society (i.e. providing local schools, sponsoring sporting events, subsidizing housing for employees, etc). The additional "rentier" agent effect is to make Gazprom less internationally competitive. In addition, authoritarian rule over Gazprom as a rent provider, fixed domestic pricing, and being chained to an outdated social contract, has allowed the rise of both domestic gas supply competition (non-capped), and an increase in USD-earning Russian gas supply competitors, chasing overseas markets (i.e., Rosneft and Novatek LNG, via overseas' export licences). In this sense, Moscow's rentier "cash cow" is being run dry - as expounded upon in Chapter Three.
Republic of Korea (RoK)	South Korea
Russian Far East (RFE)	Russian Far East is a region in the easternmost part of Russia and the Asian continent; it is classified as part of the Far Eastern Federal District. It covers from between Lake Baikal in eastern Siberia to the Pacific Ocean. The region's main city is Khabarovsk
Sea Lane of Communication *or* SLOC	Examples: Straits of Hormuz/Malacca; of global strategic and geo-economic

	importance, linking Oceans and Continents
Silk Road Fund (SRF)	The Silk Road Fund is China's state-owned investment vehicle to foster investment in countries along the BRI network
Sound Surveillance System (SOSUS)	The Sound Surveillance System was/is a passive Sonar system developed by the United States Navy to track Soviet submarines.
Terminal High Altitude Area Defence (THAAD)	Terminal High Altitude Area Defence. THAAD is an U.S. anti-ballistic missile defence system designed to shoot down short-medium and intermediate-range ballistic missiles
Third Party Access (TPA)	Third Party Access: Any Russian Energy party other than Gazprom, which wishes to gain access to Gazprom's exclusive UGSS pipeline network, for distribution of its own, non-Gazprom, natural gas must apply to the RF government to use Gazprom's UGSS.
Technology and Innovation Programme (TIP *or* T&IP)	Technology and Innovation Programme (TIP); a Sino-Russian R&D project set-up to maximise research and development of joint STEM/Technology outputs, signed in 2019 by Presidents' Putin and Xi.
Shanghai Institute of International Studies (SIIS)	Shanghai Institute of International Studies, an academic institute closely linked to the Chinese Communist Party apparatus
Russia's United Gas Supply System (UGSS)	Russia's United Gas Supply System. A national network system

	of gas distribution pipelines covering much of the Russian Federation, used by/exclusively licensed to Gazprom.
United Nations Convention on the Law of the Sea (UNCLOS)	The United Nations Convention on the Law of the Sea is an international agreement that establishes a legal framework for all marine and maritime activities. As of June 2016, 167 countries and the European Union are parties. This is the primary legal instrument applied/used by the Arctic Council for the administration of the Arctic's coastal states
Upstream Sector	An Oil and Gas industry functional classification – comprised of Exploration & Production activities
Unrestricted Warfare (UW)	Unrestricted Warfare – a Chinese term and doctrine that does not restrict the prosecution of warfare to military means only, but expands it to include economic, political, propaganda, financial and psychological/cultural means too, with/without kinetic force
World Trade Organization: (WTO)	World Trade Organization: the U.S. led global forum, that coordinates, regulates, and monitors international trade agreements and transactions on behalf of participating nations

CHAPTER 1

INTRODUCTION AND METHODOLOGY

Part One:

1. The Overall Field of Research

Since the early nineties there has been considerable instability and uncertainty in the international order; much of this was a legacy of the disruption caused by the demise of the USSR, the concomitant rise of American global hegemony, and the mixed outcomes of emerging globalization on society. Both Russia and China are particularly opposed to a hegemonic international order in the 21st Century; this inevitably meant that many observers conflate the Sino-Russian opposition to U.S. hegemony, with opposition to the U.S. itself. This is an assumption and not a fact. The conundrum though (whether this is true or not), is what are the drivers and purpose of the increasingly close Sino-Russian relationship over the course of the last decade?

In the interim, further significant physical and subterranean changes to - and shifts in, human activity and global governance are now underway that make the aim of reforming the international order challenging but equally, increasingly compelling as well. Amongst these challenges are the massive effects of climate change on regions such as the Arctic, the rise of China - as at least a global economic power, the shift of the centre of global economic gravity from mid-Atlantic to Asia, the impacts of dual-use technologies on the International Political Economy, and the questionable durability of the US-led process of globalization.

As a result, there is a simmering and ongoing debate about the need for a New World Order that must reflect these concerns and accommodate the consequent structural shifts in global society in the early part of the

21st Century. It is not yet clear however, which powers will be the major proponents of this new international order (apart from the U.S.); whether the 21st Century power will be manifested in military, cyberspace, or techno-economic terms, and if future international relations (including diplomacy, economic competition, and possible conflicts) will be directed at the level of the nation state, or at the regional level - or indeed in the domain of Space/cyberspace.

The Research Problem

Accordingly, the research problems are myriad but there are several research areas that can be already identified. Firstly, there is no unified view of the structure or nature of any new international order; should it continue with a state-oriented unipolar model, or a new multipolar vison, or more a regional, spheres-of-interests type arrangement, in the manner of the late 19th/early 20th Century's great powers in Europe?

Secondly, what will be the mechanism of creating this New World Order? What will be the *nature* of power in it and how will it be deployed, and by whom; and which states or perhaps mega-regions, will become the critical spheres of geopolitical interest in the 21st Century?

Finally, what impact will the afore-mentioned factors, such as climate/environment, dual-use technologies, the International Political Economy, and new powers such as China have on the *formation, operation, and outcome* of any new 21st Century international order, that China and Russia may be considering in Eurasia and specifically in the Arctic region?

Research Aim and Objectives

The aim is to establish, define, and illustrate what underpins the growing Sino-Russian relationship in the Arctic region, as part of its strategy of creating a New World Order. Sino-Russian Arctic endeavours in the Gas/ Liquefied Natural Gas (LNG) and Technology industries are targeted and researched as their respective establishment and expansion are two key *objectives*, facilitating the fulfilment of the Sino-Russian aim.

Layout of This Chapter

Part One of the chapter consists of an introduction to this dissertation, and a discussion of its background and context. I then identify the research problem, and explain the research aim, objectives, and questions to be answered. The significance and justification of the work is also outlined including its research limitations, in terms of accessibility, interviews, case studies, national security, and commercial proprietary information etc. Finally, I summarise the structure of this dissertation - chapter headings and purpose, as well as brief overviews of each.

Part Two is an explanation of the Methodology employed throughout the research phase, and in the Sino-Russian Gas/LNG chapter in particular, the explanation for the use of a Global Production Network methodology.

2. The Thesis' Background

The Sino-Russian relationship really began to take off in the second half of the nineties. But prior to events in Crimea in 2014, it was variously described by the likes of Lo (2008), as an inherently limited partnership, or an "axis of convenience". Cultural differences, mutual distrust, and dissimilar interests were cited as to why the relationship could never develop into any kind of alliance. The likes of Cohen (2001) however,

argued that it had alliance potential, but that its fruition (or not), depended on the worsening relationship both countries had with the U.S. Wilkins (2008) went further and suggested that the partnership's growing influence and power was already reflected in for instance, the Shanghai Cooperation Organization - and its assertion in central Asia. Wilkins suggested that this influence would expand globally, in time.

Since 2012 international events have borne out the durability and increasing importance of the Sino-Russian relationship; Putin and Xi have met more than 30 times now, since 2013, for instance. The underpinning of their relationship is that they both oppose U.S. hegemony and resent US efforts to restrict their freedom of movement in the former USSR (Russia), and East Asia (China) spaces, respectively. To this *regional* geographical list must now be added the emerging Arctic region too, where both countries wish to roam unencumbered by Washington. Rozman (2014) adds an additional noteworthy observation to the debate; namely that a national identity and a shared Communist past is actually a unifying factor, and the gap therefore between the two (say, mistrust and different visions), is tolerable because it is still far less than the gap between both countries and the U.S. This is insightful as it suggests that China and Russia, unlike the west, consider contemporary international relations in *relative terms*, and not absolutist. Within the power triangle of the U.S., China, and Russia in the Arctic region, this will be of critical relevance.

The benefit of Chinese relations to Russia, really only crystallised after the events in Crimea of 2014; Putin had overtly opposed Washington, and the country was economically sanctioned in response; this was a pivotal point for Putin, and an isolated Moscow now clearly needed China's economic help, as a priority. Critically the idea of an alliance /strategic alignment,

fermenting since 2011, now became unambiguous and public. The idea of a military-political alliance was even mentioned in conferences, with Putin suggesting that China and Russia were "*natural partners and natural allies" (*Sputnik News, 2014). By 2013 Lukin (2014) notes that a survey of leading Russian policy experts had begun to agree that China should now become Russia's strategic partner in the Asia Pacific Region.

For China, relations with Russia were heavily driven by their own relations with the U.S. especially regarding East Asia, China's own declared sphere of regional interest; or as Lee and Lukin (2016, p. 120) put it: *"their version of the Monroe Doctrine in East Asia, which inevitably resulted in rising tensions with the U.S.".*

China now saw the U.S. as the only power capable of inhibiting China's dominance in the region, according to Wang (2013). The issue was however that China - unlike the U.S. had no major, credible allies in East Asia. So, by becoming an economic global power and even by matching American military power, this was still not enough if China was to be considered at least as a regional hegemon. However, with Russia its natural, *regional* ally, offering Beijing huge *strategic depth in North East Asia*, massive energy resources, and significant technology facilities - as well as access to the Arctic's Northern Sea Route (NSR) – *thus avoiding a U.S./ western Pacific blockade*, the geopolitical balance in North East Asia altered. China's north-easterly hinterland frontier with Russia, the three "Dongbei" provinces that border the Russian Far East namely Liaoning, Jilin, and Heilongjiang, are now safe and secured, with a transport (rail and riverine) conduit taking shape, that runs *northward – linking the Dongbei region directly, overland with Russia's Arctic coastline*. This now leaves the PLAN with time and opportunity - according to Friedberg (2012), to go on the offensive in the western Pacific arena. Lee

and Lukin (2019, p.121) conclude that this secure hinterland logic, has led China to signal Russia that they may now be interested in closer political and military relations.

As both China and Russia are nuclear powers and have considerable conventional forces as well, it is unlikely though that a military driver is the real basis for any future alliance. It is more likely (and a running theme throughout this dissertation) that the basis of their relationship will be rather, techno-economic and governance-oriented initiatives, directed toward undermining the U.S.' pole position and status in these two critical categories of global leadership. Nonetheless Sino-Russian technology is inherently dual-use and whilst it will facilitate geo-economic progress, it may also be used in a non-direct and kinetic way in Space and cyberspace, to assist the military by means of satellite-aided targeting, Space-based navigation systems, Command & Control networks, and data-gathering devices (e.g., Unmanned Aerial Vehicles, drones). The crucial take-away is that much of the associated hardware connected with such Space-based operations have ground stations, support bases, and logistical requirements, located in Arctic Council countries such as Norway, Greenland, Iceland, and Finland, and where China is precisely investing. However, some of those Arctic countries are also NATO member states, and this partly accounts for recent U.S. and NATO interests in Chinese and Sino-Russian activities, in the Arctic's High North region (the European/Nordic Arctic).

The thrust is clear, however; the Sino-Russian relationship is established in the Arctic, spanning the European and Asian Arctic, whilst also creating a physical North/South corridor between its respective Dongbei and Russian Far East regions and the Pacific Arctic coastline, and an onward *virtual* push into the fourth dimension of Space as well, where the

Eurasian Arctic acts as a platform (serviced by the NSR) for launching into that celestial domain, via advanced technologies, with geo-economic and geostrategic objectives. This repeated concept of new, geopolitical spaces being created (physically *and virtually*) by China and Russia is germane to my view of what a regions-centred New World Order will look like in the 21st Century.

China's first strategic economic step into the Arctic - with Russia as its partner, is in an international LNG project, run by Russia's Novatek, comprising industry partners from Asia and Europe. LNG technology has now made gas an internationally traded commodity (as piped gas was/is too expensive to export internationally). This is massively significant as North East Asia is the biggest LNG market in the world (Japan, China and South Korea), and the capture of the LNG/gas market there (the Sino-Russian purpose) and the subsequent creation of a Sino-Russian trans-regional gas trading hub in North East Asia, is geopolitically of enormous import, regarding strategic geo-economic leverage, access to the NSR (to transport the LNG from Novatek's base in the Yamal Peninsula to the west and/or Asia), leading therefore to geo-economic influence – and potential geopolitical governance over North East Asia in the 21st Century. This gas-related region I have coined the Pacific Arctic (Pacific Arctic) and is made up of *geographically,* Russia's North East Arctic territories and Russian Far East regions and China's Dongbei region; as well as economically, the *LNG-dependent countries* (Japan, South Korea), running along the western Pacific coastline.

Recent Developments and Effects on the Sino-Russian Partnership

The Arctic is at the epicentre of a physical state-change in the earth brought about by global climatic change; this has had - and will continue

to have, geo-economic, geopolitical, and geostrategic consequences. One such consequence is that the rich reserves of hydrocarbons, rare-earths, fish stocks, and fresh water that the Arctic contains, have now made the region of global interest to regional commerce, and non-Arctic external economies, alike. Climate change has now made these formerly stranded assets economically viable - and valuable, overnight.

The ability to thus begin serious trade between Europe and Asia/China via the Arctic's now more ice-free NSR, a new global, strategic Sea Lane of Communication (SLOC), has increased the Arctic's geo-economic and geostrategic importance not only for Arctic countries, but for external powers too. China now deliberately describes itself in "soft" diplomatic language, suggests Blank (2013), in an effort to make headway into the region in pursuit of some of these benefits. Terms such as "near-Arctic state" and an "Arctic stakeholder" are now commonly used by China. China has also used the term a "global common" to describe the Arctic; the suggestion is that the Arctic is an open economic space – accessible and open to all players, even non-Arctic countries. Meanwhile Russia's position – as it straddles the Eurasian Arctic (and NSR) from Europe to Asia is pivotal, as it will influence the re-shaping of the established Eurasian Arctic's East/West balance and order; with 85% of the NSR's length in Russia's legitimate Exclusive Economic Zone and/or territorial waters, Russia is becoming a "swing" player across the Eurasian Arctic, and will act as interlocutor between China and the European Union, in the years to come.

China too sees the opportunity to link Eurasia, via Russia's NSR, (a SLOC not patrolled by the US navy) as both a geo-strategic move – and a geo-economic opportunity. It is now dawning on the U.S. that China is building strategic depth as part of the Sino-Russian partnership; spanning

northward from its North East provinces bordering Russia – and connecting up with Russia in *the Arctic*, and *westward* from Beijing *to Finland*, via a Russian-owned emerging global SLOC, financed by the Polar Silk Road, and which the U.S. is denied access to. This Dongbei/Russian Far East region is essentially now the Pacific Arctic's Sino-Russian hinterland. This raises fundamental questions about the viability of the containment policy for China that is planned by the west/U.S., and when one considers technology facilitated *virtual* connectivity as well, the U.S.' strategy looks even less robust. It is one thing to contain China or Russia; it is quite another to attempt to contain both.

The NSR is in essence for China a strategic pathway into what China regards as the "public space" of the Arctic - and a geographical platform – for a move into Space. For this reason, it sees Russia as the *irreplaceable* player in the Arctic, and its "sponsor" in the region. Moreover, the use of the NSR by China gives it strategic freedom of movement from the U.S. navy and undermines western attempts to geographically (by Sea) contain China, in the 21st Century. It is by means of the NSR vehicle that China's Polar Silk Road vision - an Arctic sub-set of the Belt and Road Initiative, is activated and whose purpose is threefold: Arctic infrastructure development; an econo-governance vehicle; and its use as a platform for dual-purpose technologies operating in the Arctic - and Space. Consequently the U.S. now designates the Arctic (along with Eurasia and the Indo-Pacific) as one of the three key geopolitical spaces in the 21st Century.

Additional contextual background factors in the Pacific Arctic region include the altering nature of the new International Political Economy, and

the effects of dual-purpose technologies on Arctic industry such as LNG operations, Space activities, and cyberspace.

The arrival of the technology-driven digital economy has introduced changes in the International Political Economy, most keenly felt (so far) in Asia; the major effects include a reduction in the centrality (and cost) of labour in business/ commerce, and its replacement with automation technologies such as Robotics and Artificial Intelligence, together with a move (in manufacturing systems) toward 3-D printing. This has meant a shortening, and re-orientation of Global Value Chains and a shift in supporting Bretton Woods'-type financial institutions and governance, from a 20th Century western-centric location and determinism to a 21st Century geo-economic locus in Asia, and China in particular. This represents an inexorable shift in the global centre of economic gravity – and power, from Mid-Atlantic, to the East in the 21st Century. The Arctic is a conduit for this lateral movement of power and status across northern Eurasia.

This effect of technology on manufacturing as described by Livesey (2019), is very significant. Western outsourcing of cheap labour overseas is reducing now as a result of Asian-based manufacturers now using Robotics and 3-D printing for instance, *which allows them overnight to begin to sell into the same markets that they manufacture in*. This is of the most upmost global economic importance as the combination of cost-saving, technology-enabling manufacturing, and Polar Silk Road funding (and Belt and Road Initiative direct investments) are now coupled with shortening, Asian-style Global Value Chains. This is ushering in a process of steady U.S./western-determined and led, *de-globalization*, and its steady replacement with Sino-Russian encouraged Regionalization, as a serious geo-economic instrument of power and influence in Asia. The

geopolitical implications of this from the point of view of impact on global governance, institutional power, and geo-economic leverage, regarding sought after geopolitical outcomes is immeasurable. Technology is in my mind the economic foundation of any New World Order arrangement.

The position that Sino-Russian technology and innovation plays in the Arctic is therefore yet another dimension causing concern in western capitals. Not only are Big Data, Broadband and the Internet of Things aspects central to modern economies but their respective control, regulation, and governance are increasingly determined by Space-based systems. China and Russia have recently suggested working in Space together and have already formed a strategic Research and Development venture – the Technology and Innovation Programme (TIP) in 2019. Much of this work is aimed at joint Space and cyberspace activities, as well as applications for the digital economy. This has governance implications for the Arctic region, which China in particular, is pursuing subtly but vigorously, with its incursion into Space from an Arctic platform base.

Key Areas of Relevant Research

Critical areas of *recent research* that have heavily informed this dissertation are Livesey's (2018) polemical work on the International Political Economy, and its link with technology; Diesen's (2017) original concept of geoeconomics as the principal framework of the Sino-Russian partnership in Eurasia, and Bennett's (2014, 2016) view of the formation of the Pacific Arctic region. Buzan (2011, 2018) and Christoffersen (2018), suggest innovative theories explaining the concept of contemporary regionalism/regionalization and its physical manifestation in North East Asia, respectively. Bridge and Bradshaw (2017) contribute a useful methodology that is revealing of LNG structure, management, and

operational practices in the marketplace, and which largely explains the *industrial* aspects of the role of Novatek's LNG in the Pacific Arctic, as an instrument of Sino-Russian geo-economic strategy, but with a geopolitical purpose. Finally, I review in detail the creation in 2019 of the Sino-Russian Technology and Innovation Programme, that informs much of the argument about its application in geo-economic strategy and its significant geo-strategic role in the Arctic, underpinning Sino-Russian operations in both Space/cyberspace –and the LNG industry in the Pacific Arctic, and finally technology's emerging *governance-enabling role* too in the region.

Summary

China and Russia have adopted a geo-economic strategy for the eventual *governance* of the Eurasian Arctic; this strategy heavily incorporates the use of technology; which they are applying both in the Pacific Arctic as part of a strategic geo-economic investment in the LNG industry (and the associated domination of the NSR), and a geostrategic thrust into the European Arctic (Space/cyberspace). The Arctic is becoming a crucible of geo-strategic competition in the 21st Century, and a test bed for the Sino-Russian partnership in terms of building both strategic trust (techno-cooperation in Space) and economic investment in Arctic LNG cooperation. These experimental initiatives are in effect both extremely important Confidence Building Measures - bearing in mind Sino-Russian history, and an experimentation with a regionalization-based New World Order, taking the form of new geopolitical spaces, the Pacific Arctic, and Space as their new, regional spheres of mutual interest(s), that they wish to influence and govern.

3. The Research Problem

The Present state of Research on Sino-Russian relations is formidable and voluminous. The main literature review of it is covered in the Framework chapter to follow. But in essence there are some general observations that can be made here, which are useful in guiding the reader's thinking throughout this dissertation.

In the main, much of the commentary is written with the hindsight of history - the USSR and post-Cultural Revolution. It is in other words a 20th Century framework of analysis that assumes that Russia and China will for instance, always fundamentally mistrust each other, and therefore will never form any type of alliance in the 21st Century. This to me is an assumption and not a fact, and a dangerous starting point from which to analyse Sino-Russian relations in general and in particular, their relationship in the 21st Century Arctic.

There is also still in the literature a view, of the likes of Fukuyama and Huntingdon, that post-Cold War, the linear projection of history is still more or less true, albeit meandering. This seems to be a very western view of history, and different to that of Asia and Russia, where their view is more cyclical, reflecting perhaps a longer view of time and space, and its relationship to history. The primary advantage to Russia and China therefore of technology for instance, is not a new $Billion Mobile system opportunity, but its ability to ameliorate the strategic issue of time and space (i.e., distance) when building new geopolitical "spaces" in the enormous Arctic region - and beyond. Any military historian will know that in 1941 Stalin's strategy for defeating the invading German army was at first, to sacrifice space – for time.

Moreover, the literature overwhelmingly reflects western deductive thinking (see Glossary); implicit in this (reflecting again a linear view of events) is the assumption of a starting point followed by several progressive milestones, leading eventually to the destination point and the apparent conclusion and fulfilment of the aim of the exercise/strategy. Sino-Russian thinking often works *inductively* (see Glossary)*;* securing the end point/aim *first*, and working backwards, back-filling milestones *toward the start point*. This is crucial for Sino-Russian analyses purposes as it gives western analyses an early "heads-up" of *Sino-Russian intent*.

Moreover, this western type of Cold War thinking runs through the literature and discourse; crucially the most important aspect of which is the continued fascination and determination to (largely) see the Sino-Russian relationship in overwhelmingly geopolitical terms. This reflects the former *ideological* battle between the USSR and west in the Cold War. It is arguable that today however, the reality of Sino-Russian/western relations are about a great deal more than ideology.

Many studies look at the military and economic aspects of the Sino-Russian relationship too, including military weapon systems, hybrid warfare and military doctrines. Others still, look at economic institutions and the effects of regulation, technology, and institutionalization on the global economy. Increasingly there is a growing body of academic work as well discussing the role of technology in the 21st Century and how it will be applied in myriad economic and strategic ways. Few are looking at all three as a part pf a geo-economic strategy however, whereby for instance, the military is subservient to strategic economic aims.

In sum, there is no end of informative and useful literature on the Arctic, China, and Russia, international relations, technology, and the global

economy. Many theories have been espoused about Regionalism, unipolar systems, contemporary geopolitical theory, and historical analysis of the Sino-Russian relationship. In the Arctic too there is considerable growing literature on a region that has been a backwater for most of its existence, until now. Issues of sovereignty, environmental protection and sustainable development dominate the discourse along with economic concerns affecting the fragile environment; itself manifested as a result of major climate change in the region. On the whole, however the Sino-Russian literature is written by specialists in International Relations, and not regional experts; their views therefore about Sino-Russian relations *in the Arctic region* are logically, somewhat limited.

The Literature and Research Gap

The Sino-Russian relationship, the changing international order, and the Arctic region are all relatively new and contemporaneous areas of enquiry, so it is to be expected that there is a research gap - which is reflected in the somewhat haphazard *arrangement* of the associated literature on the subject matters. Data is usually available but the analysis of it is sometimes limited, and I suggest, somewhat incomplete.

Major global factors such as technology, and its effects on the altering International Political Economy are not directly related to the Sino-Russian relationship - and their impact, for instance in the Arctic, nor its effect on how a new (regional) New World Order could be created; the emphasis in the LNG discourse for instance is on tonnage, exploration, and financing, but little coverage of *how* LNG networks grow (the mechanism), who they are internally influenced and organized by, and why this affects

operational practices, such as the way LNG is transported, marketed, and distributed overseas creating new markets.

Little is found either on the relationship between geo-economics and its relationship with new economic drivers, like technology, unrestricted warfare tactics, and funding mechanisms like the Belt and Road Initiative by China and Russia, in the Arctic region. What this represents is an overall *lack of connectivity between disparate research areas*; this suggests that the analyses of much Sino-Russian research is limited by the theoretical framework adopted (see earlier comments above).

Much of the relevant data is available, but it is arranged in a way that does not necessarily reflect Sino-Russian thinking about economics, geopolitics or indeed the geo-economics, say, of the Arctic region – and beyond too – in Space.

What appears in the literature instead is often a series of analyses that is rigorous, well referenced, and persuasive, but often begs the question, "so what?" The literature on Sino-Russian relations is usually stove piped, exclusive, and tactical, rather than panoramic, networked, inter-disciplinary, inclusive, and *strategic*.

The literature broadly lacks attention to what would/will be the *actual mechanism* by which a New World Order could be developed, in the case of the Sino-Russian relationship in the Arctic. The description is often admirable, including discussions of the technical use of the NSR by China for instance, rather than *how* it is made use of, and *what* does this mean geo-politically and geo-strategically in the context of making a public space in Russia's Pacific Arctic region.

A more fundamental area where the literature and research appear lacking, is in considering the altering nature of (usable) power in the 21st Century, and how it *informs Sino-Russian thinking about the Arctic*, the framework adopted, and what/which instruments of power it will deploy, to influence the creation of the Pacific Arctic region and its subsequent governance. There seems to be an assumption that the nature of *usable power,* is still largely geopolitical in nature and military in application. This may reflect a still very much western approach to understanding Sino-Russian thinking and strategy.

The Research Fallout

In summary, there is little evidence in the literature of a synthesis between regional expertise (of the Arctic) alongside traditional academic analyses of the contemporary international relations of the Sino-Russian relationship - and what it means in terms of their strategy to build a New World Order/geopolitical space in/from out of the Arctic region. For instance, U.S. academic commentary focuses on the perceived threat to their Arctic-based, Ballistic Missile Defence System, posed by China's entry into Space from an Arctic base/location; but I argue that the threat is not so much of a 20th Century military-type but of a geoeconomics type. China's intent is the *control over cyberspace (in Space)* and by which they can then *govern from* space, by building dual-use broadband infrastructure installation, communications systems, digital highways, and thus determining data-driven financial transactions, applying navigation aids, etc, through *enhanced latency,* a key competitive factor in the 21st Century international commerce. That is harnessing technology to gain global economic governance opportunities, that by occupying Space will deliver to the/ a superpower in the 21st Century. This will reflect what kinds of power (e.g., geo-economic) is then actually usable nowadays, and vital

for creating a new international order that will deliver what societies demand of it. This is an entirely different order of thinking form those considering the Arctic only in 20th Century military – and *terrestrial* terms.

The lack of any definitive test cases, reported in the literature review from within the Arctic region, involving both protagonists (the People's Republic of China and the Russian Federation), and of sufficiently scale-able, strategic, and geo-economic global weight (such as the energy or technology industries), is such that the present reliance on 20th Century International Relations theory interpretation is often insufficient, increasingly irrelevant, or just plain wrong - for even understanding and/or interpreting present Sino-Russian activities in the region. The lack too, of cross disciplinary projects found in the literature search, runs counter to the deliberate strategy of Russia and China to accommodate a geo-economic strategy (which incorporates the International Political Economy/technology) for the region, and which clearly encompasses such a panoramic view *and understanding* of the contemporary international order, and its relationship to the Arctic region in the 21st Century.

4. Research Aims, Objectives, and Questions

The Aim of my research is to understand the Sino-Russian relationship in the Arctic region over the last decade. Given the lack of real-time regional test case/analysis identified, the Sino-Russian LNG venture located on the Yamal Peninsula in the Russian Arctic, will be the main economic/industrial test case for investigation.

Research Objectives:

Research Objective 1 - To ascertain the *nature* of the Sino-Russian relationship in the Eurasian Arctic.

Research Objective 2 - To discover how Sino-Russian cooperation manifests itself in the Arctic.

Research Objective 3 - To identify the strategy used by China and Russia in the Arctic to fulfil *Research Objectives* 1& 2.

In terms of the three specific research questions to be answered by this dissertation, these derive from the three broad research objectives set.

Research Questions

Research Question 1 - What is the aim of the Sino-Russian partnership in the Eurasian Arctic region(s)?

Research Question 2 - What is the mechanism of Sino-Russian cooperation in the Eurasian Arctic?

Research Question 3 - Can contemporary International Relations Theory explain the Sino-Russian partnership in the Eurasian Arctic today?

Scope of Research

This dissertation confines itself to the Eurasian Arctic and focuses on two aspects of the Sino-Russian partnership: gas/LNG operations in the Pacific Arctic and their application of technology in the region, over the last decade up to around 2018/19. It does not cover the North American Arctic, nor U.S. interests and responses in the Eurasian region. However, a scenario is suggested in the Conclusions chapter where some likely

U.S. responses to Sino-Russian Arctic collaboration in the Eurasian Arctic are discussed.

Moreover, whilst the purpose of the LNG test study is to establish the reality (or not) and mechanism of regionalism - creating a new geopolitical space in North East Asia, I include in the final section of the Russian Arctic Gas chapter *a synopsis* of how the process of regionalization-by-gasification creating the Pacific Arctic space is mirrored and directly connected to the bordering, southerly Dongbei/Russian Far East regions, by a series of strategic transport and project/investments, that are designed to link these interior, hinterland, Dongbei/Russian Far East region(s) in a *northward direction*, toward the Russian Arctic coastline; and how some aspects, such as the NSR in the Arctic, are directly linked to the establishment of port hubs (Primorye One and Two) in two of China's Dongbei provinces on the western Pacific coastline. This section is simply a summary however, of the main Sino-Russian activities and strategy in that region, as its coverage is beyond the scope of this dissertation, and its inclusion alongside the main investigative vehicles of technology and gas/LNG, would overly complicate the research mandate and aim, and therefore detract from the overall exposition of Sino-Russian Arctic activities.

The reason it is covered briefly however, is that in order to show that the theory I have created, "Polycentric Regionalism" which frames the Arctic Sino-Russian relationship's strategy and geopolitical output - the Pacific Arctic region, is *replicable, scale-able and robust as an International Relations model of a region-based New World Order;* The Dongbei/Russian Far East region is subjected to the same Polycentric Regionalism mechanism as in the Pacific Arctic, and therefore adds credence to the *"polycentric"* aspect of the theory's title (i.e. it has

geographical transferability). Most interestingly of all, is that Polycentric Regionalism theory applies equally to the domain of Space as well, an emerging fourth-dimensional regional sphere of Sino-Russian interest in the 21st Century.

5. Significance and Dissertation Justification

From an academic point of view, I expect that this dissertation's major contribution will be to fill (some of) the gaps in knowledge/understanding identified in the brief literature review here (but looked at in detail in the Framework chapter).

The study will also expose the motivation, drivers, aim and purpose of the Sino-Russian relationship in the Arctic, in terms of their Eurasian great power status; and show how this relationship will shape the international order in North East Asia in the early part of the 21st Century. The role of Sino-Russian activities in the Arctic, and its emergence on the geo-strategic world stage, can be examined closely through the lens of industries such as Energy and Technology and by doing so reveal the mechanism of Sino-Russian geostrategic influence in the region.

For western policy makers, a better understanding of Sino-Russian motivation(s) in the Arctic region would clarify mutual regional opportunities and highlight strategic risks, and by doing so, assist in adding transparency to negotiations and governance in and about the region. Overall, this knowledge and insight would therefore contribute by helping to reduce instability and increase predictability, both critical factors in maintaining strategic balance in the region, when considering the Arctic's part in a possible reorganized international order.

For industry of course a clear picture of Sino-Russian intentions and their capabilities and capacities in the High North would assist enormously in their decision-making process of investment in the region, their choice of economic partners, and the negotiation of any win-win opportunities for all parties, involved in the sustainable economic development and prosperity of the Arctic in the 21st Century.

Today, the Arctic represents the key region in which Russia and China cooperate most intensely and are at their politically closest - and appear most strategically aligned. As both China and Russia are major Eurasian powers, whilst geographically speaking the U.S. is not, their strategic presence in what is perceived by Washington now as one of the three most important, pivotal, regions of the world in the 21st Century is testament enough for the requirement of a clear understanding of Sino-Russian intentions, capabilities, and means in the Arctic. It is suggested by me in this dissertation that Russia and China view the Eurasian Arctic as perhaps an *experimental* "safe" space where scenarios, exercises, and models of a new global governance system for the 21st Century, can be trialled and tested. One such safe, public, space is already under construction, the Pacific Arctic region in North East Asia. For China, the high latitude location of the Arctic region makes it an ideal experimental location for controlling satellite-directed cyberspace operations in and from another Arctic domain – celestial Space.

6. Research Limitations

This is a cross-disciplinary dissertation which means inevitably, that some areas of research are by necessity, more emphasised than others. It is largely a judgement call, and the apparent scant analysis of a particular aspect of the argument for example, will often be because its stand-alone

importance - is less instructive and academically significant than its relationship or contribution to the wider themes, implications, and conclusions of this dissertation.

In line with this caveat, it should be noted that, the Arctic is becoming a global, geopolitical weathervane, reflecting, and indicating the shape of emerging international (superpower) relations, caused and facilitated by massive climate change and the strategies developed in response to those changes. This dissertation addresses the mechanism of Sino-Russian Arctic climate change adaptation, and the geopolitical output(s) and impact on regional geopolitics resulting from this adaptation plan. It does not address the climatic factors, themselves.

The Arctic was chosen as the investigative “arena” because the rates of global warming, climate change, and subsequent environmental impact in the region are the highest of anywhere on earth. A consequence of such rapid climate change reveals the emerging geopolitical opportunities and risks too, which are the subject of this work. Because of the Arctic’s critical role in climate understanding and its hosting ofthe former, present, and future superpowers, it is critical to understand the relationship between climate change, geopolitics, and the subsequent balance of power emerging across Eurasia’s Arctic.

To date Western scholars have been mostly silent about the geopolitical implications of climate change (say, transport openings, sea-level rises, infrastructure challenges, migration issues, etc), focusing instead on quantifying the degree of climate change underway. Moreover, few Western policy makers have considered developing climate change adaptation strategies which could gain a geopolitical advantage (or avoid a downside effect) in the region, unlike China and Russia’s policy makers.

This dissertation addresses that gap in Western climate change understanding and its regional implications. The Intergovernmental Panel on Climate Change (IPCC) defines adaptation as the process of adjustment to actual or expected climate change and its effects.

Ice melt in the Arctic caused by climate change has meant for example, that the NSR is now receptive to an adaptation strategy, which capitalises on: China's BRI financing of its infrastructure build-out; becoming a Russian conduit for associated hydrocarbon transportation to market; an economic logistical link for Sino-EU trade; a technology platform for future Space operations; and its establishment as a strategic lane of communication (SLOC), linking Europe's Russia and Asia's China - and thus undermining U.S. efforts to contain China in C21. This Sino-Russian Arctic climate change adaptation strategy for the NSR, clearly offers geopolitical advantages to Russia and China (e.g., undermining China's containment). It also reveals to the reader why this dissertation takes the Arctic LNG industry - its associated use of the NSR for Arctic operations, and its infrastructure financing (by BRI), as its investigative framework for observing how climate change adaptation works - in practice.

In sum, China is clear that climate change in the Arctic is a fact and the subsequent disruption – caused by it, overall represents a geo-strategic opportunity; that climate change will also allow access to the region (but by competitors too, like Japan and South Korea), deliver economic advantages, and facilitate a geographical presence, thus presaging Chinese regional political influence. Along with these factors, the disruptive physical changes in the region (e.g., sea-ice melt) will further transform the regional balance of power. It is a classical Chinese neo-realist view of the region that sees the application of a climate change adaptation strategy as offering potential geostrategic (i.e., national self-

interest) opportunities – and a presence in the Arctic region. The theoretical concept of polycentric regionalism, that attempts to explain much of these developments, is of course derived from this Chinese neo-realist thinking about its Arctic climate change adaptation strategy and its manifestation, the Pacific Arctic space (see Theory Chapter later). Polycentric Regionalism attempts to account for and describe the measurable, geopolitical output occurring in the regional Circumpolar North and increasingly, Space, as well.

By contrast the U.S. is considered weak in the region, with limited capability, a divided climate policy based on an alternative climate change mitigation strategy - that is defined as intervention measures to reduce the human factors enhancing greenhouse gases, and includes solutions such as energy policy reform, a decarbonization regime, and emission reduction commitments bound in international agreements. This climate change mitigation strategy reflects an U.S. view that the climate change threat in the Arctic is environmental, and not a geostrategic threat – or opportunity (e.g., say, a contest for governance of the Arctic). This contrasts with the S-R use of a (neo-realist) adaptation strategy which seeks/benefits from the geostrategic opportunities of Arctic climatic change disruption(s).

China for instance is now deploying digital, remote, infrastructure (submersibles, satellites, optic fibre cables, etc) extraterritorially of the Arctic landmass, as part of this climate change adaptation strategy, that makes maximum use of Space-based (and managed) technologies. This subtle development undermines some AC members' resistance to a perceived Chinese territorial incursion and potential challenge to Arctic governance /sovereignty, inherent in conventional terrestrial/maritime based infrastructure tools (such as build-out of the NSR, the use of

Remote Sensing systems, establishment of scientific bases in the region and even the application of infrastructure financing through the BRI, etc). Concurrently, China has begun to classify the Global Commons as the Deep Seas, Deep Earth, Outer Space and Cyberspace, and which are now directly linked to these remote, Space-based infrastructures. These developing areas all intersect in the Arctic region however, and constitute what Beijing describes as the “new strategic frontiers” (Andersson, 2021). These frontiers are seen as strategic spaces, to be occupied as the “new commanding heights of military strategy” (Doshi et al., 2021, p.10). Crucially these commons’ spaces are often referred to as the “common heritage of all mankind” too (Nicholson, 2002); a term now recognized by the U.S/West as an indirect challenge to the Arctic Council and its members’ territorial sovereignty and governance of the region.

In essence China is extending its perception of sovereignty and territoriality towards the Global Commons and linking it to concepts such as the “heritage of all mankind” and China as a now “near-Arctic” state. By acting in such an elliptical and supposedly benign fashion (via a climate change adaptation strategy) it is establishing an extraterritorial and multi-dimensional presence in, and over, the Arctic region (Space/Cyberspace), and probing these same areas where international governance and technology legislation and/or regulatory oversight is still only fledgling. The Arctic’s intersection with cyberspace and Space is one such poorly regulated area which China sees as vulnerable (via remote technologies) to the imposition of Chinese governance norms and subsequent control - over the region. This is a very neo-realist doctrine and illustrates that China - and it appears the US as well as it is shifting from a mitigation (under Obama) to an adaptation strategy (under Trump), sees climate change in the Arctic primarily in terms that impact (and maximize) its

national interests. Climate change adaptation plans are evidence of this as they have clear geopolitical outcomes; as a result, climate change is now seen very much as a statecraft instrument for determining geopolitical outcomes in the Arctic region, for both the RF/PRC and the West.

In relation to this (geopolitical) point, *the scope of the paper is confined* to two major investigative vehicles to illustrate my new theory (Polycentric Regionalism), of a fledgling New World Order in the Arctic region: the joint LNG operation in the Yamal Peninsula; and the impact of Sino-Russian technology and Innovation Research and Development and its applications in the Arctic, and in/from near-Space.

For this reason, the inclusion of a short synopsis on the Dongbei/Russian Far East region in Chapter Four is *not to be a considered* a third - albeit short pilot study. Its purpose is two -fold: firstly, it is intended to show *how* the Pacific Arctic as a geopolitical space is being expanded and consolidated, but unlike the LNG-underpinned Pacific Arctic in a lateral east/west direction, but rather in a north/south alignment, linking Sino-Russian North East Asian heartland territories and commerce with Russia's northern Arctic territories, via rail, road, and riverine – as well as virtual means, as far North as the Arctic coastline; secondly, by illustrating this with the rudiments of the Dongbei/Russian Far East plan to consolidate a wider-encompassing Pacific Arctic, the second objective is fulfilled; evidence that Polycentric Regionalism theory as a model of a New World Order, is r*eplicable* outside of the Arctic region *per se* (i.e., transferable), and equally, scale-able and economically sustainable.

Methodology and Confidentiality

The nature of this thesis with its emphasis on strategic/national security industries such as oil and gas and technology, the geopolitical sensitivity of the Arctic region, and its principal protagonists being Russia and China, make the work somewhat sensitive.

As a result, the methodology chosen was put under stress; some interviewees in Russia and China (Appendix A), but even in America and Nordic countries, were uncomfortable being quoted or directly identified. In the main a quote from an institution in which they worked - or were associated with, was acceptable. Interviewees in more sensitive policy or government posts (Appendix B / Western institutions), were more comfortable being broadly described as from the “military, security, or intelligence community”.

The issue therefore is that the Methodology issue can lead to a suggestion that such communities’ viewpoints are often somewhat (and perhaps necessarily) confined, focused, and frankly, uninterested in the “big picture”. This may mean that any “lessons learned “may not be as transferable/universal as first appears. This I have anticipated and for this reason I have regularly used the word “experimental” throughout this dissertation to demonstrate that on some occasions I can only draw tentative conclusions from the testimony/evidence presented.

For this reason, too, I have attempted to create a new theory in this work, to explain Sino-Russian activities in the Arctic which with more time - and possibly in the hands of future International Relations scholars will provide a broader intellectual framework within which to place interviewees’ remarks and conclusions. The Dongbei/Russian Far East region is a

future, key area of investigation that will benefit from such a *theory-led,* methodological approach.

7. Chapter Structure

This dissertation consists of 6 chapters.

In Chapter One, the context of the study is outlined, and the research aim, and objectives identified; and the significance of the contribution to academia argued. The limitations of the research are also identified and addressed, as are various caveats that may limit the scope and transferability of the work and challenge the Methodology employed.

In Chapter Two, the literature review is presented in terms of contemporary theories of geoeconomics and regionalism, and the status of the present strategy/framework which the Sino-Russian relationship is deploying in the Arctic region. A new theory/framework is proposed and outlined which it is argued addresses the evidence /data collated over the period of research in the field. The chapter's main purpose is to show the inadequacy of contemporary International Relations Regionalism theory to substantially explain Sino-Russian regional activities in the 21st Century Arctic.

Chapter Three is largely an explanatory chapter, outlining evolving Russian gas /LNG policy, the effects of technology on its evolution, the internal commercial and social tensions that this causes, and the role of Russian energy/gas as a geo-economic instrument of the international relations of the Sino-Russian partnership in the Arctic region. The purpose is to acquaint the reader with the gas/LNG industry in Russia, in order to be able to understand - in Chapter Four, the economic and geopolitical implications of the Sino-Russian LNG venture creating / underpinning the

creation of the Pacific Arctic; and why that objective is dependent on how the gas/LNG industry itself is altering as a result of external factors (International Political Economy/technology/environment/power, etc) explained in this chapter.

Chapter Four is divided into 3 Sections: a description of the Global Production Network framework with which the Sino-Russian Gas venture is analysed in Section Two. The focus is on territoriality, network practices and the materiality of the gas (i.e., LNG > from gas-to-liquid-to gas states).

Section Two is an analysis of the Sino-Russian Gas/LNG venture in the Yamal Peninsula. The purpose is to show how the LNG industry is used in the Russian Arctic to instrumentalise the process of regionalization (the underpinning of the geopolitical Sino-Russian aim: the creation of the Pacific Arctic as a new public space - the initial, regional manifestation, of a New World Order in North East Asia.

Section Three is a brief synopsis to show how this Polycentric Regionalism process is already replicating itself in the Dongbei/Russian Far East region to the South, and connecting the two countries' hinterlands northward, into the Pacific Arctic space and thus gaining access to the Arctic Ocean overland, whilst consolidating the expansion and sustainability of the Pacific Arctic space.

Chapter Five addresses the contribution that Technology plays in Polycentric Regionalism theory, and its role in the process of regionalization - and indirect governance of the Pacific Arctic (via technology businesses such as LNG, and its own commercial, international institutionalization and regulation). In addition, technology is shown to be the essential component in Sino-Russian Space activities and cyberspace; the implications of these developments can be seen in

terms of assisting China (and Russia) to gain digital governance over the Arctic region, as well as being in a position with technological ascendency to consider economically de-coupling from the west.

Chapter Six covers the Conclusions and some discussion from this dissertation, and also includes a brief scenario of possible U.S. responses to Sino-Russian activities in the Arctic region.

Part Two:

Methodology Employed

The research was a qualitative one, based on first and secondary written resources, interviews in the United Kingdom and abroad, and attendance at workshops (e.g., NATO) and some closed briefings in the United Kingdom, and in various countries overseas as well.

Interviewees came from academia, policy, and government organizations. In addition, members of the military, security and intelligence communities also contributed. Authors who have written on the subject matter(s) were interviewed too, as well as members of industry and commerce.

Conferences were attended in the United Kingdom, America, China, and Finland. In my part-time capacity as a member of Her Majesty's Forces, responsible for Sino-Russian matters and the Arctic region, I also gained access to useful (non-classified) information and insights about the region.

Input was also garnered from my work experience in my own Arctic consultancy company, and feedback form my various contributions to academic papers, commercial journals, and inter/national newspapers (e.g., the Financial Times, the Times, etc).

CHAPTER 2

FRAMEWORK AND THEORY

Introduction

My central conceptual claim discussed in the Introduction chapter, is that a Sino-Russian geo-economic *space,* a fledgling pole of a new *multiregional* world order is being tentatively created and experimented with in North East Asia. In this thesis I examine this space's geopolitical manifestation – the Pacific Arctic region, and its physical and virtually connected, maritime and land links with the southerly Dongbei/Russian Far East region; the Sino-Russian heartland/hinterland of this integrating Pacific Arctic region.

The setting for this is that the U.S.' unique unipolar position, established almost by default at beginning of the end of the 20th Century, has arguably now reached its zenith; Western commentators suggest that what is to follow especially in the light of China's meteoric rise, is a more inclusive and less hierarchical multipolar world. With China now closely aligning with Russia (the broad subject of this dissertation) the concept of emerging multipolar centres of power, seems even more logical, if not naively aspirational. A fascinating question to ask however is, *how* does the world transit from one known and tested system to an unknown and non-tested, other? What is the process; what are the intermediary steps to be taken on the way; what *shape* will these alterations and processes take? What factors will affect the rate and type of multipolarity that will emerge in the latter part of the 21st Century? What will the U.S.' reaction be to in effect a loss of supreme power?

Framework Summary

In this chapter I propose an amalgam of geo-economic strategy and Livesey's (2017) revelatory concept of an Asian-evolving, de-globalizing, and *technology* driven International Political Economy: in combination, this comprises the governing *research* framework by which to address this thesis' investigation. I have developed my own theory of *Polycentric Regionalism* from within this framework, to explain the creation of the Pacific Arctic regional space in North East Asia by means of three Sino-Russian geo-economic processes/factors examined in this thesis, namely: The Sino-Russian Arctic gas/LNG relationship; joint Sino-Russian economic projects in the Dongbei/Russian Far East regions; and the application of technology to generate and link these economic initiatives, and by doing so enable integration of the Dongbei/Pacific Arctic regions.

This geo-economic *process* of integration-by-regionalization, leading to a new international order structure (in the Pacific Arctic), replacing the US-led unipolar system, I have termed *multi-regionalism*; Polycentric Regionalism theory has been created to better explain this model and augment established Regionalism theories. Polycentric Regionalism theory differentiates itself by incorporating, the altering nature of the International Political Economy, the role of technology in it and the evolving nature of (regional) power - as critical components of the theory, thus adding credibility to the utility of the framework as a contemporaneous investigative tool in this dissertation.

The three mentioned Sino-Russian projects comprise this dissertation's subsequent chapters, in all of which geo-economics' multi-regionalism process can be seen to be creating this new *geopolitical space* in North

East Asia - the Pacific Arctic region. At its heart I suggest that the Pacific Arctic is the manifestation of Chinese and Russian efforts - as Eurasian Great Powers, to build and coordinate an experimental multi-regionalism order in the Pacific Arctic and Dongbei/Russian Far East regions by means of polycentric regionalism; a formal New World Order alternative to the economic and security order in Asia, created by the U.S.

Chapter Content

In terms of chapter content, the elements of the Framework include the five following sections: Geo-economics; the International Political Economy; and the nature of Power & Great Powers' Spheres of Interests. This is then followed by an examination of Regionalism theory/literature and associated Polycentric Regionalism theory and its explanation of multi-regionalism. Finally, the *application* of Polycentric Regionalism theory (via multi-regionalism) is briefly summarised in relation to the three subjects of this dissertation: Gas/LNG; Regional projects; and the role of technology in both cases, as a geo-economic tool of Pacific Arctic/Dongbei regional integration.

From the data and interviews collated, multi-regionalism appears to be a robust *policy concept* and a useful International Relations model for describing the *shape* of a future, post-Unipolar international order. The evidence of the broader validity and applicability of Polycentric Regionalism theory (explaining multi-regionalism) is provided by the Sino-Russian Gas relationship in the Pacific Arctic which illustrates multi-regionalism's ability to develop at scale and integrate with other regions *beyond the Pacific Arctic's contiguous* North East Asian borders as discussed by Nikitina (2009, p.18), albeit in a "virtual" form (Bennett, 2014). This establishes the concept of Polycentric Regionalism as a politically *replicable* and economically *viable* framework, and therefore a

serious alternative to the established state based, and globalization-underpinned concept of *multipolarity:* the governance model/theory universally assumed in the International Relations literature, to replace unipolarity sometime in the 21st Century.

1. A Geo-economic Framework

The geo-economic framework including its operating aspect, multi-regionalism and its theoretical explanation, Polycentric Regionalism attempts to satisfy the central investigatory questions of this thesis; *define and show the nature/mechanics of the Sino-Russian economic partnership in the Pacific Arctic space – establish what its geostrategic purpose is and ascertain if it can be explained in established International Relations academic theory and policy terms.*

I have adopted Geo-economics as the overall strategic *policy* framework of this thesis as it most closely matches the recorded, observable Sino-Russian behaviour and strategy in the Pacific Arctic that I have witnessed. This thesis' framework is heavily informed by and in line with, broader, global trends including the changing nature of power, the new International Political Economy, and the associated impact of technology on society and the way it consequently organizes itself politically. In the round, the Sino-Russian emphasis on a geo-economic strategy which can contort geographical/virtual space offers the Sino-Russian relationship new structural network formations and geo-political opportunities in the Pacific Arctic region and beyond. This is the means I identify as creating and integrating the Pacific Arctic and Dongbei/Russian Far East regions.

Luttwak (2012, p.6) was an early and major advocate of geo-economics, especially after the cessation of the Cold War. He underlined the emerging supremacy of geo-economic statecraft as a theory - *and* policy instrument

too (as opposed to geopolitical/military measures) and argued that geo-economic rivalry is simply inevitable in a post-Unipolar world, where the use of nuclear (military) power is unacceptable, and the "logic of strategy …. mandates growing resistance to growing power". In this latter case he had in mind China and its emerging emphasis on growing *economic* power, and how it exercises it, and by what means. Latterly, it also reflected the recent re-emergence of "great powers", and their regional spheres of interests and balance of power concerns, as will be discussed. Paik (2012, p.18) notes these changes, especially in North East Asia:

"The new geopolitical alignments have resulted from a greater recognition of the region's multipolarity and a clear abandonment of the previously bipolar East-West policy framework by which policy approaches were largely circumscribed. The changes have been partly brought about by the diminished role and influence of the superpowers."

With this understanding in mind, I endorse and use geoeconomics' contemporary definition by Blackwill and Harris (2016, p.20) in this framework:

"The use of economic instruments to promote and defend national interests, and to produce beneficial geopolitical results; and the effects of other nations' economic actions on a country's geopolitical goals".

The nature of this thesis' enquiry, the research questions posed by the literature review, and the problems stated are all best addressed by such a precise, and delineated definition of geo-economics, and that is in line with Luttwak's concept.

This definition is most appropriate too, because it illustrates that geo-economics is both a valid analytical tool *and* an instructive policy instrument, reflecting the Sino-Russian strategy in the Pacific Arctic and

Dongbei/Russian Far East regions. For instance, the opening stanza, “The use of economic instruments…….and defend national interests”, addresses the relationship between a robust domestic economic basis *and* foreign policy. This approach is critical to this thesis’ enquiry into the geo-economic basis of the Sino-Russian LNG/gas relationship in Yamal, the neighbouring border-region industrial projects, the extensive use of Sino-Russian technology in both these regions, and their increasingly coordinated foreign policy position towards the U.S. regarding its continued presence in eastern Eurasia, and its attempts at containing China.

Similarly, the phrase “the effect of other nations’ use of economic actions .....…geopolitical goals”, is of interest too; what are those geo-economic actions and how and why do they operate within the Sino-Russian regional strategy in the Pacific Arctic? China’s use of the Belt and Road Initiative for instance (arguably a geo-economic *governance* instrument) in the proscribed region in the Arctic and along the NSR, is a suitable vehicle to observe a Sino-Russian geo-economic strategy achieve certain “geopolitical goals” in that region. The Belt and Road Initiative’s “win-win” appeal to/influence over potential regional partners in the Arctic and Dongbei/ Russian Far East regions (Japan and the Republic of Korea), is another observable geopolitical manifestation of a geo-economic strategy.

As Blackwill and Harris (2016, p. 20) note however, most of the current *economic* analysis /theory literature is International Political Economy-oriented with an emphasis on the *system* - how *globalization* impacts international institutions, and not the associated – and underlying power plays and mechanics of inter-state *geopolitical relations*, which this thesis pursues at a mainly *regional level* of analysis. As such, current analyses *assume* that geoeconomics’ influence can only lead to a *multipolar*

international order – and therefore it will involve only nation states; and that those nation states will/can only further integrate - via *globalization*. These are all *assumptions* that are challenged by me in this thesis, and the framework is therefore constructed in such a way as to illuminate these assumptions and conceptualise my alternative explanations.

Finally, it is the nature and role of "the use of economic instruments. …beneficial geopolitical results", that is especially insightful for this thesis and the Sino-Russian relationship: trade and investment/assistance; sanctions and cyber; and energy and technology policy are all geo-economic instrument examples. How, and why are these instruments employed and deployed by the Sino-Russian partnership in the Pacific Arctic/North East Asian regions of interest, and what does the People's Republic of China/the Russian Federation gain geopolitically from them? The Gas/LNG industry and the Dongbei/Sino-Russian regional projects - and their use of technology for instance - in both cases are impacted by some if not all these instruments. All such economic categories/instruments in other words, have a geopolitical/strategic impact on the Sino-Russian relationship in North East Asia, and their interlocutor nations in the Pacific Arctic/North East Asian region.

This type of understanding is critical in so much as an appreciation of geoeconomics as this thesis' central framework, allows the reader to see how the present unipolar world can be challenged in North East Asia at least by China and Russia, largely as a result of their geo-economic instrumentalization of say, *technology* on the International Political Economy, which is already resulting in and accompanying, some *de-globalization* in North East Asia. This is /will also have an impact on the geopolitical landscape and will throw out new International Relations opportunities and challenges to states in the region. In the Sino-Russian

relationship in the Arctic and Dongbei/Russian Far East region(s), International Political Economy-inspired *regionalization*, is foregrounding the emergence of an alternative governance order that may alter the present international system in North East Asia; Sino-Russian sponsored multi-regionalism – of which the Pacific Arctic space is its first manifestation.

Critical Characteristic of Geoeconomics

Technically speaking, a defining characteristic of geoeconomics (Luttwak's) is that the economic bases of power possessed by a country/state must have a clear *geographical* / *geopolitical component*; for instance, Russia's ability to stop gas deliveries to Europe at any time is only credible because Russia possesses much of the world's gas reserves and supplies its gas via *its own* pipelines. The same case holds for international maritime access to Russia's NSR. Concurrently, Chinese use of finance (e.g., Belt and Road Initiative) is only a geo-economic strategy, if it is used as a tool of geo-economics directed toward ownership over a *specific region, or sphere of influence*. This emphasis on *geographical* features and specific economic spheres of regional influence (such as the Pacific Arctic and Dongbei regions) - as the *target of geo-economic* power – and *linked to geopolitical* objectives and outcomes, is what *differentiates* geo-economic theory from International Political Economy theory. In this thesis' framework - which reflects the research findings – deliberate Sino-Russian geo-economic instrumentalization of aspects of the International Political Economy in the Pacific Arctic/North East Asian region (e.g., the LNG business across the Pacific Arctic) can be seen to produce *geopolitical outcomes*. This outcome is explained by Polycentric Regionalism theory.

This is critically important to note from the framework point of view because established Regionalism theories (see later) often assume a western, *geopolitical* framework where regionalism may exist, but within an interconnected world of western-led *globalization*; this means (unlike geo-economics) that the aim is the instrumentalization of aspects of geopolitics resulting in *economic/International Political Economy outcomes;* the exact *opposite* result to that generated by a geo-economic framework. In short, this is a Cold War *geopolitical* view of the world – which at that time would always *subordinate* the use of geo-economic instruments of power, to military and strategic measures, as part of the ideological positioning of the two superpowers, and a zero-sum strategy vis-à-vis the USSR.

For these kinds of structural reasons, I have also dismissed alternative definitions of geo-economics including Baldwin's (1985), centring around trade and domestic industries' International Political Economy, or in the case of Mandelbaum (2014), a mixture of International Political Economy, strategy, and geopolitics. Others still, continue to see economics even more simply, as just an *outcome* of *geopolitical* and/ or military power, for instance Gelb (2010, p.35).

Furthermore, my defined geo-economic framework is solely interested in *how* the Sino-Russian partnership is deliberately using geo-economic instruments to facilitate *geopolitical goals in the regions* under examination - and possibly link/integrate the Pacific Arctic region with additional *non-contiguous* regions, *beyond* North East Asia. This is Sino-Russian Polycentric Regionalism theory in action; determined by a process/*mechanism* of integration-by-regionalization (no longer solely integration-by-globalization), which I label as multi-regionalism.

The strategic benefits to China and Russia of adopting such a geo-economic framework in the Pacific Arctic region (explained in terms of Polycentric Regionalism theory and the process of multi-regionalism) are only outlined here in theory/framework terms, as their analyses and geopolitical implications are explored in the substantive chapters to follow.

2. The International Political Economy in Asia, and its Role in this Thesis' Framework

Livesey (2017) argues that as a result of *new technologies* and processes (e.g., Artificial Intelligence, Big Data, Automation, Robotics, etc), the major *cost of labour* in business and thus in the broader International Political Economy will be heavily reduced – thus somewhat negating the need for offshoring production abroad, in the face of emerging technological automation and use of robotics operating at local/*regional* levels of production. This has potentially enormous (negative) implications for globalization as a US-led global-integrating mechanism. In interviews with the late author, Livesey even questioned whether globalization's continuation/growth is *inevitable* in the 21st Century.

Concurrently new manufacturing techniques will be established (e.g., 3-D printing, robotics, Artificial Intelligence, etc), leading to a reduction in Global Value Chains and their international *reach*; those that remain will become more *regional*, shortening international supply chains, and thus reducing *inter-state* integration. As Macaes (2019) notes, technology's key strategic advantage is mitigating the huge problem of distance across countries such as Russia and China, by means of virtual connectivity. Contextually, this is crucial, as according to Livesey (2017, p.9), the *ratio* of *international* trade to global GDP is the key measure of how *integrated* the world economy is. This percentage Livesey (2017, p. 10) notes by 2016 had decreased by 10% from the figure of 52% in 2008; and "the ratio

of trade to growth has flatlined" since. Noting western failure to acknowledge this trend Livesey sympathises, "it is hard to imagine the global economy working in any other way". But the strategic takeaway from this declining ratio is steady, US-led *de-globalization,* and *growing regional importance and "ownership" of local Global Value Chains*.

As Livesey (2017, p.22) goes on to state:

"My argument is not that trade will cease, that countries will fly apart, and that integration will be no more. This will be a relatively subtle shift. The key is that the geography of production is changing, and ownership will matter more as companies will have to be producing in their final market".

In terms of this dissertation's framework this statement is critical.

The implication is that international economic integration (i.e., globalization as agency) is decreasing, whilst *regional* activities (and *regionalization* as agency) are likely to increase as major *regional markets* emerge, co-located/close to equally major technology-driven manufacturing sites; the *ownership* of such *regional economic activities* (and their Global Value Chains) is therefore crucial, as a source of geo-economic power that can lead to a multi-regional order. (I refer later to these "owners" as Great Powers). This emerging trend mitigates the realisation of the concept of a multi-polar order (associated with globalization) and instead exemplifies the geo-economic process stated by Luttwak earlier: geo-economic power of the International Political Economy, targeted at a specific *geography/regional* sphere of interest, resulting in a geopolitical outcome. Livesey's International Political Economy framework allows for integration-by-regionalization as a process gaining traction, and in places (like the Pacific Arctic/Dongbei regions) undermining, or at best *competing with, US-led globalization*. This may –

or may not lead in the short term to the creation of the Pacific Arctic – and later for instance, a policy of Chinese (and/or Sino-Russian) econo-political de-coupling as regional powers, with their spheres of economic interests secured by them, representing in effect a geostrategic outcome.

Importance of the International Political Economy in Creating this Thesis' Framework

This new model of the International Political Economy (Livesey's) that I incorporate into this thesis' framework, allows one to answer this dissertation's question as to whether or not a *multipolar order* that is based on *integration-by-globalization* between states, can usurp the unipolar order of today, or if it is in reality a *multiregional* order based on *integration-by-regionalization* (as a result of changes in the International Political Economy/technology), that is actually emerging in northern China/ the Pacific Arctic. The role of the Belt and Road Initiative is beyond the scope of this dissertation, but it is obvious that as an infrastructure concept it too has a role as Sino-Russian geo-economic *agency* alongside the technology-enhanced International Political Economy, in shaping Global Value Chains, regional markets, and virtual technologies; leading to their instrumentalization as economic governance tools in the Arctic region – discussed in the Technology chapter. If globalization is the west's tool for global economic integration, then it is becoming clear that the Belt and Road Initiative is China's, certainly in north-easterly Asia and the Pacific Arctic, and perhaps across Eurasia as well in the 21st Century.

To emphasise, globalization in the 1980s – early 2000s encompassed a range of geo-economic phenomena such as deregulation, expansion of the demand of International Financial Institutions and International Organizations, as well as new trade patterns and technological advances, that economised on global logistics and financial transactions. However,

these phenomena are not linear and some of these have seen reversals (see later in Theory Chapter) – which defy established regionalism theories and hence, the formation of a poly-centric theory, emphasising regionalization (in the face of rising de-globalization), and emerging multi-regionalism. Polycentric Regionalism and its output, multiregionalism in NE Asia, is the instrument adopted by the Chinese and Russian states in exploiting these *regional growth* trends and linking them in a way that greatly augments the chance of an emerging geo-economic order, with competitive (and geopolitical) implications in favour of them, at the cost of the U.S.

In this sense P-R is a derivative/sub-set of Realist theory – and not separate from it. It is shaped by the reaction to emerging global trends however, that to date are not fully explained by existing theories of global governance/ regionalism found in the literature. These trends include *growing de-globalization and on-shoring*, and the enormous impact of technology on the international political economy including – 3-D printing, diminishing importance of Labour in commerce, shortening and relocation of logistical/ value chains, the shift of the centre of economic gravity from mid-Atlantic to China, and the steady push back on Bretton-Woods' institutions. It is difficult to see how existing theories can reconcile an apparently smooth and linear transition to multipolarity in the face of such multi factorial shifts in global affairs – and for such tectonic geo-economic shifts not to have major geopolitical consequences. To summarise; globalization is a geo-economic process but the impact(s) of the combination of emerging global trends on it (noted above) over the last 10 years, are becoming a *geopolitical concern*.

3. Power, and Emergence of Great Powers and Regional Spheres of Interests.

a). Power in the 21st Century Society

As the definition of power is altering significantly since the end of the Cold War era, the underlying assumptions and implications of its emerging nature and purpose have a critical impact on the theoretical framework of this thesis. For instance, I have adopted a geo-economic framework to reflect the centrality of economics, trade, and technology underpinning nation states' power, and their manifestation (and effects) on the Sino-Russian gas partnership in the Pacific Arctic and its possible integration with the Dongbei/ Russian Far East region. Twenty-five years - or more ago, the framework would almost certainly have been one of geopolitics (Scholvin and Wigell, 2018), reflecting the division of the world into the USSR/ U.S. domains, based on ideological differences and competition for power over territory, resources, strategic alliances, and societal ascendency; and prosecuted largely by military and intelligence means, not economic.

In this section I define power in the 21st Century, delineate the pathways to great power positioning and status, and identify some of the major actions/instruments of power. Power is nature, and who holds it is a key component in this thesis' Framework. Along with the contribution of Livesey's International Political Economy and the use of geo-economics as a Sino-Russian strategy, an understanding of the nature and use of power today constitutes the essence of Polycentric Regionalism theory, the intellectual underpinning of my Framework.

Working Definition of "Power"

The working, baseline definition which I suggest best addresses "power" - certainly in the 20th Century, is that of Holsti (1964), who described it most simply as country A making Country B do something (X) that it would otherwise not have done, resulting in a successful outcome for Country A.

Holsti (1964, pp.179-194) suggests that this approach to power encapsulates several aspects of international relations which help to define and explain power. These include: a means to an end; real capabilities; evidence of a relationship and a process; and a capacity to quantify. Holsti's definition is arguably, the nearest to accurately describing power from the late 20th Century up until the early 21st. Consequently, the theory's associated questions (below) are still *relevant and transferable* to the emerging nature and definition of power today, and thus contribute to the creation of this theoretical framework where power is defined as *mostly geo-economic* in nature and in its instrumentalization.

Holsti's Four Questions:

- Regarding its aim, what does country A want country B to do or not to do? (means to an end)
- How can A get B to do, or not do to X? (relationship and process implied)
- What capabilities does A have, so that B will do as it is told, regarding X?
- What is B's probable response to A's attempt to make it comply (as A is quantifiably more powerful than B)?

Two other alternative/established definitions of power include the Realist view of Morgenthau (1954), in which he stated that politics was simply a struggle for power and as a Realist, he saw governments as only being

concerned with acquiring and then increasing power, by any means possible. This is largely dismissed today however, as it is too ambiguous; for instance, power is seen by Morgenthau as both a major goal of policy – and a means to an end. Such a Realist position does not satisfactorily illuminate the *process* of international relations either, that this thesis' framework must illuminate. Woodrow Wilson in Holsti (1964, p.180) by contrast, represents the anti-power theory of international relations; he saw power as synonymous with autocratic regimes, whilst post World War One, western governments settled their differences through consensus, collective security, and negotiation. Although the theory is descriptive and laudable, it again - does not explain what happens in the *process* of negotiating power, and its utility therefore is limited. Furthermore, collective security is also an assertion of violent power, and he does not explain how such collective power is better/worse than that of an autocrat's ab/use of the same type of power.

Perhaps more importantly though, neither theory incorporates the rise of Asia, the role of technology, non-state actors' influence on governments, nor the criticality of the International Political Economy, as major factors in power today. Neither does Morgenthau's especially, (nor Wilson's) geopolitical framework reflect the growing dilemma of a de-globalizing world, which will lead arguably to *less* global economic interdependency (between states); thus, lowering the threshold for a resurgence of armed conflict between nations; an aspect that is particularly relevant today with Russia economically sanctioned by the U.S. (and European Union) and concurrently in a major trade war with China as well.

How the nature of power is shifting in the 21st Century will affect future International Relations between states, shape global leadership, and alter the international order, but I argue (in the case of China and Russia) that

it will be through a Holsti-style *use* of power using geo-economic and not military and/or geopolitical instruments/means. The emergence now of independent Great Powers with *regional* spheres of economic interests (e.g., Sino-Russian energy cooperation in Pacific Arctic, exploiting the new International Political Economy, and its technology applications as well), is accommodated and explained by this dissertation's theoretical framework and which is informed by this *altering nature of power in the 21st Century*; foregrounding the position of economics/trade and finance as the cardinal 21st Century instruments for underpinning global power. Thus, Livesey's hint in conversations with the author, that ownership of regional markets and manufacturing outlets, will be *contested by emerging great powers* competing for these new regional economic spheres of interests - and the power they represent to Great Power nations.

The Emerging Factors Defining Power in the 21st Century

Shifting Alliances: Whether U.S. exceptionalism is on the wane or not, its recent observable actions in the Asia Pacific Region has affected its Asia Pacific Region allies and their allegiance - and with it the *status* of perceived U.S. power. Asian countries such as the Republic of Korea, and Japan (and other western-oriented Asian nations), are now clearly hedging between economic and defence policies; separating out economic relations with say, Russia (for LNG supplies), from their position as a security ally of the U.S. in the Asia Pacific Region (Lee and Lukin, 2016), whose aim is containment of Russia's Pacific Arctic partner, China. This situation affects the *perception* of U.S. power in the region.

Shift to East is still Western Controlled: Concurrently, whilst Maddison's suggestion (noted earlier) of the predicted global locus of economic power slowly shifting eastward from the west seems broadly true, with China at

the helm, but with western multi-lateral institutions and security measures still dominating, this is not entirely supported by emerging data which suggest all is not well: the non-linear development of global networks; the contradictions inherent in functional regionalism; and the associated de-globalization (discussed in the International Political Economy paragraph) process underway. It seems that the economic advantages of technology, wedded to the new developments in the International Political Economy, and the emergence of regional great powers (see next section) such as Russia and China, are somewhat overhauling this established and western concept, of power as globalization.

Global economic power is seeping away from the western, mid-Atlantic arrangement, as Quah (2011) argues but is instead appearing as significant (non-western) *regional* economic activity in eastern Eurasia, via a variety of Asian and Sino-Russian geo-economic instruments including new technology applications, an altering regions-based International Political Economy, the Belt and Road Initiative infrastructure affecting Global Value Chains, and the overall process of integration-by-regionalization, leading to multi-regionalism governance; all seen in the subsequent chapters. Asian geoeconomics is a significant aspect of Sino-Russian power in the Pacific Arctic/Dongbei regions that is precisely intended to bring about future geopolitical alterations - advantageous to China and Russia, in the 21st Century.

De-Globalization and Integration: If de-globalisation in North East Asia is occurring because of the reshaping of the International Political Economy, this means that global economic interdependence is also challenged. Globalization was /is the key *integrating instrument* of western power, and the primary means by which the US-led international system harnesses, and encourages states to conform with neo-liberal, values-based

economies such as those of the U.S. and European Union. The emergence now of multi-regionalism, technology, Belt and Road Initiative and an Asian-oriented International Political Economy, sponsored by great powers such as the People's Republic of China and the Russian Federation, now competes for that global power and influence.

Technology and Power: In addition, the myriad roles of technology, as a force multiplier, its various commercial applications, and its time/space saving characteristics means that it is essential as an instrument of global geo-economic power. Ownership of technology as noted by Reilly (2019), puts the recent Sino-U.S. trade war in its true perspective; it is in essence about dominating a new form of power in the 21st Century - technology ownership, and not trade *per se*. There is no clearer indicator of the nature of geo-economic *power* today than this technology confrontation between the 21st Century's superpowers.

U.S. Power Leadership and Status: Finally, the disengagement of the U.S. from many international forums, including trade blocs, nuclear agreements, security alliances and institutional arrangements, together with talk of de-coupling from China, and emphasising instead American Mercantilism, has unquestionably as Kupchan (1998, pp.40-79) comments, weakened the U.S.' status and *relative* power if not yet, its absolute power. At the same time, it has emboldened China's use of power. It has also enabled Russia for instance, to capture from the U.S. a massive market share of the LNG business in North East Asia (Novatek) by supplying Arctic gas to the U.S.' key security partners in the region, Japan and the Republic of Korea.

b). Great Powers Emergence in the 21st Century

To avert the downside of de-globalization and reducing U.S. global leadership Buzan (2011) sees the emergence of *decentred globalism*, consisting of only *great powers* – and no longer superpowers. Buzan suggests (2011, p.1) that the nature and bases of these countries' power will be regional dominance/spheres of interest. He sees a decentralized, coexistent, and cooperative arrangement for future international society. However, Buzan (2011, p.4) also insists that a great power is "one whose reach extends only across more than one region''. My multi-regionalism concept differs in that it allows for an expansion of regional integration beyond *contiguous regions*, because of the inclusion of technology which facilitates *virtual connectivity*, linking non-neighbouring regions.

In response to these changes in the international order and its structure, such as the role of geoeconomics, its relationship to power, the effect of technology on the International Political Economy and the emergence of regional centres of power, China's position according to Beeson (2018), is now at the centre of a *regional network* of economic dominance that will position it as an increasingly critical economic and geopolitical player. Klare (2020, p.2) continues with this theme and states that:

''we can expect, among other things, an accelerated retreat from globalization (and its concomitant, American global leadership), along with the hastened emergence of semi-autonomous regional blocs – one consisting of China and its client states…."

What is different about contemporary great powers of the kind I suggest is operating in the Pacific Arctic *region* (China and Russia) is the following: they are no longer understood as a unit anymore, or even as a measure against another (dyads in power transition theory). Neither are Great

Powers understood simply in a Realist sense such as Waltz (1979) suggests, that of powers pertaining to the bi-polar, unipolar, or even multipolar order(s), and which characterised the international order from (and including) the Cold War to the present day; and where multipolarity is now openly discussed as a possible variant in the way human affairs are coordinated.

In fact, I would argue that their (re)emergence in North East Asia is more due to the shift from a unipolar world order to some other form of order that is not yet clear as noted by Lake (2011, pp.185-6), but which has resulted in predictions characterised by the likes of Fukayama (2006), and Huntingdon (1999). Latterly, the emphasis has been on China's rise and whether it will result in it becoming a superpower, or instead a *regional great power hegemon*, as suggested by Buzan (2011, p.12). I argue that in fact, with a loosening of U.S. hegemonic leadership partly as a result of China's rise, material/economic power has shifted (eastward) and thus new identities have formed, and countries have chosen to establish themselves anew, but in regional settings. Technology and the International Political Economy have been the key enablers - and draw, of such a move to the regions. Kuhrt (2014, p.142) suggests that Russia and China are taking "a new approach to regionalism, one based on mutual equality". As potential Great Powers in Eurasia sharing a significant border (Russian Far East/Dongbei regions) this would seem a sensible starting point.

The Spheres of Interest that Great Powers are beginning to carve out in North East Asian (Dongbei/Russian Far East/Arctic) regions, do not conform to functional regionalism's predicted behaviour (i.e., they are created institutionally *before* the process of regionalization occurs). I will argue by means of the framework, that part of the reason for this is a

strategic driver to establish “safe” incubating regions in the Sino-Russian hinterlands, for the subsequent Regionalization/Integration process to take place and future multi-regionalism to manifest itself. Characteristically Spheres of Interest are autonomous, and are de facto power bases for Great Powers, where they can assert ownership /political hegemony in and across regions. In this sense they are part of multi-regionalism, which is itself an experiment in the process of re-ordering the application of power (economic) and altering the global order.

4. Regionalism Theory and Polycentric Regionalism

Regionalism and Regionalization - Definitions

Regionalism is defined as the political willingness to agree with another state a form of cooperation (e.g., economic, environmental, etc) on a formal, geographically delineated basis. Regionalization is seen as the subsequent exchange of capital, labour, goods, and people within this designated geographical region.

a). Multipolarity and Regionalism

The literature on multipolarity is extensive and is the more established theory of how the world may look after the demise of US-led unipolarity; thoroughly and extensively summarised by the likes of Posen (2008). Multipolarity’s overall emphasis is typically on other nation states challenging and /or complimenting the U.S.’ present unipolar position in the international order (Ikenberry, 2011). This is a state-level analytical framework and potentially zero-sum in nature as it is avowedly geopolitical – economic and geopolitical means to achieve military/strategic outcomes over other states.

This contrasts with a *geo-economic* approach to multipolarity adopted by Russia and China in the Pacific Arctic /North East Asia, consisting of a

more “win-win” framework, designed to replace the present but declining unipolar world order. As the evidence will suggest however, the geopolitical outcome of this framework – the new regional space (the Pacific Arctic), does not represent multipolarity in North East Asia, but rather *multi-regionalism* – and which I will argue throughout this thesis is a more likely geo-economic process/agency of a New World Order, especially as it emanates out of Asia (the Pacific Arctic “space”) and not Europe nor the U.S. It is acknowledged of course by me, that multi-regionalism may just be seen as a steppingstone to multipolarity.

In addition, numerous papers also discuss regionalism (Hurrell, 2007), and regionalism in relation to neighbouring and/or influencing nation states - and indeed in terms of International Political Economy (Mansfield et al., 1997), but none could be identified that suggested as I do in this thesis, that a region as a geographical and independent economic entity, could itself be classified in the future as the viable and major constituent/pole of a Great Power’s global influence and power in a *multiregional* global order, and *not* just as a regional element of a *state* entity, that is in turn, part of a *multipolar* global order as commonly assumed in the theoretical Regionalism literature.

In fact, the closest hint of a future regionally-organized world order - is centred around the far north of Eurasia according to Smith (2011), where he suggests a coalition of Northern Rim *Countries* will tilt the axis of global political and economic power towards the north for environmental, migratory, population growth and energy reserve reasons (but not geopolitical); however, he still maintains the concept of individual *states as the main power agents/actors*, not state-*sponsored regions* (i.e. sponsored by a Great Power) that have independent, regional governance

tools, financial options, and indigenous businesses capable of scale, and underpinned by dedicated *regional* institutions.

This critical International Political Economy/geo-economic differentiation is why much of the literature on Regionalism theory, has found to be wanting in this thesis; it is based on assumptions about state-centric political behaviour (leading only to a state-centric multipolar world), and a non-geographical-geopolitical interpretation of the role of the International Political Economy in Regionalism (as per Luttwak's definition), and one that *does not consider economics as an instrument of geopolitical intent*. However, when faced with a *multiregional* order variant that is created within a geo-economic framework and which actively *seeks geopolitical advantage from the instrumentalization of regional economic activity*, then it is clear why established Regionalism theory has failed to explain the emergence of modern regionalism, multi-regionalism, and the creation of the Pacific Arctic – and why Polycentric Regionalism theory has been developed to do so.

It is problematic too for 20th Century Regionalism theory that one of Livesey's (2017, p.170) major findings is that *de-globalization* is occurring primarily because of a fundamental *change in the International Political Economy*. Functional Regionalism was one of the earliest advocates of globalization theory (Rosamond, 2000), and sought to downplay the (Realist) concepts of state sovereignty /governance and the idea of state power and influence. Instead, it emphasized common societal needs and interests shared by states, leading to global integration and with it the *subsequent* creation and expansion of international/regional organizations, such as the European Union/ North American Free Trade Agreement and Asia-Pacific Economic Cooperation, *and lessening the input* from national governments. Others like Mitrany (1933) suggested

that these International Organizations would address societal requirements *alongside* other non-governmental specialists. The theory *assumed* that states would willingly agree to such moves and concede power to such organizations.

This, and more general theory of Regionalism pioneered by the likes of Mansfield and Milner (1997) is now difficult to equate with the recent rise of Great Powers (not International Organizations), and their spheres of *regional interests* (e.g., Sino-Russian creation of the Pacific Arctic); and the process of integration-by-regionalization - but which now accompanies concomitant *de-globalization* and Livesey's technology-underpinned International Political Economy. With this change comes non-western ownership and re-orientation of Global Value Chains. Such de-globalization also suggests - not unfairly, the possibility of reducing state-interdependence and thus not, according to functional regionalism – increasing economic /political international integration. This would seem to contradict the likes of liberals such as Keohane and Nye (1998) as well, who heavily promoted economic interdependence, as the means, to achieve functional integration.

Neofunctionalism's reasons for regionalism (mainly economic competitiveness, as well as some security coordination aspects) dominated the International Political Economy literature in the nineties with the likes of Haas (1958), and others seeking to explain the creation of the European Union/ North American Free Trade Agreement etc, by this concept. However, this understanding is now clearly inadequate in the face of the above developments and the evidence of the stalling World Trade Organization, the lack of further European Union integration, and the disappointing trajectory and speed of both the Asia-Pacific Economic Cooperation and Mercosur to name but a handful of global institutions.

Indeed, Neo-functionalism's basic assumption that integration-by-globalization was an *inevitable,* linear, process has made these setbacks inexplicable – in theory terms at least and contrary to the emergence say, of Great Powers and their *regional* Spheres of Interests (and institutions) and accommodated and reinforced by evolving power concepts and the altering International Political Economy.

Moreover, as Christoffersen (2017, p.439-440) notes, China and Russia in the Dongbei/Russian Far East and Arctic regions are actively creating institutions for executing regionalism, that *precede* economic integration; obvious examples include the Eurasian Economic Union, the Belt and Road Initiative, and the Greater Eurasian Partnership. This again, is not what functional regionalism would predict; the European Union as a regional institution/forum for instance, was created *following* economic integration.

Furthermore, *established* Regionalism theory cannot accommodate how Livesey's concept of a new International Political Economy – based more on geographical regionalization and regionalism than *globalization* per se, can be instrumentalised in a Sino-Russian *geo-economic* framework, that is defined by Luttwak (and seen in this thesis), as having a *geopolitical outcome* (i.e., a multi-regional order in North East Asia), and its manifestation – the Pacific Arctic. Hettne (1999) has comprehensively surveyed the contradictory nature of regionalization and globalization, and concludes that whichever mechanism dominates, it will certainly determine a change in the world order, which suggests that Luttwak's assertion that the purpose of a geo-economic strategy is not to produce an economic outcome (though this will occur too), but a geopolitical result, is logical and therefore probable.

The pivot to Asia and the shift of global GDP to Asia, supports the likes of Maddison (2007) and Marxist world systems theories' predictions about the global economic locus travelling from west to east. However, this clearly non-linear globalization, identified by Livesey, means that unlike the Marxists' predictions, global networks *do not always* converge on the more advanced countries, resulting in their disproportionate benefit. This would seem a logical conclusion as even casual observation of liberal values and ideology, as well as multilateral institutions and *state-centric* regional integration (i.e., by non-geo-economic means), is also non-linear geographically and temporally - in attainment.

Cumulatively these are all critical theoretical findings, as I argue in the following three chapters that there is evidence that Russia and China are attempting to create a *geopolitical Pacific Arctic space* and in its Sino-Russian hinterland (Dongbei/Russian Far East region), via a regionalization policy that includes Livesey's new concept of economic *localism/regionalization*; and that it can be explained by Polycentric Regionalism theory in which globalization (more suited to *state-based* multipolarity and established theories of Regionalism), is being confronted by an alternative order, Sino-Russian sponsored multi-regionalism.

b). Polycentric Regionalism Theory

Polycentric Regionalism Theory's Application to this Dissertation

Polycentric Regionalism theory's critical contribution is that it reveals - *and is constituent of* the centrality of geographical and economic factors (Spheres of Interests) informing geo-economics and Sino-Russian adoption of it, and the *form, and processes* by which a more *multiregional* (not multipolar) Great Powers led order, may emerge in North East Asia,

and be seen to offer a physical *geopolitical* outcome, the creation of the Pacific Arctic space.

Polycentric Regionalism theory has also been developed therefore out a dissatisfaction with established Regionalism theory which has largely failed to explain to date – many of the trends mentioned so far in this chapter following the cessation of the Cold War; this includes geoeconomics as a powerful framework by which states could best exploit these trends - especially the aspect of power in the international system, as discussed earlier by Luttwak.

Polycentric Regionalism theory encompasses the emergence of geo-economic-inclined Great Powers, with regional Spheres of Interests, leading to a reordering of world governance, the possible replacement of globalization with regionalization means, and a global order based on multi-regionalism rather than multipolarity (in North East Asia). This is partly because as outlined, the nature of power in the international system is changing, and the impact of technology - especially on the International Political Economy, has largely contributed to the decreasing utility of critical U.S. instruments of power (i.e., military), US-led globalization, leadership in technology, and therefore its unipolar leadership position in global affairs. These events are collectively further impacting the neo-liberal, western-led, international order of the last 40 years.

I will argue that the creation of Pacific Arctic by the Sino-Russian partnership illustrates how well Polycentric Regionalism theory explains and has grasped the fundamentals of these global trends. Accordingly, the Pacific Arctic should be seen as somewhat of an experimental component in a New World Order. It is unsurprising therefore that some established International Relations theory is found wanting when

explaining such contemporaneous changes in governance structure, power, and the nature of the International Political Economy.

Polycentric Regionalism theory is of course neonate and experimental, but as part of this dissertation's framework it seeks to explains the geo-economic process of multi-regionalism in North East Asia, and the way in which the Pacific Arctic space is being created within this thesis' broad geo-economic framework. The "Polycentric" aspect of the title refers to the *additional* characteristic of multi-regionalism to integrate *multiple* and geographically *non-contiguous regions* in eastern Eurasia by *technology's virtual* means. Crucially too, because of the inclusion of technology as a significant factor in the International Political Economy and Polycentric Regionalism theory, this means logically that technology's application is not confined to land, Sea, and air but the fourth dimension of multi-regionalism that the Sino-Russian partnership is considering in the Arctic as well – Space, and cyberspace.

This is a significant departure from 20th Century theories of regionalism in which each terrestrial region was *only* sponsored by that region's respective state, and as a matter of necessity a region could *only* be connected by physical means to a geographically *contiguous* region. Polycentric Regionalism theory explains the capacity of geo-economics' multi-regionalism policy tool, to create additional regional, *geopolitical spaces* in the future *beyond* North East Asia - and the immediate confines of the Pacific Arctic. One such additional space – is Space.

To summarise this section: P-R addresses the response to these afore-mentioned trends, and one of its apparent consequences; the concomitant rise of regionalisation in NE Asia, vis-a-vis steady de-globalization (see Livesey in the Theory Chapter), along with the emergence of regional Asian/Chinese financial institutions (such as the Asian International

Infrastructure Bank) and creation of *regional governance* forums such as the Eurasian Economic Union, and the Shanghai Co-operation Organization, lead increasingly by Great Powers-style states in the region – Russia and China, as already noted. In combination these factors suggest that there may well be an intermediary stage occurring between the transition from established state-led unipolarity – underpinned by globalization, to multipolarity; namely multi-regionalism (based increasingly on regionalization but *heavily influenced* by the a/the state). One major reason why China and Russia have pursued multi-regionalism in NE Asia is because to do otherwise – at this stage – and promote multi-polarity instead, would provoke the U.S. as it would be seen as a direct existential threat to the U.S.' unipolar position - and which heavily relies on the geo-economic power of globalization. For this reason, too, the creation of S-R multiregionalism, is formulated within a geo-economic framework (e.g., the S-R gas/LNG partnership); but the critical factor is that the output sought is exclusively geopolitical (realist). In the S-R Arctic gas case, it is the creation of new economic spaces (including the *multidimensional* region of Space itself), out of which geopolitical opportunities may emerge, such as the formation of the Pacific Arctic region; created largely be a geo-economic process of regionalization-by-gasification.

Components of Polycentric Regionalism Theory

The theory challenges some of the underlying power assumptions in established Regionalism theories already discussed (state-centric, the central role of globalization, a neo-liberal order, governance by a rules-based order, etc). As well as the evolving nature of state power (see last section), and technology's contribution to the International Political Economy - which Polycentric Regionalism theory incorporates, additional

external defining factors/trends were incorporated into the creation of Polycentric Regionalism. The theory emphasises: *local, tactical factors*; economic *scalability and sustainability* of regional projects; and their subsequent *ability to attract* in turn, *international financing;* which will cumulatively underpin the geo-economic creation of a targeted region (such as the Pacific Arctic) by these regionalization activities. This process of integration-by-regionalization is demonstrated later, in the three substantive chapters.

In addition, Polycentric Regionalism theory also recognizes and incorporates the successful *shift of (some) central decision-making* and state-centric initiatives *to regional bodies along with supporting regional (not multilateral) institutions.* Evans (2004) speculates that an institutional Asian *identity* may be developing here, because of this trend*. This is a de facto shift in the locus of power and* reflects the crucial role of *technology* in multi-regionalism in facilitating such a shift and overcoming the challenge of physical time and space constraints on geography (communications, governance connectivity, distances to customer, etc) and therefore accelerating the multi-regionalism process.

Polycentric Regionalism theory also stipulates the factors of physical connectivity and virtual linkages in commerce at a regional level of engagement; specifically in the Sino-Russian energy case, the *linkage of strategic (gas/LNG) energy projects with other Sino-Russian regional economic development projects* in the North East Asia hinterland for instance, further catalysing the economic integration-by-regionalization (land /sea) development of the Pacific Arctic, via multi-regionalism. Moreover, the Sino-Russian gas case study illustrates the formation of limited (*industrial*) *governance* structures/instruments too (e.g., Global Production Networks for LNG sector and Belt and Road Initiative), to

support the consolidation, sustainability, and institutionalization of the regionalization/multi-regionalism process. These two geo-economic (*not* International Political Economy per se) processes (integration-by-regionalization, and governance instruments), are additionally captured by Polycentric Regionalism theory as essential constituents of the 21st Century/successful multi-regionalism.

A further key characteristic of Polycentric Regionalism theory is the *political will* expressed by sponsoring nations to sustain regionalization as expressed by Zhang and Cai (2015, p.442), and the likes of Bennett (2016, p.349); the latter commentating that "the world cannot make maps of an interconnected Eurasia a reality without willing individuals on the ground", as seen in the Sino-Russian partnership in the Pacific Arctic. The lack of this (and the other parameters mentioned above) in Regionalism theory has been a major contributory factor in failed attempts at state-centric regionalism by governments in the past. Alongside political will is another crucial characteristic of Polycentric Regionalism theory; that of trust between regional leaders/interlocutors. This aspect especially important in Sino-Russian relations, is discussed in some detail in the Technology and Regionalization chapters. In Polycentric Regionalism theory suffice it to say, without trust there can be no agreed political will.

Polycentric Regionalism Theory: multi-regionalism's Geopolitical Outcomes and their Processes

Finally, by means of Polycentric Regionalism theory it is possible to illuminate three identifiable *geopolitical outcomes* of the multi-regionalism processes at the *strategic level of analysis* as the following: a structural outcome resulting from the redistribution of global power; an emerging Sino-Russian grand strategy in North East Asia; and/or a means of displacing globalization. Part of the purpose of examining (in the next two

chapters), the Sino-Russian gas/LNG relationship, and the use/role of technology in the former project, and as a multi-regionalism instrument itself as well, is to show *how Polycentric Regionalism theory within a geo-economic framework, can provide an adequate explanation of these processes and their geopolitical outcomes*, and how this may lead to the expected demise in U.S. unipolarity.

c). A Structural Outcome

If Polycentric Regionalism/multi-regionalism represents a structural outcome of the redistribution of power - and it is little to do with multipolarity emerging from rising powers in the aftermath of unipolarity – or challenging US power militarily, as per Waltzian structural realism, then this may be suggestive of major structural changes in *regionally*-oriented/originated economic networks and centres of capital projects (in the Pacific Arctic and neighbouring Russian Far East/Dongbei regions), and which together are now morphing into strategic economic power bases alongside new regional institutions.

d). A Sino-Russian Grand Strategy

On the other hand, as will be demonstrated, China and Russia have no intention of "taking on" the U.S. militarily, but instead coordinating their efforts toward *regional connectivity and economic integration*; by this means they may achieve internal balancing by such better economic coordination/structuring; that then strengthens their Greater Eurasian Partnership project. By this means they may tip the strategic balance with the U.S. in North East Asia and possibly in Space too. The former space is more suggestive of more limited, carefully *geographically* contained (i.e., the Pacific Arctic space) multi-regionalism outcome, whilst the latter (Space) symbolises a more assertive geostrategic purpose.

e). A Displacing of Globalization

Finally, of course, there is Livesey's view of partial de-globalization - because of changes in the International Political Economy (especially the effects of technology on it), and lessening therefore global interdependence, and the subsequent emergence of major *regional* markets – via regionalization - sponsored by great powers like China (via the Belt and Road Initiative), and Russia in their Spheres of Interests - the Pacific Arctic/Dongbei regions. In this sense the Sino-Russian partnership's multi-regionalism is riding the wave of more global economic trends in Asia noted in the Power section; the financing, infrastructure, and adapting of institutions to create in the Sino-Russian case, an economically viable space in the Pacific Arctic, for future markets, and the subsequent morphing of nodes of redistributive economic power into geopolitical power – a Eurasian order based on sponsored multi-regionalism, and not multipolarity. In this scenario Space plays a supporting role in determining the commanding heights of communications/ broadband, linkage and connectivity from Space - for the benefit of China and Russia and their designated regions of terrestrial interests.

The Processes of Multi-regionalism - in Polycentric Regionalism Theory

Polycentric Regionalism theory has also identified discernible *processes* by which geo-economics' multi-regionalism instrument is actioned. These three major *processes* supporting the progress and movement toward Polycentric Regionalism/multi-regionalism are measurable and attributable to the Sino-Russian gas/LNG projects in the Pacific Arctic and apply to Space and cyberspace as well, and include:

Scale-able and therefore *sustainable* economic growth at the regional level of analysis, because of altering Global Value Chains and technological changes in the International Political Economy, leading to the accelerated development of previously uneconomic regions in Russia (like its Arctic territories and the NSR) and China (Dongbei/Russian Far East region) and other parts of Eurasia. The key takeaway is that this is therefore a *viable* political/International Relations model and option, as for instance the Arctic *is being monetized*. This is discussed further in the Russian Arctic Gas and Regionalism chapters.

The formation of a *geostrategic space* – is a new International Relations activity in the North East Asian region - in line with the concept of grand strategy adopted by Great Power(s). This includes the Arctic Gas /energy lattice idea (i.e., Arctic comms, hubs, ports, rail links along the NSR), interconnected/integrated *with the* Russian regionalization-by-gasification strategy in the Dongbei/Russian Far East region. This is addressed in the Russian Arctic Gas, and Regionalism chapters.

Finally, the process of *rolling-out strategic technology applications*, the use of geo-economic instruments such as finance, trade digitization, Artificial Intelligence, manufacturing techniques, etc, and the build-out of region-linking infrastructure (e.g., via the Belt and Road Initiative), centred around regional dynamics. This is resulting in some de-globalization (redundant/shortened Global Value Chains), and replacement with limited integration-by-regionalization activities both physical and virtual. This critical arena of Information and Communications Technology and its dual-use applications in the LNG business in the Pacific Arctic and Space, is the subject of the Technology chapter.

Summary of P-R Theory's Purpose

P-R is a fledgling theory which attempts to accommodate and explain the questions posed above and covered in detail in the Theory chapter. This is achieved by the analysis of real-time changes underway in global governance, based on observation of the emerging data/trends and indicators, derived from these ongoing real-time changes.

The model chosen for such observation – and testing of the efficacy of polycentric regionalism, is essentially the Sino-Russian energy relationship in the Eurasian Arctic. The level of analysis when discussing possible multipolarity, as well as the changing shape of globalization, and the emergence of regionalization in Russia's Arctic/RFE and China's Dongbei provinces, is explained (by polycentric regionalism) primarily at the level of the state - for each of these three subject areas.

This is *not to say* that for instance globalization is only a state-centric phenomenon: But that the Chinese/Russian view of geopolitics and geo-economics applied in the Arctic region, appears to be framed very much in a Realist (neo-realist) framework, where the state leadership role is crucial – and very much about perpetuating *national (state) self- interest* at the cost of society - and all other concerns such as considered in say, a more Constructivist theory. Nor is globalization in this dissertation considered anything - but a geo-economic process. However, its effects and ***impact on*** **geopolitics** (*post, Cold-War*) is what is altering, as Luttwak carefully differentiates – and polycentric regionalism tries to illuminate.

5. The Sino-Russian Gas Relationship, Dongbei/Russian Far East Projects, and the Integrating Role of Technology

The use of the multi-regionalism development model – underwritten by Polycentric Regionalism theory as part of the overall geo-economic framework of this thesis, is suited to testing the mechanism, purpose, and outcome of three investigatory elements of this dissertation: the Sino-Russian LNG/Gas relationship in the Pacific Arctic; and the efficacy of Technology in Space and its role too in linking the Pacific Arctic with the Dongbei/ Russian Far East regions.

For both the Russian Arctic Gas and Technology chapters, the framework may now investigate both projects via a combination of established geoeconomics parameters and processes, to illustrate how multi-regionalism operates at grass roots level in North East Asia, and in the Pacific Arctic specifically - as this thesis' key area of interest.

a). *The Sino-Russian Gas/LNG Partnership* will be examined through three specific processes: Infrastructure support (logistics, ships, terminals, etc); Capital investment means (e.g., Novatek, the Belt and Road Initiative, and Russian Regional / Federal Funding); and Institutional /Political support and associated governance aspects (e.g., LNG swaps with non-contiguous and non-Asian countries and creation of a Gas/LNG OPEC-type structure). These processes are exposed by means of applying an industrial methodology called Group Production Networks. This is intended to show *how* multi-regionalism works within the Arctic LNG environment.

b). *Sino-Russian Regionalization in the Dongbei/Russian Far East regions* is briefly examined from the point of view of: Sino-Russian

Industry projects (e.g. Rail, manufacturing, transport and Communications joint-ventures); institutional means (Shanghai Cooperation Organization, Greater Eurasian Partnership, Belt and Road Initiative, Asian Infrastructure Investment Bank, etc); and at the International level as well via international joint ventures (Primorye transport links, Arctic Ship building, NSR cooperation, etc).

Within the geo-economic framework both the Gas and Regionalization studies are subjected to the effects of altering power, the new International Political Economy, and technology's connectivity/integrative characteristics, as part of the process of multi-regionalism, operating within the Pacific Arctic region.

Secondly, both projects were selected to provide evidence (or not) of whether the geopolitical outcome of multi-regionalism is a) a structural outcome in the distribution of power - foregoing political change or b) a neonate Sino-Russian grand strategy beginning to get underway in North East Asia or finally c) an International Political Economy focused de-globalization process emerging in line with other global trends. It is most likely that it will be a combination of all three. The evidence sought via this framework is whether the *processes* - of any of those three geopolitical outcomes of multi-regionalism (scale, space, and /or technology) *can be identified* in both/either of this thesis' investigations, i.e., the Gas/LNG project in the Pacific Arctic, and/or Technology/ Space or even Regionalization projects in Dongbei/Russian Far East.

Finally, technology is seen as the essential glue that underpins multi-regionalism's versatility and allows it to integrate gas and regional projects in the Pacific Arctic, both physically and virtually, as part of the integration-by-regionalization process. It is also the critical component in geo-economics, in as much as it is the backbone of the global services

industry, the mainstay of global GDP in the 21st Century. It is therefore critical to the development and sustainability of the Pacific Arctic region, in so much as multi-regionalism is the geo-economic instrument which will pioneer the integration of the Pacific Arctic and Technology/ Space aspects, leading to a significant geopolitical outcome in North East Asia, in the 21st Century.

In summary: By means of the Sino-Russian energy relationship in the Arctic and Sino-Russian investment/infrastructure projects in Space and in the neighbouring Russian Far East and Dongbei region, Polycentric Regionalism theory explains how for instance, the gas/LNG industry's geo-economic power is transmitted through its industry characteristics of capital, infrastructure capability, and networking processes. Such applied geo-economic power facilitates the physical connectivity and virtual linkage aspects of multi-regionalism, as predicted in Polycentric Regionalism theory. The building of shared spaces (via the Sino-Russian Arctic energy and projects ventures) and bilateral trust can/may well lead to the creation of the Pacific Arctic region - an experimental step in establishing a viable alternative to the economic and security order in Asia - shaped largely by the U.S. and its regional allies. It is by this means that China and Russia can convert geo-economic processes - and its instrumentalization (multi-regionalism strategy) into the foundations and underpinnings of their geopolitical aim.

CHAPTER 3

GLOBAL GAS DEVELOPMENTS AND RUSSIAN GAS POLICY

Introduction

The gas industry was chosen as a means of studying both the nature of global international relations' themes and trends outlined in the Introduction chapter, and to foreground its role in a new concept of global governance - multi-regionalism in North East Asia, as discussed in the Theory chapter. This chapter covers the global gas setting and subsequent emerging Russian gas policy.

Chapter Content

This chapter therefore sets the global gas scene and introduces the Russian Arctic and Russian Far East territories as a major natural gas/LNG region and a strategic industrial complex which will supply gas/LNG to North East Asia; it also establishes the industrial raison d'être of Sino-Russian energy relations in North East Asia, which lays the ground for the Russian Arctic Gas/LNG chapter and China's involvement in Russia's Novatek LNG project there. In the second section of this chapter, discussion of emerging Russian gas policy in response to these export opportunities and associated domestic challenges are reviewed there too, as they impact the nature and purpose of the Sino-Russian energy relationship in North East Asia – and its intended geopolitical purpose(s); which are addressed in both the Russian Arctic Gas/LNG and Technology chapters.

This chapter (and the case study of the Sino-Russian Arctic Novatek project discussed in the following chapter), I argue, is how the energy industry's geo-economic power is transmitted through its capital, infrastructure build-out capabilities, and economic influence over global

institutions /states - and is the key determinant in facilitating the physical connectivity and virtual linkage aspects of Polycentric Regionalism in North East Asia. By generating new economic dynamism in the shared space and thus building trust for further bilateral commitments (addressed in the Regionalism chapter), Russia and China can then create the Pacific Arctic region as an experimental step in establishing a viable alternative to the economic and security order in Asia, shaped largely by the U.S. It is by this gas/LNG industry means that China and Russia can convert geo-economic processes (via its sub-agency, multi-regionalism) into the crucial underpinnings of their geopolitical aims.

The primary facilitators of multi-regionalism - itself a manifestation of geo-economic policy for North East Asia included: an altering global power structure (e.g., Great Powers' re-emergence and regional Spheres of Interests); the shift of the International Political Economy to Asia/China (coinciding with rising de-globalization and shortening Global Value Chains); and the impact of technologies on the International Political Economy such as "virtual" regional connectivity, leading to the increased penetration of new international markets and consequent disruptions in multilateral political institutions and global governance. This is the global setting (and the factors within) in which the Sino-Russian gas partnership in North East Asia, operates today. The Russian gas and LNG industry in North East Asia is thus an illustrative model of my Polycentric Regionalism theory and an instrument of its geo-economic output/agency, multi-regionalism.

In multi-regionalism terms, the gas industry's commercial levers of geo-economic influence and power (the application and uses of capital, build-out of infrastructure, and creation of governance networks mentioned), can be readily observed in developing a *global gas market/hub* in the

North East Asia region, by means of their collective impact on the region's industrial, institutional, and international policies and organizations.

It is not coincidental therefore that these energy project development tools (capital, infrastructure, and governance/industry networks) both reflect - and are an *industrial sub-set* of the concurrent and ongoing strategic-level *processes* of multi-regionalism in North East Asia, identified in the Theory chapter too. These were categorized as a), the creating of geo-econo/political space, b), operating at industrial scale and c), facilitating new techno-governance networks and markets. Moreover, these multi-regionalism *processes* are very much integral in the coordination of Arctic Sino-Russian gas projects (see the Russian Arctic Gas chapter), and in allied Sino-Russian infrastructure, transport, and communications projects that are the subject of the Regionalization chapter.

Global Energy Trends

Global energy trends are altering in line with the changes in the IPE as noted previously, namely: The shift in the centre of global economic gravity from the mid-Atlantic to energy-hungry Asia; the Russian/U.S. economic pivot(s) to Asia in response to an arising China; the influence of emerging technologies (e.g. 3-D printing, LNG delivery means, etc) on the International Political Economy (IPE); and the subsequent shortening of Global Value Chains, accelerating the process of existing de-globalization and the growth of regionalization.

These changes impact the global Energy industry in a number of ways too, and which China and Russia are exploiting by various means: The adoption of LNG technology as an increasingly attractive multi-delivery-point gas system, that looks poised to (almost) replace pipeline gas systems worldwide; the creation of a massive LNG market in NE Asia

(Japan, China, and South Korea), heavily influenced by the availability of energy $investment; facilitating the process of international gas de-regulation; whilst concurrently answering the demand for energy's environmental sustainability, and the possibility for affordable energy infrastructure build-out. Together, these factors have directly contributed to a growing, liquid, LNG (and pipeline gas) market worldwide, but most especially for LNG, in NE Asia.

Asia is the critical LNG market in C21; in 2020, 64% of global LNG import volumes were contracted by just five Asian countries: Japan (74.43mt), China (68.07mt), RoK (40.81mt), India (26.63mt), and Taiwan (17.76mt). In the same year, global import volumes peaked at 356.12mt. Also, in the same year these five countries alone represented 90% of total Asian LNG imports (254.63mt). Asia is now in other words, clearly the dominant region for the international development of global LNG markets; and NE Asia will be the most important LNG (and pipeline gas) market/trade hub by far in C21 with just three countries, Japan, China, and ROK, commanding the largest regional/country LNG demand in the world.

Figure 1 (below) is highly instructive therefore, regarding the commercial raison d'etre of the Sino-Russian energy relationship, both in Siberia (pipeline gas) and increasingly in the Arctic (LNG). China's gas expansion plans as noted by Razmanova and Steblyanskaya (2020) including gas/LNG diversification occurring alongside deteriorating Western relations, are symbiotically in line with Russia's export gas/LNG plans. As of 2020, China's domestic gas supply was 194bcm; that supply figure is expected to rise to 329bcm by/in 2030. However, China's gas demand by 2030 is estimated to be around 600bcm!

Year (bcm)	2016	2017	2018	2019	2020	2021E	2022E	2023E	2024E	2025E	2026E	2027E	2028E	2029E	2030E	20-25 CAGR	25-30 CAGR
Demand	206	237	279	307	330	370	396	424	452	479	503	525	549	574	600	8%	5%
Annual Growth		15%	18%	10%	8%	12%	7%	7%	7%	6%	5%	5%	4%	5%	4%		
Domestic Supply	137	149	161	178	194	208	224	238	252	266	278	290	302	315	329	7%	4%
Non-Shale	129	140	149	160	170	181	194	205	216	224	233	242	251	261	269	6%	4%
Shale	8	9	12	18	24	27	30	33	36	42	45	48	51	54	60	12%	7%
%YoY Domestic		9%	8%	11%	9%	7%	8%	6%	6%	6%	4%	4%	4%	4%	4%		
Imports																	
Pipeline	38	41	50	50	48	53	59	67	74	83	88	90	93	96	98	12%	3%
Central Asia (A-C)	34	37	47	45	39	38	38	40	41	45	45	47	50	53	55	3%	4%
Myanmar	4	4	3	5	4	5	5	5	5	5	5	5	5	5	5	4%	0%
East Siberia	0	0	0	1	5	10	16	22	28	33	38	38	38	38	38		
LT LNG (Contracted)	34	42	73	78	82	86	90	100	97	106	106	104	103	101	101	5%	-1%
Spot LNG				0	6	23											
Additional Imports							24	20	29	23	31	42	51	61	71		
Central Asia -D											5	12	18	24	30		
West Siberia																	
LNG (Available for Contract)							24	20	29	23	26	30	33	37	41		
Total Imports	72	83	123	129	136	162	173	187	199	213	225	236	247	258	270	16%	5%
Imports % of demand	35%	35%	44%	42%	41%	44%	44%	44%	44%	44%	45%	45%	45%	45%	45%		
Total LNG bcm	34	42	73	78	88	109	114	120	125	130	132	134	136	139	142	22%	2%
Total LNG (MTPA)	24	31	53	57	64	79	82	87	91	94	96	97	98	101	103	22%	2%

Source: Government data, Bloomberg, Bernstein analysis and estimates
Note: Design capacity for Central Asia Line A-C is 55bcm, Myanmar is 12bcm, East Siberia is 38bcm, and Central Asia Line D is 30bcm

Figure 1. China Long Term Gas Supply Demand Projection

The shortfall of 270bcm is unlikely to come from Australian, U.S. or other western-friendly LNG Asian suppliers, for well-known and now firmly established political reasons; this may suggest that most of the shortfall may well be taken up by Russia's Power of Siberia (PoS) pipeline project, and the "D" line from Turkmenistan into western China. The possible advent of PoS Two (projected to run through Mongolia) will compete with this Turkmen supply, but this will only be advantageous to China. Further gas supply competition may well manifest itself in the form of Novatek LNG's Yamal and ALNG2 projects, and in the later 2020s, ALNG 1&3 as well. All these LNG projects include Chinese financing, equity participation, and/or BRI investment (or all three).

Geopolitically speaking this Russian/Arctic energy partnership alone, is a long-term, mutually beneficial S-R geo-economic arrangement, and the coincident rise of LNG as an industry-wide alternative to infrastructure-dependent (and less flexible) pipeline gas, has been fully exploited by both countries, and seen in the geo-economic regionalization-by-gasification process in Russia's RFE/Arctic regions and NE Asia. Collectively, these major S-R ventures/gas and LNG projects represent significant physical

evidence for refuting the oft-repeated mantra that the Sino-Russian relationship is only a temporary “axis of convenience”. What the next chapter illustrates is how precisely that S-R energy relationship in the Arctic is increasingly recognized as a world class LNG undertaking, and that it is in the medium/long-term, strategically, and *mutually beneficial* to both China and Russia in C21.

In economic terms, with China’s increasing gas consumption tracking its global economic rise, it is also reasonable to assume that in the coming years the *key price setter for LNG* will be China. To date Western-oriented Japan - as the biggest consumer of LNG, has assumed that role. That leading position is expected to be usurped by China within the next two years, and it is already clear that China’s future price negotiations with key LNG suppliers such as Australia, Russia, Qatar, and the US will be much tougher.

One reason for such a predicted change in stance under a Chinese price negotiating “regime” (as discussed later in chapter four), is that the critical security of LNG supply ascendency in NE Asia is being slowly reversed, putting the power now in the hands of these major Asian consumers. This is partly also because with the formation of a regional (Pacific Arctic) LNG trading hub, the real criticality for all players (and the economic prize) is no longer security of supply/demand *per se*, but the security (and $ value) of the emerging LNG market. China is aware of this shift in emphasis, and as the biggest customer in Asia, it will play the leading role in any NE Asian LNG market/hub foundation, pricing, and trading parameters.

In theory terms too, the Russian regionalization-by-gasification policy of the RFE/Arctic regions reflects the underlying geo-economic process of polycentric regionalism in action, itself underpinned by the technology-enhanced activities of such Russian LNG projects from within both the

Arctic and Siberian regions. The geopolitical aim of this framework and process, is the creation of a new geopolitical space, the Pacific Arctic region in NE Asia, whilst also fulfilling the S-R economic objective of creating a major LNG trading hub in the NE Asian region.

1. The Gas Business – A Global Gas Market

According to Henderson and Moe (2019) Energy markets are always of supreme importance to nation states, as they have both strategic and national security implications, and directly impact both domestic and international politics as well as the macroeconomic environment. They are universally created and maintained according to the geopolitical landscape (wars, sanctions, embargoes, etc), domestic and international policy goals (e.g., market access, OPEC determinations), and probably most importantly today, society's environmental concerns.

Largely because of growing environmental evidence and public concerns regarding hydrocarbon usage, international markets for natural gas are changing geographically and structurally (Birol, et al, 2011). One reason for this is that gas is now recognized as the key economic "transitional" fuel in the eventual conversion to a hydrocarbon-free world; a global acknowledgement of the environmental imperative to move away from the fossil fuel-derived pollution of the 20th Century.

With this overall change has come a steady increase (25%) in global gas consumption during the noughties, especially evident in North East Asia's growing economies. The shift toward gas usage has been assisted and encouraged by changes in global energy financing, including investment in necessary gas-specific infrastructure (pipelines, ports, etc), the de-regulation of (some) gas markets, and new environmental regulations (International Energy Agency, 2011, 2014). In addition, U.S. shale gas

production, new natural gas reserves discovered in northern Europe, the Mediterranean and Australia has also boosted this growth in gas usage and marketing. From a research point of view, the overall importance of energy markets - central to the Sino-Russian energy relationship in North East Asia today and their make-up in relation to macro-economic development has been already well covered by the likes of Manners (1964).

Others such as Odell (1970) examined how geopolitics was shaped especially in the Cold War by oil markets; in addition, Chapman (1989) addressed the organization and structure of oil and gas markets, and most recently Calvert (2016) has taken a fresh look at energy markets and their characteristics. All reflect a gas *trading* emphasis, and not a network, organizational nor geographical approach to the gas industry by which one could ascertain *how* the industry facilitates this commodity trading. The Russian Arctic Gas study (next chapter) reflects this approach however and focuses on the present direction of the gas business, and specifically the integration of separate, new, geographical regions for gas delivery, and with that the possible development of a regional gas market in North East Asia. These are the first economic steps in creating a global gas market, like that of oil.

Concurrently, from a macro-economic point of view, the centre of global economic gravity is moving steadily from mid-Atlantic to the Asia Pacific Region (Quah, 2011), and as such, gas demand in Asia is increasing too, especially in the North East Asian market. The importance of this global gas trend (Birol et al., 2011) is that the gas market integration process in North East Asia runs parallel with the concept and processes of multi-regionalism, reflected in Polycentric Regionalism theory, and in which regionalization occurs by a process of economic integration, resulting in

the possible, geopolitical creation of the Pacific Arctic. In sum, I assert that regional integration-by-gasification occurring in Russia's Siberian and Russian Far East territories (extending to the Arctic), is a multi-regionalism process by which the Pacific Arctic can be economically *underpinned* - and proven geo-economically and politically *sustainable* in North East Asia.

New Technology Developments - LNG

Essential to developing a global gas market (a regional hub of which is a major first step in North East Asia) and achieving multi-regionalism's geopolitical objective in the Arctic/North East Asia, is the Sino-Russian exploitation of a new gas technology, LNG.

This industry is characterised by its *seaborne* ability to distribute gas *beyond the geographical limits of traditional natural gas pipelines* - and to service therefore multiple, geographically disparate gas markets, such as those in Russia's neighbouring North East Asia region. This potentiality of global gas markets because of LNG technology, is discussed by the likes of Jensen (2004).

LNG Structure and Organization

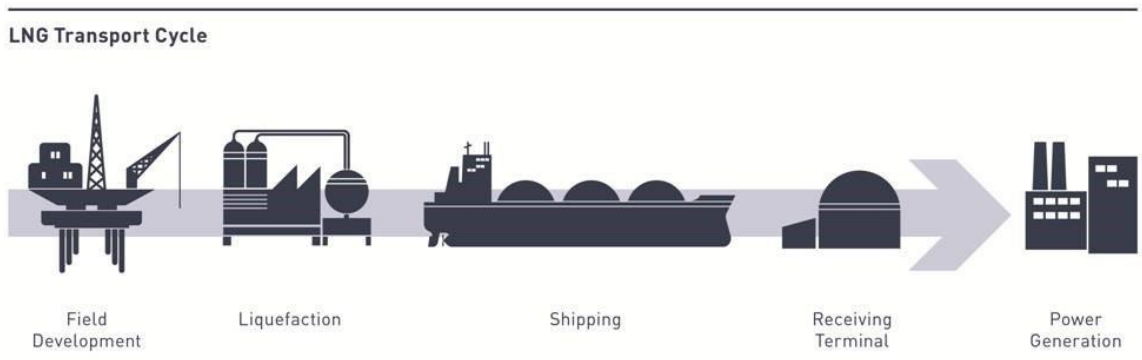


Figure 2. LNG Transport Cycle. Source: Chamber of Shipping of British Columbia

Established LNG networks (see Figure 2) consist of specialists/investors in production, transportation (by sea), storage, marketing, and distribution. This is known as the LNG supply chain. As Russia's Arctic LNG project grows (e.g. Russia's Novatek LNG project), with major trade customers in North East Asia (Japan, China and the Republic of Korea), so there is increasing commercial collaboration in the LNG network, all along the LNG supply chain, from initial production and liquefaction in the Up-stream sector (Russia's Arctic), via Transportation in the Mid-stream sector, to re-gasification and eventual distribution in the Down-stream sector in the customers' territories (China, Japan, and the Republic of Korea especially). The mechanics of the LNG industry are described in detail by Tusiani and Shearer (2007).

LNG fortuitously illustrates Polycentric Regionalism theory's explanation of multi-regionalism's integration by instrumentalization of regionalization activities, by means of the industry's organization and its agents' network practices. One way regionalization can manifest itself is integration-by-LNG expansion, (which allows the formation of a global gas market and the establishment of the Pacific Arctic in North East Asia). What is significant from a multi-regionalism point of view about this in terms of the broader Sino-Russian relationship in North East Asia, is that this concurrent global transformation in gas markets (i.e., using LNG increasingly) is facilitating an *increase in the integration* of disparate gas markets in North East Asia, and thus furthering the *technical* possibility of bringing about an emerging global gas trading hub/market in North East Asia (reflecting the economic rise of Asia and China in particular). This is something that the author has discussed at length with Paik, an academic and policy expert on North East Asia gas and LNG activities, in various meetings over the years.

To date unlike oil, pipeline natural gas has been a largely *local/regional* commodity (reflecting its higher transportation costs and infrastructure requirements), and therefore usually produced, marketed, and consumed, all in the *same region*. This means that traditional natural (pipelined) gas, although commercially attractive to governments, from the point of view of long-term, take-or-pay contracts, and security of supply / demand, is seen by North East Asian customers as extremely expensive (to build new international pipeline connections), thus increasingly uncompetitive with alternative LNG deliveries - on pricing; as well as being physically tied to a single source/ production field. But perhaps the most serious reservation about its ability to fully capture the expanding North East Asian gas market, according to Henderson and Moe (2019, p.106), is its inherent inflexibility - to supply more than one consumer, per dedicated pipeline network. This is especially significant for Russia, which as part of its geo-economic asymmetric strategy to supply gas/LNG to China, which Diesen (2017, p.71) discusses at length, must *also concurrently supply* Japan and the Republic of Korea as well with gas.

Nonetheless and despite pipeline gas' limitations, by having *both* pipeline and LNG delivery means of supplying multiple gas destinations in North East Asia (from different gas fields to different supplier destinations by land and sea), this is still a massive geo-economic advantage to Russia in its dealing with partners and potential energy customers in neighbouring North East Asia.

In addition, gas can now (via LNG) become a more *internationally traded* commodity (like oil); strategically, it is now potentially trans/inter-continental in geographic reach. This gives the LNG industry the credible scale and space, to attract *international interest and investment* in such a networked industrial ambition. This is a profound techno-industry

advancement with massive geo-economic and geostrategic/ geopolitical consequences for Russia and China – including the formation of a networked global gas market (and trading hub) emanating out of North East Asia, fed by enormous reserves of Russian Siberian natural gas and Arctic LNG.

Moreover, at an academic conference in Cambridge ("The Russian Far East, Arctic, and China: Reshaping Northeast Asia in the 21st Century"), arranged by the Scott Polar Research Institute (2017), these regions were identified as having undergone huge climatic change such as in the Russian Arctic, and were always known to contain vast reserves of gas, which are now no longer economically "stranded" assets, and can be connected via sea-going LNG tankers to far-away customers in other regions, and even onto other continents. Consequently, production areas in the Arctic such as the Yamal Peninsula where Russia's Novatek LNG operates, and which is linked to Asian regions via the NSR, have become economically and *strategically significant for both the Russian producer and its customers in North East Asia.* An increasing supply of easily traded and relatively inexpensive LNG is anticipated to be one of the most important milestones in the global energy system in the remainder of this decade (IEA 2016), and specifically for the development of a North East Asian gas trading market.

Global Natural Gas and LNG Summary

The significance of an emerging global gas market is of course beneficial for the industry itself as outlined by BP p.l.c. (Dudley, 2015) but its impact on individual economies and *regional economic growth* is the more profound longer-term consequence in my opinion. It is occurring as China is growing in power in the region, the gas industry is emerging as a global player, and the centre of global economic gravity is already moving to

Asia. This will have both geo-economic repercussions and geopolitical implications in North East Asia, as suggested in the Theory chapter.

In terms of this dissertation's enquiry as to *how* multi-regionalism - as a global governance system to challenge US hegemony could take shape in North East Asia, - and the exposition of the *mechanism* by which the Pacific Arctic as a new multi-regionalism geopolitical space is thus created according to my Polycentric Regionalism theory, the Russian LNG (and natural/pipeline gas) industry in the Arctic is highly instructive and illuminating: It comprises two great *neighbouring* collaborative powers in North East Asia, China and Russia, the world's biggest gas reserve base (Russia) and LNG market (China/Japan and the Republic of Korea), and the technological, financial, and institutional capabilities to integrate, link, and industrially underpin North East Asia, and convert such Sino-Russian natural gas/LNG-determined geo-economic power (by forming a global gas market in North East Asia) into geopolitical and global governance gains. This may also be quite possibly, at the cost of the U.S.' present geopolitical influence in the greater Asia Pacific Region.

2. The Russian Gas Industry and Policy Formulation:

General Situation

This section's purpose is to lay down firstly, the economic essentials of the Russian gas industry including major pipeline and LNG projects, and secondly, comment on the implications of the implementation and review of the Russian Energy Strategy until 2035, as reviewed by Mastepanov (2014), for both domestic and export operations. The analysis of Russian gas projects (both natural gas and LNG) and Gazprom's and the "Independents"' (defined as any Russian gas/ LNG company other than Gazprom, and either state-owned or private) involvement in them, is

designed to expose the various industry trends, global events and issues that have resulted in a review of Russian gas policy. Prime Minister, Mikhail Mishustin of the Russian Government (2020) made the following statement about the latest Energy policy reaching out to 2035 in the Summer of 2020:

"The priorities include meeting domestic demand for energy, developing exports, upgrading infrastructure and improving its accessibility, achieving technological independence, digital conversion, and ensuring energy security.

The strategy focuses on expanding the gas transport infrastructure in eastern Siberia and the Far East, building up liquefied natural gas facilities, and ensuring the resilience of the energy system. Also, emphasis is placed on reducing the fuel and energy complex's impact on the environment".

Unsurprisingly therefore, the emerging Russian Federation energy policy includes the gasification strategy for the Russian Far East, and the export drive to North East Asia of both pipeline gas and LNG. This then provides the political intent for the industry, and inadvertently gives a hint as to the politico-economic priorities of Sino-Russian Arctic energy (gas) relations, which I suggest may pave the way for how the Russian gas industry - and its development of an Asian gas /LNG marketplace - could be the future underpinning of a Sino-Russian *regional* model of economic governance and integration in North East Asia. His reference to the role of technology in Energy is critical to the creation and sustainability of the Pacific Arctic (and is referred to again in the Technology chapter). This concept of *eastern gasification* is also mentioned by Mishustin in this statement as was technological independence and critically also, digital conversion.

Much of this content is discussed in the Russian Arctic Gas chapter, in relation to Novatek's LNG project(s) on the Arctic's Yamal Peninsula.

Russian Gas Industry: Gazprom's Heritage

Rem Ivanovich Viakhirev was appointed Chairman of the newly established Gazprom in 1989, around the time of the collapse of the USSR. Between 1992 and 2001 he was the Chief Executive Officer of Gazprom and was Soviet man personified: His first name "Rem", was an acronym of the intellectual aim and proponents of Socialism and Communism; "Revolution, Engels, Marx". Gazprom was a critical organization in the USSR (and still is), and its primary role was to supply subsidized energy to domestic and industry consumers. Stern (2005) has written the most magisterial account of the Soviet (and early Russian Federation) energy/gas industry to date and is the root of most knowledge today about Gazprom and the Russian energy industry. At the end of the Soviet period all individual state-owned gas businesses were amalgamated into one gigantic new edifice, Gazprom, which is a Russian term meaning "Gas Industry".

It is in this sense that Gazprom has somewhat largely determined Russian Gas policy, and Russian Gas policy is played out through Gazprom. Gazprom is Russian gas policy. However, both domestic and export as well as global developments are now altering that relationship; the combination of a Soviet inheritance, new international market opportunities, and a desire to spark internal competition within the industry to capitalise on these new opportunities - and pay for the social contract system, is partly why Putin/the Russian government now feel the need to play a more central role in formulating energy policy according to one Russian interviewee familiar with Russian gas activities. This directly impacts Gazprom.

By exporting gas to western Europe during and after the Cold War as Henderson and Moe (2019, pp.58-64) cover in detail, Gazprom inevitably became a political instrument of the Kremlin, but also a key generator of overseas hard currency. This was the basis of its role as the provider of “rent” for the Soviet and later, Russian governments. In combination wittingly or not, Gazprom was perceived as having a social contract within Russia wherein it not only supplied cheap gas to householders, but it also massively subsidized Soviet life: football stadiums; local children’s kindergartens; food outlets, etc, were all paid for by Gazprom. This was the status of Gazprom; an enormous, benevolent organization, intimately tied to the State, even after the break-up of the USSR. Its critics maintain that it is still Soviet not capitalist in outlook, backward in applying the international gas industry’s new methodologies, management techniques and applied technologies, and still largely domestically oriented; yet it is still the crucial custodian of the biggest gas reserves in the world.

From the late 1980s, and on through the post-Soviet period, Gazprom supplied pipeline gas to Warsaw Pact markets and western Europe. However, according to Stern (2005), since the late nineties the list of suppliers, gas field sources, and overseas markets has altered significantly and impacted Gazprom’s (primarily) pipeline business. New major gas markets include Asia for instance; in response Gazprom’s pipeline orientation is gradually orientated eastward, together with exploitation of new fields - to serve these eastern markets. A new technology (for Russia), LNG, takes an increasingly large percentage of exported Russian gas to overseas markets. In fact, the liberalization of Russian LNG exports in 2013 (Sidortsov, 2014), was a key policy moment for Russia as it also heralded the strengthening of the Independents and

de facto introduced export competition to Gazprom; a new concept for Gazprom to ponder, and for Russian gas policy to accommodate.

The Russian population and its government from Soviet times onward, have had a benign view of their gas industry. Russian gas is perceived as plentiful, (apparently) inexhaustible, and cheap at the point of delivery. Its social contract aspect is also appreciated and more importantly - even today, relied upon by much of the population, especially outside of Moscow.

In the late '90s Yeltsin's ordering of Gazprom to stop/reduce gas supplies to Vladivostok, when Moscow was having "issues" with some of its Far East, independence-seeking governors, illustrates both Gazprom's "rental" power, and how its role as a state-controlled social contract instrument can work both ways. Russian Far East governors were brought back into line quickly, not least because of local citizens' concerns of trying to run their homes and facilities without heat in minus 30/40^{o}C conditions! Whilst the local population saw it as a sensible restoration of the vital social contract with Gazprom, the Kremlin (and Russian Far East governors) and observers like the author (who was resident at the time in Moscow and working for a British Oil and Gas company) saw it as a demonstration of Moscow's ability to still exert powerful political control over its Far East territories, from an impressive 9,000Km away (by road/rail).

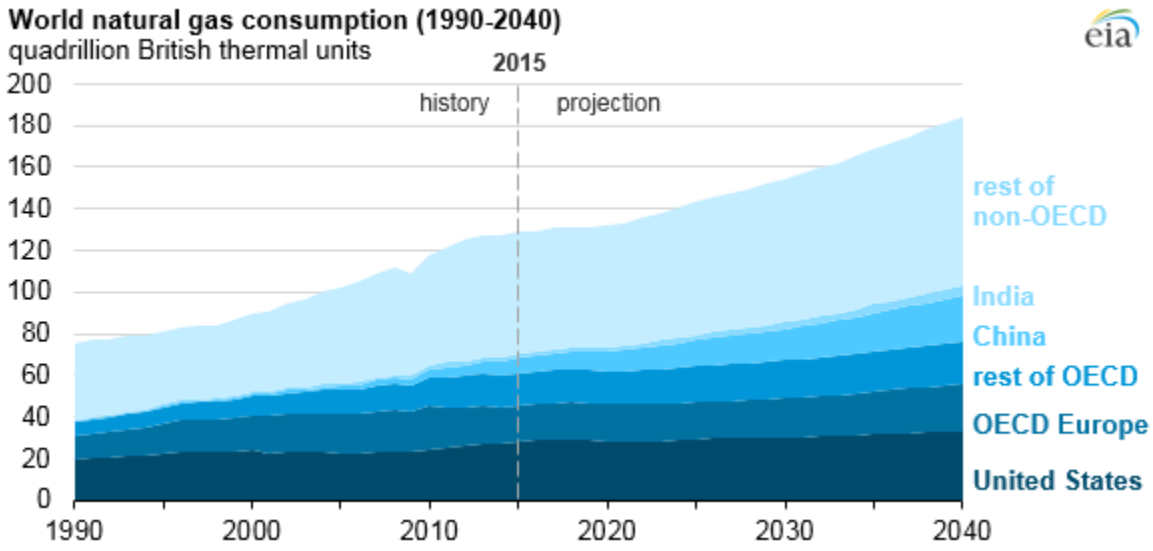


Figure 3. World Natural Gas Consumption (1990-2040). Source: U.S. Energy Information Administration, 2007

In the broader geo-economic context, international markets for natural gas have been undergoing profound change. Gas consumption worldwide has grown 25 percent in the last decade (see Figure 3). This shift toward gas exploitation has been facilitated by energy market deregulation, major infrastructural investment (e.g., in pipelines and ports, and Polar-class shipbuilding in the case of the Arctic), and environmental regulation that recognizes gas' less damaging effect on the environment (*International Energy Agency. 2011, 2014*).

In the case of Russia with enormous, booked gas reserves, these global trends have combined with the multiple effects of sanctions (lack of access to capital and banned technology), the application of new technologies such as LNG, Arctic accessibility / monetization, the emergence of the Independents, and closer Sino-Russian geo-economic ties. All have impacted Russian gas policy formulation in the early 21st Century, with varying degrees of success, and offer both challenges and opportunities to Russia as a major international gas player, and for its national champion Gazprom, the hitherto embodiment and instrument of Russian gas policy.

Gazprom: Role in Society and Gas Policy Formulation in the 21st Century

Today in the Russian Federation, Gazprom as the primary state-owned gas company, contributes over a third in receipts to the Russian budget; its operations are both country-wide and continental. However, its present monopoly domestic pipeline gas position is being challenged primarily by Russia's state oil company Rosneft, in the domestic and export arenas, as reported by Reuters (2017) where it is attempting to break into the domestic gas business by demanding Third Party Access (TPA) to Gazprom's monopolized United Gas Supply System, and by new, indigenous Independents – such as Novatek LNG, which are chasing Gazprom's export natural gas markets (which are also monopolized), as reported by The Moscow Times (2014), but with *alternative* LNG volumes transported from the Arctic to Asia via the NSR.

At a policy level, these commercial developments, and the global shift to LNG supply (away from the incumbent pipeline gas delivery system), as well as the broader internal competition by both private and state-owned Russian gas companies are now demanding an alteration in the structure and functions of the Russian Federation gas industry, and by default, Gazprom's dominant industry position in Russia. For instance, whilst the LNG business is an economic success, nonetheless as Russian LNG becomes the preferred method of delivery to international consumers in North East Asia, this means a potential reduced "rent" (see Glossary) for the likes of Gazprom.

As Gazprom is the state's established domestic gas supplier - and monopoly pipeline gas exporter to the European Union and China - as well as the key "rent" distributor in Russia to other industries and parts of the Russian economy (Gazprom fear, 2017), this has serious implications about its future structure and role, for the government - and the economy.

This has not gone unnoticed by the Russian government and its policy makers; the tension between Gazprom's domestic supply responsibilities with capped prices, and its revenue-gaining export opportunities, is the key policy factor and the major political sensitivity in the Russian Federation industry today and goes to the heart of emerging gas policy. Henderson and Moe (2019, p.2) note also how *"non-gas actors have a fundamental interest in upholding the current institutions of the gas industry"*. This emphasis on Russian energy institutions' importance, reflects Polycentric Regionalism theory's focus on the centrality of such agencies/institutions in embodying multi-regionalism strategy *firstly* (institutionalization), and only then - building *subsequent* economic development on the back of such institutionalization – leading to eventual political power.

Gazprom's Monopoly Positions

However, as Gazprom continues to argue, it has been responsible for supplying pipeline gas to both residential (largely price subsidized), and industrial customers since Soviet times. Henderson and Pirani (2014) provide the best analysis of recent Russian industry that includes coverage of these Gazprom developments. To be able to fulfil this "social contract" at regulated, discounted prices, it has been allowed to maintain by law, a monopoly on domestic third-party access to its distribution system, and sole pipeline exporter status, thus helping to sustain social stability at home, a key political objective of the Kremlin via a rental system, itself based on domestic and export revenues accrued.

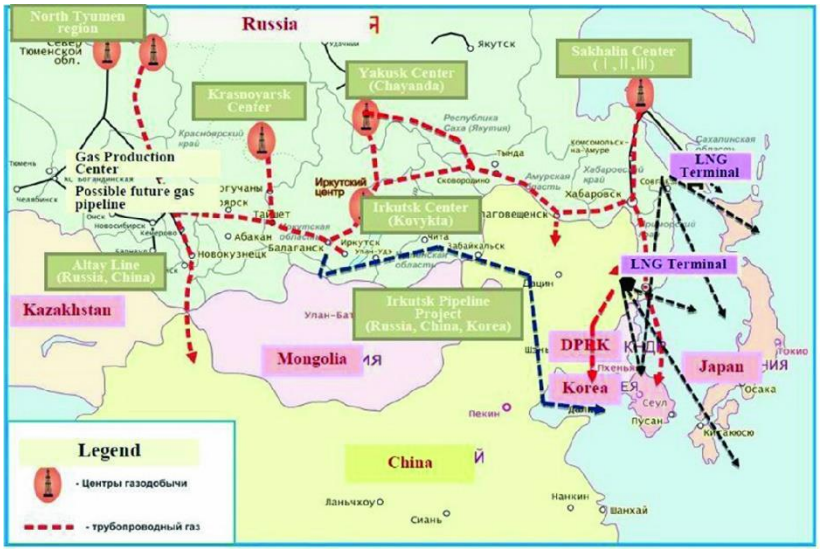


Figure 4. Russia's Gas Development & Export Plan. Source: Energy Security Cooperation, 2020

Exports offset regulated (discounted) domestic prices, and latterly allowed Gazprom to put in place a pipeline expansion programme, in line with a Russian gasification policy expanding out towards the Russian Far East and Arctic regions (see Figure 4). Gazprom's export revenues also funded the replacement of depleting western Siberian mega-fields, which in turn, allowed Gazprom to continue to guarantee gas deliveries to the European Union (and latterly to Asia as well).

Legacy Challenge for Gazprom: Depletions, Diversification, and Monopoly Position

Nonetheless, irrespective of Kremlin machinations and their benefits - or otherwise in updating Russian gas policy, basic industrial and economic issues continue to challenge Gazprom - and thus Russian gas policy: enormous Soviet-era fields such as Bovanenkovskoye, noted by Kruglov (2018) are depleting (see Figure 5), and the estimates are that by 2030, 30% of production will have to come from more expensive to maintain (Shatalov, 2016) new fields, which are split between offshore locations (23.7%) difficult and remote formations (32.5%), or already depleting fields (13.6%). This will warrant significant investment from Gazprom, which

detracts from its main, social contract mission to supply cheap (capped) domestic gas to residential customers and some, but not all industrial users too.

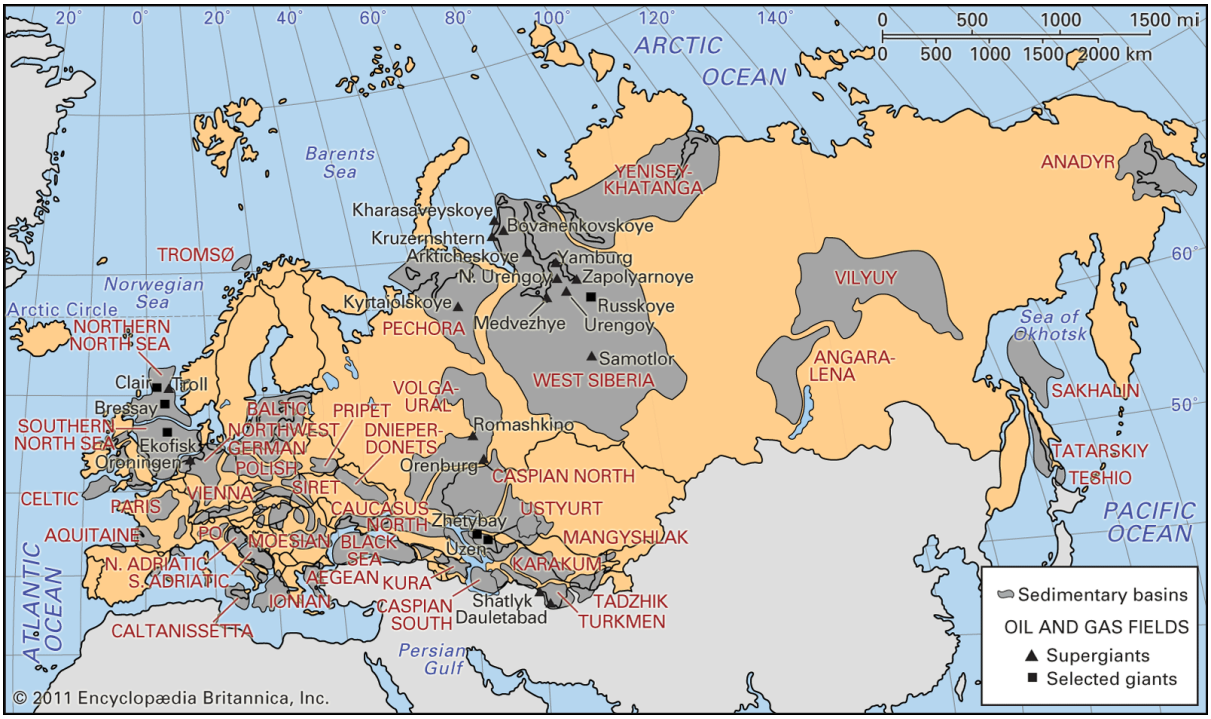


Figure 5. Sedimentary basins and major oil and gas fields of Europe, Russia, Transcaucasia, and Central Asia. Source: Encyclopaedia Britannica, Inc., 2011

The basis of Gazprom's Soviet-inherited wealth was cheap, fully amortized, gigantic gas reserves. They are now largely depleting, at least in western Siberia. This situation has made *export revenue critical* faced with rising debt, a refusal to be allowed to increase domestic prices, and the requirement for investment funding to develop new, higher maintenance fields. This has resulted in Gazprom's trenchant defence of its export monopoly position and a refusal to extend TPA to its UGSS, for what it sees as its domestic competitors' use, at the cost of their own production capacity - and customers.

In addition, the UGSS itself will clearly have to be updated and expanded too, as the present process of gasification of the Russian Far East - and some Arctic regions, gathers apace. The Soviet gas distribution system

largely ignored the Arctic and Russian Far East regions of Russia up until June 2007, as Paik (2012, pp.85-91) notes and instead, mainly connected-up and distributed gas to industrial and strategic econo-military regions and cities, located mainly west of the Urals.

Furthermore, the legacy of providing rent to the Soviet government, and at the same time acting as gas supplier of last resort as part of its social contract has made Gazprom somewhat domestically uncompetitive, over-politicized, and industrially behind the times. Moreover, this perception of Gazprom's rental-accruing role is also shared by the Russian Federation government in that decisions about Gazprom's future are intricately bound up with its interlocutor role with foreign powers such as China (and the European Union), with which Gazprom is authorised (and trusted), to conduct multibillion-dollar export negotiations. In this sense, the politicization and role of Gazprom in international relations and ergo, Russian gas policy, is indivisible.

Gazprom's role in events in Ukraine and the Crimea, Nord Stream, and Turkmenistan, and in deals with the likes of China and the European Union, bear testament to this view. These contemporary international deals conducted by Gazprom only came about because of Gazprom's Cold War success in establishing a hard currency earning Soviet gas feed to western Europe.

In Russian policy terms as stated, the emergence of LNG and its associated "Independent" producers, also challenges Gazprom's predominantly pipeline gas model. A growing concern for the Russian government is whether a private company like Novatek (producing LNG in the Arctic), and Rosneft, a state-owned oil behemoth (but which is attempting to enter the pipeline gas / LNG businesses *and* export to North East Asia as well), have employed different strategies and commercial

approaches to gain domestic and overseas gas markets to those of Gazprom, the state-owned gas giant; a view promoted by Henderson and Coe (2019). If so, this will demand structural changes in the Russian gas industry. Policy too will have to reflect these changes, which may have wider political implications for the Kremlin, shared by industry/Gazprom, but not necessarily of the same order.

Asia Dimension and Effect of Gazprom's Legacy Position

In terms of this vital export business though, a serious reservation gaining momentum is about Gazprom's pipeline business, and its limited ability to diversify into new, geographically separate markets in Asia (as opposed to more destination-flexible LNG). This in turn reduces its chances of rapidly capturing the expanding North East Asian gas market, as these multiple overseas consumers will each demand a pipeline (or dedicated trunk line) supply network. We shall see later how some of the public tension between natural gas suppliers such as Gazprom and Rosneft, and LNG suppliers such as Novatek, is precisely over this fundamental, strategic issue of gas-market competition in North East Asia, and the capacity to rapidly access the Pacific Arctic customer base and gain access to North East Asia, and in turn, the creation of a significant, regional gas market/hub there.

In addition, a major restriction on modern-day Gazprom is that the days of unlimited financial backing and the availability of state funding for capital projects is now heavily restrained. This fact, alongside sanctions, and privately owned and competing Russian gas suppliers, like Novatek which has managed to attract equity participation in Yamal LNG and project funding (including foreign funding (China's Belt and Road Initiative)), also exacerbates Gazprom's difficult position regarding the financing of replacement gas fields, as Paik (2012, p.86) acknowledges, and

diversification into new technologies such as LNG; the upgrading of the UGSS and not to mention the funding of the gasification programme for the Arctic and Russian Far East continues to put pressure on Gazprom and therefore in turn, Russian gas policy for the 21st Century. How does Russian gas policy attempt to square this circle, especially when – arguably, Gazprom is Russian gas policy personified?

Vertical of Power and the Russian Gas Industry

As several Russian energy expert interviewees discussed with the author, the fierce competition between state edifices like Gazprom and the new Independents exemplified by the likes of Rosneft and Novatek is the critical nexus point where the Russian gas industry meets the reality of the Kremlin's political considerations – and machinations regarding gas policy.

As part of Putin's "power vertical" of management/leadership style in Russia, favouritism is used to play competitors off against each other by the Kremlin. In this case that means Rosneft, Gazprom and Novatek. Whilst Miller is considered a safe pair of hands at the Gazprom helm, Sechin at Rosneft is a powerful oligarch and President of the Energy Committee and is also close to Putin. On the other hand, Timochenko and Mikelson (the original oligarch owner and Chief Executive Officer respectively) of Novatek, find Kremlin favour by consistently performing; on time and within budget with a project (Yamal LNG) that is considered strategically important by Putin, because of its Chinese investment in it (Belt and Road Initiative), its commercial underpinning of the use of the NSR, and Russian LNG's role in the formation of the Pacific Arctic region and the concomitant development and capture of a massive LNG market in North East Asia.

As Zygar (2016, p.16) goes on to note too:

"The top political leadership has stakes in the success of all three companies, even if they may compete against each other - and any policy developments must be understood against this background".

For instance, both Novatek and Rosneft achieved their objective of partially liberalizing Russian LNG (by breaking Gazprom's monopoly position for LNG export in 2013) by heavily lobbying the Kremlin (Zasedenie, 2013). The Kremlin agreed as it wished to support the Yamal project for geopolitical reasons; and it equally wished to see Rosneft gain some commercial benefits at the cost of Gazprom, which was seen to have dithered over the execution of its own Sakhalin LNG projects, according to one western energy specialist interviewed, who has been intimately familiar with the various Sakhalin LNG projects, over a twenty+ career analysing their various operations.

But equally, Putin refused heavy lobbying by Rosneft's Chief Executive Officer, Sechin, to allow Rosneft TPA into Gazprom's Power of Siberia pipeline project to China, nor to allow total export liberalization (pipeline gas & LNG) and refused also Sechin's wish to break-up Gazprom – as discussed by Podobedova (2015). Barsukova (2016) records however, that the leading gas Independent, Novatek LNG, supports the fundamental argument of Rosneft that there should be pipeline gas (export) competitors to Gazprom, but that Gazprom should as a critical state asset, be kept intact. Such a suggestion is largely political in my opinion, as Gazprom still owns 10% of Novatek and is not a company to make an enemy of! This debate about pipeline (export especially) monopoly continues to this day.

For the government, the key energy policy questions according to Henderson and Moe (2019, p.17) are still: What is the best way to develop the country's resources; and whether the Independents should be given a bigger role in this process? But who/which company will be involved in this process, will always be a matter considered in relation to the power vertical. This is a theme I shall return to in the Russian Arctic Gas chapter as it is impacts issues such as Sino-Russian trust, level of Chinese commitment and investment, and the nature of joint gas/ LNG project criteria.

The Bottom Line in Gas Policy Formulation; The Rules of the Game.

Whilst industry policy reform is increasingly necessary for the commercial and social contract reasons outlined, nonetheless political obstacles remain to reform. Barsukova (2016, pp.21-39) reminds us that economic reform in general, is dependent not necessarily on the strength or weight of evidence, but on *"the rules of the game for how business should be subordinate to the state".*

Key industry sectors (like energy) are part of this system, and dependent on decisions from government that are often based on *national interests, and not necessarily economic needs*. This approach is reflected in the rent management system imposed by the Kremlin, and the subsequent transfers from the likes of Gazprom, to favoured interlocuters, as diligently noted by Gaddy and Ickes (2015). Any change in the rent management system, and more importantly to those who control it and or benefit from it, is a major political consideration in the decision-making process regarding structural and governance reform of the domestic gas sector.

To the extent that LNG complicates matters as it is partly in private hands, it is outside the scope of pipeline distribution and export dominated by state companies. However, as one Russian energy consultant with close

ties to the Kremlin suggested when interviewed in London, it (LNG) is a politically competitive question mark for Rosneft and Gazprom, and Novatek's survivability depends on it continuing to make money, attracting Chinese investment and interest, spearheading entry into the LNG market in North East Asia - and monetizing the NSR; all of which economically speaking, solidify Sino-Russian relations which is a good thing as far as the Kremlin is concerned. Balance is all in other words, regarding emerging Russian gas policy.

The Emergence of LNG in Russian Gas Policy Calculations

A strategic change in the global gas market is the emergence of LNG, as an international gas delivery system; that has directly impacted Russian energy policy formulation, as sea-borne LNG can be delivered and traded *beyond the regions* in which it was extracted. This has enormous import in Russia's Arctic, where changing climatic conditions now facilitate access to hydrocarbon resources there and their subsequent transportation to markets, via Russia's NSR. This is therefore a highly significant geo-economic asset for Russia and its geopolitical ambitions.

As a result of LNG technology, iced regions in the Russian Arctic with vast reserves of gas can now be connected by the LNG process to *international customers via sea*. Consequently, production areas in the Arctic such as the Yamal Peninsula where Russia's Novatek LNG operates - and which is now linked to Asia via the NSR, have become strategically and commercially significant for both China's security of gas supply and Russia's security of demand, respectively. This form of supply (LNG) is I argue, the territory-linking basis of the economic underpinning, creation, and future integration of the Pacific Arctic region; economic linkage and physical connectivity by both LNG (maritime) and pipeline (land based)

delivered gas. Arguably this is a strategy where Russian *national interests and economic needs* as noted earlier, may eventually coalesce.

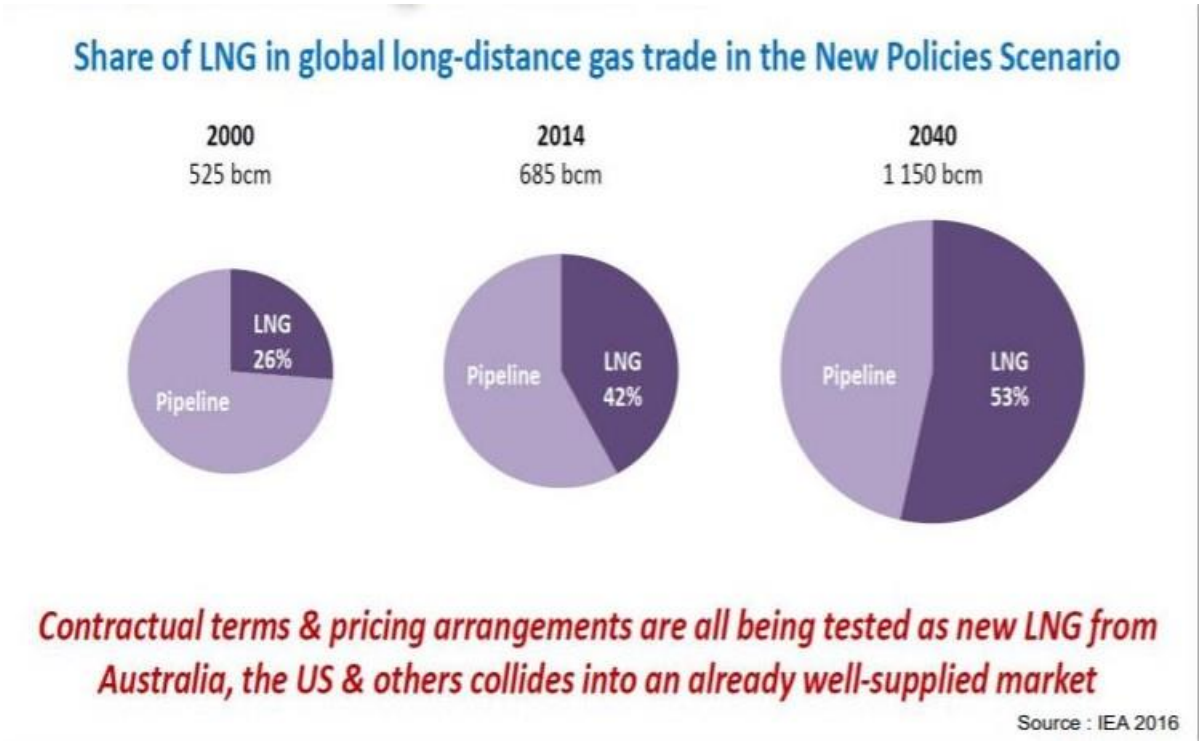


Figure 6. A wave of LNG spurs a second natural gas revolution. World Energy Outlook 2006. IEA 2016

For Russia - and its gas policy model operating on the global stage, both opportunities and challenges present themselves: LNG's growing dominance in neighbouring North East Asia, where the world's three biggest LNG customers exist (Japan, China and the Republic of Korea), may mean that traditional Russian natural (pipeline) gas, although arguably better from the point of view of long-term, take-or-pay contracts, and mutual security of supply / demand in established markets (such as in the European Union), is equally seen by potential North East Asian customers as an expensive anachronism, lacking supply diversification and thus increasingly uncompetitive with internationally available LNG (see Figure 6). This is partly because of the necessity to build and pay for new, eastward-oriented, international pipeline connections from Russia. Equally, for Russia there is a further necessity to develop new gas fields

in the east of Siberia, to meet the additional Asian demand. This exemplifies the tension between a traditional model of pipeline gas, largely based on security of *supply* (see Figure 7), clearly being challenged by North East Asia customers shifting toward an *interpretation of security in market* terms (i.e., sufficient traded volumes of gas, regularly available, at a competitive price), and *increasingly delivered in the more flexible/trading form of LNG*.

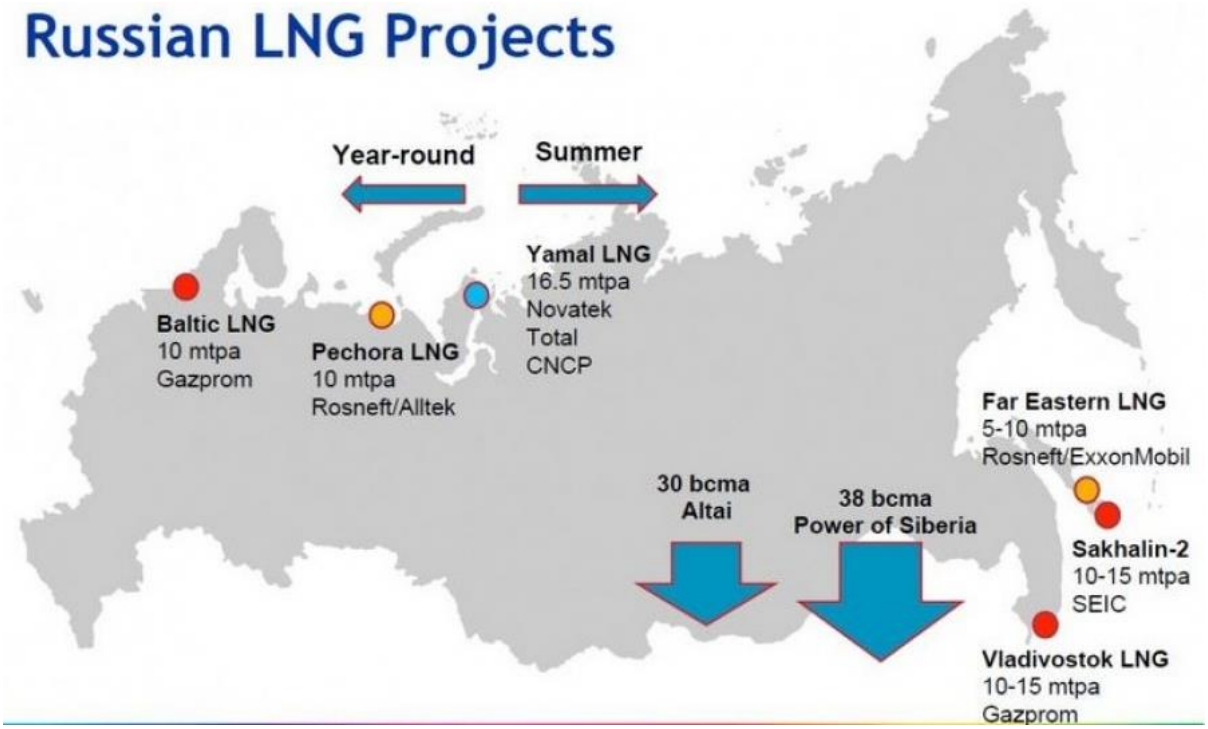


Figure 7. Yamal LNG and other Russian LNG projects. Source: Asia Pacific Foundation of Canada, 2015

Figure 7, a 2015 map of Russian LNG projects, requires comment and updating. Both Rosneft's Pechora LNG project and Gazprom's Vladivostok LNG venture, are presently stalled /behind schedule. This is notable because, as Figure 5 clearly shows, the global trend of long-distance gas trade is clearly moving away from pipeline delivery means, to LNG. Part of the problem for Rosneft's project has been obtaining an LNG export licence; later it was explained as economically inferior to other, similar Rosneft investment opportunities. Lastly - and possibly most

convincingly, it was rumoured that the massive Shtokman gas field (cancelled originally due to the emergence of US Shale projects in the early noughties) may well be reappraised for investment, thus negating Rosneft's need for developing Pechora. Concurrently Gazprom's LNG project at Vladivostok, has had its capacity reduced from its original figure of 10mpta – to around 1.5mtpa (March 2021 figures). It appears now that the project will seek high value spot market opportunities for sales, including the shipbuilding sector and small scale, niche LNG markets.

The central issue for emerging Russian gas policy is already therefore, one of "balance"; and that will not be just an economic/industry consideration as the likes of Paik (2012) forcibly argue, but a Kremlin one too, especially when addressing new market opportunities in China/North East Asia, and developing both pipeline - and LNG deliveries, whilst maintaining established pipeline delivered gas markets in the European Union.

Developmental Issues and Tensions

The Independents

Gazprom initially welcomed the emergence of "Independents" in around 2004 (defined as any Russian gas/ LNG company other than Gazprom, and either state-owned or private) as they could reduce the burden on Gazprom of supplying domestic gas, and by doing so allowed Gazprom to concentrate on more profitable export gas deals that would pay for upstream ventures and the eastern gasification project as already noted. In fact, the Independents' share of domestic gas supply was around 20% by the end of the decade according to Henderson and Pirani (2014).

Concurrently Gazprom was subsequently allowed to raise (the government capped) domestic gas prices to cover its increasing costs,

and central Asian suppliers' gas becoming more expensive, but the 2008 crash left Gazprom with a gas surplus, whilst the new Independent gas entrants (Rosneft and Novatek), unrestrained by price capping, signed up more premium customers who appreciated their better account management, commercial efficiency, and technical reliability. Henderson and Moe (2019, p.10) estimates that Novatek was selling gas at a 2% discount to Gazprom's prices, at one stage.

This marked the end of good relations between Gazprom and the two gas Independents, as Rosneft and Novatek were now undercutting Gazprom's *regulated* prices and capturing a premium client base, that could not source gas from Gazprom. With Gazprom's pipeline and export monopoly businesses protected by law, the Independents had also attempted during this period to compete with Gazprom over domestic gas *production* (which is not protected by law in Gazprom's exclusive favour). Rosneft for instance acquired the gas trader Itera and TNK-BP as well, as reported in the Financial Times by Weaver (2013), as part of this production acquisition strategy to compete with Gazprom in the domestic marketplace.

By 2018, the Independents accounted for 32% of total Russian production and 42% of Russian consumption (Gazprom, 2019). However, the decade ended with no real gas policy reforms or any change in governance, and only minor changes in companies' political strategies, but with some resultant amended regulations. These actually backfired to some extent on Gazprom, as its aspiration for limited liberalization (e.g. price capping) coincided with the arrival of Independents who were interested in the domestic market - as opposed to Gazprom whose emphasis was on revenue earning export markets, and which almost led to the emergence of a quasi/fledgling gas market in Russia within which Gazprom would

have found significant domestic competition; this had serious implications, such as a possible altered rent distribution system that unnerved some in the Kremlin, and those with close ties to the Kremlin and an interest therefore in the prolongation of the established, Gazprom-facilitated system of rent allocation.

So overall, as Henderson and Moe (2019, pp.26-30) comment whilst changes in domestic pricing had been caused by investment needs (e.g., the eastward gasification project and replacement of depleting western Siberian gas fields), and cost increases, the effect was not to spur industry reform in the second decade of the 21st Century, but to simply change the balance amongst the three principal players: Rosneft, Gazprom and Novatek. This could not be seen as an unforeseen consequence however, when one considers the vertical management style of the Kremlin - as already noted, and the financial stakes at risk of any change in the rent system (at home or abroad), for both state and private interests involved in the Russian gas/ LNG businesses and/or its policy development.

The Independents versus Gazprom for Domestic and Export Market(s)

The Independents clearly want export access/liberalization for both LNG and pipeline gas (LNG they already have in fact); the argument deployed is that in return they will take on supplying more domestic (pipeline) clients and agree to assist in some gasification projects in the Russian Far East, which Gazprom is obliged to fulfil under the terms of its social contract with the government. Meanwhile however Gazprom wanted to maintain exclusive pipeline export status as described already and is under pressure now to open-up some of its domestic market to the Independents (via TPA); but Gazprom also wants to be able to compete with the Independents on domestic pricing - as well, and not be bound by regulated prices to households as Stern (2017), notes, as per its social contract

covenant. Historically and legally, Gazprom has enjoyed a monopoly on domestic distribution (TPA) and exports (authorized monopoly), but *not production*. This third sector is where to date the Independents have been competing, but as their production grows it is obvious that they need distribution (TPA) and exports rights as well, in order to monetize their gas production! From an economic point of view, the Kremlin agrees.

This tension perfectly illustrates the policy problem: the relationship between exports and liberalization policy - and the structure of the present domestic gas industry. Compromise will be required within the power vertical; and that will be a political - and not an exclusively commercial decision. The challenge for China as a potential (and increasingly actual) massive customer is that this industry process is perceived as fuzzy and hugely political. This puts strains on the Sino-Russian relationship and encouraged China to attempt to move into Russia's Upstream sector (Exploration & Production) and buy equity positions in Russian gas fields, to compensate for this midstream (e.g., TPA/ licensing issues aspect of the business) wrangling, a consequence of unreformed Russian gas policy. In an interview at Renmin University, Professor Zhengyu Wu, who specialises in Chinese Energy matters, reinforced that this (an equity position for China in Russia's Up-stream), is still an issue in Sino-Russian energy relations.

For Gazprom, if it can maintain its monopoly over both distribution (no TPA to other producers/Independents) and exports it argues, then it can deliver to residential consumers as usual, thus maintain social stability, and continue its gasification programme for the Russian Far East and Arctic regions. These are all persuasive *political arguments* that the Kremlin listens to intently, especially as sanctions-driven unemployment rises, the west's objection to Russian gas deliveries to the European Union

increases, and access to foreign capital remains limited, resulting in increased national debt.

In addition, from an export point of view, Gazprom states that its occupying of a monopoly position is exactly why revenues/rents can be maximised (back to the state), and that liberalization abroad will lead to Russian competition between all three players, which will result in an overall drop in gas pricing, which could mean a drop in the rent, back to Moscow. The Independents counter according to Mikulska and Jakubowski (2020), by suggesting that with an abolition of Gazprom's export monopoly, this would lead to greater competition, access to a new customer base for Russian gas, and the potential to develop a *Russian-influenced* gas (and LNG) market in North East Asia; this would lead to *maximising* revenues for Russia. For the Kremlin this too is a commercially - and geoeconomically persuasive argument.

In a nutshell, according to Russian interviewees in Moscow familiar with the Russian gas scene, Gazprom is promoting security of delivery to Asia - thus maintaining power in the producer/buyer relationship, whilst Novatek LNG is instead promoting the (future) *security of the giant Asian gas/ LNG market* (as a regional trading hub). This means *de facto* that geo-economic power will shift steadily *from Russian producers to their Asian consumers;* China, accordingly, is acutely aware of this change in the balance of economic forces in North East Asia and its energy relationship with Russia.

Summary: Present State of the Russian Gas Industry

Three consistent themes emerge in this Russian Gas policy section. Firstly, the lack of access to capital that the industry faces and has been facing since western sanctions were imposed in 2014. An industry such

as gas is highly capital-intensive for both ongoing and prospective projects, and as an industry, Return on Investment is often measured in decades after the initial capital investment. This therefore dictates that investment horizons (especially for pipeline gas) are long, that long term supply contracts are the “norm”, and strategic direction and planning is developed over decades, not years.

On the other hand, an increasing Kremlin concern is that whilst LNG-delivered gas is a serious (Russian) competitor to Gazprom’s Power of Siberia pipeline to China, in terms of Russia’s political economy it is a strategic opportunity to diversify and increase its supply-base to the three largest LNG consumers in the world namely, Japan, China and the Republic of Korea. The balance sought by the Russian Federation government is offering financial incentives and tax breaks for LNG businesses, whilst not undermining rents generated by Gazprom. The multi-regionalism prize, however, is capturing the biggest LNG market in the world (North East Asia) *and by doing so*, greatly facilitating the emergence of the Pacific Arctic region as a Sino-Russian regional sphere of geopolitical interest via these geo-economic means.

Secondly, the effects of sanctions. Fierce industry competition both domestic-based and international for Gazprom’s established European market and more importantly, the emerging North East Asian market is putting an additional strain on the Russian gas industry and Gazprom as its national champion, and further compounds the issue of dwindling development funding from international sources of capital since sanctions were imposed. Moreover, new pipeline gas projects in North East Asia are expensive, and the combination of a low global oil price, and high production/development costs in the Arctic – make development projects in Asia economically tight for Gazprom. The importance therefore of

Chinese investment in LNG projects such as Russia's Novatek is of clear strategic importance and will be discussed in the next chapter (Russian Arctic Gas).

Gazprom and Techno-Industrial Competition - LNG

Finally, competition, both technical and managerial (Gazprom). At a technical and Upstream investment level (Exploration and Production), the emergence of LNG in global gas markets as a growing means of gas delivery - especially in North East Asia directly competes with Gazprom's core business of natural /pipeline gas delivery in Europe - and its plans for capturing the gas market in China and North East Asia as well.

This may mean for Gazprom's natural (pipelined) gas, although good from the point of view of long-term, take-or-pay contracts, and security of supply/ demand as already discussed, is seen by North East Asian customers as inflexible, as well as being physically tied to a single source/ production field. But perhaps the most serious reservations about Gazprom's ability to fully capture the expanding North East Asian gas market, is its *inherent inability to supply more than one consumer, per dedicated pipeline network*. This is especially significant for Russia, which as part of its geo-economic strategy for working with, but at the same time limiting China's economic power in North East Asia, is the necessity, according to the likes of Diesen (2017) to act asymmetrically and concurrently supply Japan and the Republic of Korea – as well as China, with gas. Without Japan and the Republic of Korea as LNG customers especially, the Pacific Arctic is unlikely to emerge as a powerful, independent region, nor the commercial location for a regional gas trading hub.

In the next section, public tension is illustrated between natural gas suppliers such as Gazprom and Rosneft, and LNG suppliers such as Novatek, precisely over this fundamental, strategic issue.

The Kremlin's Policy Dilemmas, Challenges and Opportunities

As already rehearsed the Russian gas industry is also intrinsic to Russia's broader foreign policy relationship with Europe, China, and Asia in general. This increasingly Asian emphasis coincides with the received macro-economic view of the world, in which the centre of global economic gravity is moving steadily from mid-Atlantic to the Asia Pacific Region, and as such, gas demand in Asia is increasing too, especially in the North East Asian market.

Consequently, the effects of global low energy prices (including gas), a trend of lessening gas demand in Europe (Gazprom's largest customer), western sanctions, and depleting gas fields in western Siberia that must be replaced is taking a considerable toll in terms of these critical parameters and on Russia's stated gas policy, regarding: new field development in the Arctic; gasification of the Russian Far East; technology applications; and the rate of exploitation of new gas markets in Asia.

One major policy conclusion that Putin has acknowledged in terms of these (above) factors, and the three other contextual factors already noted facing the Russian gas industry, is that the industry must develop new gas markets in the 21st Century. China appears to be an obvious neighbouring partner of choice in Asia, along with other key consumers such as the Republic of Korea and Japan. China for instance, has the financial resources, scalable demand for gas, and the technology to partner Russia in its quest to supply - and develop the potentially enormous North East Asian gas market and satisfy its regional demand. This is especially so

regarding LNG, where China has invested in the Arctic (Novatek's Yamal LNG project) and from where the biggest global consumers of LNG including China, can be supplied.

A Eurasian (European Union and North East Asia) Gas Market Strategy Emerges`

Russian emphasis (toward Asia) is on their LNG industry and Gazprom's giant "Power of Siberia" natural gas project, transporting pipeline gas from the Kovytka and Chaiandinskoe gas fields in Irkutsk and Sakha, respectively. Both industries export gas to China and represent the contrasting commercial, economic, and geo-economic advantages (and limitations) that characterise these two distribution and delivery systems and increasingly reflect the role of Russian gas policy, in accommodating them both at home and abroad.

However, Russia must continue to supply Europe, at the same time as it attempts to enter the Asian gas market; concurrently part of the purpose of the US' latest round of sanctions directed at Gazprom is to a), destroy Gazprom's domination of the European Union pipeline gas market - and *de facto* weaken further the Russian Federation as a state, and b), replace it with US LNG supplies. Russia's response to this threat is three-fold: to publicly highlight the European Union's own concerns (and row with the U.S.) about the threat to long term security of supply to the European Union; secondly, highlight also the higher cost of alternative US LNG supplies; and thirdly to emphasise the development of an additional Siberian gas pipeline into western China (the Altai or "PoS2"), that would effectively make Russia a "swing" gas supplier to both Europe and Asia, and thus allow Russia to deploy - for the first time ever, some *political* leverage over future European gas supply negotiations, whilst simultaneously entering the enormous Asian gas market.

Partly as a result of this strategy, Russian gas policy now includes the LNG business (the third response), with the aim of capturing at least 30% of the global LNG market by 2030 according to Musikhin (2019, pp.16-29). This means that Russia will now compete head-on with Australia, the U.S. and Qatar (amongst others), for the highly lucrative, and critical North East Asian LNG market. But it also means that Russian pipeline and LNG projects could be competing against each other abroad; an additional *political* focus for emerging Russian gas policy. In addition, Gazprom's hold on European Union supply is still critical in terms of the revenues generated, for the funding of gasification programme in the Russian Far East and development of new fields in eastern Siberia to replace depleting Soviet-era gas fields in western Siberia, which supply the European Union.

In sum, pressures on Russia's gas industry have direct consequences for the government in areas such as Gazprom's rent distribution system, its relationship with the Kremlin, domestic and international gas markets, and Russia's broader international (energy) relations, especially in the European Union and Asia. The route to sustainable growth and expansion into new markets like China and North East Asia is at present far from clear.

Latterly, as industry observers like Henderson and Moe (2019, p. 24) have identified (at least) four policy areas of concern regarding Gazprom as they impact areas such as regionalization and integration. They are: long-term security of demand concerns for Gazprom with regard to both the European Union and Asia; the lack of commercial competitiveness in Gazprom, its lack of access to western capital markets, and its deteriorating level(s) of technical know-how and management systems - compared to its competitors; the challenge of Gazprom's stolid and poor

political leadership in establishing Chinese/North East Asian gas deals, in the face of Rosneft's more radical and operational strategy, and Chinese equity-holding Novatek's already successful LNG penetration of the gas market in North East Asia; and fourthly, the tension between a Chinese desire to hold Russian upstream equity positions in Arctic/Siberian gas fields (to supposedly ensure security of supply compliance), and Russian reluctance to agree to such demands as noted already, on the grounds of national sovereignty, and Russian exclusivity over its own natural resources.

Thus, Gazprom faces international political as well as industry and economic challenges, in terms of a new 21st Century Russian energy policy. This equity issue was repeatedly brought up in interviews that the author conducted in China with leading Energy scholars and commentators, including Professor Yang (June, 2017), China's most eminent Arctic scholar and Vice-President of the Shanghai Institute of International Studies, a part of the Chinese Ministry of Foreign Affairs.

For these types of reasons Gazprom cannot fail in the eyes of the RF government (although it is badly managed and slow to respond to global gas trends), as it is both the major source of Russian gas exploitation (and therefore rent back to Moscow), but also a *political conduit* regarding relations with the European Union and Asia - and especially China in the years to come. Consequently, the idea of the Independents ever fully being able to level the competitive playing field (via liberalization, TPA, and /or cancelling Gazprom's export monopoly of piped gas) is questionable.

Gazprom's Power of Siberia and Altai (Power of Siberia 2) Projects.

Figure 8. Russian Pipeline Routes to China. Source: Gazprom, 2020

However, the Gazprom story is not all bad news. Despite these domestic challenges and Russian LNG competition overseas in North East Asia, in May 2014, the Chinese and Russian governments signed a 30 year £400Bn gas delivery deal to China, the "Power of Siberia" (PoS) project; Gazprom agreed to supply 38bcm of gas from Russia's eastern Siberian and Russian Far East fields to Bohai Bay, and supply specifically China's three north-eastern provinces of Heilongjiang, Jilin, and Liaoning (see Figure 8). This was and still is, an important economic regional integrating aspect of the deal between China and Russia (as these three north-easterly "Dongbei" provinces border Russia's Far East region), and partly why a trusted state organization such as Gazprom was involved from the get-go in negotiations with China. China knows full well that it is the Kremlin that it is in fact, engaging with, regarding these energy deals.

Significantly, this was *before* sanctions were imposed upon Russia, and before a 50% collapse in the global oil price. Paradoxically, these two events in fact led to a further deal some six months later (November 2014), for gas supply to China, from the western Siberian "Altai" (Power of Siberia 2) pipeline. Paik predicted when in discussion with the author in 2017, that in combination, these two major projects (PoS1&2) will change the energy supply/demand balance in Asia, whilst threatening the global expansion of LNG projects too.

Economically, this was because for Russia, such natural gas projects would complement the significant supply of western LNG to the Bohai Bay market and, in the case of the Altai (PoS2) natural gas pipeline, make Russia a swing gas supplier between Asia and Europe as noted earlier. This underpins Russia's asymmetric strategy to deal with China; by always having additional/alternative consumers for its gas and LNG, and thus reducing (but not eradicating) its total economic (energy aspect) dependency on China.

The LNG Business

Examination of the Russian LNG business is particularly emphasized in this chapter for three reasons: industry-wise, it is rapidly gaining an increasing share of the global gas market (in comparison with pipeline gas), and is therefore demanding a change in the structure and organizational policy of the pipeline-dominated Russian gas industry; concurrently North East Asia is a crucial and neighbouring regional LNG market with the largest LNG consumers in the world, and finally; it is being developed within the Sino-Russian energy relationship by both Independents (e.g. Novatek's Yamal LNG and Arctic LNG projects), and state-owned enterprises such as Rosneft's & Gazprom's respective LNG projects, resulting in both tensions and opportunities within Russia in

pursuit of the creation of an North East Asia regional gas market/hub. Crucially too, it is my contention that Novatek's Yamal LNG project (above all other Sino-Russian gas ventures) is instrumental in creating the Pacific Arctic region, a Sino-Russian multi-regionalism quasi-experiment in a bottom-up driven regionalization concept in North East Asia, as rehearsed in the Theory chapter.

Evolving Russian Policy Toward LNG

Russia's neighbouring North East Asia is now the largest LNG market in the world, with the three top consumers of LNG located there (Japan, China, and South Korea). Russian LNG (as well as other nations' too) in other words is a major gas game-changer and market-maker in North East Asia. This factor alone will have a material effect on the political economy of the North East Asian region and with that there will be geo-economic and geopolitical consequences too, for Russia's domestic energy industry.

Gazprom was the first Russian company to develop an LNG business and sell LNG overseas in 2005 (Gazprom, 2006). It suggested attaining a 9% share of the global LNG market by 2020, and aimed at increasing it to 14%, by 2030 according to Investor Day (2011, p.127). Overall, it was seen as a successful new business as it fulfilled several policy goals in one commercial move: It developed Russia's stranded offshore gas assets; it established an international market for Russian gas; and it promoted this new (for Russia) LNG technology.

From the Russian government's point of view Gazprom's policy to move into LNG served several additional objectives too as Mitrova (2013) notes:

- Export markets resulted in a more balanced trade portfolio and added to the Russian Federation's foreign currency income.

- The development of geo-economically important regions such as the Arctic, Russian Far East, and eastern Siberia.
- Kick-starting economic and industrial investment in remote regions in the Sakhalin Islands, Barents Sea, and Bering Strait; this included the centrality of LNG shipping in developing the NSR, a foundation stone of economic growth in the Arctic region(s).
- Consolidating via major energy deals, broader geopolitical influence in North East Asia, especially with China.

These objectives and aims were consolidated in the Federation's Russian Energy Strategy (2009), and in fact as Mitrova states (2013, p.20), the government encouraged the growth of this industry by reducing the export tax on LNG exports, to zero. As pipeline export gas was rated at 30% this was a huge concession and added a competitive edge between the Gazprom pipeline business and Independents (and Gazprom's own LNG business), exporting LNG to the same overseas markets.

Despite Gazprom's initially successful start with LNG, things have not progressed well since. Four Gazprom projects are summarised here, along with brief commentaries that illustrate some of the industrial, commercial, and policy issues that faced the company - and continue to do so.

The Shtokman and Baltic LNG Projects.

The Shtokman project was/is an enormous gas field, some 500Km offshore in the Arctic's Barents Sea, with 3.9tcm of gas (Moe & Jorgensen, 2000) and was an ideal source of gas for LNG and positioned well to supply both Europe and /or the eastern Seaboard of the U.S. The project had minority foreign partners (Total @25% and Statoil @24%), and

included an LNG facility in Murmansk, with an interconnector to the Baltic Sea.

However, it failed overall for reasons of cost overrun and the revolution in US shale gas (a target market for Shtokman LNG exports). The economics literally fell out of the project. But there were other issues that could only be laid at the door of Gazprom, and which continue to today, much to the consternation of the government. As Loe (2018) comments, Gazprom's management would not accept advice from its western expertise partners who already had LNG expertise (Gazprom had none), and in general Gazprom badly managed their foreign partners' contributions. In fact, the author was also asked by Gazprom about the efficacy of this project in the early noughties in Moscow.

Secondly, delay and indecision about where to market the gas - or LNG, cost the project opportunities in both the European Union and U.S. This was then compounded by the shale revolution in the U.S. As Moe (2010) points out there was more to come: little fiscal support for such an enormous and strategically critical project from the Russian government.

If this was not bad enough, a second project, the Baltic LNG, also run by Gazprom failed too and for similar structural and mismanagement reasons. This was a 7mt LNG project reappraised in 2004, and this time with a Canadian partner (Natural Gas Intelligence, 2004). The sourcing of gas was controversial, the marketing strategy was again, muddled, the financial resourcing poor (just after the global crisis of 2008), and global energy market conditions were in any case, underperforming. A further aspect was that the sourcing gas (from Yamal) was directly competing with Gazprom's West Siberian pipeline gas, which could be delivered more cheaply - and was much closer to the Baltic Sea too! The project was cancelled in 2008 as reported in Reuters (2008), further undermining

western trust in cooperation with Gazprom – especially regarding highly complex and expensive LNG operations.

Sakhalin-2

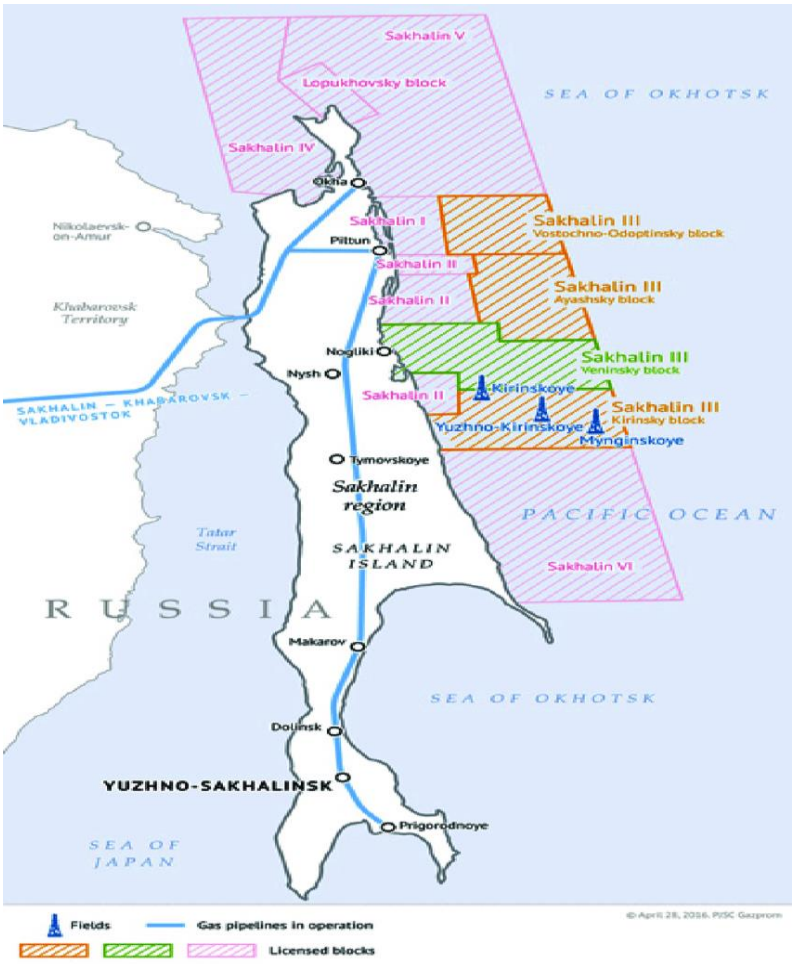


Figure 9. Energy Fields and Licensed areas in the Sakhalin Region. Source: Gazprom, 2004

Sakhalin Island (see Figure 9) is in the Russian Far East, in the Pacific region, South East of Vladivostok. It is Russia's first LNG project and is in the Sea of Okhotsk, with 600bcm of reserves in the Piltun-Astkhskoye field complex. This equates to a two-train capacity (9.6mt), and the construction of an LNG liquefaction plant, at the southern end of the island.

Gazprom has had the controlling stake in the operating company, Sakhalin Energy since 2009, when it wrestled the project from partners,

Shell, Mitsui, and Mitsubishi, which originally formed up in 2006, and had already done the hard, technical, work well before Gazprom became lead partner. Gazprom - supported by the Russian government, claimed as Krysiek (2007) notes, that the original Production Sharing Agreement was unbalanced in the partners' favour, and so determined according to Bradshaw (2009), that it was a breach of Russian law. This move was again dimly received by foreign partners, and undermined confidence in any future collaboration with the Russian gas industry, as noted by Brooke (2006). In fairness though, the Russian government also noted Gazprom's attitude with growing concern from a policy point of view, especially as global market conditions tightened and (later), sanctions began to bite.

The policy importance of this project (and Gazprom) is that Sakhalin-2 exports (10.8mt in 2011) are to North East Asia (Japan and the Republic of Korea); this represents the first diversification success, away from the European Union, for Russia. As such there is a case now for an additional, third LNG train to be added. The issue however is the source of the additional gas required. The obvious answer was Rosneft's neighbouring Sakhalin-1 project that is presently shut-in, whilst looking for a market. Rosneft, an emerging threat to Gazprom's position as monopoly gas operator did not agree a price for the 8bcm of gas it has, and frankly, as Gorst (2014) notes, it had its own LNG ambitions! This fiasco (see later) has resulted in the government hinting that it will be the final arbiter of development of Sakhalin – going forward, as a result of this costly domestic and incoherent rivalry.

Sakhalin-3

Gazprom's Sakhalin licence also extended into the two offshore fields of Kirinskoye and South Kirinskoye, containing approximately 700bcm of gas. But again, although Shell was the existing Sakhalin-2, partner with

offshore experience, and could have rolled over the licence into Sakhlain-3 as well, (and thus provided the gas for Sakhalin-2's Third LNG train), Gazprom's reluctance to share upstream assets with foreign entities reared its head again. An agreement was signed off finally in 2015, at the St Petersburg Economic Forum (Royal Dutch Shell, 2015) when Gazprom realised that it could not proceed alone. However, the US determination that their 2014 offshore sanctions (Chiacu, 2015) now included the Kirinskoye fields as they lay under 500 feet of water (a stipulation of the sanctions), meant that in 2015 the Shell partnership and the development of Sakhalin-3 project was by 2019 at least, effectively over.

Vladivostok LNG

This was a 100% owned Gazprom operation, although a consortium of Japanese companies was involved in planning up to the final approval stage. The project was designed in 2011, to produce 10-15Mt of gas and was part of a regional gas network to integrate all gas in eastern Russia, as Mastepanov (2015) outlines. Some coordination of the project's liquefaction plant at Vladivostok was expected with the Power of Siberia's (pipeline gas) concurrent negotiations with China, as well. (Mitrova, 2013, p.19). Confusion reigned as to whether the gas would be sourced (via PoS from Siberia), some 3,500Km away, or from Sakhalin, via the Sakhalin-Khabarovsk-Vladivostok pipeline. The former seemed un-economic, and the latter immediately undermined the expansion plans /economics of Sakhalin-2. In combination with US sanctions and the need for certainty of supply when signing long-term gas contracts, this project too was badly managed and again gave the impression that Gazprom was reverting to an emphasis - certainly in Asia, on a pipeline model of delivery, and not the additional/alternative use of the more flexible - and the *buyer's* market favourite, LNG.

Gazprom's LNG: A Summary

In essence, the Gazprom experience of the LNG business to date, is summed up by Henderson and Moe (2019, pp.134-136) as: continuous change of objectives and strategies; a limiting of foreign partners' involvement in joint venture projects; and because of these combined limitations; growing conflict and competition between Gazprom's LNG and pipeline export businesses.

Gazprom is in an unenviable position today: It is the subsidized pipeline supplier to the domestic market and with a fall of the oil price this has left it with less cash to develop new fields and infrastructure for Putin's "pivot to Asia" and the opportunity of establishing new gas markets there.

Concurrently LNG represents a new technology for Gazprom and requires new management skills, the mastering of new technologies and establishing new overseas markets. This all takes time and money whilst still responsible for domestic pipeline supply (and thus the government's critical source of revenue ("rent")). All of this is compounded by the international competition (Australia, US and Qatar) all chasing successfully to date LNG contracts in North East Asia/China. There is a view reflected by Henderson and Moe (2109) that Gazprom, but not necessarily Novatek, has in fact already missed the opportunity to capture a critical global LNG market, on its very doorstep.

Gazprom's Competition: The Independents; Rosneft and Novatek.

Novatek LNG

The emergence of new LNG players (Novatek and Rosneft) is only briefly covered next as it (especially) is the subject of the Russian Arctic Gas chapter, and both Novatek and Rosneft comprise a part of the discussion in the Regionalization chapter as well. The economic highlights of both,

and the Russian government policy towards these projects are however, covered here.

Novatek formed the company “Yamal LNG” in 2009 from a company owned by a Russian oligarch, Timochenko, which held the development licence for the South Tambey field, on the Yamal Peninsula on the edge of Russia’s Arctic coastline. In time, Novatek as a non-state, independent company, acquired an LNG export licence following coordinated lobbying with Rosneft, Russia’s major oil company but which also wanted to enter the domestic and export gas markets, too. In October 2013 the Ministry of Energy approved the new LNG export law. This covered only three projects however: Yamal LNG, Arctic LNG (both Novatek’s), and Rosneft’s Far East LNG.

The good news for the Russian government was that the economics of LNG projects stood up against international competition and moreover, this project of Novatek’s was delivered on budget and ahead of schedule. The fact that it was also selling gas either directly, or via traders, (reducing the risk to the project’s investors incidentally), to countries such as Spain and India - as well as China and South Korea/ Japan, fulfilled Russia’s LNG strategy for supply diversification (along with its inherent customer flexibility), outside of the European Union (as a result of US/ EU sanctions), and the European Union’s increasing reluctance (under U.S. pressure) to buy Gazprom’s pipeline gas.

For Russia, the LNG business - in the Arctic especially, established three important landmarks in its energy policy: Russia can clearly build and manage a complex, world class energy project(s) in the Arctic environment; secondly, with Novatek’s fourth Yamal LNG train to be an indigenous/local content effort, aided by exclusively Russian technology, the industry will also establish itself as a LNG technology leader

(Barsukov, 2019a); finally such technical and economic success will continue to attract non-US international investors and partners over time, consolidating its global presence and credentials.

Rosneft and Far East LNG

Up until 2014 Rosneft was also keen on challenging Gazprom as an exporter of gas abroad. The plan was to gain TPA to Gazprom's Power of Siberia pipeline, and export to China (which proved unsuccessful), and/or to create its own LNG capacity on Sakhalin Island where it was already in a Joint Venture with Exxon, developing the Sakhalin-1 licence. This project was named Far East LNG. Third party access was refused by the Presidential Energy Commission (Rosneft challenges, 2014), but permission was granted for a 5Mt LNG project (Far East LNG), sourcing gas (500bcm) from the Sakhalin-1 project.

For the government however, this competition on Sakhalin between the two giant state entities, Gazprom and Rosneft regarding LNG development and pipeline TPA was ridiculous. Sakhalin-2 (Gazprom) had room for expansion – a third train, and Sakhalin-1 had the source gas, yet Rosneft was building an entirely new green-field LNG project next door, Far East LNG (Rosneft plus partners) and both companies were competing for the same customers in China!

However, the Russian government refused Rosneft's suggestion (Sakhalin-1, LNG plant, 2015) that the capital costs of creating Far East LNG could be charged against the revenues of the already operating Sakhalin-1 licence, as per that project's Production Service Agreement. This was a setback only to be compounded by a Gazprom announcement that in any case, Rosneft would have to use a Gazprom pipeline to transport the gas to a liquefaction site located in the South of the island.

This combination effectively strangled the project at birth – for now. The low oil price, sanctions against Rosneft, and Gazprom's blocking, had not helped matters either.

Russian LNG Summary: Energy Policy Issues

From a Russian institutional and energy framework viewpoint, Novatek especially has liberalized the entire Russian LNG industry for export, and with clear economic benefits that justify the state's subsidy of Novatek's Arctic projects (e.g., Yamal LNG and Arctic LNG) that are of enormous technical complexity, in an equally geographically challenging part of the world. This effort alone by Russia has considerably advanced its LNG/energy industry reputation, globally.

In fact, by the mid-2020s the expected volumes of LNG for export are expected to exceed 70mpta (Outlook, BP Energy, 2019); this is therefore a very significant production and export business and more than justifies Russia's listing as one of the Big Five global LNG producers.

Russian energy policy will undoubtedly change as result of Novatek's export performance which has shown itself to be entrepreneurial, highly expert, and able to attract non-sanctioned, foreign investment and equity participation. This has not been missed by the Russian government, nor Novatek's centrality in developing the Arctic and the international use of the NSR, an economic gateway for Russia. The NSR can be monetized now (LNG movements), and is important for political relations too, with China for instance, as will be discussed in the Sino-Russian Gas chapter.

However, future competition between Russian LNG exporters, and between LNG and pipeline gas exporters to China in particular, is a policy concern of the Russian Energy Ministry and the Kremlin, because of its effects on the domestic functioning of the energy economy, and the

political ramifications abroad, in particular developing Sino-Russian - and other Asian states' *political* relations.

The Russian government is satisfied with Novatek's performance, and the LNG liberalization and export arguments are now largely won, with the role of the "Independents" in it confirmed and here to stay. Rosneft and Gazprom's LNG performance(s) are weak in comparison but with their enormous gas reserves (Gazprom), Rosneft's proximity to alternate pipeline networks, close to Asian markets, all is not lost, and Russia retains many options going forward with LNG, albeit at different rates of expansion and commercial success in the North East Asian LNG market.

From a broader government energy policy point of view, LNG will demand gas policy reform (e.g., a review of "rent" distribution, and associated "private interests") at home, and may therefore be seen as a barrier to Russian LNG expansion abroad, if not handled well by both the Kremlin and the three key players: Gazprom, Rosneft, and Novatek. Furthermore, others see LNG competition abroad (i.e., Sakhalin-v-Yamal) as counterproductive as it results in a lower price obtained; LNG may also compete with Gazprom's PoS and Altai pipeline projects as well, thus reducing overall state revenues for Russian gas too. LNG advocates say though, that increased LNG export liberalization and competition will lead in fact to new customers, and the capture of the massive LNG market in North East Asia, which will result in maximal revenues for the Russian government.

What is clear though is that LNG is now a central plank of Russian energy policy. This will influence evolving Russian domestic gas policy too, with varied implications. As noted, the fact that China is investing heavily in Novatek in Yamal (technically, via the Belt and Road Initiative, and through its own banks as well), means however that Beijing may see

Novatek (a non-state company) as a conduit and partner for its wider economic and commercial presence in the Russian Arctic; that is not necessarily in Russia's interest, and puts Novatek in a highly political position at home. These political and regional aspects will be discussed, and their implications analysed further, in the Sino-Russian Gas chapter.

Market Opportunities for Russian Gas?

For Russia, with these largest reserves of gas in the world situated in its Siberian and Far Eastern (Russian Far East) territories, as well as in the Arctic - linked to the Asia Pacific Region by the maritime NSR, this represents a significant economic opportunity to supply neighbouring China and North East Asia, as well as continuing its gas supply to the European Union. By doing so it obviously provides a means of maintaining/increasing much needed energy export revenues, as well as establishing the Russian gas industry in two distinct ways as a key component of its much-heralded "Greater Eurasia" integration strategy: the internal (domestic) instigator of its regional development plans for the Russian Far East and Pacific Arctic (of which a large enabling part is Russian Far East/Arctic gasification); and the key geo-economic industry player in the emergence of the Sino-Russian energy relationship in the Russian Arctic and its development of the Pacific Arctic, and its integration with the growing North East Asian gas market.

For the Russian government, gas industry reform can only really begin once four critical challenges have been addressed adequately. Domestic competition is viewed overall as a good thing; but pricing, customer base, and distribution and gasification must all be agreed between Independents and Gazprom. Whatever the commercial outcome the social contract aspect, and the responsibility for actioning it, is considered paramount and will be a major factor in liberalizing (or not) domestic prices

and the gaining of distribution rights across the Russian Federation for the Independents, for instance.

Regarding additional pipeline networks (i.e. distribution), the challenge remains to pay for the network build-out of new, remote, and offshore fields, as part of the gasification programme; it seems that if domestic TPA is agreed for some/all of the Independents, then they may also want to build their own pipelines as well (as Gazprom), to connect up to the new/evolving Gazprom network in the far east of the country, for instance. This is a win-win result for the government and its gasification strategy, as it lowers overall infrastructure costs, that could be shared with the private sector, albeit primarily for its own distribution to consumers. However, Gazprom and the government understand by granting TPA to Independents, it is in effect an undercutting of the vertical integration model of Gazprom (by allowing non- Gazprom Independents into regional gas distribution, via TPA and/or their own distribution system). *Balance*, once again, is the watchword for policy formulation.

Another factor – subsidization, has always been an issue for the Russian gas sector (and Gazprom) because of the Soviet emphasis on centralisation, the enormity of the Russian landscape and the social contact aspect that continues to this day (cheap gas and supplier of last resort). This puts Gazprom at an enormous competitive disadvantage. On the other hand, its monopoly position means that Gazprom gathers tremendous rents and distributes them freely across Russian commerce, which makes them economically very powerful, and thus affords them a particularly powerful position in Russian politics. As prices have been allowed to rise (in order to pay for infrastructure, Russian Far East gasification and development of new fields), non-payment is an issue for Gazprom, as deliveries must still be honoured as per the social contract.

A bigger issue is that of how distribution is managed; this is sometimes subject to “favouritism” at the centre (Moscow), and corruption at the local level. The latter negatively impacts the gasification plan and associated commercial infrastructure/development investments, so it is a growing concern to Moscow. One partial solution is the idea of a separate gasification fund which could use private as well as Gazprom investment to promote the gasification programme. This will obviously demand gas policy reforms, as Russia rotates more to the Russian Far East and Arctic regions, where gasification/distribution is most required and subsidization is increasingly unaffordable, in order to support such an expansionist, economic strategy. The Regionalization chapter looks at this factor again from the point of view of how certain Sino-Russian border regions could integrate, possibly with some Chinese regional funding, or joint funding.

Finally, the liberalization of gas/ LNG export is a constant theme, whose outcome will impact the shape of the domestic gas industry, and how it is governed in the 21st Century. The financial aspect, in terms of export revenues and rent has already been discussed, but undoubtedly with a market the size of China and North East Asia alone, the idea of maintaining a state controlled single export channel is simply nonsensical. In fact, LNG export has already been liberalized, but there is now rumour that additional export pipelines may be created but that they would still be largely state controlled; whether that is via Gazprom, or another pipeline mechanism is not yet clear. But with a third of Rosneft’s gas being located in the Russian Far East, and its signing of a gas delivery contract with Beijing Gas, (which furthers the Sino-Russian energy arrangement) - the case for pipeline liberalization is growing and becoming more commercially credible.

Rosneft is also an explicit foreign policy tool of the Kremlin, especially with regards to Chinese relations and other important interlocutors in the region such as Japan and South Korea. This is a real time issue for the Kremlin; if LNG is “run” by Novatek, and it consolidates Sino-Russian relations well, should then Rosneft usurp Gazprom’s political position as interlocutor with China, for pipeline gas, for geopolitical reasons, even though Gazprom’s Power of Siberia project is in place and commissioned and the Altai project is now back on the table?

Meanwhile the Russian Energy Ministry is concerned with Russian (Novatek) LNG in the European Union, taking market share from Gazprom, and with PoS now up and running (as of December 2019) China may well begin to play off Gazprom’s pipeline gas against Novatek’s LNG and/or Sakhalin’s various LNG deliveries, in terms of pricing to the detriment of Russia as a whole. This means that in policy terms the Russian government may have to play a greater role in the coordination of pipeline and LNG marketing activities and export strategies, so that the best deals can be secured for Russia, and not necessarily individual state organizations or private companies.

Russian Energy policy informs the next chapter’s Russian Novatek LNG project, where there is substantial Chinese involvement and where many of the issues raised in this chapter such as domestic/export tensions, Gazprom’s TPA/ export monopoly position, infrastructure requirements for LNG (NSR, ports, infrastructure, etc), the question of Sino-Russian trust and investor relations, and the domestic factors of domestic “rent” and political considerations – will impact Independents such as Novatek LNG and their international partners in the Pacific Arctic region. “Balance” in other words, is the critical watchword for Russian energy policy in the 21st Century.

In terms of international energy politics (in North East Asia), clearly the Russian government is also torn about whom to instruct as the key interlocutor with China in terms of broader Sino-Russian geo-economic strategy, including objectives such as spearheading the creation of a regional gas trading hub in North East Asia. The choice is either through the Independent, Novatek LNG, to date successfully delivering projects on time and within budget and attracting foreign partnerships (including China) in spite of sanctions, or Russia's Gazprom, which, whilst the source of crucial domestic rents, and the key energy player in Russia, has not done well overseas latterly, and its refusal to allow equity Upstream ownership for overseas investors for instance, has not endeared it to the international energy industry (including China), and nor perhaps to the Kremlin, from time to time, either.

Of significance too for Russian gas policy is the growing global shift to LNG as the principal means of delivery - as opposed to pipeline gas (which is more expensive and structurally limited in sourcing and delivery locations). Pipeline gas was traditionally determined by a 20th Century model of security of supply/delivery. In contrast Novatek LNG is diversifying both its resource base and its delivery locations, and it is monetizing the NSR (a Putin priority). Moreover, as an LNG producer, it is part of a new form of the 21st Century gas trading model (akin to the United Kingdom's National Balancing Hub, and the Henry Hub in the US) that may take hold in North East Asia, in which *security of the market* is the prime driver of inter-national gas trading/deals.

These types of operational, financial, and commercial issues facing the Russian (and international) energy sector, cause tensions between Rosneft and Gazprom, and between both these state players, and Novatek LNG; it also politically concerns the Kremlin too, as the *security*

of the market model for instance, will *de facto* begin to transfer geo-economic power from the producer to the buyer. This will affect over the longer-term, Sino-Russian energy relations in North East Asia, and the nature and shape of the Arctic Pacific region.

In the next chapter (Russian Arctic Gas) a methodology is discussed - Global Production Network as applied to LNG, which gives the reader insight into the second section of that chapter; an analysis (using Global Production Network) of Russia's Novatek LNG project in the Arctic, and in which China plays an increasingly infrastructure, financial, market and geo-economic role that reflects I argue, Sino-Russian multi-regionalism "in action", and which concludes with the industry's geopolitical outcome in the North East Asia region, the creation of the Pacific Arctic space.

Finally, in this next chapter I provide a brief synopsis of the Dongbei/Russian Far East territories- the Sino-Russian border land regions, across which the PoS pipeline traverses for instance. This is also the region which hosts ports and logistic hubs on its western Pacific coastline for the berthing of Arctic LNG deliveries and the location of major LNG regasification installations. The synopsis is provided in order to show how polycentric regionalism is transferable, robust, and relevant in *regions other than the Pacific Arctic*, and how this Polycentric Regionalism process of creating space, adding scale and developing various networks (digital, transport, communications, etc) is viable in geoeconomics terms, beyond the energy industry of its northern, Arctic neighbour.

CHAPTER 4

SINO-RUSSIAN ARCTIC GAS

1. Global Production Networks and its Analysis of LNG

Global Production Network (GPN) analysis is an established methodological tool widely used internationally in the manufacturing sector. A GPN analysis can be used to describe how LNG networks are functionally organized and integrated and how they then manifest themselves in the form, scale, and shape of the territorial space that they subsequently occupy. This is a useful explanation of *how* the Sino-Russian Arctic gas/ LNG Partnership operates and will expand into North East Asia, as discussed in Section Two of this chapter. Global Production Network methodology also explains the LNG industry's technical role in the development of a regional gas market in the 21st Century (Bridge and Bradshaw, 2017).

Global Production Network analysis gives the reader the tools therefore to understand and interpret the geo-economic impacts and geopolitical outcome of the Sino-Russian Arctic LNG partnership - including in the latter case, the geographical /territorial creation of the Pacific Arctic region, the subject of the next section of this chapter.

If multi-regionalism is to operate in North East Asia, then the *territorial mechanism* by which regional, *scalable* expansion may occur (i.e., creating new "spaces"), via the LNG business - a strategic industry, is a crucial insight as it directly addresses the principal research questions posed in the Introduction chapter and addressed in my Polycentric Regionalism theory chapter.

Global Production Network in LNG; Definition and Aim

Bridge and Bradshaw (2017, p.218) define the Global Production Network approach in terms of its:

"..*embrace of multiple geographic scales, recognition of a plurality of economic actors extending beyond the firm, and attentiveness to the unevenness of regional development outcomes. A Global Production Network approach focuses on the relationship between the geographic extensification of economic activities and the activities' organizational integration and coordination".*

The multi-regionalism aspects already discussed in the Theory chapter, such as the need for scale, and the process of uneven regional development (which confounded adherents of neo-regionalism theory), as well as the role of networks/institutions in emerging International Political Economy organizations and creating "space", are all addressed in this GPN methodology. Therefore, I have used this tool to illustrate these multi-regionalism characteristics and the nature, role, and outcome of the Sino-Russian Arctic LNG relationship in North East Asia (Novatek LNG), that is the underpinning of the neonate Pacific Arctic region. In sum, GPN analysis unveils in the Sino-Russian LNG partnership the relationship between the "geographic extensification of economic activities" (i.e. extending Russian Arctic LNG network and its deliveries to North East Asia, creating a global gas market) and how "the activities' organizational integration and coordination" (i.e. how the Sino-Russian network relationship in the Novatek LNG project works to achieve this), determines the shape, scale, and sustainability of the Arctic LNG project; all of which is structurally mirrored by the integrative *mechanism and processes* of multi-regionalism. In addition, the *economic and political implications* of

such an analysis are reflected in the aim/output of GPN analysis, according to Bradshaw and Bridge (2017, p.236) in that an:

"…analysis of the LNG production network demonstrates the potential of Global Production Network for contributing new insights into the emergence, organization, and scaling of contemporary energy markets, and their economic and political implications".

Specifically, what GPN contributes in relation to LNG understanding - and its application to the subsequent Sino-Russian LNG partnership in the Arctic (final section in this chapter) is firstly the creation of a *geopolitical space* – the Pacific Arctic. It also contributes the following:

1. An elucidation of multi-regionalism's instrumentalization of LNG and its contribution to building a global gas market in North East Asia via an initial regional gas/ LNG trading hub.
2. Murphy (2012, p.211) makes the point that previous GPN frameworks have not explained an "empirically informed exposition of how different production network configurations develop through the actions of agents". What is of interest is the usefulness of Global Production Network in showing the "*process(es)* through which network linkages are established, sustained, and reorganized over time and space". This is in line with Luttwak's comments in the Theory chapter, that what is required is not just a functional regionalism, state-level understanding of geoeconomics, but rather the granular processes and agencies (via networks and organizations) by which power is applied via these geo-economic agents/agencies' (e.g., Russia and China in the Novatek LNG venture) means and methods. That "power" here, is the LNG industry in North East Asia and the methodology it employs.
3. Finally, as Coe and Yeung (2015, p.35) have noted, "the territoriality of global production networks is elusive and under-developed." But as

Bradshaw and Bridge (2017, p.217) comment, by putting the concept of *territoriality* at the centre of the GPN it is possible then to see how the organization of an LNG network (total supply chain) and its network(s) of agents/agencies involved, operates across time and *space*. This is important for a space as large as the Pacific Arctic! Bradshaw and Bridge (2017, p.217) continue with this territoriality theme by saying:
"By paying attention to the spatial configuration of LNG production networks, we are able to show how, in the case of natural gas, Global Production Networks are constitutive of markets - market making, rather than merely responsive to them".

This too is a crucial insight as it reveals a *mechanism* by which multi-regionalism may manifest itself, and the central importance of LNG's geographical integration by means of *firstly* - institutional (i.e., organizational and networked structures) creation and interaction, establishing a pathway for *subsequent* - or at least contemporaneous, regionalization (i.e., *the staged process* mechanism, a la Polycentric Regionalism theory). The second key insight is that LNG's territoriality (influenced by its organization and industrial networks) is of itself the *mechanism of market growth* - and not the *response to* market growth. This too is entirely in line with my Polycentric Regionalism theory and its practical application, multi-regionalism. The development of ports (e.g., Tiksi, and Pevek, and Providinaya, in the Pacific Arctic area), Search and Rescue bases, navigational aids, etc, along the NSR eastward, toward Asia, facilitating and supporting LNG midstream activities, is also evidence of *initial* structural institutionalism, and the LNG *market making* process and its relationship to territoriality (i.e., geographical expansion and creation of new space((s).

The Structure of Global Production Networks

GPN's capacity to explain the interaction between organizational structure and territory, and the resulting necessary networking to coordinate these activities makes it useful in understanding a strategic geo-economic undertaking like LNG, which is geographically, organizationally, and network-wise still at a primitive stage of development in North East Asia. As Bridge and Bradshaw (2017, p. 219) comment too, GPN's emphasis on a spatial /geographical mode of analysis helps to *establish* the process of LNG development. This analytic approach is supported here by the three underlying parameters/characteristics already noted and which are fundamental to GPN structure and function: Materiality (and its transformation); Territoriality; and Network Practices.

The Factors in Global Production Network - Materiality

The nature and type of a commodity like gas, effects the organizational structure's spatial form of an LNG operation and its associated network practices. In the LNG process, once gas is explored for and extracted it is then converted into a liquid state (Liquefaction) and placed on special purpose ships to be transported (known as the Mid-stream business) to overseas markets, where it is then re-gasified (Re-gasification), often then stored, and consequently distributed and sold on to various commercial outlets (e.g., to power stations for subsequent electricity generation). Bridge and Bradshaw (2017, p. 221), describe Materiality as:

"..how production networks are organized around moments of material transformation in which the (biological, chemical physical) qualities of materials shape strategies for value capture" … and which they draw from as Birch and Calvert suggest (2015, pp.52-72) as also having *"their influence on the organizational and spatial structures of energy regimes."*

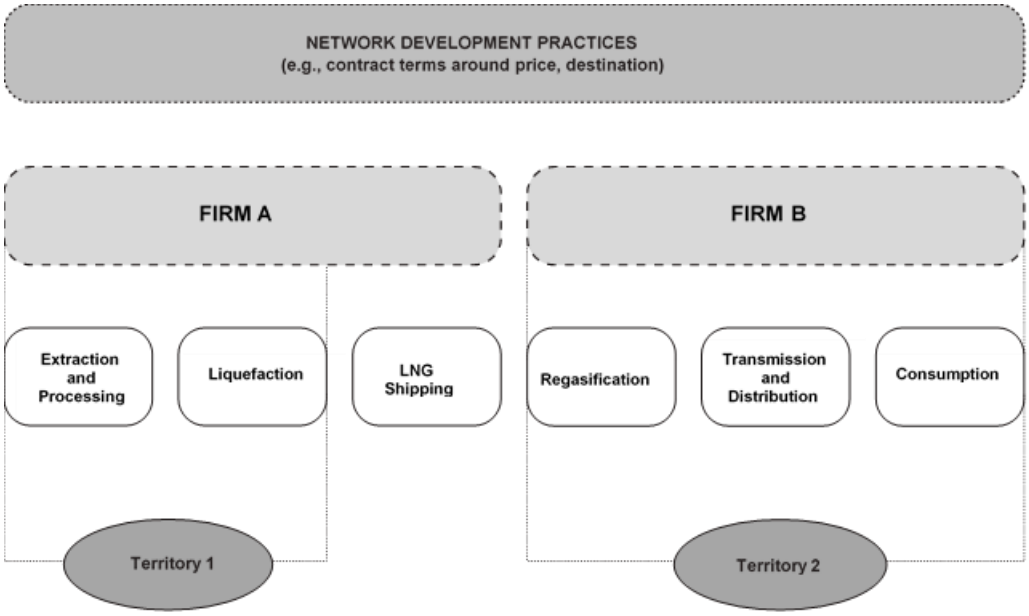


Figure 10. Conceptualizing the LNG production network. Source: Bridge and Bradshaw, 2017, p.221

Figure 10 shows the segmentation of the LNG business from Extraction and Production to Consumption and where at each stage the materiality of the gas is altered (from gas - to liquid - and back to gas). At each segment along the entire LNG value chain, the individual sectoral levels of risk are different; the aim of the individual sector-agencies involved is to maximise value in their own respective (and collective) LNG value chain sectors. Coe and Yeung (2015) illustrate how this commercial segmentation of the LNG industry's value chain is territorially spread out from say, one company, the supplier, (Firm A) in one country conducting "Upstream", exploration and production activities - and liquefaction, to another country where the Customer company (Firm B), then conducts "Downstream" activities, including regasification, storage, transmission, and eventual consumption.

This is the basic LNG "A to B" model reflecting an exclusive, binary (i.e., from country A to country B) relationship. However, Global Production Network analysis now shows that LNG's increasing organizational changes (based somewhat on the altering "materiality" of gas along the

value chain) are reflected in the segmentation of LNG value chains, which are beginning to produce new *spatial and territorial* forms of LNG networks that reflect individual sector's appetite for risk and/or opportunities to add value. This materiality process and its accompanying organizational development is useful in understanding therefore *how* the Sino-Russian Gas/ LNG relationship is developing in North East Asia, and why their respective holding of *different* segments of the LNG value chain (e.g., regasification or consumption), will affect the *shape, scale, and territorial expansion of LNG in the Pacific Arctic* region building process. This is demonstrated in Section Two of this chapter with Novatek's Arctic LNG projects.

The Factors in Global Production Network - Territoriality

Steinberg (1994, p.3) defines Territoriality as *"the process by which individual and collective social actors define, bind, reify and control space toward some social end".* Others suggest such as Bridge and Bradshaw (2017, p.219) that *"particular geographies are integral to the exercise of economic and political power" and* expanded upon by Brenner et al (2003). These definitions and how they pan out will be seen in the Sino-Russian Novatek LNG section, where different agencies, states, and investors "own" different sectors of the LNG supply chain (e.g., gasification facilities or LNG shipping assets) *that determine the territorial and geographical "reach"* of the LNG supply chain – increasingly (inter)-continentally, and thus exercise accordingly, economic, and *political power,* in line with multi-regionalism processes as discussed previously. By analysing each separate industry activity (Up-stream, Mid-stream, and Down-stream) of the LNG value chain, the spatial/territorial extent of the supply chain - the industry's organization, and how it develops, can give an insight into how (organizationally/network-wise) a *global gas market*

can be built. This has explicit relevance for Sino-Russian gas/ LNG plans in North East Asia where different international agencies/actors in the Novatek LNG venture own different segments of the LNG value chain across North East Asia, with each sector characterized by different risk levels, and/or opportunities to add both sectoral and overall project value. One major prize in terms of "value" to all participants is the creation of a regional gas/ LNG hub in North East Asia.

Territoriality's key application in this context is, according to Bridge and Bradshaw (2017, p.219), its ability *"for linking spatial form with strategic practice"*. This too is fundamental for examining the Sino-Russian Novatek LNG relationship in the Pacific Arctic/North East Asia and multi-regionalism's *geopolitical* aim*.* Coe and Yeung (2015) go on to focus on the importance of this *spatial configuration* in Global Production Networks - and which is immensely useful for analysing Novatek LNG project's *geographical marketing expansion* in the Arctic region (see Sino-Russian Gas/ LNG section) and by this means, its development of a potential gas/ LNG regional trading hub in the Pacific Arctic (the territorial space created).

Territoriality's analytical advantage, as Bridge and Bradshaw (2017, p.220) comment is - in terms of Polycentric Regionalism theory, that it shines a light on an LNG "network's territorial configuration (why *this* particular spatial form, why *now?*) and links this form to strategic intent (for what *ends* with what *effects?*)". This analysis is supported directly by Luttwak's comment from the Theory chapter, that whilst a geo-economic tool (such as LNG), has obviously economic objectives, its strategic aim is usually a *geopolitical output.*

In sum the global LNG business is expanding and changing the rules of geographic territory. Territoriality allows the analyst to see more clearly

the relationship between how LNG networks and their organization - is built, its relationship to the agencies involved along the value chain, and how in combination it gives an additional insight into the reasons for subsequent geopolitical and geographical outcomes. It examines *process* in short – and is a useful tool by which to gain an understanding of how Novatek's LNG project actions the geo-economic development of multi-regionalism in the Pacific Arctic by Russia and increasingly, China too.

The Factors in Global Production Network - Network Practices

Bridge and Bradshaw (2017, p.222) state that the *"concept of network development practices (Figure 1) provides a way to focus our analysis on key interactions between sellers and buyers that sustain the LNG production networks and that are important in understanding its changing organizational structures and geographic form".*

The emphasis here is the way in which network agents create and maintain networks and their linkages - for instance between international LNG suppliers and customers. Due attention is also paid to the social and economic ties within and across these LNG networks ensure that these peripheral elements are *always integrated* as part of the functional network entity. In the case of the Sino-Russian relationship within the Novatek LNG venture this is of critical value to both/all parties, and includes concepts such as trust, strategic agreement, and shared political determination.

Background: The Changing LNG Business Model and its Implications

Japan was in the '60/'70s historically the largest importer of LNG (as it had no gas reserves itself and no natural pipeline gas supplies) for its giant economy. As a result of this the LNG industry adopted a typical commercial-based model for trading with it, which was binary in nature

(i.e., export production from producing Country A, to buyer in consuming Country B), and usually contracted between/by state-owned National Oil Companies. This led to contracts based mostly on a long term and “take or pay basis”; the commercial emphasis (for Japan especially) lay with the security of supply. This was an asymmetrical relationship as the balance of power was in the *supplier’s* favour.

Accordingly, networking practices/geo-economic power – via pricing and contract schedules, was dominated by the gas supplier and thus also favoured the Upstream and Midstream (i.e., the producer) sectors of the LNG value chain. This LNG trading model – structurally vertically integrated from the Upstream down through to the Downstream sectors of the value chain, was described by Bridge and Bradshaw (2017, p.229), as the Traditional or “floating pipeline” concept. This network/contractual situation was compounded by limited infrastructure and fixed contracts - with few consumers, leading to *restricted organizational structures* that determined LNG supplies, in a manner that led to and endorsed this limited and limiting, floating pipeline model.

Thus, the LNG industry was viewed as niche, and point-to-point in distribution, and reflected its typical organizational structure, networking, and territoriality. As Tusiani and Shearer (2006, p.67) note, this meant LNG was only an *intra-regional industry at best* in terms of distribution, as it networked only between a small number of usually government-owned agents, in independent, limited and limiting A-to-B projects, and where those government agencies were usually often simply supplier and customer. The industry was in effect, geographically limited and commercially confined.

What has changed in the business is the volumes of LNG traded; in 2002 it was about 100Million metric tonnes per annum (MMTPA), but it was 248

MMTPA by 2015, (IGU 2016). Qatar, Australia, and the USA, as well as Russia latterly, are the major new global players responsible for this growth.

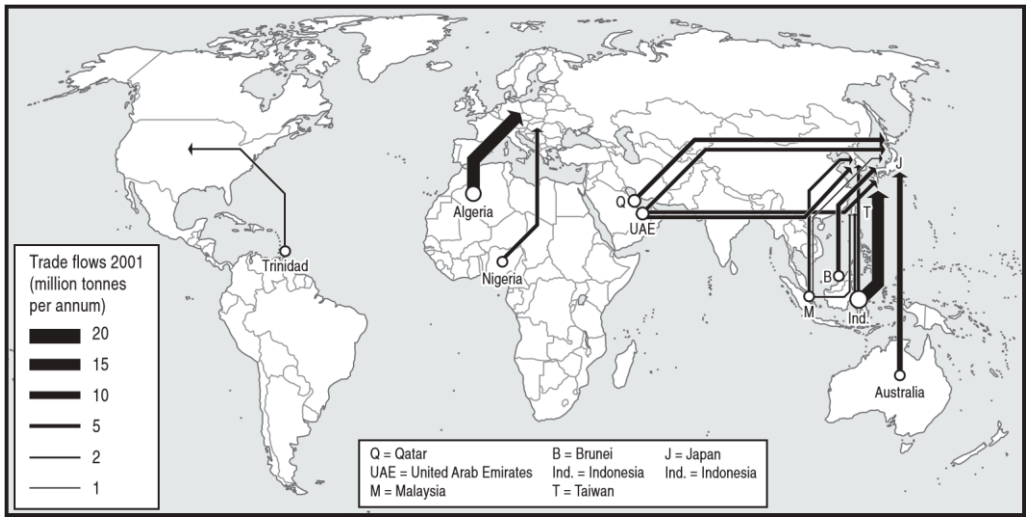


Figure 11. Worldwide LNG Trade, 2001. Source: Bridge and Bradshaw, 2017, p.266 based on data from BP Statistical Review of World Energy, 2016

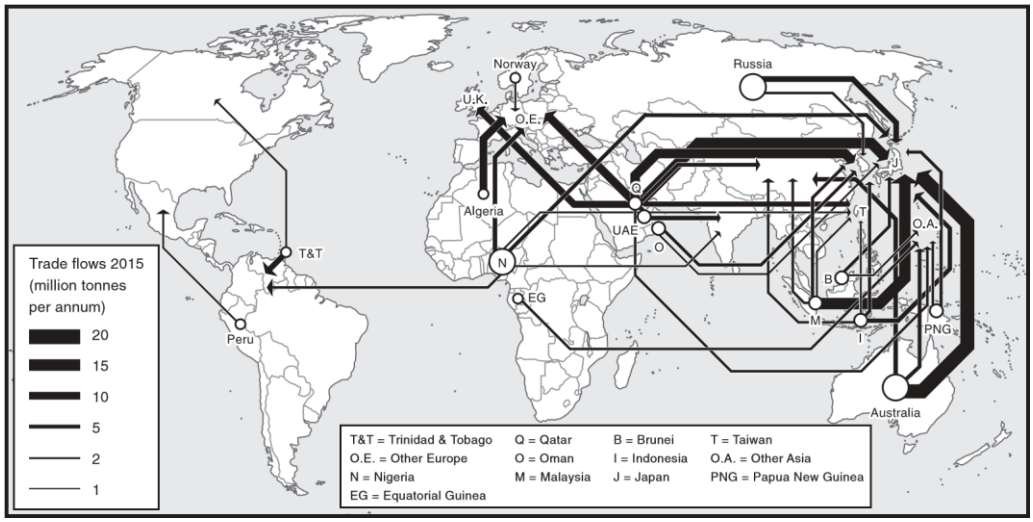


Figure 12.. Worldwide LNG Trade, 2015. Source: Bridge and Bradshaw, 2017, p.227, based on data from International Gas Union, 2015.

What Figures 11 and 12 illustrate is how the regional structure of LNG trading is now transitioning and concentrating in Asia. In essence more gas is in demand from emerging giant economies in Asia especially

(Figure 12), and consequently more players (non-governmental) are in the business, and regasification capacity has therefore multiplied (Figure 13), thus making LNG distribution now possible *across regions and internationally*. With such infrastructure expansion, the possibility of creating a major, regional LNG/gas hub and market in North East Asia, has increased significantly. This in turn includes the monetization of the NSR as part of the LNG value chain and together creates some of the scale and wealth needed to create a regional space (the Pacific Arctic), which I argue is a characteristic/defining factor in Polycentric Regionalism theory and the geopolitical outcome of multi-regionalism policy.

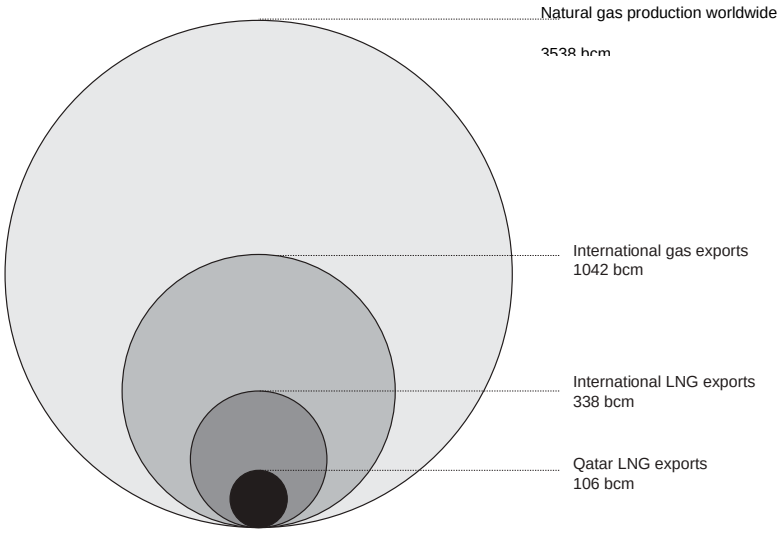


Figure 13. World production and exports of natural gas and LNG, 2015 (billion cubic metres). Source: Bridge and Bradshaw, 2017, p.223, based on data from BP Statistical Review of World Energy, 2016

Concurrently, commercially speaking (Figure 14), greater global regasification capacity now means for instance, expected shorter term contracts and the development of a corresponding spot market, and possible gas hub benchmarking too (a critical component in establishing a regional gas trading market), according to Bridge and Bradshaw (2017, p.227). These market/network trading trends are examined again, through

the lens of the Sino-Russian Novatek LNG relationship in North East Asia in Section Two of this chapter.

Traditional Contract Characteristics	Emergent Contract Characteristics
Long-term, take-or-pay obligations	Shorter-term, options on delivery
Limited off-take flexibility	Flexibility in off-take volumes
No destination flexibility	Flexibility in delivery points
Oil-indexation of prices (outside U.S./United Kingdom)	Pressure on oil indexation, hub benchmarking
Limited options for review and reopening	Contract re-opening

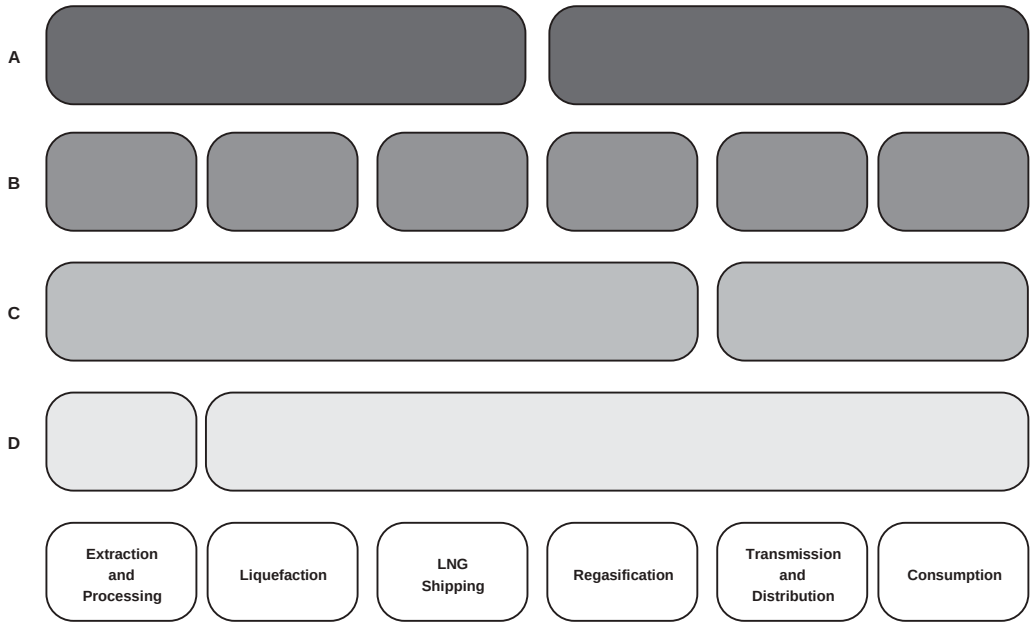
Figure 14. Changing Network Practices: Comparison of Traditional and Emergent Contract Characteristics. Source: Bridge and Bradshaw, 207, p.233, based on Tusiani and Shearer (2006)

Consequently, the original floating pipeline model of LNG is beginning to undermine the very maritime geographical reach, which LNG creates and affords - and the new commercial dynamics (more LNG infrastructure, increased volume demand, pricing structures) have altered established network practices too, resulting in new contract options and organizational models of LNG projects.

For that reason, the nature of LNG commercial deals is modifying the *organizational structure* of LNG projects also; moving away from a floating pipeline model to different forms of sectoral segmentation (point A&B in Figure 15) - adding value and more/less risk along the LNG value chain, and sectoral integration (Points C&D respectively in Figure 15; backward toward the Upstream and forward toward the Downstream), and will probably result as noted already, in a shift in the economic balance between buyer and seller (in the former's favour). Such "jockeying" will

also *change the territoriality of LNG projects' extension/geographical reach*, as a Production specialist in Region A for instance starts, to forward integrate into an additional sector of the value chain (say regasification), in Region B (in a different geographical region). This development (affecting an LNG project's inter-linked organizational, territorial, and commercial network relations) is in line with how, mechanically, a regional gas trading hub in the case of North East Asia may well develop – as per Novatek LNG's project.

This explanation of LNG's growth also chimes with interviews with Professor Paik in which he broadly concurs with these commercial-contractual changes and developments (i.e., value chain segmentation, new commercial contracts) in the LNG marketplace - and especially in North East Asia.



A Traditional model

B Specialization (disintegration) and horizontal integration

C Forward integration

Figure 15. Organizational Trends in the LNG production network. Source: Bridge and Bradshaw, 2017, p.230

Unsurprisingly LNG's organizational and network model began to shift because of these developments noted above. The emergence of new LNG actors, cross border equity holdings of particular segments of the LNG value chain (e.g., China buying into Russian LNG projects' Upstream activities), spot contracts, and pricing policies effected inevitably (as all three Global Production Network parameters are linked) the territoriality of the LNG projects as well. This is geopolitically and economically significant as will be demonstrated in the Novatek LNG study, next.

In sum, these industry trends have led to operational and market integration and led to a sharing of commercial risk (segmentation of U/stream, M/stream and D/stream activities), and a race for *capturing value* amongst investors/participants within the LNG chain. This is facilitating the development of a *geographically integrated* gas/ LNG market – itself becoming more liquid as contracts become more flexible (e.g., cargo destinations no longer confined to a simple point-to-point destination), and regasification infrastructure increasing LNG capacity and the number of delivery destinations around the globe. This trend (which is critical in supporting – and demonstrating multi-regionalism's theory of how the Pacific Arctic is created), is resulting in a new LNG model which reflects a more "portfolio" or *project-based model of LNG* trading as suggested by Bridge and Bradshaw (2017, p. 232), replacing the floating pipeline commercial concept in the 21st Century.

Global Production Network and LNG Implications

In terms of LNG's global Network Practices, the role of contracts, including increasing destination flexibility and new pricing strategies, will result in alterations in *how* the agencies involved in the increasingly multinational LNG value chain will disperse their collective risks and capture value. If

they do so well, a global gas market may well emerge in the North East Asia region.

Already it is clear that the new (portfolio-type) LNG pricing model reflects a strategic shift in where power now resides in the relationship between LNG supplier and consumer; it has shifted (organizationally) to the consumer (buyer) latterly in North East Asia. In the Sino-Russian LNG partnership in the Arctic, this is most noteworthy regarding Russia's asymmetric strategy toward China in North East Asia. To some extent the *security of physical supply* that largely determined early LNG cargoes (into Japan) and led to the floating pipeline model is being replaced, in the manner of the United Kingdom's Henry Hub, and where the critical factor now is *security* of the LNG *market* – that is, LNG deliveries at reasonable cost, in sufficient volumes, and of predictable availability, (the very purpose of the Henry Hub model). This is crucial for establishing a regional gas market in North East Asia.

In the final section of this chapter, Global Production Network analysis will be applied to Sino-Russian Novatek relations and its operations. This will include observation of the infrastructure projects, contract types, destination locations in North East Asia, and the equity purchases along the LNG value chain (resulting from Novatek's increasing sectoral segmentation), by its constituent Russian, Chinese, Asian/European shareholders and international operators and investors.

Such an analysis will shed light on the geo-economic purpose of the Sino-Russian Novatek project, and its geopolitical aim, in terms of this LNG, multi-regionalism mechanism employed (as part of the Sino-Russian geo-economic strategy) to create the Pacific Arctic space, and whether this geopolitically represents, a shift in the international structural form, an unfolding grand strategy development, or simply an isolated phenomenon

reflecting global trends in geopolitics, the International Political Economy, and shifting global powers.

In sum, Global Production Network is an appropriate methodology by which to understand Sino-Russian relations in the Novatek LNG project (next section) in Russia's Arctic. The factors comprising GPN (Materiality, Territoriality and Network Practices) assist in exploring the specific relationships and drivers between states, agencies, and investors, which all operate in various segments (e.g., regasification), along Novatek's LNG value chain from Upstream to Downstream. These three Global Production Network factors also closely mirror the three *processes* of multi-regionalism – a *scalable tool* of geo-economic strategy: the creation of new economic/geopolitical spaces - because of scalable inter-regional operations such as LNG, and which together facilitate - new techno-governance networks and institutions across these new spaces.

Finally, an observation that reflects Sino-Russian relations in Novatek LNG (and the region around them) is that both GPN analysis and multi-regionalism strategy share a view that whilst the commercial benefits of the LNG industry, and multi-regionalism's instrumentalization as a geo-economic tool are key objectives, the strategic aim in both cases is a *geopolitical outcome* – the Pacific Arctic, in terms of Sino-Russian regional energy cooperation.

In the next chapter, informed by the regional energy policies and global economic trends reviewed in the first section of this chapter, I apply the lessons/analytical tools of GPN analysis to Novatek LNG's activities. This is itself a vehicle for developing Sino-Russian, multi-regionalism relations and energy wealth, as well as fulfilling a joint, Sino-Russian geostrategic intent; to create a new geopolitical space (the Pacific Arctic) which may serve as an experimental model of new international order - multi-

regionalism, to compete in time with the U.S.' regional hegemony in North East Asia, and its global leadership status.

2. Sino-Russian Relations; the Novatek LNG Project

Part A. Chinese Energy Policy and Political Factors in the Arctic

Gas industry-wise the first decade of the noughties was considered to be the period of a shift toward the U.S.-led shale gas "revolution" and the future of gas production in C21; as such the arrival of the Arctic's Yamal LNG in 2007 went largely unnoticed. However, with Arctic Yamal LNG, ALNG2 under construction, and ALNG1&3 approaching Front End Engineering Design (FEED) stage and FID, for production in the late 2020s and early 2030s, the full industry portent of Novatek LNG feeding the huge growth in the NE Asian LNG market is only now coming to light; and with it the global energy industry significance of the scale of the Sino-Russian arrangement - the supply of Russian Arctic gas/LNG in that growth, especially with regard to China's growing gas demand out 'til 2030 (Razmanova and Steblyanskaya, 2020). In particular, the ALNG 2 project, heavily funded by China, and its product largely destined for China is also very competitive pricewise with established U.S. and Australian LNG suppliers (see Figure 16 below). It is China that *de facto* will now determine the global competition between shale gas and LNG supply in the decades to come.

China's LNG policy is latterly influenced by political relations with both the U.S. and Russia, and it is essentially two-fold in nature. On the one hand in 2021 China decided that there was over-reliance on Australian LNG supply (29.67mt), and that LNG supply diversification was needed. In fact, Australia's supply was over three times the tonnage of the next largest LNG supplier, Qatar (8.20mt). The result of this is that LNG supply to

China will be the most highly competitive market, with LNG supplies from Qatar and pipeline gas/LNG from Russia increasing, whilst U.S. and Australian LNG sales falter.

On the other hand, in line with the global gas market's maxim about the required parameters of any LNG supply (as opposed to pipeline gas supply) to be, in sufficient volumes, easily available, and at a competitive price, this explains in large part China's decision to venture with Russia's Novatek LNG in the Arctic. For instance, by taking an equity position in Novatek's ALNG2 project alone (supplying primarily China/Pacific Arctic region), funding the NSR's associated infrastructure, and its determination to be the LNG market maker in NE Asia, China fulfils all three gas market requirements for the growth of an LNG trade hub/market.

On 27th February 2019, at the IP Week Conference in London, Novatek LNG's CFO and Deputy Chairman announced that Novatek could deliver LNG to Europe for $3.15mmbtu. This compared with an U.S. price of $7-8.00 by U.S. producers. He went on to state that extraction costs at $0.1/mmbtu compared with the U.S.' $3.0/mmbtu (Zhdannikov, 2019), and further outlined Arctic liquefaction costs of $0.5 as opposed to a cost of $3.0. in the USA. Gyetvay concluded by stating that Novatek could deliver LNG to the crucial Asian market for $3.6mmbtu. This latter figure is very significant if true, as it would/will be *the* game changer in the 2020s and beyond.

	USA	Australia	Yamal LNG	Arctic LNG 2
Extraction	3	3.8	0.8	0.8
Liquefaction	2.5	4.9	4.1	2.5
Transport to Europe	0.9	2.1	1.1	1.1
Transport to Asia	2	0.7	2.8	2.8
Total to Europe	6.4	10.8	6	4.4
Total to Asia	7.5	9.4	7.7	6.1

Figure 16. LNG Cost Breakdown by Origin and Destination. Source: Interfax September 5, 2018

The geo-economic implications of Russia being able to produce and deliver Arctic (and Sakhalin) LNG into NE Asia at such low cost - and China being able to buy very large volumes at a commensurate reasonable price, are myriad. Firstly of course is the geo-political leverage such energy deliveries into NE Asia will bestow upon Russia, coupled with commensurate growing Sino-Russian Sea power along the NSR and into the western Pacific. Secondly for instance, is the viability of the regionalization-by-gasification strategy for Russia's RFE and Arctic territories (as well as China's Dongbei region), which comprises the creation of an Asian LNG hub in NE Asia. Finally, there are associated geopolitical benefits to the S-R relationship including the economic underpinning of the creation of the Pacific Arctic region, resulting in the formation of Arctic-Asian energy alliances (i.e., Asian consumers) working in say, Novatek LNG's projects, and partly because of this an overall reduction of U.S. geo-economic influence and superpower status in the Pacific Arctic, China, and the wider NE Asian region.

Chinese energy policy is only briefly summarised here, as the essence of the chapter is not about China's energy policy *per se*, but one aspect of it;

the drivers of its diversification of gas supply policy (LNG) which includes some political and strategic factors.

Discussed herein are the broad domestic, industry and geo-economic factors associated with LNG operations in the Arctic, including the Polar Silk Road initiative linking Eurasia via the Belt and Road Initiative-supported infrastructure build-out, the role of the NSR in LNG midstream activities, and the pursuit of Beijing's geo-economic interests in the region.

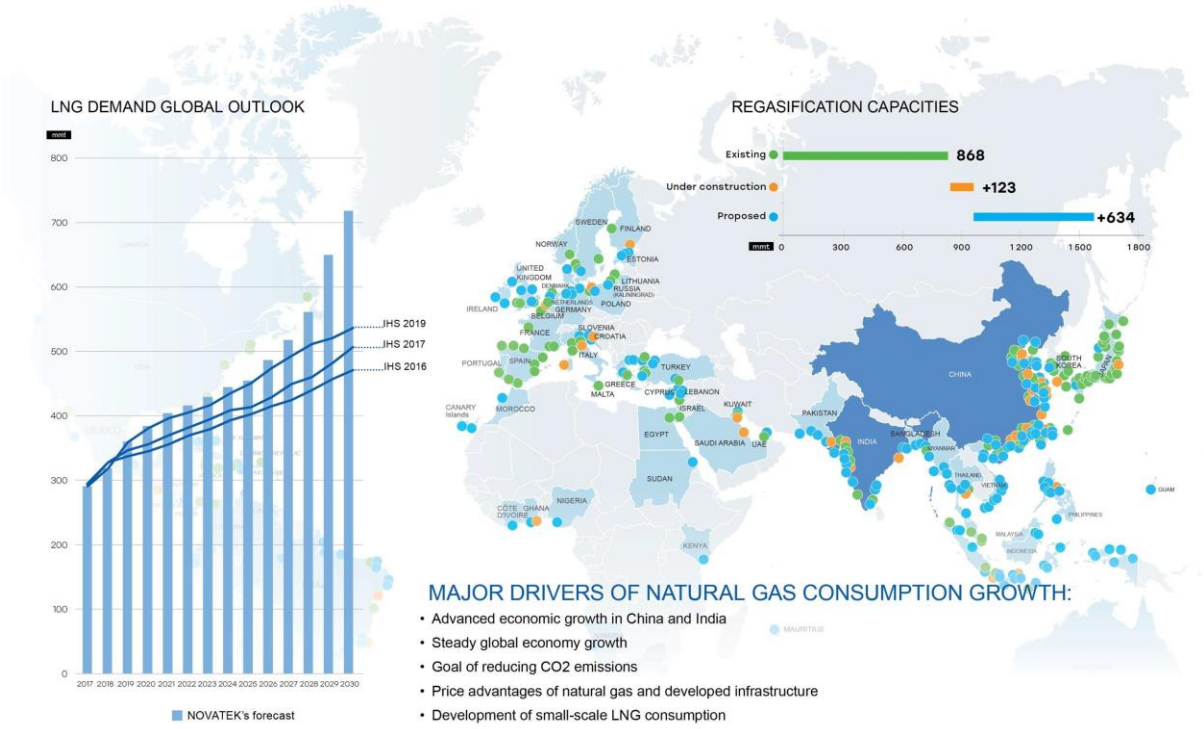


Figure 17. LNG Demand Global Outlook 2017 to 2030 - Novatek's Forecast. Source: Novatek, 2020, p.10

Some of these factors are also addressed in the subsequent Novatek LNG section. The critical issue focused on, which reflects the above factors is Novatek's Arctic operations and the Sino-Russian energy relationship in it, as a mirror and agent of multi-regionalism activities in North East Asia, and the resultant geopolitical reshaping of the region - with Russia to create a new, experimental, political space - the Pacific Arctic.

Lastly as noted in the introductory chapter I provide a brief synopsis at the end of this Section about the Dongbei /Russian Far East regions. As explained earlier this is designed to show the reader, after reading this section (2), the relationship between the process of Polycentric Regionalism occurring (via the LNG industry) in the Pacific Arctic and how that industry is already creating new Polycentric Regionalism spaces (and scale and industry networks) along the western Pacific coast for instance, with Re-gasification terminals at Chinese, Japanese and South Korean ports. This is exactly as GPN analysis predicts how the market is expanded and territoriality sustained and developed by the additional networks created. To conclude, the Dongbei/Russian Far East region is already undergoing the Polycentric Regionalism processes of increasing scale, developing new public spaces, and building out (in this case) LNG industry networks from within the Pacific Arctic.

Chinese energy demand has been rapid over the last two decades and has increased (Figures 17 and 18), by 100% since the early noughties. Liu, Chen and Liu (2011) estimate that China's gas consumption will steadily continue to increase and be 2.5 times higher in 2050 than it was in 2007. Downs notes (2006, p.1) that *"from 2000 to 2005, China's energy consumption rose by 60 percent, accounting for almost half of the growth in world energy consumption".* Other energy researchers such as Shan et al, (2012); Liu, Chen and Liu (2011); and Rout et al, (2011) all report similar statistics and support this analysis.

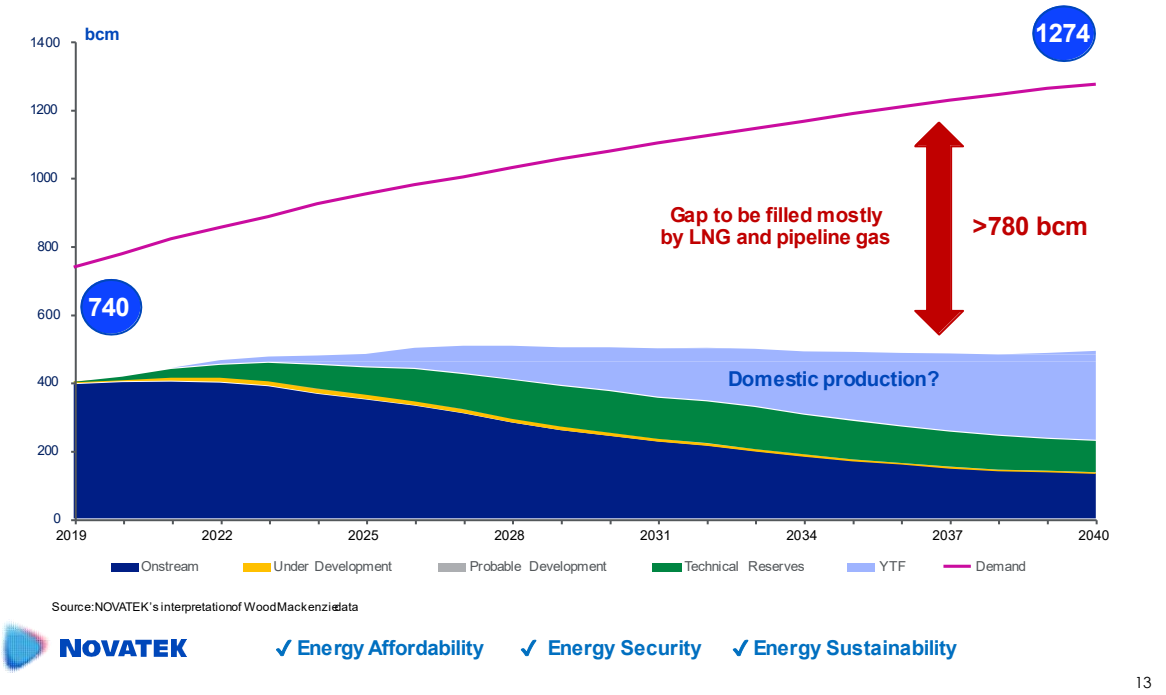


Figure 18. Asian Gas Market Prospects. Source: Novatek, 2020,p.13

China is concerned most of all however, about gas pricing, as gas is heavily subsidized domestically, and the process of gas price reform to deal with this, has been uneven and to date unresolved (Paik, 2012); various gas pricing formulae are mentioned by Paik, (2012, p.262) including a weighted average pricing (WEP), pricing by sources (PBS), and a price pegged to international crude oil prices (PTC). Equally of growing concern has been estimates suggesting China will be 100-150bcm short of required gas supply (about 300-350bcm) by 2020. This will have to be made up from overseas imports (LNG or natural gas); This may reduce its concern regarding security of supply, but this alternative sourcing of overseas gas will be intimately connected to cost however, as *imported* gas will be PTC priced.

As a Chinese energy specialist interviewee explained to the author in Shanghai in the Summer of 2017, this is an emerging energy dilemma because although domestic production is subsidized, it produces *insufficient* volumes too; but conversely internationally-sourced gas – will give China enhanced security of supply, but at too expensive a cost for consumers in China, and additionally in such volumes that it will inevitably put pressure on domestic pricing anyway. Paik (2012, p.263) also notes that this security of supply issues is further compounded by little storage capacity as well (in 2015, it stood at only 3% of natural gas sales) which of course reduces China's ability to forward buy reserves in the international markets, and/or have a realistic contingency strategy for fluctuation in gas demand because of say, climate differentials or possible embargoes on imports.

So, what is clear however is that imported gas will be a necessary strategic move for China, not just because of domestic prices but associated with the purchase of such enormous volumes (Liu, 2006; Zhang, 2006**)**, the level of state subsidization required. One obvious gas supplier for China with enormous reserves is Russia, its geographical neighbour. With Sino/ US relations difficult (Leung, 2011; Zhang, 2011; Blunden, 2012), some/much of that imported LNG/gas will logically be Russian. The Arctic's relative political stability, China's good working relations with Russia, and the latter's ownership in the Arctic of 25% of the world's remaining hydrocarbon reserves (Jakobson, 2010), means that China's security of gas supply and *added strategic use of a new global SLOC* (the NSR) makes investment in the Arctic an attractive option for Beijing. This is aside from existing natural gas supply contracts with Gazprom via its recently commissioned Power of Siberia (and possibly the Altai) pipelines, as well. Russia's view is similarly enthusiastic

regarding LNG supply from the Arctic, as it covets the enormous North East Asia gas/ LNG market, and welcomes a Belt and Road Initiative/NSR relationship - endorsing China's Polar Silk Road concept, as the latter's wealth underpins the necessary infrastructure investment that the NSR now needs to monetize its growing use as a possible international SLOC; to the geo-economic benefit of China and Russia, and their linking up of North East Eurasia by both land and sea (LNG and natural gas industry), as per the industry's multi-regionalism instrumentalization of their shared geo-economic strategy in/for the region.

There is a political dimension to China's energy diversification policy too; the Chinese economy's growth relies on prodigious energy consumption, and as that fuel may be imported, so China's political class feel vulnerable domestically, with its expectant commercial class of citizens in China demanding onward growth and stability from its government. In addition, political vulnerability is also felt regarding dependency on the international energy markets dominated by the US/ West. This is an aspect of the security of supply dilemma for China's Communist Party elite especially (Zhang, 2006), and where Sino-Russian warming energy relations increasingly matter, when faced with a common regional competitor/foe; the U.S. and its control over established SLOCs (Malacca and Hormuz Straits (but not the NSR)), international energy resources, and its own geopolitical plan to influence China's economy by supplying strategic volumes of LNG to that country (that it can then shut off if it wishes). The latter point is well understood by both Moscow and Beijing and reinforced by the author's talks with both Chinese and Russian energy and policy specialists' interviews in Moscow, Beijing, Shanghai and London in 2017 and 2019.

As stated though, in terms of Sino-Russian energy relations much depends on pricing, China's increasing equity participation in Russia's Upstream and Midstream activities (to guarantee security of Russian (Yamal/PoS) supply), and latterly, by adding value to Russian-related Siberian and Arctic gas projects by building for instance, petrochemical plants, discussed by Chung, Lai, and Joo (2009), on the back of regular natural gas feed/offtakes to China (e.g. Power of Siberia's pipeline to China).

Strategically, and security-wise, researches show too (Xu, 2006; Erickson & Collins, 2007; Leung, 2011; Zhang, 2011, 2012; Cao & Bluth, 2013; Rainwater, 2013), that Yamal LNG and Arctic LNG (Novatek's two LNG projects in the Arctic), as well as Russia's Power of Siberia pipeline gas project are all China-critical for two major additional reasons: Like Russia's Far East region China too wants to economically revitalize its north-easterly Dongbei regions (one of which borders the Russian Far East) and this will require gasification (for power generation to feed industry's needs); secondly the NSR is vital for China's Belt and Road Initiative /Polar Silk Road developmental and governance plans in the Arctic according to collated findings (Cao & Bluth, 2013; Rainwater, 2013); and its use as a potential global SLOC - conveying Yamal LNG to China and North East Asia's gas markets is critical. Concurrently 50% of China's GDP depends on shipping, and secure SLOCs linking regional markets such as the European Union; thus, the NSR is of vital concern to both Russia (economic monetizing of the region and LNG movement) and China (trade with European Union and avoiding the US Navy in the NSR).

Both these factors – kickstarted by a Chinese overseas *energy policy* (ie diversification of gas/ LNG feed from Russia's Arctic) will steadily shape Chinese international relations with Russia - and in the Arctic in particular.

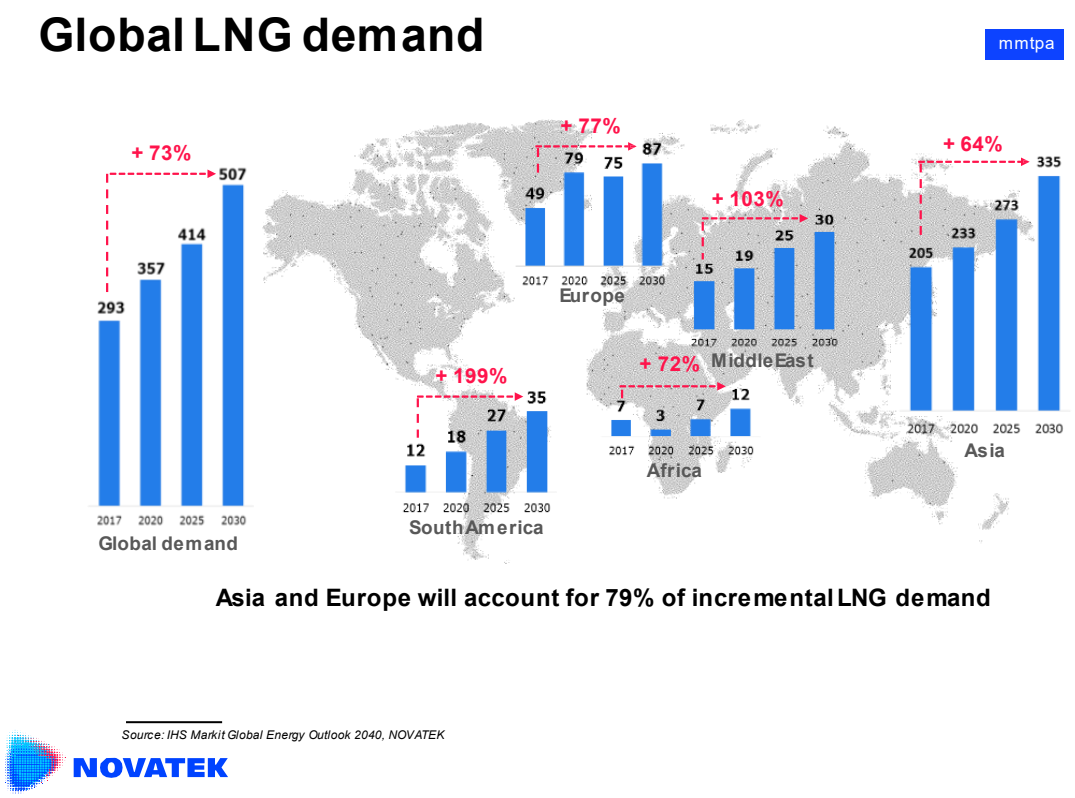


Figure 19. Global LNG Demand. Source: Novatek, 2017, based on data from IHS Markit Global Energy Outlook, 2040, Novatek, p.45

For Russia and China therefore the geo-economic advantages alone, as Zhang (2006, p.17) points out, of working together in Novatek's Arctic operation(s) are numerous and self-evident: for instance Russia's Arctic gas, to date largely stranded can now be monetized by means of expanding LNG supplies to North East Asia and China (Figure 19) via the NSR; as China's gas market is so huge, it also means that the realisation of a regional LNG trading hub in North East Asia will have in effect geopolitical consequences as previously alluded to, as well as the subsequent geo-economic creation of a global gas market with China and Russia, at the heart of it. This will be referred to again, later in this chapter.

As Xu (2007, p.6) states, the global gas industry will be affected as it:

"is influenced not only by economic, political, and social factors of resource-rich countries but also by international political factors, particularly change in the international balance of power, adjustment of relationships among countries and changes to international rules"

Paik (2012, p. 406) goes on to endorse this theme too:

"…...Russian gas reserves in East Siberia and the Far East are so huge and stranded (that is without nearby markets) that they could transform the gas industry in China."

Finally, Arctic climate is both a challenge (difficult operating environment for gas extraction) and a governance and geopolitical opportunity for China in relation to Arctic energy activities. China brings engineering expertise, capital and marine technology (via the Belt and Road Initiative's Polar Silk Road), to solutions along the NSR for instance (all denied to Russia by sanctions), arising from climate change challenges, including permafrost melt, eroding coastlines, shifting ice activity, establishing ports and bases along the coastline, navigation challenges, and the (vital) lack of sub-sea batholithic data, etc. All these factors are crucial for the good functioning of the Yamal projects and Russian LNG's *territorial expansion* of activities eastward to North East Asia gas markets, including China. Moreover such cooperation within the Novatek project(s) also *builds trust* between Moscow and Beijing as such undertakings by China, although unquestionably opening the door to further governance opportunities in the European Arctic via the vehicle of the Belt and Road Initiative's Polar Silk Road vision, still require Russia to alter its NSR legislation for instance (to allow foreign shipping along the Russian NSR), and a loosening up of regulations allowing the participation of Chinese Oil Field Services groups

in the Arctic as noted by Gao and Erokhin (2020); alongside some acknowledgement of Chinese equity participation in Russian upstream projects, such as Yamal LNG and Arctic LNG. All of this is now under discussion (Henderson and Moe (2019, pp.124-125) and/or already underway.

In combination with technological applications (e.g., Chinese Oil Field Services companies) and new regional infrastructure to support hydrocarbon projects, climate alterations open up the Arctic to Chinese incursion, and the possibility of linking not only Russia with North East Asia but China with western Eurasian (EU) markets. As a result, by various political means that are used to exploit climate change, such as international law determining sovereignty/access of/to the Arctic region, and dual use technologies useful in economic governance terms (e.g., 5G/Broad band connectivity), the region is becoming an emerging *internationalizing geo-economic space*, that both Russia and China wish to exploit – and influence. The energy industry - along with its powerful geo-economic instruments of capital, technology applications, infrastructure capabilities, and integrating networks, is a powerful multi-regionalism means of exploiting Eurasian Arctic geography and its climate change in North East Asia; on both on land and at sea, and where the US is in the main, absent in the 21st Century.

In summary, as a rising global power, China sees the Arctic region's geo-economic importance - and its possible role in the governance of the Arctic (via the Belt and Road Initiative/Polar Silk Road, science diplomacy and Arctic Council Observer membership), along with interests in other key regions around the world (Eurasia, Indo-Pacific, Africa and the Middle East) as part of its growing global responsibilities (Bekkevold and Lowe, 2018) as a super-regional power. However, it is equally aware that within

the domain of energy, Russia's energy and institutional position in the Arctic which China wishes to benefit from, and its domination of Eurasia's maritime link – the NSR, encourages cooperation not outright competition with Moscow. In the Arctic Russia is the indispensable player and partner, and for China, with no Arctic experience - its regional mentor. It is also acutely aware that like any sponsor, Russia's sponsorship can be withdrawn at any time.

However, working jointly in the Arctic through a strategic industry like energy, China and Russia may use this capability – and capacity, and its instrumentalization of multi-regionalism, to create via gasification and LNG operations, territorial expansion eastward. The associated use of the NSR's Eurasian transhipment bases' locations in North East Asia, and virtual technologies, which substantially facilitate regional connectivity and expansion – including interregional LNG/gas trading, for instance, will lead inevitably (in terms of sheer economic scale and political will) to the creation and sustainability of new geopolitical and economic spaces in North East Asia, such as the Pacific Arctic and increasingly, Space itself and cyberspace; where of course the Arctic with its high latitude position, is perfectly located for low-orbiting satellite links determining telecommunications and navigation, say, along the NSR. This technology aspect projects further into Space Communications and Command and Control of Space-based military systems too, such as Ballistic Missile Defence systems, the ground-stations for which are located overall in the European and Pacific Arctic. However it is the gas/ LNG industry that has bult already much of this gas-related infrastructure (including the NSR) initially for its own purposes, but as much of the technology and infrastructure involved in LNG/gas is dual-use, it clearly has additional use

at a geostrategic level for China and Russia in the Arctic region's Space and cyber domains as well.

This is *de facto* then, part of a Sino-Russian geo-strategic, multi-regionalism strategy to contest and challenge US power and governance in the 21st Century in North East Asia - and in Space/cyberspace as well.

Part B. Novatek; Russia's LNG Operation on the Yamal Peninsula

This quote from Novatek's (2019) own website gives a summary of the company's establishment, commercial mission, and its important role in Russia's energy strategy, especially in the Arctic region.

"PAO NOVATEK is the largest independent natural gas producer in Russia and in 2017 (Figure 20), entered the global LNG market by successfully launching the Yamal LNG project. Founded in 1994, the Company is engaged in the exploration, production, processing and marketing of natural gas and liquid hydrocarbons. The Company's upstream activities are concentrated mainly in the prolific Yamal-Nenets Autonomous Region, which is the world's largest natural gas producing area and accounts for approximately 80% of Russia's natural gas production and approximately 15% of the world's gas production. NOVATEK is a public joint stock company established under the laws of the Russian Federation. The Company's shares are listed in Russia on Moscow Exchange (MOEX) and the London Stock Exchange (LSE) under the ticker symbol "NVTK".

The purpose of examining the Novatek LNG project(s) and the Sino-Russian relations within them (including their respective energy policy aims), is to illustrate how the three *processes* of multi-regionalism incorporate the use of commercial/ technological developments in gas transportation (LNG) - as a critical geo-economic *instrument*, and which

will lead to one of the three (or a combination of) hypothesized multi-regionalism Sino-Russian *outcomes* discussed in the Theory chapter, namely: A structural change in the international order; an emergence of a Sino-Russian grand strategy in North East Asia; the emergence in North East Asia of a regionalization-by-integration developmental strategy emanating out of broader global forces and subsequent International Political Economy trends, including decreasing globalization, undermined by greater regionalization, which lessens globalization's *inter-state* integration (i.e. state-led multipolarity).

Figure 20. Resource Base for Novatek LNG Projects. Source: Novatek, 2020

At the commercial level, the international gas industry usually deploys its New Business Development strategy - and its *de facto* assertion of *geo-*

economic power in three ways: Via its access to capital/financing, its use of infrastructure build-out, and its political/institutional networking. Yamal LNG - as a New Business Development project, reflects this industry process and is therefore illustrative of a Sino-Russian geo-economic power play in North East Asia.

I use Global Production Network methodology to illustrate how themes discussed in the Theory and Gas Industry chapters (including national energy policy, and the mechanism of Polycentric Regionalism, (multi-regionalism), are reflected in Novatek's geo-economic-driven Arctic LNG operations. These are themselves determined by the industry's three processes - noted above, resulting in the creation of a regional, scalable, and networked output - the Pacific Arctic geopolitical space.

At present Novatek's present and future LNG projects - "Yamal LMG", based on the Yamal Peninsula, at the mouth of the Ob River in the Arctic's Kara Sea, and "Arctic LNG-2" on the Ob River's eastern bank (Figure 18) are both largely oriented toward Europe and the North East Asian gas markets, (though not exclusively). Both projects are Russian-led, independent private consortium projects comprising western (French/German) and Asian (Chinese, Korean and Japanese) equity partners and financial investors, as well as other western/Asian Oil Field Service providers, operating in and across international gas/ LNG projects, from out of the Yamal Peninsula. Arctic LNG-2, Novatek's second major LNG project is very much aimed at the Chinese LNG market, however, reflecting growing Sino-Russian trust, geo-economic interests including connectivity-infrastructure building along the NSR, and mutual commitment in/toward Pacific Arctic region building.

Novatek's Yamal LNG Project

Yamal LNG project is the only Russian LNG project in which China has a Belt and Road Initiative involvement (the Silk Road Fund@9.9%) as well as an industry equity position (CNPC@20), and which uses the NSR to transport Yamal LNG to China and the North East Asian market, in Summer (Figure 19).

As of 7 April 2014, the Yamal LNG OJSC consisted of: Novatek (50.1%), foreign partners, include: Total (with a 20% interest in 2011); and CNPC with 20% too (in 2013); along with China's Silk Road Fund (9.9%). This international consortium brings with them technical expertise and access to European and Asian markets. This was vital for the Russian Federation government as Weidacher (2016) relates, when US/ EU sanctions in 2014, forbade the financing of (future) Novatek projects; the addition of China's Polar Silk Road fund (Belt and Road Initiative) buying in with a 9.9% stake also sent a message worldwide, underlining Xi and Putin's desire to make this a very determinedly Sino-Russian energy operation in the Arctic.

The Barents Observer (2015) reported that in December 2014, the Russian government also awarded a subsidy of 150Bn roubles to the Novatek project. Yamal LNG deliveries (Figure 21), sail westward to the European Union and beyond along the NSR in Winter, and usually to Asian markets in the Summer – this pattern allows for seasonal ice-conditions along the NSR.

Yamal LNG is designed for a total 16.5Mt capacity, fed from the South Tambey gas field which contains some 900bcm of natural gas. The cost of the project was approximately $US 27Bn. Yamal LNG's operational headquarter is based inside the Arctic Circle at the port of Sabetta, in the

North East of the Yamal Peninsula, and gas is evacuated to world markets via the NSR, from this location. The gas reserves in this Yamalo-Nenets Autonomous Okrug represent 80% of Russia's natural gas, which equates to about 15% of global natural gas supply.

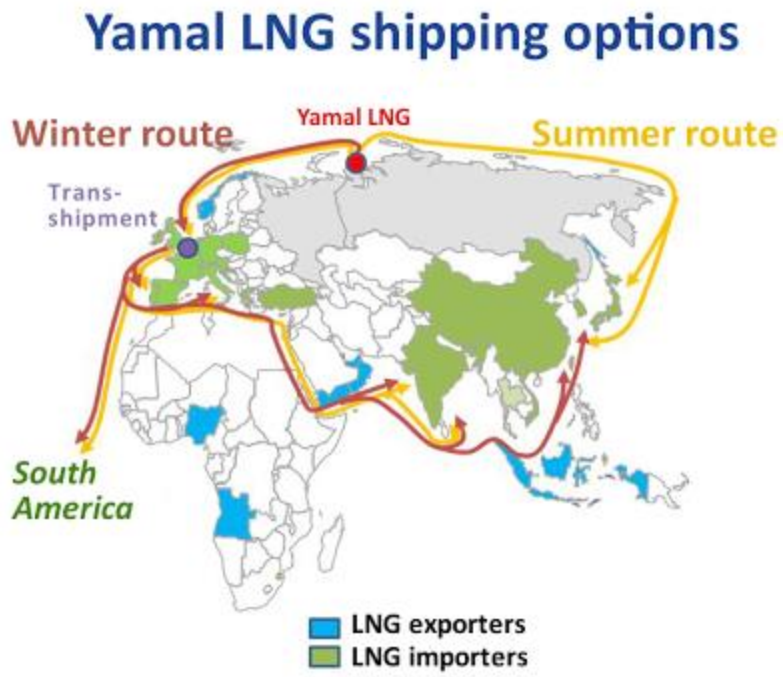


Figure 21. Yamal LNG Shipping Options. Source: Total Plc, 2013

Yamal LNG Capital and Financing

In the case of Novatek and its partners, capital investment and financing manifested itself partly in terms of Chinese funding initially, of the project; In 2016 (Yulong, Linghao and Jia, 2016), the China Development Bank together with the Export–Import Bank of China extended a credit of US$12Bn to the Yamal LNG project (Figure 22 below). Part of this deal was the securing of regular LNG deliveries to China as part of its energy diversification strategy. CNPC contracted with Novatek 3 million tons of LNG per annum for 20 years (Yamal LNG, 2014). This now equates to approximately 20% of Yamal's total (three train) capacity.

Additional Russian government investment covered infrastructure and engineering requirements (partly driven by a policy of substitution following sanctions) and also included development of Sabetta - $1.5Bn for the port's construction (Lunden and Fjaertoft, 2014) on the banks of the Ob River, the commissioning of two transhipment bases along the NSR, in Murmansk and Kamchatka, and most importantly state-support for the building of icebreakers, and 15 LNG Arctic-class carriers (Moe, 2014), most of which were designed with an eye on the Asian market for LNG, and built and owned by Japanese, Korean and Canadian partners.

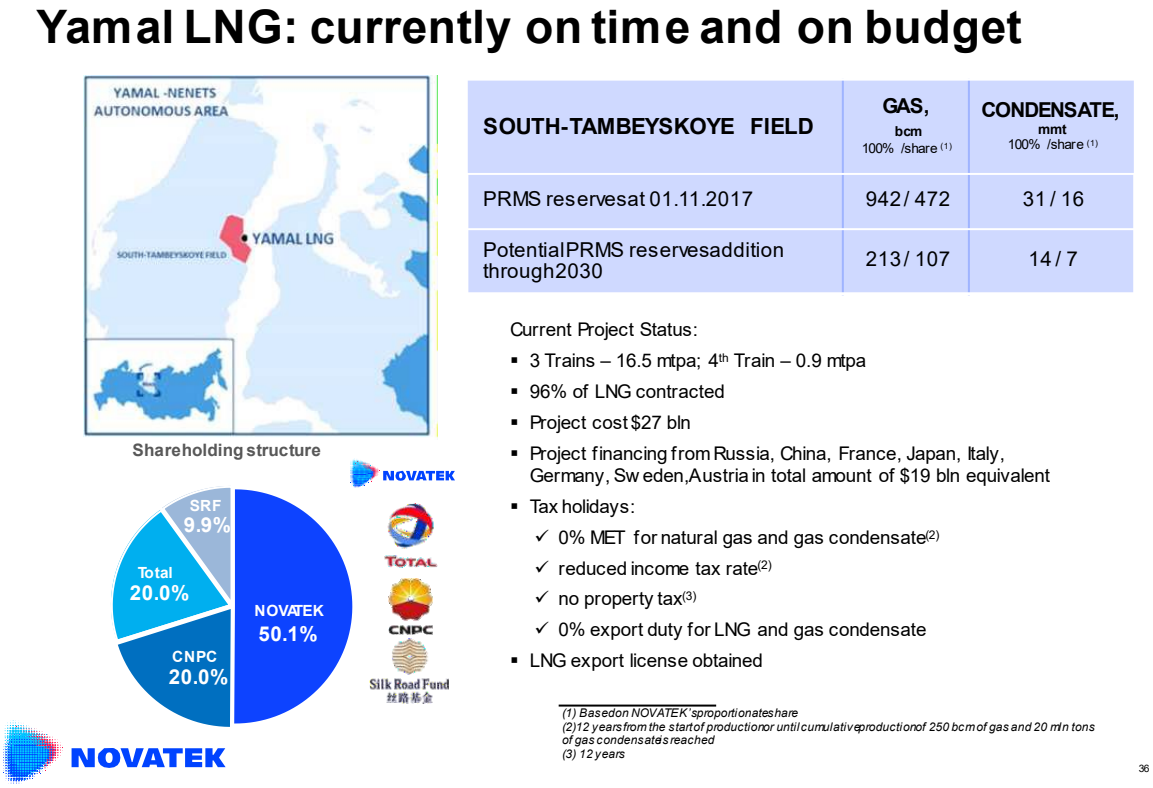


Figure 22. Yamal LNG: currently on time and on budget. Source: Novatek, 2017, p.36

For these regional development reasons, the Russian government awarded Novatek a series of benefits (Staalesen, 2019) including tax concessions: Deputy Prime Minister Trutnev introduced several new hydrocarbon tax breaks extending out to 2035. These include offshore

projects, production of LNG feed (natural gas), and petrochemical projects; this is estimated to lead to approximately Euro216Bn of revenue from Russian Arctic investments over the next decade and a half. In addition, the government planned free economic zones which allows tax-free importation of equipment and export (tax-free) of processed product. As Sidortsov (2018) explains, the Russian government also amended the tax code to encourage foreign investment too. The Extraction tax is rated at zero for offshore development fields, and export-duty exemptions for some offshore equipment are in place, as are lower taxes for corporate assets based/located on the Arctic shelf.

In relation to these financial plans and incentives for exploitation of these Arctic hydrocarbons (having such long Return on Investment horizons) along with the acknowledged aim of zero net carbon targets to be achieved within the next 30 years, the explanations are necessarily complex. China is particularly interested in the Arctic's fisheries, fresh water supplies, and environmental research facilities precisely because anthropomorphic climate changes in China, largely caused by large scale hydrocarbon use are having such negative effects (e.g. factory-polluted rivers poisoning rice/paddy fields) on Chinese society. However, until such new technologies as wind farms and solar-generated power have the *industrial scale, affordability, access, ease/ and universality of use* as existing hydrocarbon-generated power, gas projects such as Russia's Power of Siberia, that were commissioned a decade *before* more green, alternative technology developments (i.e. the growing global market share of LNG *at the cost* of pipeline gas - and the advent of solar power technologies, etc), will be honoured. Nonetheless, natural gas/LNG is a strategic energy source for *China's transition from fossil fuels.* That is squarely reflected in China's Energy policy (see Chapter Four, Part A).

The central energy issue for China remains - ensuring sufficient, affordable, and readily available power generation *capacity between now and 2035.*

In a nod to the Arctic environment however, Novatek's LNG carriers for instance are fuelled by LNG, not heavy fuel oil. More recently, Gazprom and Rosatom (see Chapter Three), are jointly developing a blue hydrogen facility on Sakhalin Island; concurrently - and in line with this development the Russian government has designated Sakhalin Island as the first region to attempt to reach carbon neutrality by 2035. It is also in the process of creating a regulatory framework for carbon capture and storage projects (CCS). In the Arctic, in October 2021 Novatek announced (see Chapter Four, Part B) the development of its own blue ammonia/hydrogen project, the Obsky Gas Chemistry Complex (Obsky GCC), drawing on its natural gas feed from the Yamal Peninsula licensing area.

Notwithstanding these more optimistic environmental measures being taken in the Arctic region, it is still only an assumption - not a fact, that China agrees with the zero net carbon timeline. There is no evidence of China linking climate commitments to hydrocarbon energy projects at the strategic policy-making level for instance. The well documented scale of Chinese coal projects clearly attests to this conclusion. But as pointed out in this work, China and Russia are competing head-on with the three biggest, established LNG players in the World; the US, Australia, and Qatar (two of which are Western) for the giant NE Asian LNG market. It seems that the world's biggest hydrocarbon polluter – the U.S., is also ignoring environmentally-driven, zero net carbon targets - *and the associated issue of the ROI period to develop Upstream assets to feed such a market*, in pursuit of developing the (same) Asian LNG market.

Aside from the obvious commercial benefits and ambiguity of energy projects with long term ROIs, investment in large scale Arctic operations is also continued because the capture of the enormous LNG/gas market in NE Asia confers strategic/geo-economic *leverage to the supplier* over the consumer (i.e., gas is needed for the powering of manufacturing in China, Japan, and the ROK – and therefore Asian economic growth). Russia's determination to supply of gas/LNG - to China especially, is also because such energy leverage is essential to Moscow in attempting *to counterbalance the asymmetrical economic Sino-Russian partnership in NE Asia*.

Politically speaking, Novatek LNG's secondary but equally vital role in the Arctic is paying for the infrastructure and use of the NSR. For China the importance of the expanding NSR (facilitated by climate change effects) has led to a *climate adaptation strategy that gives China access to the Arctic and* sees BRI financing as a geo-economic instrument of Chinese regional governance, and the NSR itself as an Arctic platform/forward mounting base into Space. In sum, Russia and China see the ROI *of Arctic energy projects not only in terms of financial USDs*, *but in political treasure gained, intra-regional influence established, and geopolitical re-balancing facilitated* - as well.

For these reasons Novatek LNG and Gazprom (and Rosneft), as discussed in detail in Chapters Three and Four, are central to Russian Arctic/Siberian energy policy, with Gazprom as the state monopoly and wealth producer, conducting on behalf of Moscow inter-governmental energy negotiations with China. Gazprom's position and the role of its Power of Siberia pipeline(s) is therefore highly political, and far more than

just commercial; it is the Russian state negotiating a major geo-economic undertaking in NE Asia.

Conversely, Novatek LNG was initially seen by Moscow as a mainly privately-owned interloper, and supplier of Arctic LNG. However, as the global industry trend was shifting away from pipeline gas to LNG, and Novatek's international equity participation, project scale, and the *associated development* of the critical NSR grew so fast (as well as the prestige gained by this enormously successful undertaking), its emerging political and commercial centrality was noted by both Beijing and Moscow. For Putin, Novatek's commercial success in attracting *international industry collaboration and participation*, was a snub to the effectiveness of the U.S./EU's sanctions regime. Novatek has now established itself as the subsequent commercial facilitator for a S-R energy trading hub in NE Asia's huge LNG mkt, along with the ability to trade with *non-contiguous regions* as per Polycentric Regionalism's observation (via technology-enabled swaps deals - see Chapter Four, Part B). Today, Novatek LNG is probably the central *strategic* plank in Russia's Arctic relationship with China - because its delivers on time/budget- and is therefore a critical component of China's energy diversification policy, especially after the Sino-U.S. trade war and the formation of the QUAD, which has endangered continued (alternative) U.S./Australian LNG contracts with China.

The financial - and geopolitical rationale for supply duplication (Gazprom / Rosneft, and Novatek) is clear when considering these related (above) factors but it is only one of many factors that Russia and China see as advantageous in their energy relationship in the Pacific Arctic region. Gazprom is a political conduit for S-R relations, and Novatek a commercial

platform for a broader S-R Arctic partnership. For Putin the competition for contracts between Gazprom, Rosneft, and Novatek is also essential, in order to raise the game of these two inefficient and poorly managed state operators, which are still viewed by many as cosy monopolies, unable and ill-equipped to compete in international markets as discussed in Chapter Three.

In summary, whilst Gazprom as a state institution offers long term, high volume, and affordable contracts via the PoS network, locking in Russia and China as supplier and customer respectively, quasi-privatised Novatek LNG offers *in addition*, destinational flexibility, spot market pricing, and non-oil indexed payment options. Geoeconomically, as rehearsed in Chapter Four, this will bring with it the possibility to build an LNG hub/market in NE Asia, that is non-USD denominated and (eventually) de-linked from the ($-underpinned) oil price. The revenue earning from such a massive investment will economically underpin the creation of the Pacific Arctic region – as per Polycentric Regionalism theory.

In this dissertation pipeline/LNG Project RoI is recognized as important of course, especially to Russia but in the S-R Arctic partnership the gas/LNG industry's role is as a geo-economic instrument and part of a climate change adaptation strategy (see Introduction) wherein the S-R outcome sought is primarily measured not in specific RoI, but broader geopolitical gains (regionalization by gasification) in these newly created polycentric spaces in NE Asia. This in turn reinforces and highlights China's neo-realist climate change adaptation strategy for the Arctic, seen here in tooth and claw and which clearly does not prioritize environmental aspects nor concern itself solely, with financial (RoI) considerations.

Yamal LNG Infrastructure

The Yamal LNG plant has three LNG trains with a total capacity of 16.5 million tonnes of LNG, per year. The processing plant's Front End Engineering and Design (FEED) contract (and for construction), was awarded to an international consortium of engineering companies: Technip (US/French company); JGC Corporation (Japan); and Chiyoda (Japan). This consortium's make-up reflected Asian interest in working with Novatek to ensure LNG deliveries to Asia, in due course.

Additional infrastructure projects included the development of the port of Sabetta as well as an airport/seaport and a power plant; the projects were developed by Russia's Technopromexport, and the latter power project's turbine construction was won by Germany's Siemens.

Even at this neonate stage China had been quick to chase major Oil Field Services contracts for Yamal LNG, but not just for commercial reasons, as Yulong et al (2016, p.16) remarked, but about their general involvement in the Arctic as well:

"Their involvement in the project showed to the world not just their comprehensive strength in both LNG technologies and equipment fabrication but also their potential to become a world class competitor in the petroleum engineering market, as demonstrated by their strong capacity, attractive cost, and short delivery period for module fabrication during their participation in the Yamal LNG project".

China, as a major investor in Yamal LNG is determined to be involved going forward, in the Arctic's *regional economic development* as Beixi (2021) suggests. This will be achieved - in industry terms by being involved in *both upstream and midstream* activities in the Russian Arctic,

and by doing so making use of its expertise (and technologies) in marine engineering and infrastructure construction. In effect China is building a position for itself as the key supplier of fabrication materials, technologies, and equipment to Yamal LNG, and diversifying its risk (and strengthening its influence), by operating in several sectors (e.g., Upstream and Oil Field Services activities) of - and geographically along Yamal LNG's value chain/network.

Chinese companies specialising in modular design and construction won - according to Yulong et al (2016, pp.15-17), contracts from Yamal's general contractor, Yamgaz (a Technip Joint Venture with two Japanese companies), including a design, purchase, and construction contract (for LNG trains) for COOEC, a Chinese offshore oil engineering group.

Further developments included various fabrication and engineering contracts for CPOE and Penglai Jutal Offshore Engineering Industries, as well as creating Qingdao's joint venture with McDermott; the latter venture to build various modular fabrication units, and gas separation units too. In 2015, Sichuan Honghua Petroleum Equipment Co, built and delivered Arctic-class drilling rigs for the Yamal project (Honghua, 2015). This was the first ever drilling rig that could operate in -55C.

Of note was that it also drilled to a depth of 7KM, breaking the hitherto western lead in such drilling technologies. Undoubtedly China is now a recognized global provider of Oil Field Services - tested in the harsh Arctic environment; its financial muscle, and now expertise in permafrost engineering - and the size of its market, suggests it will use these capabilities to further its involvement in Arctic energy projects, and their associated infrastructure needs.

The NSR and China's "Blue Economic Corridor"

In terms of critical infrastructure needs for the functioning and sustainability of the Yamal project, the Arctic's NSR is growing in attractiveness for both Russia and China; especially for Russia under western sanctions, and for China regarding a safe maritime route for evacuation of Arctic hydrocarbons home, and a partial answer to the security situation in the East and South China Seas - and its impact on China's access through the Malacca Strait to European destinations and beyond. It is also a means by which Chinese equipment and Oil Field Services, for further infrastructure build-out of the project can be delivered.

Moreover, the NSR saves China time (and money) in terms of shipping costs and concurrently, placing it at the epicentre of international economic relations in the Russian Arctic *space*. In 2016, China's COSCO Shipping Specialized Carriers was created, with the Arctic its main maritime focus. It is certainly now a critical part of the Yamal LNG value chain, linking Russian LNG with Chinese/Asian gas markets as part of China's Polar Silk Road plan.

In terms of shipbuilding capabilities that support Yamal LNG and Arctic LNG operations, China's Guangzhou Shipyard International Company has been awarded contracts for the construction of semi-submersibles and offshore platforms for the Yamal LNG. This is alongside ship-building contracts awarded to other Asian ship builders too, including South Korea's Daewoo Shipbuilding & Marine Engineering (DSME) which won the contract for the building 15 type Arc7 ice-class LNG tankers for the project; and Finland's Aker Arctic Technology Inc which designed them to operate all year round in Arctic conditions (they can deal with ice up to 2.5 metres in thickness). The first ice-breaker LNG carrier (Figure 23) which traversed the NSR in August 2017 was named by Putin after the (late)

Chief Executive Officer of Total, Christophe de Margerie, and covered its maiden voyage in 19 days. Various international companies then lease these ships to Yamal LNG including: the Teekay - China LNG joint venture (6); Sovcomflot (1); Dyngas (5); and MOL (3).

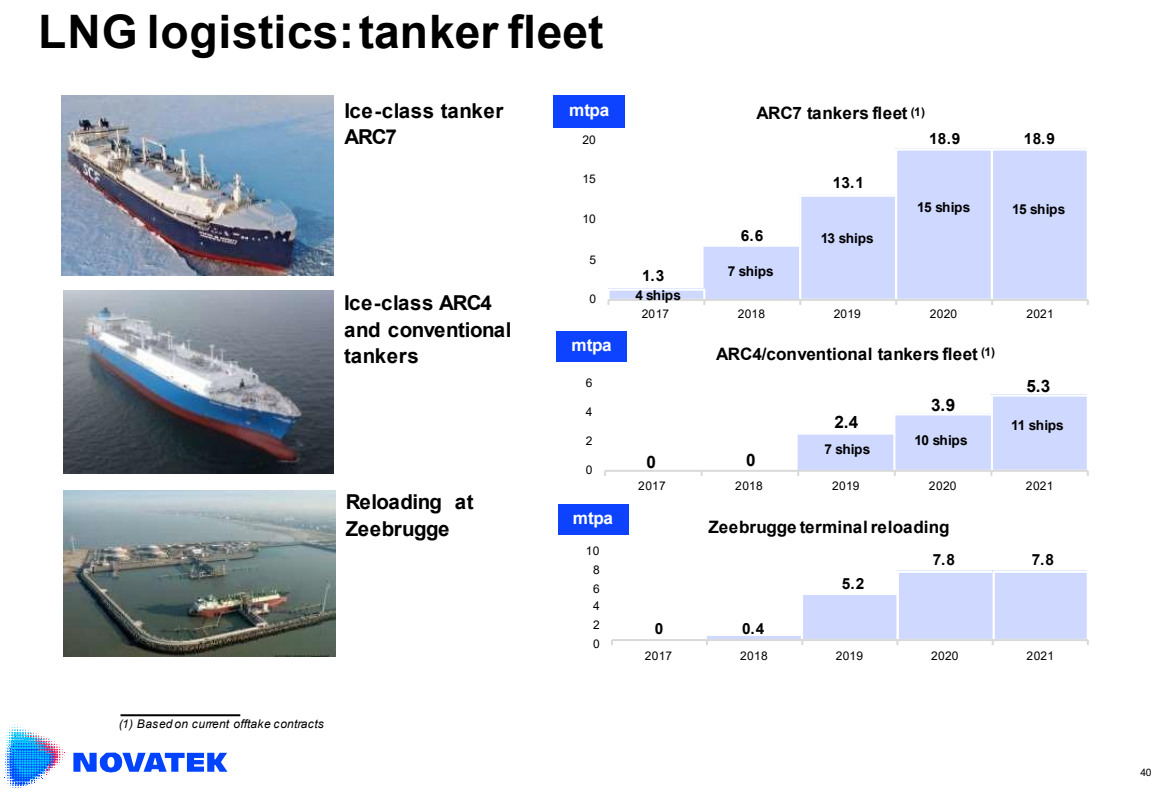


Figure 23. LNG Logistics: tanker fleet. Source: Novatek, 2017, p.40

The NSR – designated by China as part of its blue economic corridor policy linking Europe with China was integrated according to Erokhin, Tianming and Zhang (2021), with China's Belt and Road Initiative in 2017 in the Vision for Maritime Cooperation under China's Belt and Road Initiative published by China's National Development and Reform Commission and State Oceanic Administration.

In January 2018, China's newly published Arctic Policy White Paper (China, 2018) proposed that all stakeholders participate in the development of Arctic shipping routes, thereby *building* and integrating the

“Polar Silk Road” with Russia’s Arctic Transport Network plan (Serova, 2021). Chinese companies have also been commissioned to carry out in the construction of infrastructure along the routes and to promote conduct trial voyages, establishing the NSR as an established SLOC for commercial ends. Encouraged by these integrating opportunities and projects, China’s use of Russia’s NSR is becoming significant already. Regular commercial operations have been classified as both trans-Arctic and destinational with both operations related to Novatek’s Arctic LNG development, namely Yamal LNG (and in the future Arctic LNG-2).

In summary, China’s involvement in Yamal LNG’s operation, as part of its energy diversification strategy, is intimately linked to the infrastructure build-out of Russia’s NSR (including shipping and energy-related port facilities) and its Greater Eurasia concept, linking both countries. China’s Blue Economic Corridor concept, as well as its vision of a Polar Silk Road are also increasingly dovetailed with Russia’s NSR in terms of its Belt and Road Initiative financing, and with Yamal LNG’s shipping, engineering, and design requirements, provided increasingly by China’s fledgling Oil Field Services groups.

These Sino-Russian institutions’ arrival in the Arctic correlates closely with my Polycentric Regionalism theory, which suggests that institutionalisation (linked with GPN analysis emphasis on organizational and networking processes) is a *first or concurrent* step, in the process of multi-regionalism. This is in contrast to established Regionalism theories which state for instance, that the European Union as a governing institution, was set up *long after* the practical economic process of European unification had already begun.

Novatek's Arctic LNG-2 Project

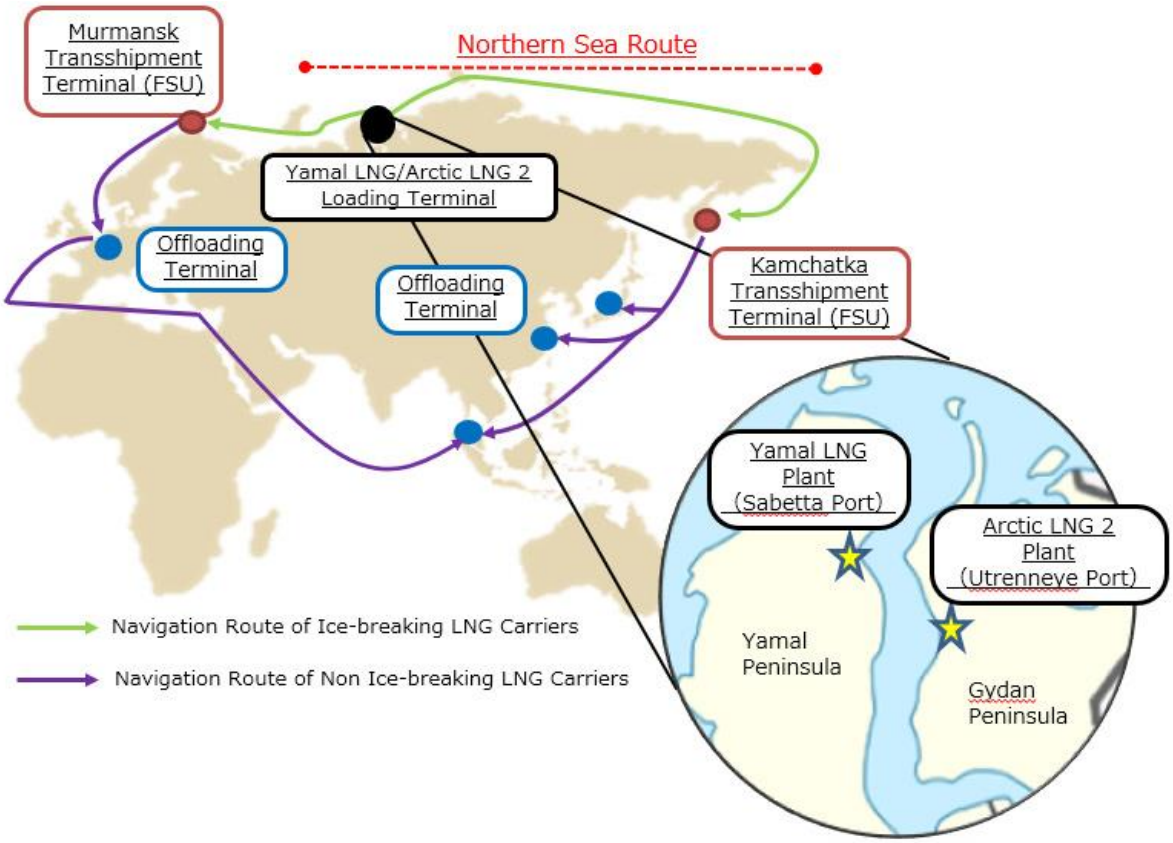


Figure 24. Overview of LNG Transportation Routes and Transhipment Points. Source: Mitsui O.S.K Lines, 2020

The second Arctic project of Novatek's is Arctic LNG-2 which was/is more local-content oriented, reflecting Russian energy policy and ongoing western sanctions (Figure 24). The plant is positioned at a site near the Gyda Peninsula, opposite the port of Sabetta, and across the Ob River.

Consequently, additional *foreign* participation in Arctic LNG was sought, but from Asia primarily, not Europe; at first this was thought to be (Murphy, 2019), a combination of Korea's Kogas, a Japanese consortium, and even a Saudi interest too. The final decision however was that a consortium was created consisting of: "Japan Arctic" (Mitsui and JOGMEC), awarded 10%, alongside China's participation of 20% in total; a split between CNPC (10%) and CNOOC (10% also). France's Total gained a 10%

position too - with an option to increase that to 15%, leaving Russia's Novatek, holding the remainder (60%).

Arctic LNG-2 comprises 3 x 6.6 mtpa Trains (a "Train" is an LNG stand-alone liquefaction and purification plant) with a total capacity of 19.8 mtpa. Arctic LNG-2's expected online/commissioning dates are the following:

Train 1: 2023

Train 2: 2024

Train 3: 2025

The construction cost (CAPEX) of Arctic LNG-2 will be approximately US$21.3 Billion. However, as a result of revised Russian Energy policy (Sidortsov, 2017), Arctic LNG-2, like the Yamal LNG project, will also be awarded various tax incentives/breaks, state subsidies including for the development of Utrenniy Port, as well as the associated LNG trans-shipment terminals (Figure 7) at the eastern and western ends of the NSR, namely Murmansk and Kamchatka.

In 2020 at the company's AGM, Novatek Chief Executive Officer, Leonid Mikhelson reported that 39% of the construction work on Arctic LNG-2 was already complete and that its Train 1 was also 53% complete and on schedule for launch in 2023.

Also mentioned was that Yamal LNG's Train 4 – a technically substituted local enterprise (as opposed to a western engineered effort, pre-sanctions) was on schedule too - and had already secured commissioning volumes. The overall summary of Arctic LNG-2 is represented in Figure 25 below. Of note about Arctic LNG-2 is the reduced CAPEX of this project, the introduction of new *substitution* technologies (Gravity-Based Platforms) and sustained the Russian government investments in the form

of tax breaks and concessions. Existing infrastructure is being leveraged too, with the project being designed, built, and operated in a contemporary sustainable way with though to minimal environmental impact(s).

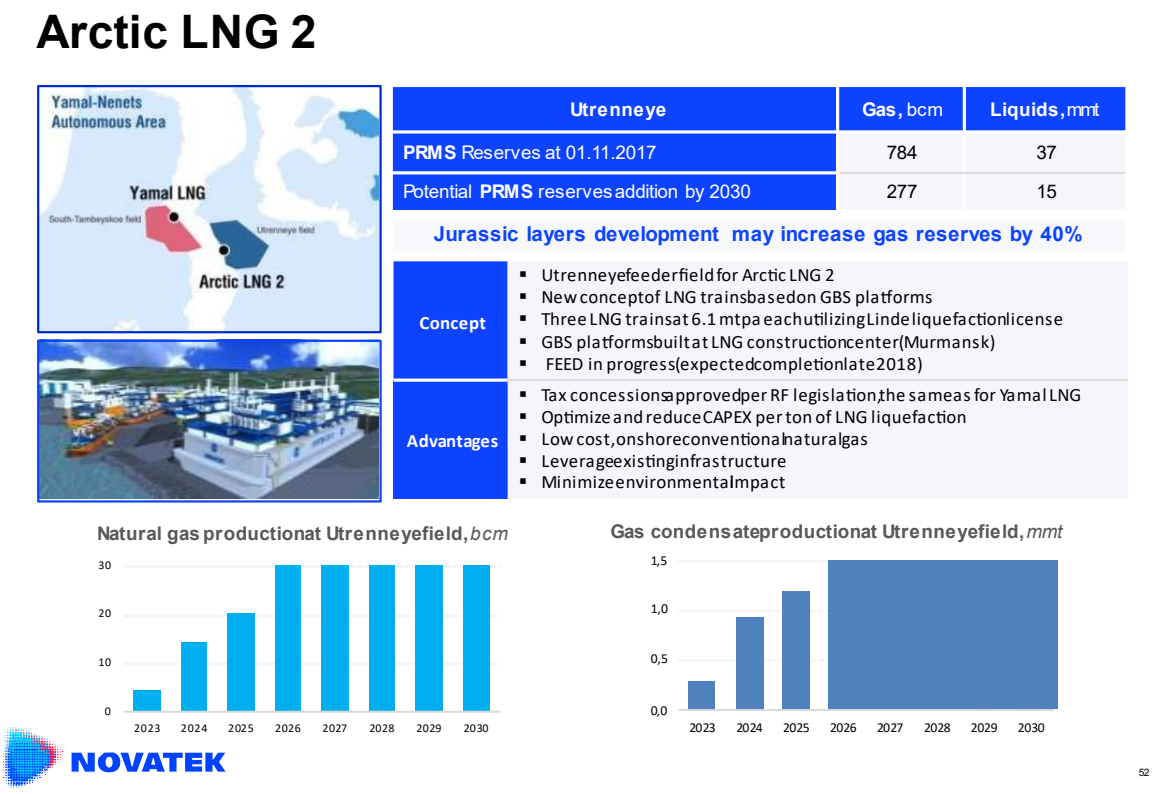


Figure 25. Arctic LNG 2. Source: Novatek, 2017, p.52

Arctic LNG-2: Shipping, Docks and Terminals

There is now much competition between participants, OFS groups, and international dockyards, especially Asian, for ice-breaker construction contracts related to Yamal LNG and Arctic LNG-2. Humpert (2020) reports that between 2019-20 additional contracts were awarded for additional Arc-7 icebreakers for conveying the last Train (4) of the Yamal LNG project, and for the new Arctic LNG-2 project. Between 2016-19 South Korea's DSME had already built 15 such ships for the original Yamal LNG project.

The latest order amounted to 5 ships in all, to be built at the Zvezda shipyard on Russia's Pacific coastline. However, to comply with Putin's directive of Russian engineering, design, and fabrication substitution at Yamal (because of sanctions), the fledgling shipyard, Zvezda, with little as yet experience, augmented the construction process by hiring the leading international ice-breaker construction company, South Korea's DSME for aspects of the build of the five of the Arc-7 ships.

Novatek and its partner, Sovcomflot, have finalized a further order for ten Arc-7 ice-class LNG carriers from Rosneft's Zvezda shipyard on Russia's western Pacific coastline too (see Figure 26). These will be delivered sometime between 2023-2024 to Arctic LNG-2&3 projects.

Payment for these vessels was assured when Novatek agreed a long-term charter arrangement with Russia's shipping outfit, Sovcomflot. However, Zvezda has already outsourced some of the more complex aspects of the Arc-7 contract, to France's Gaztransport & Technigaz, to construct the LNG tanks in the first five of their vessels.

Despite pressure from Moscow to use the Russian Zvezda shipyard (belonging to rival Rosneft) Novatek has argued that Zvezda is only capable of producing a maximum of 6 ships per year. Their additional requirement (for LNG-2 and other Arctic projects in the future), is 12 vessels, by 2023-24. For this reason, Korea's DSME has now got an order book for 6 Arc-7 icebreakers and a Memorandum of Understanding for a further 6. The new ships will be owned and leased by Sovcomflot, and a joint venture of MOL and COSCO Shipping. The value of all 12 ships is approximately $4Bn.

Figure 26. All 15 ARC7 Ice-Class LNG Tankers in Operation. Source: Novatek, 2020, p.25

Interestingly China's Hudong Zhonghua shipyard did not win any ice breaker orders at all, although they are financially competitive and their shipyards, world class.

This surprising outcome may partly explain the recent row over Russia's awarding of another major Arctic infrastructure-related project, involving Turkey and China. According to The Barents Observer (2021), China has recently appealed to Russia's Federal Antimonopoly Service over the award of a floating dock contract (for the Russian fleet of nuclear icebreakers) to Turkey's Kyzey Star shipyard, in Istanbul.

As China's Dajin Heavy Industries Co, Ltd offered a substantially lower tender figure, Rosatom, which awarded the contract to Turkey is now having to open a new tender. This will delay the arrival of the dock from its original delivery date of Autumn, 2024. The dock will be located near

Murmansk and is to accommodate a fleet of five new Russian LK-60 icebreakers, at least two of which will be built and already operational by their delivery deadline of 2022.

In terms of the Yamal LNG value chain, France is expanding its position in the Novatek project(s) by moving further down the chain - and buying a stake in Novatek's midstream subsidiary, Articheskaya Perevalka. Total is buying 10 percent of this company and will act as the operator of the natural gas reloading terminals in Murmansk and in Russia's Pacific Kamchatka region. This includes floating ship-to-ship LNG reloading facilities, where Polar Class LNG carriers working the NSR transfer their LNG (at Murmansk/Kamchatka) to non-Polar Class vessels for onward shipping to consumer terminals, and their respective regasification facilities. The two facilities will be built according to the Barents Observer (2021) by Korea's DSME and have a 20Million tons through-put capacity/year and will be built by 2023. The terminal barges will be owned however by the Russian State Transport Leasing Company but operated by Articheskaya Perevalka.

Arctic LNG-2 Russian Gas Policy Aspects

From a Russian policy point of view China will now have a broader representation from its hydrocarbon industry in this second, Arctic LNG-2, (19.8mt) planned project. Supply diversification is also maintained too, in the shape of the (inter)national operators and buyers, and the local content input acting as a form of technology and management substitution, in the face of continued western sanctions.

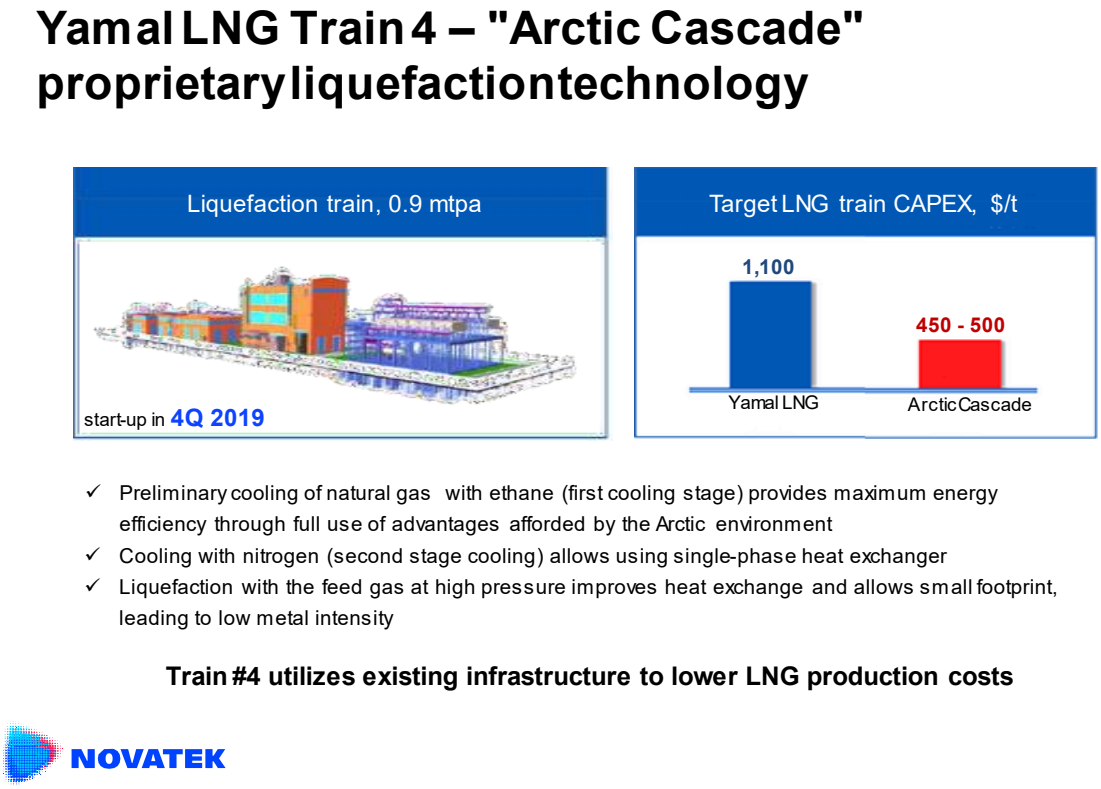


Figure 27. Yamal LNG Train 4 – "Arctic Cascade" proprietary liquefaction technology. Source: Novatek, 2017, p.39

In addition, Novatek's LNG's progression toward a deliberate policy of domestic /indigenous manufacturing and design Is evident with Yamal LNG's last project: Yamal LNG's 4th Train (Figure 27), and Arctic LNG-2, are part of an important substitution policy reviewed by Reuters (2014) and introduced by the government in the face of US sanctions which targeted Russian access to western LNG technology and the wherewithal to build it. In spite of this and with an engineering substitution policy in place (e.g., "Arctic Cascade" technology for Yamal LNG Train4), Novatek has now established Russian LNG, according to Henderson and Moe (2019, p.144), as one of the Big Five LNG global players (Australia, Africa, US, and Qatar), whilst simultaneously spearheading a strong market presence in Asia, and thus highlighting Russia's developing international trade credentials, especially in China and North East Asia; this was/is another, critical Putin geo-economic policy objective. In this sense the

Russian Federation's energy short term policy goals discussed in the last chapter, have already been achieved at least for North East Asia, and in some cases, exceeded expectations too.

Part of the reason for the considerable subsidizing of Novatek's Arctic LNG projects (tax breaks, subsidized infrastructure pricing, zero export tax rating, etc), by the Russian government, was its policy role in kick-starting the development of the Arctic economy, alongside its introduction of LNG-associated commercial technologies that enhance economic efficiencies, linked-up neighbouring transit countries, and reduce transaction costs across the Pacific Arctic region. For Putin, Novatek's Yamal LNG and Arctic LNG-2 are proof that despite sanctions and with a careful substitution policy, major complex projects can be created in the Arctic, that attract external (non-Russian) financing and gain respect on the international energy stage.

A second - but major policy aspect of leading with the LNG industry in the Pacific Arctic – and in particular and Novatek's key role in this, was its use of LNG carriers and ice-breakers along the NSR as per Putin's directive (Travkina et al, 2019) to increase shipping volumes along it substantially by 2030, along with associated infrastructure development of NSR ports such as Sabetta in the Yamal Peninsula, Tiksi, and Pevek (in the Laptev and East Siberian Seas, respectively) and Kamchatka, in the Pacific Arctic; all connected with Novatek LNG operations. This was also in line with the Russian Federation's NSR directive to *support* the growth of the Arctic's and Russian Far East's hinterlands' physical infrastructure as discussed in detail by Lagutina (2019). This aspect is covered in the next chapter where China's Dongbei and Russia's Far East overlapping regions similar development strategy, is discussed.

Surprisingly, but perhaps understandably, for these Pacific Arctic developmental policy reasons, Novatek as a private company has become the nation's national LNG champion; this is in spite of the fact that state-owned Gazprom and Rosneft have (non-Arctic upstream) LNG positions too, in Sakhalin Island close to the North East Asian gas market; but they have not been as successful as Novatek in establishing a world class LNG export business.

Conversely, the issue of Novatek – (because of its commercial access to North East Asia/China), being the key (political) interlocutor with China for LNG transactions, is not entirely welcomed by the Kremlin as it is largely a private company, unlike other LNG players such as Rosneft and Gazprom, both loyal, state owned companies. However, with Novatek's Yamal LNG's fourth train to be largely of Russian design and manufacturing construct (as part of the Russian Federation technical substitution policy), and its growing use of the NSR, these moves have endeared the company more to Putin.

From Novatek's point of view there are three policy aspects to ponder going forward: the need for a possible diversification *away* from China as the key investor, as Gazprom's Power of Siberia pipeline may mean China will play off Yamal LNG prices/imports against PoS' gas pricing; and a concern that with China taking a bigger *equity* position in Arctic-2 LNG, Beijing will begin to "influence" the Kremlin's /Novatek's energy and LNG policy, respectively. Thirdly, for political and not commercial reasons, Novatek at present has been forced (by the Kremlin) to place orders for future LNG carriers with the Zvezda ship building port, rather than with reliable and internationally recognized South Korean shipyards which already have an excellent track record with Novatek and are competitively priced. They are fighting this from a commercial point of view, however.

These points about strategic industries in Russia (e.g., like shipbuilding) and private interests, are highlighted and rehearsed by Henderson and Moe (2019); Rosneft is in fact the owner/funder of this new yard (“Zvezda”) close to Vladivostok and has no track record to date of ice-breaker ship building. This raises further doubts about Novatek’s competitive vulnerability as Rosneft is keen to export LNG to the same market(s) as Novatek.

In spite of some of these reservations, Arctic LNG is illustrative (Figure 26), of how far Sino-Russian cooperation has intensified since their original participation in Yamal LNG, which elements of the LNG value chain each wishes to endorse /involve itself in further (e.g., the midstream sector - NSR), the technologies developed - and why, and the overall future direction of their geo-economic collaboration. Figure 28 summarises the Novatek operation so far, and its future aspirations within which I anticipate further foreign and especially Chinese participation.

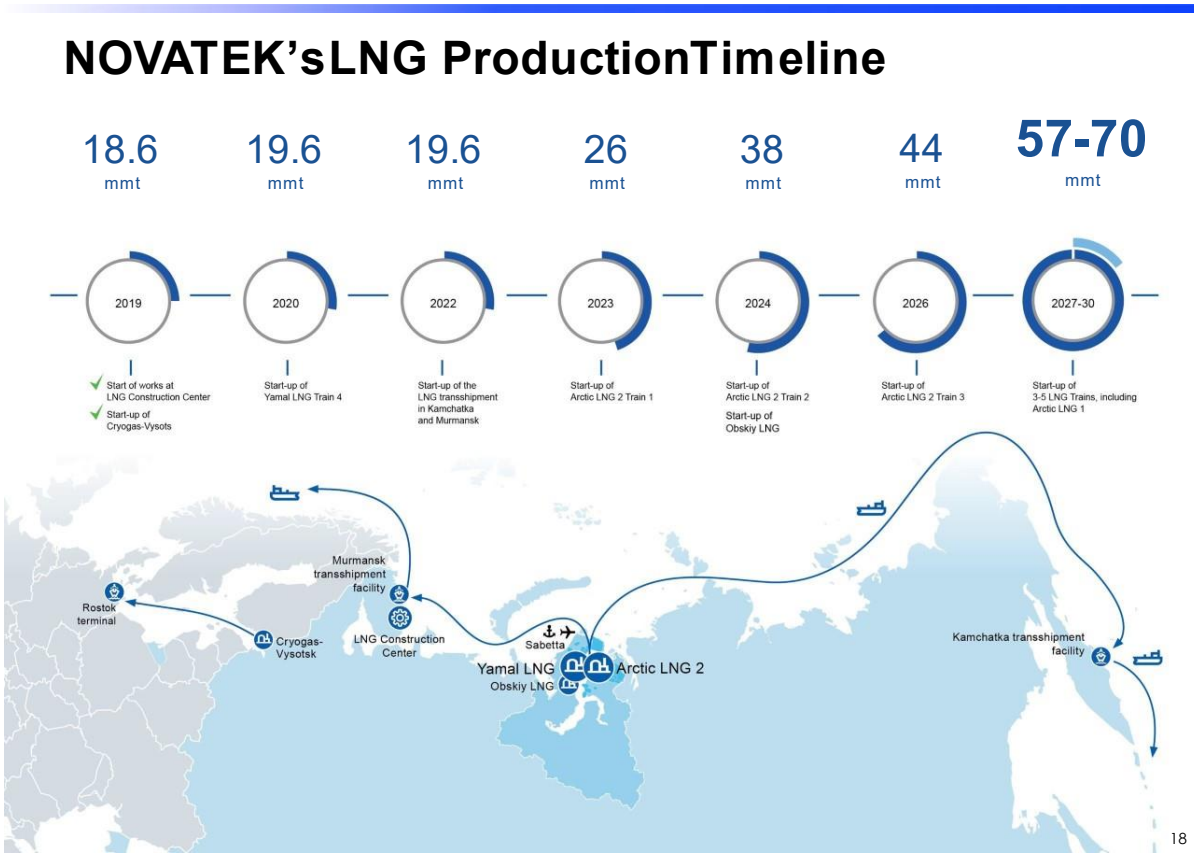


Figure 28. Novatek's LNG Production Timeline. Source: Novatek, 2020, p.18

Implication of Novatek LNG's Arctic Projects: Russia as a New Global LNG Supplier?

ALNG 1

This planned project is situated on the East bank of the Ob River, Southeast of ALNG2. Its (onshore) resource base (consisting of 7 license bocks) is in the central and Eastern parts of the Gydan Peninsula. The project qualifies as an LNG exporter, under a generic Novatek LNG export license framework, agreed back in 2014. The project has "probable" status and is therefore classified as part of the Russian Federation's long term LNG development plan (2021), but on two conditions (Seligman, 2021) that were very favourable to Novatek as the only gas-to-LNG producer in the region, namely: that the licence applicant had to have an existing production block(s) in the Peninsula, and the project is only concerned

with LNG production. The estimated capacity of ALNG1 (consisting of three trains) is expected to be around 20mtpa – as well as 1.5-1.8 of Condensate.

Economically, ALNG2's expected production volumes are part of the Novatek Group's production forecast of between 57-70mtpa, by 2030. This is a tight developmental schedule for ALNG1 therefore, and the additional effects of Covid probably mean that the (announced) Final Investment Decision (FID) date of 2022, will be missed. Financially, there will be a requirement for approximately 15 ARC-7 type ice-breaker LNG Carriers to be commissioned, with both Russia's Zvezda Pacific shipyard and South Korea's DSME as the two principal contractors. Some CAPEX savings are possible however as the intention is to share the *existing port* of Utrenniy – which was originally built for ALNG2. CAPEX will be required though, for a pipe gathering system to transport the gas to the Utrenniy port. ALNG1 is based on the Gravity Based System (GBS), and alongside with additional Topside fabrication work, will be built at the Belokamenka facility in Murmansk, which serves ALNG2 as well, and then towed to Utrenniy port.

ALNG 3

Despite its designation number, ALNG3 will be developed after ALNG1. The most likely date of first production train is not before 2027. Final Investment Decision will probably be in the late 2020s. For Novatek, this will be its first experience of an offshore LNG project, and for that reason it is most likely that it will form a 60/40 partnership (a la ALNG 1&2) to reduce the project's risk profile. In connection with this, there is a possibility of Novatek working with Gazprom Neft - to gain (prior) offshore experience and develop two fields on the Sakhalin shelf, where conditions are similar to those encountered in Arctic offshore operations.

The licence block awarded in 2011 is for offshore development of the Severo-Obskoye gas field, situated in the Ob Bay, between the northern most parts of the Yamal and Gaydan Peninsulas. The project's license holder (OOO Arctic LNG3) has an exploration and production (E+P) license until 2041. The resource base for the gas feed is approximately 1Bn bbls oil/condensate, with C1 gas resources of 37.2 TCF. The present Novatek LNG production forecast however, of between 57-70 mtpa, by 2030 does *not* include these ALNG3 predicted volumes.

It is expected that the Belokamenka fabrication facility at Murmansk will once again be responsible for assembling ALNG3's three Trains. There are however some challenges/advantages with ALNG3's development plans: firstly, the E+P block is formally classified as occupying the inshore waters of the Ob Bay, but as its location is so close to the Kara Sea, it is possible that either/or Gazprom and Rosneft will contest this project, on the grounds that only they are licensed to operate in the Kara Sea; on the other hand, its very position so close to the Kara Sea coastline is ideal for exporting, and therefore negates the logistical cost (and complexity) of developing an additional approach channel into the Ob Bay area.

Novatek's Implications and Russia as a New Global LNG Supplier?

Novatek's existing and future LNG projects are best illustrated in Figure 29 (see below). What this figure crystalises is not only the sheer scale of Novatek's Arctic operations and its export LNG tonnage over the next decade and the effect that will have on gas supply into the Pacific Arctic region, but the overall role that Novatek LNG is playing in establishing Russia as the fourth member of the World's biggest global LNG suppliers, namely the U.S., Australia, and Qatar.

Furthermore, as the biggest global consumers of LNG are based in NE Asia, with Russia as their geographical neighbour, it is clear that for Russia, this is the number one priority market for Russia's fledgling LNG industry, and its pipeline business too.

Figure 29. Novatek's licenses on the Yamal and Gydan peninsulas. Source: Humpert, 2020, based on information from Novatek.

Global Production Network Analysis of Novatek LNG in Arctic; multi-regionalism at Work?

From the above description of Novatek's Yamal LNG and Arctic LNG-2 developments, it is now possible to see both Russian and Chinese energy policies in practice, and by applying Global Production Network analysis' tools (Materiality, Territoriality, and Network Practices), how Sino-Russian economic, political, and geo-strategic plans are manifesting themselves through the Novatek LNG relationship in the Arctic. One aspect that is immediately apparent from both projects' activities, is intensifying organizational and network *integration* amongst Novatek's international participants across the Pacific Arctic region: all along the LNG value chain, from the Upstream in Yamal to the Downstream along the NSR, and into the western Pacific coastline.

Emerging Trends Appearing in Yamal LNG and Arctic LNG2

From Yamal LNG's initial (upstream) start-up phase to its soon-to-be Train 4 commissioning, and the most recent Front End Engineering and Design (FEED) stage of Arctic LNG-2 and plans for Ob LNG, Global Production Network analysis already clearly shows, organizational and structural changes in management and operations as the LNG projects develop, with 35% of the construction of Arctic LNG-2 already completed. Both projects affect Novatek's territoriality and network processes, as outlined in GPN theory and discussed below.

As Novatek's LNG operations have developed between the commissioning of Yamal LNG, and Arctic LNG-2's planning and design, there is already a greater Chinese/Asian participation in Arctic LNG-2, with the arrival of CNOOC, and a Japanese consortium, Jogmec. The process of increasing project *segmentation* along the LNG value chain is underway too, with the emphasis in Yamal LNG now moving towards the *midstream*

sector - transport along the NSR, and accompanied by OFS' interests, especially those of China, which is making inroads in this domain (see Figure 30) as part of its energy policy to gain *Arctic/regional* oil and gas experience, and thus gain more international contracts (leading to further international diversification of its LNG /natural gas sources in Eurasia).

Additional services that support the midstream network, including Shipbuilding/port and terminal infrastructure projects (South Korean, Russian service providers, and Arctic LNG's Total company, respectively) are also heavily engaged at this (midstream) project stage, and which facilitate geographically, Novatek's *physical linkage* - by sea with the North East Asian region, and its LNG buyers there.

Organizationally (as will be demonstrated below), Materiality changes (in gas structure; liquid-gas and vice versa) have a direct effect on Novatek's network practices and territoriality reflecting power shifts and individual shareholders' influence, leading to the segmentation of Novatek's Yamal LNG value chain.

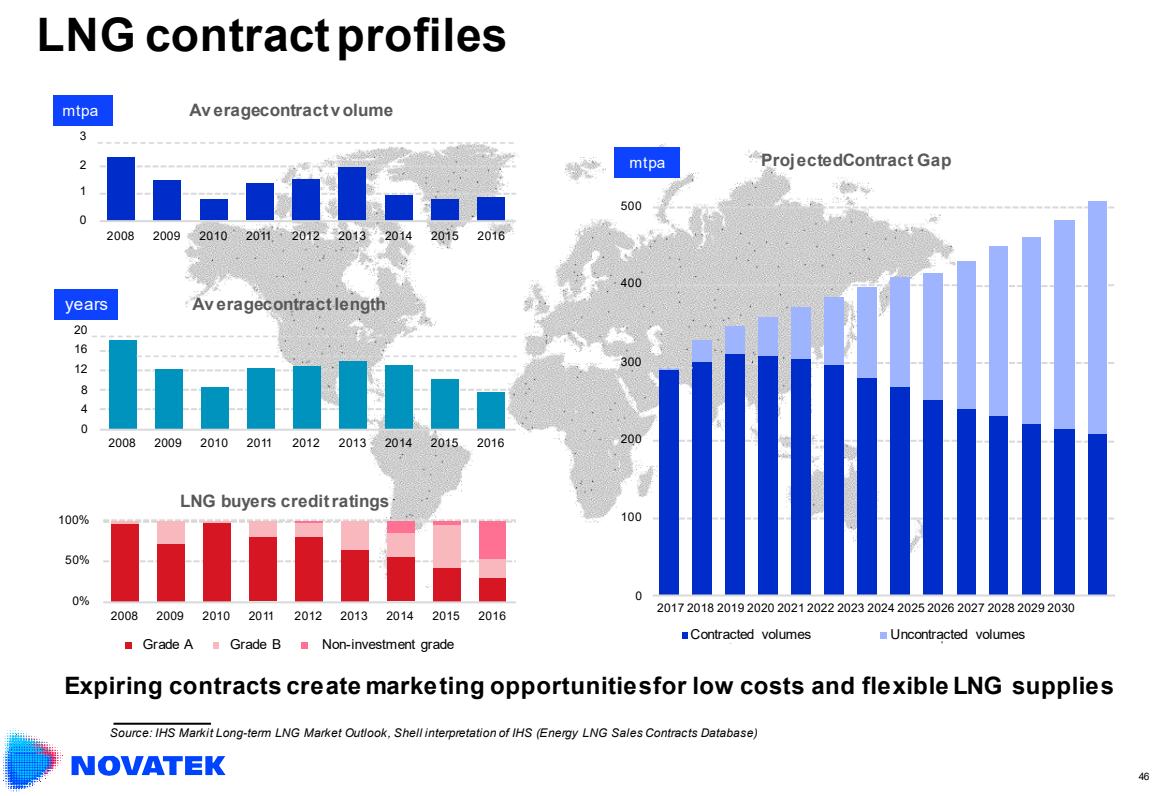


Figure 30. LNG contract profiles. Source: Novatek, 2017, p.46, based on data from Shell

What is apparent with Arctic LNG-2 however, is the shift in the balance of network power from *producer (in Yamal LNG) to buyers*, with the latter (mostly in Asia) now becoming the key player in Novatek's developing business (thus its recorded uncertainty about its total submission to Chinese shareholders' wishes, going forward). Altering Materiality in Arctic LNG-2 is reflected also in aspects of Territoriality, for instance the planned extended geographical "reach" of transhipment terminals located along the NSR in the West – Murmansk, and in the East – Kamchatka.

In other words, GPN's consideration of territoriality as the focus of this particular segment of the project (i.e., the midstream), illustrates how materiality and network practices are working across the time and space domain of the Arctic framework.

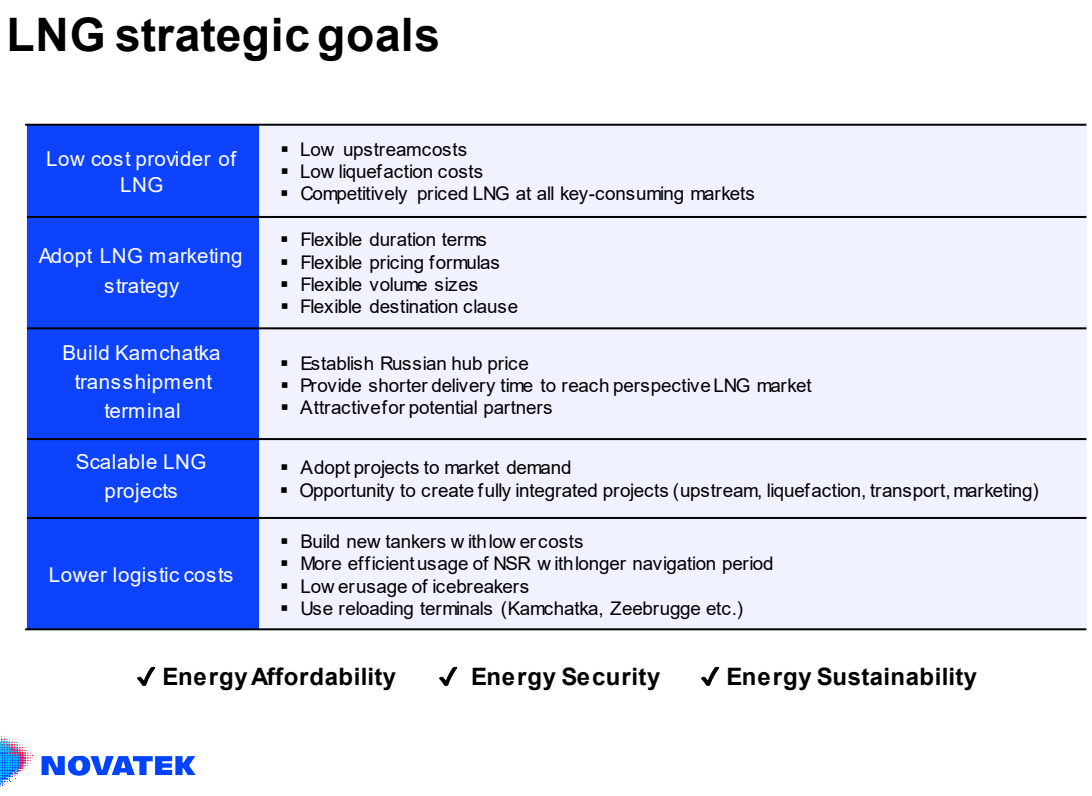


Figure 31. LNG Strategic Goals. Source: Novatek, 2017, p.48

In terms of multi-regionalism's processes - of which LNG is arguably a key instrument and Global Production Network a useful methodology, the *scale* of operations (Figure 31 above) and the steady creation of new *space* in North East Asia - the Pacific Arctic, is evident regarding Novatek's growing, inter-regional / international operations, *integrating* the Arctic with North East Asia via the NSR's midstream *networking and organizational* activities. This lays the foundation of the creating of the "space" that is the neonate Pacific Arctic region. A transhipment base in Kamchatka's coastal region for instance, is vital to this process of the project's spatial and network integration in the Pacific Arctic.

Secondly, in terms of Polycentric Regionalism theory's assertion that - unlike established Regionalism theory, institution/network building, supporting multi-regionalism occurs *very early on or concurrently* with, the

process of regionalization; the forming up of an LNG networked institutional structure (equity holders, operators, service providers and financing instruments such as the Silk Road Fund) under the banner of the Novatek partnership, constitutes a fledgling *institutional component* of industrial multi-regionalism in North East Asia. This is critical in terms of the political sustainability of Russia's regionalization-by-gasification' policy aim, as previously alluded to. It is also vital in terms of creating the geopolitical space – the Pacific Arctic.

Global Production Network Analysis: Materiality and Yamal LNG and Arctic LNG-2 Projects

Some participants in Yamal LNG are now steadily moving from initial upstream (and midstream) activities, and into the downstream sector of the Yamal LNG's value chain, as well. This reflects the latest *stage* of the Yamal LNG project where the commercial driver now is on extracting *added value* by offering additional gas products (see Figure 28, "Maintain low-cost structure"), such as both Russia's and China's move into petrochemical sales (this is more associated with Gazprom's Power of Siberia gas pipeline however), and Novatek's announcement that it may start producing added value products, such as ammonia and /or hydrogen from another Yamal plant, Ob LNG. Technology too plays a role in Materiality's sustainability and transformation, with Yamal LNG's "Arctic Cascade" technology, and its Gravity-Based Structure; both operations ensure LNG materiality is very cost effective and therefore internationally competitive which is then reflected in Network Processes (i.e. contract negotiations). But the overall effect of this change in *LNG's materiality* is that it impacts the organizational structure of Yamal LNG; already Novatek is in terms of Yamal LNG's industry segmentation, forward integrating into downstream sales in petrochemicals, for instance. This clearly will impact

both Yamal's LNG operation (and territoriality), its partnership's organization - and its future network integration and industrial processing across North East Asia.

Similarly, the commercial need to now transport Yamal LNG to Asian (and European) markets following the setting up of the production phase of Yamal LNG (Figure 32), places greater emphasis on shipbuilding, port refurbishments, and marine engineering for instance; much of this takes place along/ in connection with the NSR, (the midstream segment again). These various midstream Novatek ventures, alliances, and contracts, conducted by participants in this sector, will in turn affect the overall spatial (territoriality) configuration of Novatek's LNG's operation(s) in Eurasia. In effect this reinforces the already stated assertion by Bridge and Bradshaw (2017, p.217) that, *"By paying attention to the spatial configuration of LNG production networks, we are able to show how, in the case of natural gas, Global Production Networks are constitutive of markets - market making, rather than merely responsive to them".*

The last stanza is especially relevant as it shows that the combination of all three factors in Global Production Network analysis, is what creates the space, scale, and integration of internal LNG networks, that create a gas market and not vice versa. This is critical as it puts power and decision making within the Novatek consortium and not elsewhere, externally. And by having such powerful international partners as part-equity owners of Novatek, it will be very difficult for external parties, to deflect it from its mission.

The diversification of contracts to Russian, Korean, and even Chinese icebreaker/ LNG carrier-builders, together with Chinese OFS' and engineering companies chasing contracts for Yamal LNG modules and marine engineering contracts - as well as Turkish/Chinese companies

competing for floating dock projects (for a new icebreaker fleet, supporting Yamal LNG), all illustrate how the physical/managerial *organization* of Yamal LNG is being altered by these *material changes* occurring in LNG's physical form, from gas to liquid, and from liquid back to gas (or into petrochemicals and /or ammonia products instead). At each stage of materiality and associated segmentation, the value of the project is altered, as does its risk profile.

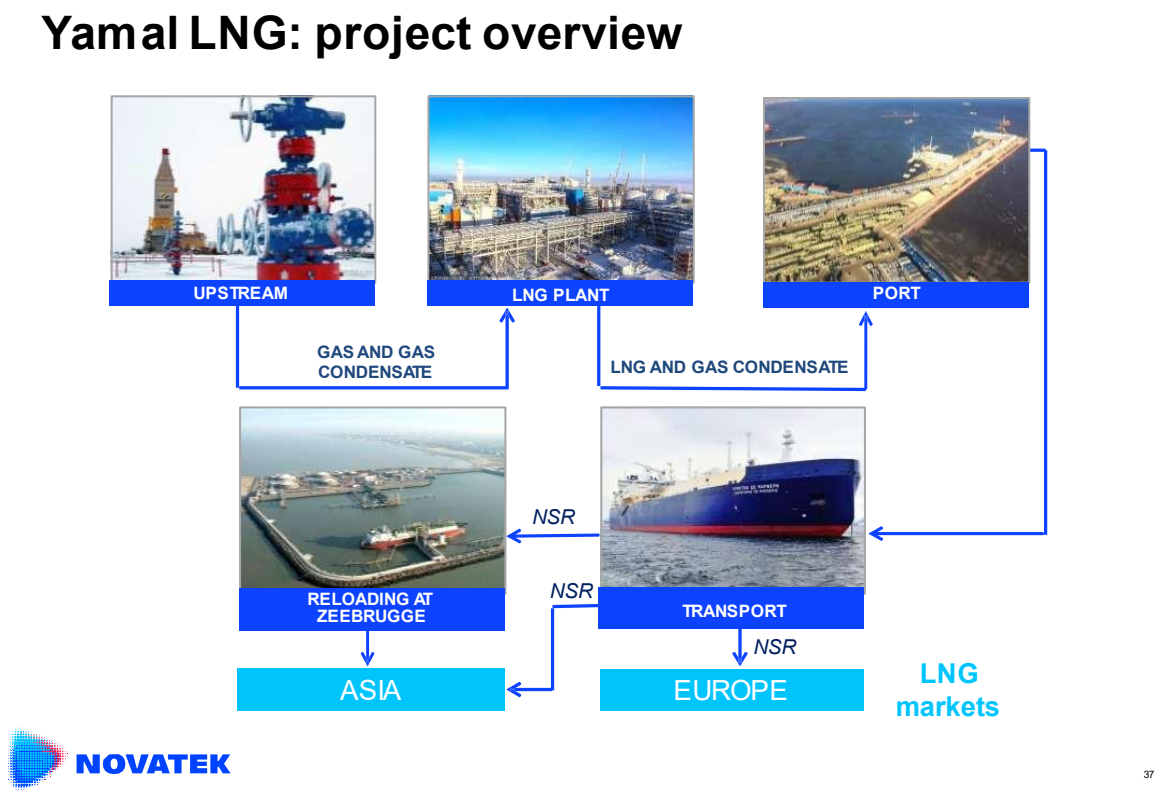


Figure 32. Yamal LNG: project overview. Source: Novatek, 2017, p.37

Project members participation in any one LNG segment reflects therefore their interests and relations with other players in different segments - and stages, of the Yamal value chain too. Further forward integration has been displayed by Total of France for instance, as it moves into acquiring a percentage of Novatek's midstream subsidiary, that is developing transhipment terminals in Murmansk and Kamchatka, and where

materiality - in this case, takes the form of a *transfer of Novatek's LNG* from NSR-required Polar Class ships (eg Arc-7) to non-Polar Class vessels, for onward shipping from the NSR passageway to customer destinations in Europe and Asia respectively.

To summarise so far; the shifting segmentation "ownership" of the LNG value chain and its steady *geographical move towards Asia* (via midstream and downstream activities) is afforded *by material changes in the nature of the product* (gas), and how it is segmented (ie produced, shipped, transferred and stored).

This is the reason for the knock-on change in LNG Network Processes' (next section) relationships (e.g., Turkey and China's on-going tussle over contracting for a floating dock facility) and the gradual shift in LNG's organization and associated geo-economic power from the producer (Russia) to European and Asian buyers. This shift in materiality is reflected in the altering *value and scale* of the midstream and downstream (refining, storing distributing and selling of LNG and its products) segments of the Yamal LNG value chain - and the evident competition between participants to "own" added value and strategic segments in the LNG value chain, as their individual territoriality develops and expands geographically. This has led to the demise of the floating pipeline model (i.e., simply moving LNG from country A to country B) and the adoption of a portfolio model of LNG (i.e., segmented ownership by various owners along the value chain), selling LNG to *multiple* buyers at *multiple* locations), altering the organization and network practices of the industry, and its *expanding territoriality*, most notably eastward across the emerging Pacific Arctic.

This process of segmentation, brought on by changes in Yamal LNG's materiality as it progress from upstream to downstream activities, self-

evidently has seen China very clearly asserting itself in the segmentation process in marine engineering aspects (backward integration) for instance, and into ship building (forward integration), which reflects its growing regional power and strategic interests not only in assuring LNG deliveries get home as part of its Arctic energy policy, but equally, the critical importance of the infrastructure build-out of the NSR, as a key component of its Polar Silk Road strategy, which encompasses geo-economic ambitions in the European Arctic and not just the Pacific Arctic region.

Global Production Network Analysis: Network Practices and Yamal LNG and Arctic LNG-2

Such structural and associated territorial changes in Yamal LNG's regionalizing/*international* operations are creating changes in emerging LNG pricing schemes too (e.g., appearance of spot market liquidity replacing long-term, *regional* contracts) which in turn are facilitating new Network Practices' arrangements within Novatek (Figure 32). These include the move away from a "floating pipeline" organizational/pricing structure as mentioned, with its large volumes of long-term gas contracts simply trading between country A&B. Such new "portfolio" (contract) network arrangements *signal* a profoundly critical geo-economic change in energy. Gas can now be internationally traded *outside of the region in which it was produced (*like oil is already*)*. This changes overnight the geo-economic and political power that gas possesses for those who produce and it and use it. In Polycentric Regionalism theory terms for Moscow and Beijing, the instrumentalization of gas for multi-regionalism purposes - creating networked regions of scale, which are economically sustainable and geographically capable of further expansion, is critical for the

geopolitical manifestation of their geopolitical intent, the building of the Pacific Arctic region, in North East Asia.

As part of this emerging portfolio pricing policy, arising out of the re-organization of the LNG model, Russia is planning to create an LNG hub price in North East Asia (Figure 30 below) for instance, to support this internationalizing capability of LNG, once Kamchatka's transhipment terminal is commissioned. This has profound implications for gas trading and geo-economic leverage in and beyond the Pacific Arctic region, for Sino-Russian relations and the west's response.

This means of course now, steady - and now largely explicable shifts in where *geo-economic power* lies within Novatek's value chain, from along the upstream, through the midstream to final downstream operations. Increasingly for Novatek's consortium members, valuable portfolio-*style contracts* can now be monetized, as a result of *geographical expansion* of LNG presence and sales in North East Asia, via these now regionalizing Novatek net*works* (Figure 33).

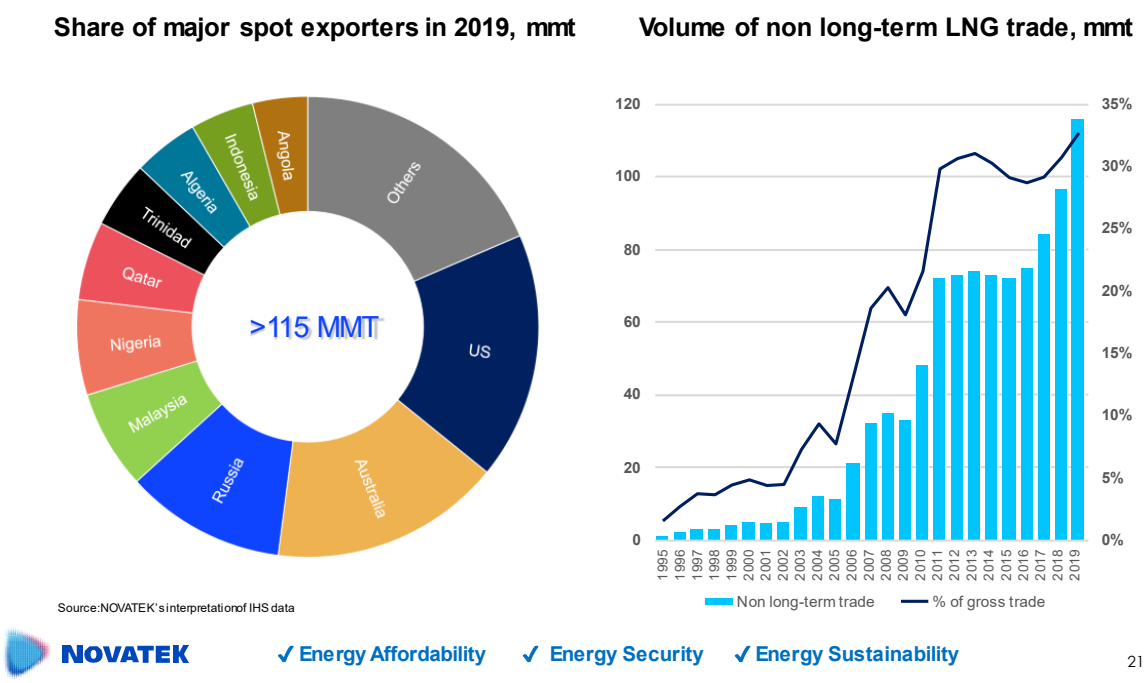


Figure 33. Spot LNG market increasing volumes. Source: Novatek, 2020, p.21

What Yamal LNG - and Arctic LNG-2 especially, have illustrated so far, is how North East Asia's increasing gas consumption has resulted in a process of LNG industrial segmentation - partly because of the changing materiality of gas along the value chain and its effects – as just described. As a result, new spatial/territorial forms of LNG networks (and their practices) are appearing in the industry, which suggest new/additional ways that investors/participants can reduce risk and add value in the Novatek project(s), and which also reflects LNG *organizational* alterations to accommodate *international /inter-regional* gas markets. These factors add to the *integrative process* of the LNG business across the Pacific Arctic region.

In Yamal LNG and certainly in Arctic LNG-2, there will be a significant interaction *between two critical networks* within both projects: the

producers (mainly Russian) and the buyers – Asian markets in Japan, South Korea and China. Until these two major projects appeared in North East Asia, there has been limited *regional* availability of LNG; this reflected a historical lack on infrastructure, inflexibility of contracts with subsequently few buyers. This meant the floating pipeline model was supreme in Asia and LNG operators' organizations were structured accordingly (in the producers' favour), and which meant overall, a limited supply of LNG. As Yamal LNG's organization and territoriality is changing now (expanding gas demand, etc), new industrial *networks are emerging* in/alongside Novatek, including shipbuilding, OFS services, marine engineering, and shipbuilding/port infrastructure operations.

Secondly, as more industry/commercial players join the Yamal LNG network (no longer just producer/buyer sovereign governments working from destination A to destination B) so too more cargo destination facilities are required, including transhipments and storage facilities (eg Kamchatka). What this means is that a multiplicity of new regasification plants is appearing on the western Pacific coastline feeding a growing LNG market comprising Japanese, Chinese and South Korean buyers, all participants in Novatek's two major LNG projects. Such increases in re-gasification facilities mean that Yamal's LNG distribution is now possible internationally. However, the first step for Novatek, is to aggregate more *LNG buyers* by *connecting and integrating the two regions* (Arctic and North East Asia) by means of the NSR, and in line with polycentric regionalism's modus operandi. Such a regionally linked space I refer to as the Pacific Arctic.

In line with this strategic expansion of Novatek LNG's security of supply to Asian customers now underway, Bridge and Bradshaw (2017, p.227) endorse the fact of a changes in Yamal LNG's networks and its

organization processes, including the inevitable appearance of an LNG spot market, with fewer longer-term contracts, as already noted. Geoeconomically-speaking, along with these newly emerging regional networks, the arrival of a regional gas trading hub network (Russian or an Asian consortium arrangement) as a logical next developmental step, will have profound geopolitical implications in North East Asia, and moreover be the economic underpinning of the neonate Pacific Arctic region.

Global Production Network Analysis: Territoriality and Yamal LNG and Arctic LNG-2 Projects

As noted earlier, Territoriality's key application is in understanding how the spatial form of the Yamal LNG operation (organization, materiality and network processes) reveals both Chinese and Russian *strategic practice*; for instance the construction of the NSR, providing the ice breakers for LNG transportation, designing floating docks, and building industry networks etc, all reflect the project's spatial configuration along its value chain, and give an insight as to *how* the strategic spatial form (the Pacific Arctic) is being formed. The internationalization of Yamal LNG for instance signals changes in its network configurations (eg OFS appearing in the midstream sector) and materiality means, which is then reflected in the "reach" of Yamal LNG's overseas markets, accessible now because of the territorial reach of new LNG transhipments terminals, at the eastern/western extremities of the NSR which allows onward, rapid, passage to Asian LNG markets.

It is in this manner that the *territorial form* of Yamal LNG is integral to the overall process of expressing Novatek's growing geo-economic power in the region(s).

Strategic practice now includes fulfilment of the Russian Federation/the People's Republic of China energy policies too; the forming up of a gas hub in the Pacific Arctic; a shift in focus from the security of supply/delivery, to increasingly – the *security of the gas (buyer's) market*, needed to promote the growth of a regional hub. This is the process of territoriality in which such strategic and network practices are linked to spatial form (i.e. expanding geography of Yamal LNG operations eastward (especially) via the NSR, with physical ports and docks established, and the likes of the Transhipment bases created in Kamchatka. This effectively expands Yamal LNG into new economic spaces in North East Asia.

Looking at Yamal LNG's territorial form here allows the analyst to focus on asking why this particular form is being developed, (eg Tiksi and Pevik ports development along the length of the NSR) and why now, and to what end? In one case this is part of an Arctic maritime Search and Rescue Response plan, and with it the establishment of "ports of safe haven" along the NSR route. This is part of the Polar Code developed by the International Maritime Organization (IMO), another industry network, that ensures that the expanding territoriality of LNG activity along the NSR, is done so within safety limitations that are dictated by international law (UNCLOS).

The development of the NSR is clearly another example of strategic practice linking the Pacific Arctic regions together. From a Territoriality point of view these moves are all linked to Yamal's LNG's spatial form, in terms of the *scale* of the resultant LNG operation and the space it is creating via some of the LNG regional linkage factors noted.

Summary Analysis of Novatek's Operations per Global Production Network Methodology

Novatek's Yamal project clearly demonstrates serious strategic Chinese, Russian, and Sino-Russian intent, regarding their geo-economic design for the Pacific Arctic region; this includes the monetization of the NSR, the creation of an internationally recognized, regional, LNG trading hub, and the establishment of a trans-regional shipbuilding industry - supporting energy/Arctic activities. This tracks Putin's (2017) succinct aim to make the NSR, *"competitive, universal and desired for transportation of all types of goods, from raw materials to containers".*

These LNG connectivity activities facilitate inter-regional integration by means of a regionalization-by-gasification process in North East Asia. The Sino-Russian relationship, within the context of the Yamal LNG development and the process of multi-regionalism, is clearly still experimental at this stage however, as Bertelsen has acknowledged too (2021). He states that the *"Yamal cooperation is a pilot project that offers a potential model".* He goes on to comment that such Sino-Russian energy cooperation in the Arctic is part of a policy that *"attaches importance to fostering China's all-round engagement in Arctic regional economic development".*

Global Production Network analysis showed that China, as part of the Novatek consortium, is influencing the Yamal project in terms of multi-regionalism's processes of space, scale, and territorial expansion of LNG sales internationally, by means of Yamal's (Global Production Network/multi-regionalism's) industrial organizational and institution-building, such as Yamal's shipbuilding, port infrastructure, and OFS networks, supporting the midstream stage of Yamal LNG, and Arctic LNG-2. It is also gathering enormous energy experience by working in such a

hostile Arctic environment. Such activities widen its regional and international ambitions, thus further increasing the scale and geo-economic footprint of the Pacific Arctic space, via Yamal's LNG operations and the economic governance aspect of the Belt and Road Initiative-funded, NSR.

In China's case this approach, seen too in the Global Production Network analysis, is part of its own energy security of supply needs (ie the NSR is secured for routing gas to Chinese regasification terminals on its Pacific coastline) and fulfilling its broader strategic vison of developing the Polar Silk Road vision alongside Russia, and the latter's own Greater Eurasia Partnership geo-economic plan - which also requires developing the NSR. The maritime aspect of Yamal (i.e., status/use of NSR) is a key aspect of Sino-Russian relations for both energy and geo-strategic reasons for both countries, and hence China's particular focus (and financing of) the midstream sector of Yamal LNG, as shown by the Global Production Network analysis of Yamal LNG and Arctic LNG-2.

In fact, a joint communiqué of the 20th meeting between Chinese and Russian Prime Ministers was announced in 2015, agreeing *to "strengthen the cooperation on the development and utilization of the NSR and launch research projects on the Arctic shipping"* (Ministry of Foreign Affairs of China, 2015). In 2017, President Xi, and Russia's Prime Minister Dmitry Medvedev, announced further plans to build the Polar Silk Road; as Luo (2017) put it, to *"conduct cooperation in Arctic Sea route and implement relevant connectivity projects".* Global Production Network's territoriality and network aspects of China's interests in the maritime aspect (NSR) of the Yamal LNG project is thus clearly understandable and unambiguous.

Such intense Sino-Russian cooperation in Yamal LNG is also instilling mutual trust and confidence in each other and establishing a modus

operandi for cooperation that will encourage further joint region-building activities in the Pacific Arctic (see Technology chapter). Without doubt the Yamal project indicates a heightening, broadening, and intensification of Chinese interests in the Sino-Russian integration of the fledgling Pacific Arctic region. Quite what that will mean is reviewed in the Technology chapter.

There is also clear evidence from the Global Production Network analysis of Novatek's operations, of how the gas industry's geo-economic-influencing factors of deployment of capital, infrastructure build-out, and state-level institutionalization / networking, have been applied in the case of Novatek LNG's projects in the Russian Arctic. This is also reflected in the Global Production Network analysis, especially with the application of those industry factors in the midstream and upstream stages of the Yamal LNG project(s).

In terms of multi-regionalism's *processes* (scale, space, and associated networking and institutional activities), that engender regionalization/regional integration, there is also considerable evidence from the Global Production Network analysis of Novatek's operations - and from the declared energy policies of both countries reviewed earlier, of how Yamal LNG is subjected to - and is part of, these multi-regionalism *processes*.

Multi-regionalism Processes: Scale

The scale and growth of Novatek's international operations in the Pacific Arctic is now indisputable; the investment by China's Silk Road Fund in Yamal LNG, its financial support from the Russian government (tax breaks, investment incentives for foreigners, etc), the creation of the Polar Silk Road as a part of Belt and Road Initiative, and its coordination with

Russia's Trans- Eurasian Development Plan, all signal strategic intent, institutional support, and significant governmental backing from both countries. In addition, mutual confidence and political will is further reinforced with additional external funding, along with agreed forward sales for Arctic LNG-2's entire production; and this is a project that is still under construction.

The scaling up of the initial Yamal LNG, and the Arctic LNG-2 projects signifies a slow re-orientation of global value chains (Global Value Chains) and their logistical aspects (e.g., evolving destination of LNG trains, ports/docks developments, and Chinese infrastructure upgrade to NSR) in an eastward direction, tapping into new territories and (soon) creating a regional gas hub/market in North East Asia. Such geo economic developments confirm China and Russia's regional geo-economic ambitions, and the scale and sustainability of this project in the developing Pacific Arctic region.

Yamal LNG and Arctic LNG-2 now reach across Eurasia from upstream activities in western Siberian Arctic, into the downstream - the largest LNG marketplace in the world in North East Asia, supplying increasing numbers of Korean, Japanese, and Chinese regasification terminals, located from North to South along the western Pacific coastline. The economic scale of Yamal LNG is gigantic. The two regions are now geo-economically linked by Russia's NSR - partly financed by China, and it is establishing itself rapidly now as the one of the world's critical SLOCs, with LNG transhipshipment terminals being established at its western and eastern extremities (Murmansk and Kamchatka ((Petropavlovsk). Despite sanctions, European, American (the latter via Chinese joint ventures), and Asian businesses are deeply involved in these projects with Novatek, and

adding to the scaling up, regionalization, financing, and geo-economic growth of the Pacific Arctic space.

Multi-regionalism's instrumentalization of the LNG industry (and Gazprom's PoS pipeline network) to promote the process of regionalization-by-gasification - by sea to Asia (via Novatek LNG) and on land by Gazprom (its Power of Siberia pipeline) across Russia's Russian Far East territories (including the Arctic and China's Dongbei regions) is now self-evidently underway in both cases, further integrating the region(s) economic foundation, on land and at sea. The scale of such investment and territorial reach is colossal and critical in achieving the *geopolitical aim of multi-regionalism (*and mirroring Global Production Network's political implications*),* however – the creation of the experimental, Pacific Arctic space.

Multi-regionalism Processes: Space

The critical result of Yamal's success to date in terms of multi-regionalism's processes and Global Production Network's economic and political implications, is the steady building of an energy lattice/territory in North East Asia and with it the formation of a geo-economic space – the Pacific Arctic; geographically integrating the North East Asia and Arctic regions by a process of the regionalization of land and sea' (NSR/Western Pacific coastline) contiguous borders and boundaries. Major infrastructure projects along the NSR (SAR structures, ports, docks, floating platforms, communications, and navigation systems, etc), as well as regasification and transhipments terminals, and ship-building yards (in Asia), are steadily integrating into this expanding spatial energy lattice, reflected in Global Production Network's network processes (e.g., a new LNG portfolio contract model), and culminating in the emergence of a significant regional LNG market/hub in North East Asia. All are part of Novatek's commercial

and institutional networks, as explained by Global Production Network ‘s methodology, and which cumulatively serve to geo-economically underpin the sustainability of this emerging Pacific Arctic space.

Politically, such economic moves are beginning to empower the Arctic region and position it for further institutional integration (e.g., Polar silk Road initiative) with adjacent regions. The Technology chapter explains how it itself is instrumentalised by multi-regionalism, to create new public spaces such as Space and the cyberspace; with the Arctic seen as its terrestrial forward mounting base, linking Space ground-stations in various Nordic countries (Norway, Sweden) via low-orbiting Satellite means, with Space activities including the cyberspace domain. It is no longer just these *northerly* Russian Arctic energy projects that are responsible for expanding multi-regionalism and creating just the Pacific Arctic regional space. Technology projects and applications facilitate multi-regionalism’s further expansion into the fourth dimension of Space and the cyberspace.

Meanwhile the shifting distribution of power within the (Novatek) LNG business is altering the shape and importance of the Pacific Arctic space; this is because of the *international commodification* of LNG – driven itself by increasing global demand for gas, especially in North East Asia. LNG is now an inter-regionally and increasingly international traded commodity. With increasing numbers of Asian customers and destinations, and an increase in regasification facilities there, the *spatial location* of power in LNG is moving away from the supplier’s location (in this case Novatek’s space in Yamal) towards the buyers’ (in North East Asia), and where an LNG trading hub will logically be created within the next 3-5 years too. This is in line with Novatek’s Asian partners, and its LNG customers taking a special interest in the midstream and downstream segments of Yamal’s

LNG value chain, as per Global Production Network's Network Practices' analysis and its move away from the floating pipeline organizational structure of LNG contracting, to a spot-market driven, and more spatially distributed customer-based model. This new LNG trading contract mode is associated with new network opportunities driven by, new technologies, the altering International Political Economy, and Asian-oriented Global Value Chains, which together are creating the Pacific Arctic but also determining its shape - and therefore its geo-political purpose.

The critical geo-economic space that Novatek is presently occupying with its international partners is thus physically shifting, integrating, and developing *eastward* in other words, along with its trading networks, emerging nodes of connectivity, and physical linkages. The Pacific Arctic "space" is thus expanding toward Asia - as noted by Global Production Network's analysis of the territoriality factor in Novatek's operations; this is also in line with Polycentric Regionalism theory and its reference to the regionalization potential of the gas industry, to serve a multi-regionalism strategy in North East Asia, initiated by China and Russia.

Multi-regionalism Processes: Network Practices

The Pacific Arctic space and its potential geographical and economic scalability - which Novatek's operational presence has created, along with its concomitant expansion of the economic linkages and reach of the NSR, has created new regional connectivity networks, industry groupings (eg ship-building, OFS groups, SAR specialists) and institutional structures (Polar Code, Trans-Eurasian Development Plan, Polar Silk Road strategy, etc). These new power structures (such as LNG producers and buyers in North East Asia) enable a deepening of the process of regionalization and integration, by *de facto* creating regionally oriented technopolitical governance instruments - and networks that support their activities, and

by doing so, economically embed, nurture, and sustain the territoriality of the Novatek's LNG presence, which is also the geo-economic locus of the Pacific Arctic space.

Global Production Network's Network practices are so far - most relevant and visible, in Novatek's impact on the original floating pipeline LNG contract model; its reconfiguration now as a more of a portfolio, systems-based contract model - for reasons examined earlier, has and will continue to have a profound effect with regard to networked LNG pricing in North East Asia, the creation of a regional LNG trading hub/network in the Pacific Arctic, and the possibility of an international network of gas swap arrangements with other *non-contiguous* regions of the world, especially the Middle East region, as part of multi-regionalism's own networking process.

Multi-regionalism's Output from Novatek's LNG Operations in the Pacific Arctic

There is some evidence that the reasons for all three of Polycentric Regionalism theory's possible explanations of apparent International Relations changes in North East Asia, are becoming distinguishable and visible from this Global Production Network analysis (and multi-regionalism's processes) of Novatek's Arctic LNG activities.

One such configuration/reason is a possible structural outcome of the redistribution of power in the region. Causation here is attributed not to multipolar interpretations or Waltzian/realist modelling of Novatek's activities, nor associated military or institutional challenges therein, but instead fundamental changes of regionally oriented (and based) LNG economic networks, and nodes of capital accumulation/LNG investment that are potentially now, transferable into political influence, and which (via

LNG's industrial influence and considerable geo-economic power) will pave the way for multi-regionalism. The Pacific Arctic is the manifestation of this explanation.

Certainly, Chinese financial firepower, and the enormous market power of a regional LNG trading hub - as the new definition of states' energy security in North East Asia, is another aspect, and so too is the institutionalizing power of Sino-Russian regional investment/infrastructure vehicles such as the Polar Code (as a part of international maritime law) for the NSR, the Greater Eurasia Partnership, and China's Polar Silk Road initiative.

A second possible reason, identifiable by multi-regionalism's instrumentalization of Novatek's operation is to see this as an unfolding grand strategy, being played out by two Great Powers and as a means by which, both countries avoid military or direct geopolitical confrontation with the U.S. - as a nation state. Instead, both countries are working at this regional (Pacific Arctic) level, in a coordinated Great Powers' fashion, building a joint regional *sphere of interest* - the Pacific Arctic, via local industrial (LNG), institutional (eg Polar Silk Road), and international (e.g. Novatek's foreign partners) structures and economic networks; all are seeking commercial and political regional integration and dependency of/for this sphere of interest. This arrangement will lead to - in time, the two major regional powers deploying resources (like strategic gas /LNG resources, and energy markets' buying power) to promulgate additional Eurasian integrating projects, as part of multi-regionalism's geo-economic objectives, and geopolitical aim.

The concept of Novatek's LNG "swap" arrangements with similar LNG-producing states such as Qatar and Iran – supplying Novatek-contracted tonnes of LNG volumes to *Novatek's LNG customers* in the ME region, is

one way in which multi-regionalism's territorial expansion will occur "virtually", and by which inter-regional connectivity and linkage between *non-contiguous* regions (i.e. non-Russia/Asian) may arise; with these other (e.g. ME) regions in political alignment with this Sino-Russian led, grand (regional) strategy , supporting a multiregional global order model.

Lastly, there is a more prosaic interpretation of Global Production Network's analysis of Novatek's multiregional operations in the North East Asia region. This sees the major role of technology and advances in the International Political Economy, as outlined by LIvesey - and its impact on Novatek's planning and design (e.g. LNG's producer/buyer power shift, and *security of the gas market* now seen as key power position) as another reason for regionalization's / multi-regionalism's emergence, and the possible steady demise of globalization under these circumstances. The combination of an altering International Political Economy, technology applications, and infrastructure development of the Arctic LNG industry is seen in this scenario as assisting in creating the Pacific Arctic space for future markets (regional gas-trading hub), redistribution of Global Value Chain nodes and the eventual conversion of such economic power - into geopolitical leverage.

Such moves dovetail with more global trends affecting the Pacific Arctic region, such as threatened U.S. de-coupling, the influence of technology on economics, and the global shift of wealth generation from manufacturing to service economies (where global GDP is situated), and which China is determined to dominate to and benefit from. In this sense the emerging connectivity aspects of Novatek's Asian LNG markets, linked virtually by digital contract swap arrangements, with other regional spheres of interests is a good explanation (and reason) for multi-regionalism's emergence - and its application as part of the Sino-Russian

geo economic strategy for eastern Eurasia. In sum the Novatek project is in this scenario, riding the broader wave of more global economic forces.

The Dongbei / Russian Far East Region in North East Asia and Polycentric Regionalism

Initial Sino-Russian regional economic development projects in the Dongbei/Russian Far East region in the early-noughties described by Lee and Lukin (2016) were a failure as they were too small, too numerous, non-sustainable, too directed by Moscow (less so by Beijing) and lacking in scalability; a typical outcome as noted in conventional regionalism theory. They were also created in a period when global logistical and value chains were still largely E/W route-oriented between Europe and the U.S. and the influential international/ financial institutions were still western, underpinning and promoting U.S.-led globalization in North East Asia. The Belt and Road Initiative had appeared, but its mandate was still primarily expansion to the West, south-west and south-east from China.

Russia initially in fact was more interested as part of its Greater Eurasian Partnership (GEP) to orientate the Russian Far East (Russian Far East) eastward, towards the Chinese Pacific coastline, where economic benefits were greater and where in any case, Novatek's LNG deliveries were being berthed at Chinese (and other states') ports. This was an already establishing and promising link between the Arctic's NSR and Novatek's LNG customers based along the western Pacific coastline (China, Japan and South Korea). Fledgling Polycentric Regionalism - beyond Russia's Pacific Arctic territory was underway, but yet not formalised.

By 2019, a new set of projects were being highlighted and agreed according to Christoffersen (2018), that included large scale infrastructure

developments (railroad networks, roads, airports, border crossing points, etc), and others based on telecoms, information technologies and networked administrative facilities as noted again by Christoffersen (2018, p.444). China was particularly interested in port development, natural resource exploitation, manufacturing projects, and infrastructure opportunities as part of the region's integration plans. What was clear however was that this round of projects was strategic, inter-regional in design, and linked with major established projects already underway in the Russian Arctic, such as Novatek LNG and the Power of Siberia gas pipeline into China. This dovetailed well with the growing national security aspect of China's relations with the U.S. - and its subsequent wish to push Northwards from the Dongbei/Russian Far East region, towards the Russian Arctic in the Pacific Arctic, by means of these more strategic interconnecting projects.

Chinese governors of Dongbei provinces such as Heilongjiang's (whose province is land-locked however), recorded by Chistoffersen (2018, p.458), as being enthused about new regional linkages eastward, via Russia's two land-to-sea transport corridors (Primorye One and Two), linking the Dongbie/Russian Far East hinterland to (Russia's) western Pacific coastline. This was assumed to be part of a joint vision for the region that was deliberately *not meant to be a competition for spheres of interests*, but rather an agreement about *a Sino-Russian regional order* for North East Asia that would *include* the Dongbei/Russian Far East regions.

Heilongjiang was also keen to not only access its own coastal ports, via Russian transport means but also to take part in NSR-enabled opportunities in the Arctic too to its North. It is through an old Chinese rail network (the South Manchuria Railway) that Elleman and Kotkin (2010)

discuss, that originated at Port Arthur and extended in Soviet times to Harbin, that a link is now being developed extending the network up to the Russian city of Yakutsk, and from where it is connected to the enormous Lena River, which meanders northwards out into Russia's Arctic's coastline. This project represents the scale of the Polycentric Regionalism thinking that China and Russia have adopted as part of their geo-economic strategy of building a New World Order from out of the fledgling (but rapidly expanding) Pacific Arctic region.

China had assumed that the Dongbei/Russian Far East economic integration would be part of their Belt and Road Initiative, (initially linked in fact more to central Asia in the East). It was happy to work with Russia's Eurasian Economic Union (EAEU) to do this. In 2015 this Silk Road Economic Belt (SREB) /EAEU linkage was made official (Tao, et al., 2019). The aim was that by having the Doingbei/Russian Far East region placed in a larger, joint strategic framework, the region would gain economic momentum and thus become a serious "space" and therefore begin to attract inward investment and achieve some kind of economic scale.

As Christoffersen cites in her own report:

"However, the incorporation into the SREB transformed the Dongbei/Russian Far East project from a low-level, narrow regional project into a key component of China's rise and globalization" (Zhang and Cai, 2015)

With time, China now sees this Dongbei/RE linkage moving northward, towards the Arctic Ocean, into the Pacific Arctic arena. This was pushed hard Christoffersen (2018, p.441) notes, by China's ambassador to Russia, Li Hui in Moscow in 2015, when he stated that any

Dongbie/Russian Far East integration that included any Chinese oil and gas projects (ie from Russia's Russian Far East regions, or further North) would be covered from within China's main Dongbei/Russian Far East framework, the SREB fund, (as opposed to Russia's EAEU).

Ze (2017) reports that Shi Ze, (interviewed Beijing June 2017) from China's China Institute of International Studies (which carries out research for the Ministry of Foreign Affairs), stated that the Sino-Russian partnership *is dependent on the integration of the Dongbei/Russian Far East regions*. It is now considered a national security issue and the aim is to develop transport routes from the region, *northward all the way to the Russian Arctic coastline*. Shi insists that the hinterland regions' success depends on it working within the larger SREB and EAEU-combined framework, to give it region scale, and political prioritisation.

Lukin (2015) goes on to say however that the real importance to China of the region (investing in Russia's Russian Far East territories) is as a means of securing their heartland's back door, thus allowing it a freer hand to be more assertive in protecting their own western Pacific coastline for what they see as U.S. incursion into their coastal regions, in an attempt to contain China in the 21st Century.

In essence the initial ambitions of Russia and China in the early noughties were that: Russia wished to lead agreed Dongbei/Russian Far East integration with its Greater Eurasia Partnership (GEP) framework, as a counter to China's wish to lead it with SREB (an earlier name for today's Belt and Road Initiative ((Belt and Road Initiative). This was partly because the GEP gave Russia the opportunity to *diversify its economic links* in the Russian Far East, with other regional powers such as Japan and South Korea (thus the establishment of the Primorye transportation projects). This explains their initial wish to expand Eastward toward

(international) Pacific coastline opportunities. The vison noted by Christoffresen (2018, p. 442) was the creation of new regional institutions and development scenarios, the build-out of the Russian Far East and its subsequent integration with the Asia Pacific region, and and the promotion of international investors for joint, commercial/trade opportunities.

China however has more strategic reasons for seeing the Dongbei/Russian Far East regions as a conduit into the Pacific Arctic proper and an *overland/riverine route* (via rail, road, and latterly riverine passageways) to Russia's Arctic coastline. One obvious reason for this is to avoid a (potential) U.S. maritime blockade at the Bering Strait and thus deny China access to the critical Eurasian-interconnecting NSR, a new global SLOC. The strategic depth that occupying/developing the region would/will give China, is not an inconsiderable part of Chinese thinking too. Beijing had also hoped that the Russian Far East/Dongbei relationship would have been exclusive, as it covets Russia's enormous natural resources, such as coal, natural gas, and oil transportation networks, as well energy upstream opportunities.

By 2019 the second round of these Sino-Russian development projects in the developing Dongbei/Russian Far East region coincided with emerging global trends including technological advances directly impacting the International Political Economy of the Pacific Arctic and Dongbei/Russian Far East regions by means of "virtual" business linkage and connectivity, improved manufacturing practices (e.g. 3D-printing, Robotics and Artificial Intelligence), regional market growth, and technology-based time-and-space saving benefits across the vast region's distances. This accompanied the rise of global powers investing in the infrastructure and governance of key strategic regions, as their new (wished-for) spheres of Great Powers' interests (e.g. European Union and China in the European

Arctic) and participation in major energy projects such as Novatek LNG, which now had developed a major customer base in North East Asia. Japan, China and South Korea occupied coastal Pacific territories where their respective LNG were now berthing. Meanwhile Russia's Power of Siberia gas pipeline had almost completed routing through to China's North East easterly territories. In short Polycentric Regionalism was underway in these regions too and beginning to absorb the Dongbei/Russian Far East region into the Pacific Arctic proper.

These revived regional joint ventures (in 2019) were in other words fewer, better targeted, and more sustainable, as a result also of being linked to existing Sino-Russian strategic projects such as Yamal LNG, significant transport projects such as Primorye 1&2, and the Baikal Amur Mainline (BAM) rail extension northward to Yakutsk; this represented a major difference to previous regional development attempts in terms of network *connectivity*, project *scale* and geographical *scope* (i.e. linked overtly to the Pacific Arctic).

As stated, these later regional joint initiatives coincided with what Livesey described as the beginning of deglobalization (the falling ratio of global trade in goods - to economic activity ((global GDP), and in its place the growing rise of regionalization, and with it, its inherent characteristic of great powers' emerging spheres of interest. In China's case this included the formalisation of what was now termed the Belt and Road Initiative, to fund the necessary infrastructure associated with this process of regionalisation in global affairs. A subset of Belt and Road Initiative, the Polar Silk Road fund was created specifically for the Arctic too and linked to Russia's Greater Eurasia Partnership vision in the Dongbei/Russian Far East region; this was a catalyst in the success of the Novatek project too,

a venture that also increasingly links the Pacific Arctic with these southerly border regions.

Putin too, had begun to talk enthusiastically about the Eurasian Economic Union, aligned with China's Belt and Road Initiative (and less about the GEP framework surrounding it) and Asian-oriented institutions such as the Asian Infrastructure Investment Bank were also discussed as financial governance instruments, reflecting the rise of these technology-driven regional Asian markets that were now "connecting" virtually - as well as physically in a North/South direction too. This Polycentric Regionalism initiated process of integration began to gain traction, especially with Novatek's considerable success in building enormous Arctic LNG capacity, capable of feeding China, and the North East Asia region, too. One especially significant observation about this is that inevitably Russia and China will become sea-powers in the Pacific Arctic region, largely on the back of escorting LNG deliveries between the regions for national security reasons. This too is a form of multiregionalism that was unexpected, but it does mean that the western Pacific marine space is beginning to look like a Sino-Russian maritime/naval space and possible strategic opportunity in the 21st Century.

Geopolitically, these latter joint regional projects *integrated China further northward* towards Russia's Arctic coastline leading to deeper regionalization-by-integration. Concurrently other transportation projects mentioned like Primorye One and Two, moved both China and Russia further eastward out of the Chinese heartland, toward the Pacific can be seen as a regionalization process that is effect further securing the *heartland and boundaries* of the future Pacific Arctic region, whilst simultaneously reorienting logistical and communication /transport chains, between and in/around North East Asia *and the Pacific Arctic*. These

secondary regional joint initiatives in the Dongbei/Russian Far East hinterlands coincided and were coordinated with Putin's regionalization-by-gasification directive for strategic gas ventures in the Arctic and Russian Far East. Such a strategy encouraged greater multi-regionalism and necessitated the stimulation of these regional Sino-Russian cross-border industry/commercial linkages, both physical and virtual.

In sum, Polycentric Regionalism as a theory appears to broadly accommodate these directives - as well as these secondary regional development initiatives in the Pacific Arctic region. By creating a communications and transport lattice across the Pacific Arctic's hinterland (N/S and E/W) and adopting a policy of infrastructure build out and deployment of connectivity/distance-reducing technology initiatives, the sustainable regionalization of the Pacific Arctic was/is more guaranteed – and is clearly scale- able, sufficiently technologically networked, and capable of absorbing additional "space" in North East Asia as per Polycentric Regionalism theory.

In the next chapter the role of technology, its development in the Sino-Russian partnership, and its application to gas/LNG operations in the Arctic - as well as its economic implications (possible Sino-Russian de-coupling from the West) and the geostrategic consequences of technology-enhanced Polycentric Regionalism extending into the Arctic's fourth dimension of Space, is discussed. Clearly the link between Space-based satellite communication systems aiding, for instance, safer NSR navigation from/ out of Novatek's location, and the implications of Arctic governance and regulation of Space and cyberspace, will all have an impact on the Pacific Arctic region and Space itself. For sure there will be a linkage therefore between the evolving nature of geoeconomics-based Sino-Russian relations in the Pacific Arctic (e.g., gas/LNG relations) and

their future, possible geostrategic alliance, regarding joint excursions into the Arctic's sensitive Space domain in the 21st Century, that will impact Arctic operations, the role of the NSR, and U.S./Sino-Russian relations in the Eurasian Arctic.

In the next chapter I discuss the role of trichology in polycentric regionalism, and its use in the Arctic's Space domain. The critical aspect is that such techo-experimentation may move the Sino-Russian relationship into a possible geostrategic alliance in the Arctic in the 21st Century.

CHAPTER 5

RUSSIA AND CHINA IN THE ARCTIC AND SPACE:

TECHNOLOGY AND SINO-RUSSIAN GEOECONOMICS

Technology is increasing Sino-Russian economic competitiveness in the Pacific Arctic region and will facilitate the physical and virtual expansion of polycentric-regionalism into the European Arctic as well. A key technology characteristic of extreme importance and utility to Russia and China in the Arctic region, is that it militates the effect on time and space created by the enormous distances involved in the Arctic territory; and via its *virtual connectivity* capabilities it can also ameliorate the further geographical challenges of operating across such a hostile landscape as the one that the Novatek project operates in.

In the context of this dissertation, technology and its associated infrastructure in the Arctic, can be seen as an institutional and governance tool of multi-regionalism too; much as gas /LNG was similarly instrumentalised in the process of creating the Pacific Arctic. Technology, like oil and gas is an industry that also reflects multi-regionalism's processes of economic scalability, creation of new strategic spaces (largely appearing because of technological advances, and subsequent changes to the International Political Economy and de-globalization), and the building of new networks in those spaces that facilitate the (re)-emergence of great powers, and their regional spheres of interests, including localised development (multi-regionalism's regionalization), leading to geopolitical changes in/to the political order.

This chapter covers various aspects of technology and its applications including Energy, technology Research and Development, and a summary Sino-Russian Space activities. In Energy this includes

developments such as LNG technology and its applications, (eg gas production and offshore power generation technologies), the digitally facilitated institutionalization of a gas trading hub in the Pacific Arctic, and fin-tech' networked "swap" deals between the Pacific Arctic and other non-contiguous gas-producing regions. The idea of a specific Gas OPEC (in line with the creation of an LNG/gas trading hub in the Pacific Arctic), illustrates a *techno-institutional* process by which the gas industry could then function not only as an economic governance instrument in the Pacific Arctic and beyond (in MENA gas-producing countries for instance), but as an international multi-regionalism economic *institution* as well, spreading multi-regionalism's connectivity *beyond geographically contiguous borders* in North East Asia /the Pacific Arctic region, the fundamental *differentiator* of Polycentric Regionalism.

Technology Research and Development is also the underpinning of the Sino-Russian infrastructure strategy in the Arctic, and this is reflected in their 2019 announcement (Bendett and Kania, 2019) of a joint Technology and Innovation Programme (TIP). Finally, technology's role as the key to the Space dimension is summarised, which is another critical aspect of multi-regionalism's technologic instrumentalization, for geopolitical purposes occurring in the Eurasian Arctic.

All three aspects comprise the broad geo-economic factors employed by China and Russia across the Arctic, and which are resulting in a geopolitical outcome - an emerging multiregional system led by two great powers with techno-economic spheres of *regional* interests, of which the Arctic and its sub-set the Pacific Arctic, is their first manifestation in Eurasia. For China especially, the introduction (De Maria, 2019) of its Digital Silk Road (DSR) is now being increasingly dovetailed with its High North vision of the Arctic, the Polar Silk Road

(Lim, 2018). Both initiatives are also part of China's 2035 strategy (Callahan, 2016) which blatantly makes it clear that China will compete with the U.S. for technology ascendancy in the 21st Century. The Arctic and Space above it will be (one combined) such arena for that competition, as China considers the Arctic (and of course Space too) as a *public space* to be competed for - as specifically cited later.

The critical takeaways are that the/a launch pad for Space Command and Control is largely from the Eurasian Arctic, and infrastructure funds like Belt and Road Initiative/Polar Silk Road that are tailored for the Arctic region, also serve as technology platforms - partly for Space activities. The trust garnered - by promoting these types of projects and concepts between Russia and China is sobering as this type of strategic projects (Novatek / TIP / Space Research and Development, etc) also serve de facto as Confidence Building Measures, which help to *mitigate historical Sino-Russian feelings of mutual distrust*. If successful therefore the Sino-Russian relationship coalescing around the Arctic, Space and Technology, may soon become more than just a partnership, but perhaps transform into a *regional* alliance – reflecting this geo-strategic endeavour in the Arctic region and linked of course, to multiregionalism and its - now possible, *four-dimensional* expansion.

The fourth-dimension aspect has serious implications about a potential Sino-Russian/U.S. Space race that will be built around the 21st Century *cyberspace* capabilities (digitization, 5G, Broadband, Big Data, Artificial Intelligence, etc) *rather than* 20th Century Ballistic Missile Defence systems, per se. This may explain China's focus on its DSR and Polar Silk Road infrastructure strategies in the Arctic (ground stations in Sweden, science labs inside the Arctic Circle, under-sea data cables from Finland, and 5G infrastructure, etc) for Space activities and their

emphasis on the NSR, for Arctic-wide connectivity and technology-platform reasons. The recent Sino-Russian announcement of their intention to build a joint Space station puts the TIP (a joint technology Research and Development initiative) in context and serves also as a geostrategic gauntlet being thrown down.

The conclusion of this chapter is that there is a triangular relationship forming up in the region, coordinated by Russia and China and that comprises: the Arctic, Space, and Technology; the Sino-Russian technology drive is initially for primarily economic reasons. However, it is already transforming into a geo-economic framework in which technology is seen as having critical dual-use applications both economic and military in the Arctic. This development will challenge U.S. global leadership, and the international *governance* order in the region. In relation to the last point, I further argue that the Arctic is becoming the chosen *launch-pad arena* for superpower competition in Space; as from a digitized Space one can control the commanding heights (as noted later) of Eurasia/Arctic region. This linear process I have suggested is divided into three developmental phases (reflected in the TIP's Research and Development mandates): structural, Research and Development and resources matters; Economic and institutional factors; and eventual Space/Geostrategic activities, which I will refer to later.

1. Novatek LNG in the Arctic and the Impact of Technology

Economically, whilst the Sino-Russian Gas chapters illustrated the *commercial* means and mechanism of multi-regionalism (regionalization by gasification) this section reviews with some LNG examples, how new technologies are crucial to Novatek's LNG operations, in the ways in which they facilitate the *industrial and networking processes* of multiregionalism, saving time and money, and speed up multi-

regionalism's spatial integration of the Pacific Arctic by being able to operate at *scale*, alongside well connected and embedded LNG network processes that in turn, lay down the infrastructure for creating a new economic and public space, the Pacific Arctic.

In the Pacific Arctic, the geopolitical output I have argued, was the geo-economic use of the gas/LNG industry to create and dominate a related global strategic space - the experimental Pacific Arctic, and which - as in this technology/broader Arctic region context, has begun to undermine U.S. technical leadership (e.g. new LNG technologies/5G, etc), taken global gas market share (Russian LNG deliveries into North East Asia) and by doing so, compromised some established U.S. regional alliances, Japan and South Korea, and thus made inroads (e.g. in terms of offering "win-win" LNG deals to such U.S. regional allies) in determining an alternative future governance system (multiregionalism) to that of the U.S.' and its established hegemonic, regional order in the Asia Pacific. This strategy is attractive to countries like Japan and South Korea as it is both win-win in nature (geo-economic), and *non-kinetic (geopolitical)* in delivery.

The emphasis now on *security of the Asian LNG market* as the key requirement in Asia's energy security – as opposed to traditional western controlled and benefiting - *security of* supply/*demand,* reflects this western unease, and the shift in the nature - and ownership of such technology-facilitated *power* eastward. Moreover, as noted by Khanna (2016, p.20), *"Supply chains and connectivity, not sovereignty and borders, are the organizing principles of humanity in the 21st century".* Novatek's LNG operation seems to epitomise this observation in the Pacific Arctic, as the Global Production Network analysis illuminated.

I propose that the kinds of techno-developments (as part of a geo-economic framework), seen through this Sino-Russian techno-strategy lens of Novatek's gas /LNG operation can be seen as a blue-print for understanding the strategy, shape, and manifestation of technology-underpinned governance in the Arctic arena, potentially leading to a Sino-Russian alliance.

The very strategic gas/LNG industry's own technology-enhanced ability to create, and then connect up regions such as the Pacific Arctic (*and its link to Space-based activities such as satellite coverage for NSR navigation*), as per my Polycentric Regionalism theory, I believe is by definition experimental - testing for instance: Sino-Russian trust; their geo-economic strategy including the dual use of the Belt and Road Initiative; and the *application of technology to affect a change in governance at a regional level* of engagement - in a specifically chosen and circumscribed Sino-Russian dominated part of the world - the Pacific Arctic.

In terms of multi-regionalism, technological advances evident in the infrastructure upgrading of the NSR (as seen in China's deliberate choice of investment emphasis on the midstream activities of Yamal LNG operations), are combined with regional funding institutions such as Belt and Road Initiative, Russia's EEU, and China's Polar Silk Road regional concepts. These create *scale* as per one of the multi-regionalism processes, by developing new physical and virtual technology *network spaces* across the Eurasian Arctic; by such means an *integrating* instrument such as the NSR when combined with these institutions and a powerful industry of scale and wealth and political networks (i.e. gas/LNG), allows say, China's Belt and Road Initiative to act in the Arctic not only as an infrastructure investor, but as both a technology *platform* -

and a techno-economic *governance instrument* as well, physically and virtually connecting the European Arctic with the Pacific Arctic.

The Gas-related infrastructure and technology development in the Eurasian Arctic (Figure 34) provided by Novatek and its partners, provides this industrial framework and politico-economic lattice upon and through which the Sino-Russian gas relationship is facilitated, and multi-regionalism's creation of the Pacific Arctic region can occur. The NSR for instance is the key multi-regionalism inter-connector for China, linking the Pacific Arctic with the broader Eurasian Arctic region. Russian ice-breaker technologies along with triple-hulled shipping, and protected propulsion systems (as part of the regulatory Polar Code for the NSR) are just three types of Arctic-related technologies that facilitate safe and secure use of the NSR as a conduit for LNG passage and the steady roll-out of multi-regionalism between Russia's Arctic and North East Asia.

Figure 34. Technological accomplishments. Source: Novatek, 2017, p.8

Geo-economically speaking, infrastructure including advanced LNG production facilities, communication/data technologies, and ice-breaker fleets, enable wider physical market (virtual) connectivity and physical network linkages (such as the LNG Transhipment facilities in Kamchatka), throughout the developing Pacific Arctic region (Figure 35), overland from China's most northerly provinces to the Russian Arctic, and via the Arctic's NSR to Chinese Pacific ports.

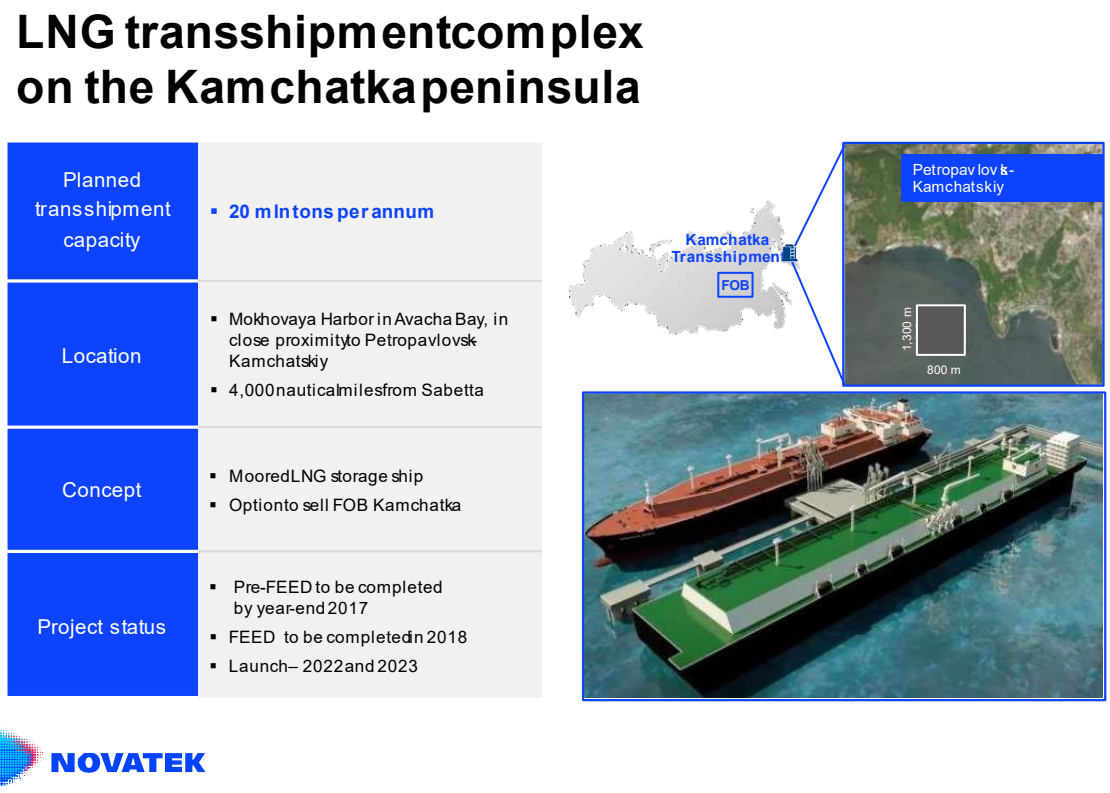


Figure 35. LNG trans-shipment complex on the Kamchatka peninsula. Source: Novatek, 2017, p.58

There is also techno-developmental *coordination* of specific Sino-Russian gas projects in the Arctic such as Novatek LNG's projects, with broader governmental-level Eurasian infrastructure initiatives such as the Chinese Polar Silk Road (Belt and Road Initiative) and Russian Eurasian Economic Union (EEU), and its Far East Development (FED) fund. As the Deputy Head of the FED told the author in a Moscow interview in 2017, this is of significance as the government which pays for such infrastructure, and technology upgrades, immediately has equity and sovereign influence in the region (and/or country) within which it is built.

The fundamental importance of infrastructure build-out in the Sino-Russian gas relationship is that it geographically delineates sovereign territory, it underpins and demonstrates strategic economic collaboration, and most significantly of all it unambiguously signifies joint political and

strategic *intent* – and will in the Pacific Arctic region. Technology tied to energy infrastructure development (Figure 36) is therefore the lynchpin between Sino-Russian gas network development, and the formation of Pacific Arctic region building as per multi-regionalism, but it is also in itself a sensitivity and possible point of tension between Russia and China as the Sino-Russian gas case shows.

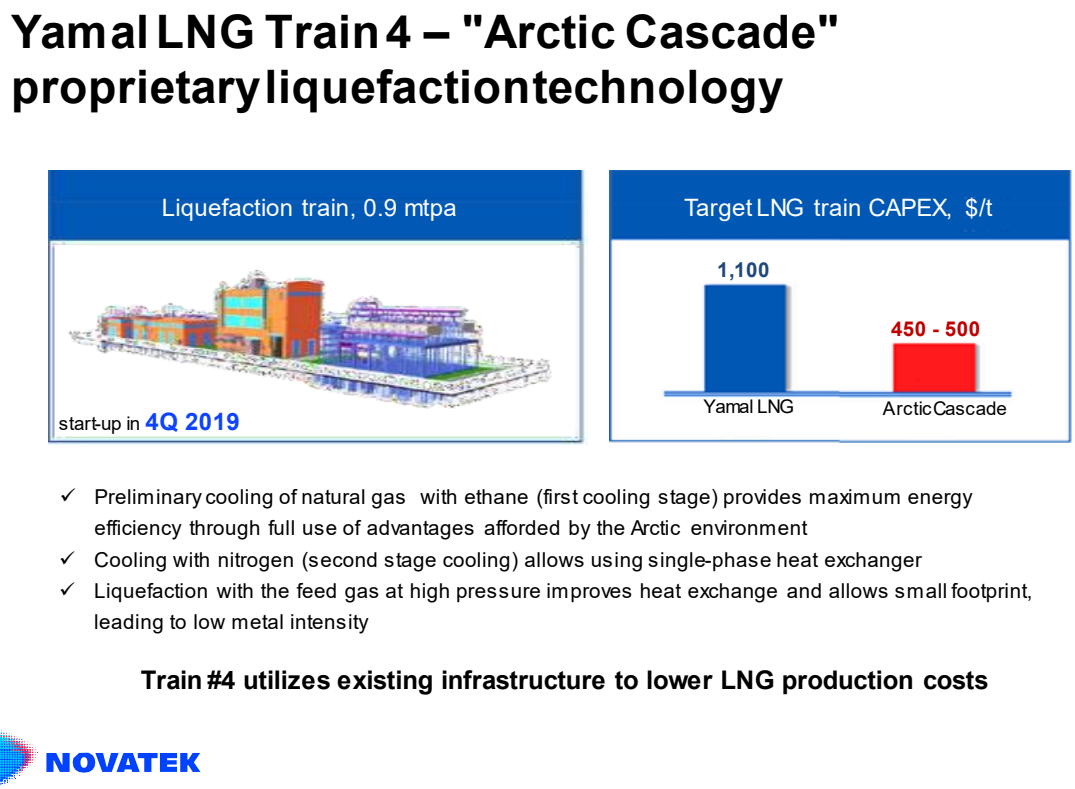


Figure 36. Yamal LNG Train 4 – "Arctic Cascade" proprietary liquefaction technology. Source: Novatek, 2017, p.39

The use of technology and innovation, re-orienting global value chains eastward for instance (e.g., LNG deliveries to the East/Asia), and its part in a technologically sophisticated industry such as LNG (Figure 37), is reflected in the following (McKinsey, 2019) statement about the Sino-Russian focus on regionalization; economic linkage and technological (including virtual) connectivity across regions in Eurasia, not just within it:

"Regionalization is most apparent in global innovations' value chains, given their need to closely integrate many suppliers. This trend could accelerate in other value chains as well, as automation reduces the importance of labour costs and increases the importance of speed to market in company decisions about where to produce goods".

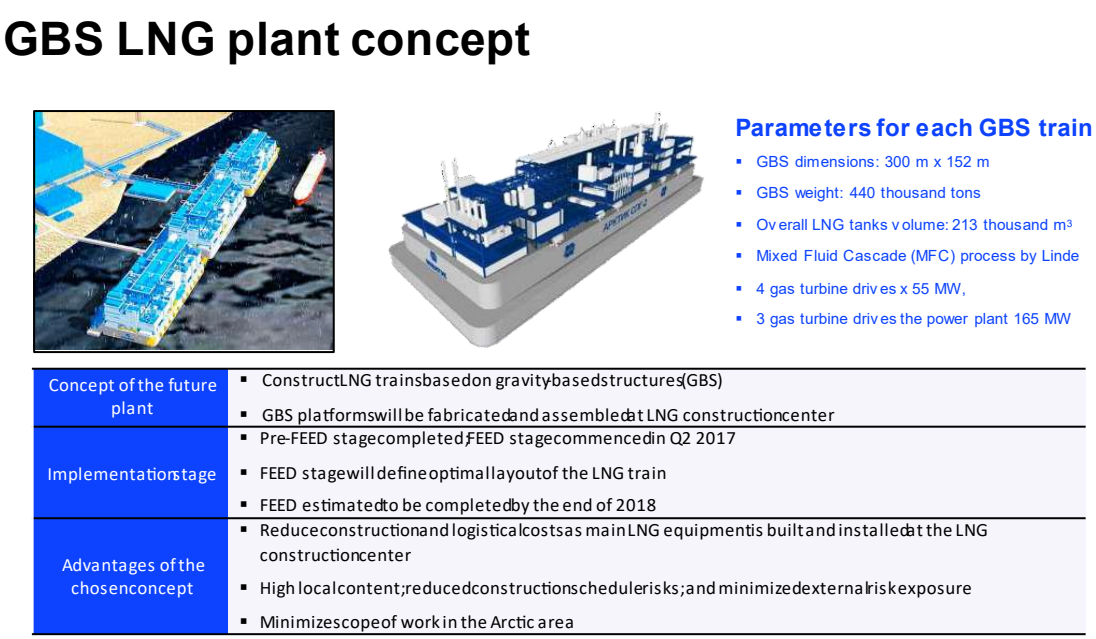


Figure 37. Gravity-Based Structure LNG plant concept. Source: Novatek, 2017, p.53

Global Production Network analysis of Novatek's LNG projects showed how its organizational changes in response to new suppliers' inputs into the LNG value chain – and promoted by differing network practices are brought on by changes in the International Political Economy (e.g. reducing the importance of Labour factor in manufacturing, as per Livesey's view), and technology breakthroughs such as LNG, and the *latency advantage* of data transmission (speed to market) via undersea interconnected cables ("Arctic Connect") along the NSR, along with for

instance, space-based satellite systems improving for example, climatic and navigational information-gathering data along the SLOC, ensuring that the NSR/commercial passageway is both safe and (Figure 38), environmentally sustainable.

Figure 38. Green technologies – committed to sustainable development. Source: Novatek, 2017, p.71

This is precisely why the Sino-Russian Gas relationship is so crucial in the Pacific Arctic, as it exploits technology not only for obvious industry reasons (e.g. automated smart metering for customers; gas flow-rate data, billing processes, distribution, etc), but for *its facilitating role in internationalizing gas*. By doing so it is altering the geography and shape of governance in North East Asia (as per Global Production Network analysis) by *creating new public spaces – regional gas* markets, and associated transport, energy, and communications Global Value Chains in the Pacific Arctic, via the digitization of its own gas infrastructure. This

is in turn also facilitates trans-regional commercial connectivity such as the opening up the NSR as a new global, transport and communications corridor *across the Eurasian and into Space as well*; the Sino-Russian gas relationship is in fact the key facilitating industry of the political and economic process of regionalization - resulting in the development of polycentric regionalism of/in the Pacific Arctic. Technology is intrinsic in that industry's activities, and this why it was chosen as the multi-regionalism vehicle by Russia and China as part of their overall geo-economic strategy.

2. The Arctic, Technology, and the Sino-Russian Partnership

The global competition with the U.S. for technology ownership is fierce as summarised by Reilly (2019), and China's geo-strategic ambitions in the Arctic are also reflected by Reilly (2013) when he states that:

"China's view of the Arctic is as much informed about influencing the shape of the world order in the 21st century as it is about Arctic development and its role in that."

Technology applied in the Arctic heralds strategic connectivity and physical and virtual infrastructural linkage across the Eurasian space. The prize being the operation of – and more importantly the *use of,* alternative (non-western) pathways of trade, leading to eventual recalibrated global governance. As seen in the Sino-Russian Gas chapter, the Pacific Arctic is in my opinion a regional microcosm of that connectivity/linkage phenomenon, and Arctic Sea routes such as the NSR, heavily related to inter-regional LNG activities, are the epitome of new Sino-Russian influenced pathways of Arctic-facilitated Eurasian trade, and *political* power in the region.

Fukuyama, Richman, and Goel (2021, p.100) when discussing the political aspects of technology, consider in fact that *"the coin of the realm is data"*; they surmise that with the capture of massive data on people, organizations, and businesses it is then possible for companies - and states, to move into new markets (and spaces), offering customers new data-led products, which in turn increases the size of the company's/state's network, which will lead to subsequent market domination.

The three authors (2021, p.100) go on to explain that *"companies in the digital space do not compete for market share; they compete for the market itself"*. This is not unlike my statement about Global Production Networks in relation to LNG operations, in that they are intrinsically *market makers* and not a response *to* the market, i.e., their organizational structure, form, and networks *determines* the shape, nature, and scale of the market they create – and operate in. This may mean that the Sino-Russian partnership views the "ownership" of Space (via technology means deployed in the Arctic) as the "prize" (the market), and the terrestrial region (the Eurasian Arctic), the marketplace; to be *governed* via Space-based technologies (5G, internet, the Internet of Things, Artificial Intelligence, etc) which are supported by economic governance vehicles, such as the Polar Silk Road - and multi-regionalism instruments such as the NSR - as part of the process of Polycentric Regionalism in the northern Eurasian Arctic.

Moreover, within the confines of the Sino-Russia global vision, and its aim laid out in the Introduction/Theory chapters, the use of a dual-purpose, Space-based technology enabled Sino-Russian geo-economic strategy to influence a longer-term change in North East Asia's regional governance is sensible, when faced with such a capable, economic, and military

superpower as the U.S. The deployment of the LNG industry's activities to prosecute technology-underpinned multi-regionalism *is a non-confrontational* way by which the Sino-Russian relationship gains geo-economic, then governance, and finally geostrategic advantage over the U.S. in the Arctic region.

To underline this obvious conclusion, I am stating that the Arctic will be a region of superpower contestation in the 21st Century; its link to Space for geo-strategic reasons is unavoidably connected to esoteric, dual-use technologies that influence the governance in/across the Arctic; this is in opposition to many scholars' views, for instance Bekkevold and Lo (2018), who still maintain that China's influence will be limited and non-strategic in the Arctic. My view is that they fail to take into consideration the major impact of technology on international affairs, and the geo-strategic *relationship between the Arctic region and its link with Space*. Ownership of Space today is *less* about Ballistic Missile Defence issues, and *more* about cyberspace and the global geo-economic *benefits of its ownership* - and *governance implications* - to major great powers with regional sphere of interests/aspirations.

Related to this is the unease felt in the west that this type of technology-enabled connectivity (e.g. Russia's Arctic region now feeding Asia with strategic volumes of gas via the NSR), also produces a type of governance that is not hierarchical but instead operates horizontally - seen in Global Production Network's analysis of Novatek's organization and network practices (that are inter-nodal, virtual, and time and space defying), and is therefore structurally and inherently antipathetic toward the Westphalian governance system/economic model, which is dependent on established inter-state and trade relationships, formalised through western trade Global Value Chains (Global Value Chains), and

supported by hierarchical western governance and financial (Bretton-Woods) institutions. The remark in the Gas chapter that the security of demand/supply as a concern of nation states' is being replaced in the Pacific Arctic with an emphasis now on security of the gas *marketplace*, and its attendant shift in the balance of power *from western energy producers to digitized Asian buyers*, is in line with such organizationally flat, techno-networking management structures as Novatek's.

This leaves the west in an exposed position in the Arctic region, as any new organizing structure of international affairs (such as Polycentric Regionalism) is increasingly dependent on technology that may well be "owned" by China in the 21st Century, and which may not respect such established sovereign trade relationships and their institutional governance mechanisms, and instead views borders as (virtual) gateways - and not sovereign (physical) barriers. This is of course initially for commercial gain - such as establishing *inter-regional* gas trading markets (i.e. no longer geographically confined), and later, leveraging the geo-economic power of the market place for governance and political advantage too.

Technology, in all its various forms can therefore be central to creating multiple networks of both economic and governance mechanisms across regions, as noted by Castells (2011). With it is appearing various institutions (e.g., China's Asian Infrastructure Investment Bank bank, the Polar Silk Road initiative and Russia's Greater Eurasia Partnership concept), as well as governance vehicles (eg Belt and Road Initiative as a governance platform) and major infrastructure projects like Russia's nuclear powered ice-breaker station, located offshore in Kamchatka - for electricity generation in the Pacific Arctic; and China's "2035" Technology concept. Technology is the underpinning of all of these activities. As

President Putin (2017) pointed out to some Russian schoolchildren, “whoever leads in Artificial Intelligence will rule the world”.

To this end, the world of information and digitization is now becoming firmly entrenched in the Arctic region (Brookings, 2021). The lynchpin of fundamental importance in the world of information, data, and networking is connectivity - thus the importance that both Russia and China place on the infrastructure development of the NSR (see Gas chapters), linking Eurasia via its Arctic territories; with the NSR dominated by Russia, and increasingly funded by China - the benefits of digitization of Russia’s NSR for instance, are obvious. It enhances its military/security posture; it improves its energy exploration capabilities; and it betters the NSR’s safe navigability (improving its international commercial attractiveness). Economically, digitisation can be seen as a foundation stone for new, *non-energy businesses* to operate in the High North, thus helping to diversify Russia’s economy.

In terms of background and the context of Sino-Russian TIP endeavours, I summarise briefly here China’s view of Unrestricted Warfare (U/W), very similar to Russia’s expression of hybrid warfare as demonstrated in Crimea recently. The purpose is to show how within the Sino-Russian geo-economic framework – TIP and other dimensions of Chinese and Russian thinking, like U/W, coordinate and contribute to this strategic framework, and what effect this has on the Arctic and increasingly, Space too and Sino-Russian plans for both.

Unrestricted Warfare Doctrine

A Chinese view is that modern conflict will be more about bloodless unrestricted wars to acquire or disrupt new technologies (including military), than present bloody wars are about dominating territory,

peoples, or physical resources. In theory terms, according to Qiao and Wang (2017, pp. xii-xvi) the authors of this strategy of Unrestricted Warfare (U/W), the *function of war* is changing specifically because of the emerging combination of human rights, *economic freedoms, and technology*. That these factors are linked to unrestricted warfare as well, makes absolute sense in geo-economics terms - as seen in the Sino-Russian gas/market relationship in the Pacific Arctic. In other words, as Qiao and Wang (2017, p.234) note:

"..we no longer have to be like our ancestors who invariably saw resolution by armed force as the last Courts of appeals. Any of the political, economic, or diplomatic means now has sufficient strength to supplant military means"

Qiao and Wang (2017, p.xvi) predict that whilst we see a relative reduction in military violence globally, there will be a comparable rise in the levels of global economic, political, and economic violence, *undergirded by technology* applications such as Artificial Intelligence, robotics, the Internet of Things, digital economy, media, etc, which is every bit as effective in achieving objectives/aims in society as conventional warfare was/is. It is noteworthy that the 2019 T&IP mandate emphasises these very aspects of technology development noted above.

U/W's key characteristic is that it militates superior U.S. techno-military power, by changing the rules of engagement, introducing significant uncertainty in military response, causing confusion by introducing dual use technologies onto the battlefield, and targeting economic and military systems - and not personnel, for destruction. This is one of the best d/ most accurate summations of the west's response to Sino-Russian activities in the modern Arctic, that I have come across.

Importantly, U/W also buys time for Sino-Russian technology *incubation* and operationalization. It is a system-based strategy of total warfare, that does not differentiate between economic and military means - or targets. There are similarities too with Russia's concept of hybrid warfare. The use of technology to achieve political outcomes such as Belt and Road Initiative's techno-governance aspirations, and TIP's Research and Development project emphases in the Arctic for instance, is at the heart of the conduct of this type of warfare.

Unrestricted Warfare (UW) does reflect the type of technology-based, but largely non-kinetic wars (i.e., geo-economic) of the future noted by Wright (2017), which both Russia and China now envisage when planning any future confrontation with the west/U.S. In this Chinese framework, military capability may be directed in support of or in coordination with economic, political, and societal aims. One of which is to capture, dominate, and own technology - because of its direct effect on the International Political Economy, and the concomitant impact on the governance, norms, and structure of new international trade arrangements, and the associated development of centres of economic wealth and growth – such as the Pacific Arctic region. It also explains why the governance and control of Space (using dual-use technologies) is so critical for Chinese plans in the Arctic region. This (Phase Three) aspect will be discussed in the TIP section of this chapter.

Technology and the Latency of Data; Some Implications

The crucial aspect of successful digitization via the NSR, is that as a technology platform, it links the massive markets of the European Union and Asia in the *shortest time possible*. This is because the delay - "latency" (the Holy Grail of digitization) of information transfer is *shortest* (via undersea cables) along the NSR, a hugely critical Sino-Russian

competitive advantage in *global* financial and trade transactions. “Arctic Connect”, a sea cable (Saunavaara, 2018) linking Finland with Japan is owned by Cinia Oy of Finland, in partnership with Russia’s MegaFon, running an underwater cable (along the NSR) from Finland to the Asia-Pacific region. The appeal to the global commercial community (and China strategically) is its *excellent inter-continental latency*, and for Russia, its effect on the digitization of Russia’s Far North, connecting the local population to broadband; thus, improving the socio-economic status of the area, and encouraging the work force not to migrate out, but stay and help support the Far North’s economy. The prize overall of such digital connectivity for great powers observing these developments in the Arctic, connecting Europe with Asia/China, is *governance over the information flows (latency of Big Data accessibility) in and out of the Arctic region* and *de facto* across Eurasia. This type of technology is fundamental in leveraging economic (via Big Data) and later military (Artificial Intelligence) and political influence in the Arctic too.

An emerging and aggressive view by the Chinese military (The Science of Military Strategy, 2013, p.105-106), that is in line with my introductory comments on Unrestricted Warfare strategy, suggests that *“the game of great powers” will “increasingly focus on the struggle over and control of global public spaces”* like the Arctic. Furthermore, some Chinese officials in their Foreign Ministry (Guo, 2016) go further and state that the Arctic now represents the *commanding heights for strategic competition*, and that from such heights one can control a “three continents and two oceans’ geographical advantage” over the northern hemisphere. The last word is revealing, as it pertains to Space - and not just terrestrial Arctic concerns. The significance of this is that as Space science and technology intensifies, it only accelerates and *coalesces*

further Arctic involvement; as much of the “connectivity”, command and control, land-based supporting technologies, and scientific diplomacy supporting these Space activities, are directed from the Arctic region. This view was reinforced in a May 2018 interview in Cambridge with Professor Ho Kin-Chung of the Polar Research Institute of Hong Kong.

Chinese Aspects of Technology Governance Implications in Arctic

China, as already mentioned shows an interest in subtly changing the concept of governance in the region too (Yang and Zheng, 2017), by means of its High North strategy, featuring the Polar Silk Road, a key component also in the Yamal project, within the Sino-Russian energy/LNG partnership. Peng and Wegge (2015) suggest that as part of this (low-profile) governance initiative, science and its diplomacy is a powerful way for China not only to obtain respect and voice, but influence too, from within the region. So far it has established scientific bases in Iceland, Sweden, Norway, and Greenland. These are the necessary building blocks of regional infrastructure build-out – for *subsequent* future economic governance and multi-regionalism instrumentalization in the Arctic, but they also serve as terrestrial technology platforms for activities in Space.

Chan (2018) whilst not specifically addressing the crucial aspect of Belt and Road Initiative (the Polar Silk Road, in the Arctic context) as a techno-governance instrument in the Arctic, as I have highlighted, argues that geo-developmental infrastructure (such as the Arctic’s NSR), is a theory that explains the emerging Belt and Road Initiative Chinese strategy; in it he suggests that Belt and Road Initiative’s aim as the crucial initiator of this developmental strategy is to facilitate and fund mutually

advantageous economic growth - with chosen partners. In the Arctic, that Belt and Road Initiative “partnership” is very clear.

As the “means” to achieve this Belt and Road Initiative aim is often via virtual connectivity and physical linkage (e.g. 5G and the use of the NSR respectively) between countries and/or regions, then the role of the Sino-Russian Novatek partnership in this geo-developmentalism infrastructure concept (leading to the creation of the Pacific Arctic region and a future re-configuration of the international order), is crystal clear here; it is fundamental to China’s aim as a rising great power to play a shaping role in the broader Arctic region, alongside its powerful and *necessary* regional “sponsor” – Russia.

However, my view, reflected in my concept of Polycentric Regionalism and manifest as multiregionalism in the Gas chapters, is that the combination of technology applications and Belt and Road Initiative’s technology-distributing infrastructure is just the minimum necessary requirement for establishing a form of *economic governance,* in the Arctic. But this combination is *insufficient f*or Belt and Road Initiative to achieve *political governance* in the Arctic, as intimated as the Chinese goal, by Chan.

The technologies involved in economic governance (by China and Russia) in the Arctic, I argue, must also be subjected to recognized industry standards, and framed in an internationally accepted technology regulatory framework. I noted this in the Theory chapter in reference to Polycentric Regionalism and its recognition of this institutional input. That itself can only be achieved if in addition, that regulatory framework - and a technology (Research and Development) “pipeline” is institutionalised. The Polar Code (absorbed into / within the UNCLOS framework) determining the safe and secure operation of the NSR as an emerging

SLOC, is one such regulatory instrument with considerable technology input, but it was created on behalf of the Arctic Council by the International Maritime Organization (IMO), and not China's Belt and Road Initiative, per se.

However, the strategic TIP initiative that China and Russia signed up to in 2019 (see later) will logically lead to questions of regulation, governance, and institutionalization of technology; this is because the relationship between Space, technology, and governance in the Arctic, is clearly connected to this issue of geo-developmental infrastructure and Belt and Road Initiative, that Chan refers to, inevitably leading to questions of the Arctic's future strategic position and its multi-regionalism implications.

Only with these two additional criteria in place (technology regulation and its economic institutionalization), could the Polar Silk Road initiative in the Arctic for instance, be a seriously *recognized* economic governance instrument, and eventually transition to a regional, political governance agency - in due course. In this sense, Chan's theory which *only emphasises infrastructure* in Belt and Road Initiative's role in geo-development, is incomplete and therefore inadequate to fully explain China's regional - Belt and Road Initiative ambition in the Eurasian Arctic. Polycentric Regionalism does in contrast, incorporate the necessity for institutionalization and regulation as part of its definition, as demonstrated in the Gas chapters.

In line with the experimental nature of the Sino-Russian relationship and its geo-economic strategy in the Arctic - and like Russia too (as will be discussed), China is also testing new technologies in the region relating to for instance, autonomous underwater vehicles (UAVs), satellite capabilities, and communications systems. Infrastructure wise alongside

the development of the NSR, China is presently looking at the acquisition/funding of ports (in Sweden) a submarine base (again in Sweden), and a rail line in Finland, linking the northern Finnish coastline with its southern, Baltic border, a stepping-stone into the European Union marketplace (via this infrastructure-borne governance). This is on top of a rail and port project in Russia's coastal Arctic town of Arkhangelsk.

I suggest that this technology "testing" phase is very much part of the overall Sino-Russian geo-economic approach and is a further indicator of its experimental nature in the Arctic arena. The TIP in my opinion, will serve partly as an incubator facility for such experimental technologies - and for consideration of their geo economic effects, and is an important (and underestimated) aspect of the Sino-Russian science partnership.

3. The Sino-Russian Technology and Innovation Programme (TIP)

In this section I look at the strategic underpinning of the Sino-Russian relationship; the Sino-Russian technology and innovation partnership (TIP) which has a focus on research and development, and instrumentalization of technologies (dual-applications) which have clear geopolitical implications: These include the steady *coalescing* (via technology, and terrestrial *space-creating* industries like oil and gas in North East Asia) of the Arctic with geo-strategic Space activities (see Space section later); secondly, the Sino-Russian TIP relationship may represent the necessary framework and mechanism for developing *future* Chinese and perhaps Sino-Russian, geo-economic decoupling from the west. The Pacific Arctic is to my mind a geo-political experimental space that if successful economically, may prove to be the precursor of broader Sino-Russian decoupling - and a strategic indicator of great powers' (i.e.

Chinese and Russian) emerging regional spheres of interest(s), with the Pacific Arctic as an intrinsic part of a future polycentric/multiregional international order in the 21st Century.

The institutionalization of science, technology, and innovation (and its coordinating role) - represented by the TIP, alongside techno-regulation and its commercial regulation, is a fundamental indicator of agreed Sino-Russian political intent, joint techno-scientific purpose and increasing strategic coordination. If successful this concept of TIP-enhanced Polycentric Regionalism, tested first in the Arctic/Pacific Arctic via the gas/LNG instrument, may then be rolled out further across the Eurasian Arctic too, as an alternative governance system to that of the present neo-liberal, U.S. led, global order. However, much of China's (and Sino-Russian's) technology's potency will be aimed at Space /cyberspace competition and governance; for that reason, the Arctic will play a platform/launch-pad role and is desirable as the high-latitude geopolitical public space governing the commanding heights over Eurasia and its Oceans – and reinforcing its prime location, under the geostrategic umbrella of Space.

The multi-regionalism arena in this sense is the fourth dimension – Space, via the instrumentalization of dual use technologies, which will shape the economic and possible political governance of the terrestrial Arctic region – in a similar fashion as to how the Pacific Arctic space was /is being created some 6,000Km (by air) away to the East by the LNG industry and it use of the digitizing NSR and the formation of a Pacific Arctic gas/LNG regional market place, a part of multi-regionalism's roll-out.

I believe the 2019 Sino-Russian Technology and Innovation Partnership (Bendett and Kania, 2019) is a strategic enabling factor at the very heart of the Arctic - Space - Technology triangle, that is beginning to exercise

the three major great powers, reflecting the increase in the geostrategic importance of the Arctic in the 21st Century and its role in relation to Space/Cyberspace governance-competition.

The TIP's Background

Sino-Russian scientific Research and Development cooperation has in recent times been reinvigorated and accelerated in its development since May 2015 when Xi Jiping visited Moscow and where a series of agreements were put in place (China Daily, 2016), including cooperation in the vital digital economy. Later cooperation (Chinese Ministry of Science and Technology, 2016) included initiatives across Sino-Russian Eurasia, which laid emphasis on dialogues and exchanges, creating industrial science and technology parks, the joint funding of technology projects, and the expansion of scientific academic cooperation.

Within the geo-economic framework adopted by both Russia and China (less so in the People's Republic of China's case) it is therefore not surprising - I argue especially since Crimea and China's trade war, that there is an underlying joint applied scientific/technology policy aspect emerging now, with this recent acceleration in coordination of the TIP, signed by Xi and Putin.

This is in effect a formal attempt at *institutionalizing Sino-Russian science and technology*, not just for market competitiveness reasons, but for geo-economic reasons too. The TIP's structure as outlined by Bendett and Kania (2019, pp.5-12) reflects firstly a), their own respective science communities and facilities for collaboration and how they are to work together, and then b), specifies the areas of STEM (Russian) and applied technology (Chinese) Research and Development projects to be jointly undertaken. This partnership is fully politically, scientifically, and

financially supported by both states with the personal involvement of Putin and Xi.

It is also unsurprising that China's spend on Science Research and Development (Casassus, 2020), is predicted to be higher than that of the U.S.'s by the end of the 2020s. Within this Technology and Innovation Partnership, Russia's traditional capabilities in STEM subjects, science research, *Space,* engineering, and military applications are now being formally integrated with China's expertise in high-tech' economic and strategic applications. This type of technology-based endeavour (TIP) I suggest, is the strategic glue that now binds the two countries together for the geopolitical reasons stated earlier.

Structure of Sino-Russian Scientific Cooperation

Firstly, in terms of *Dialogues and Exchanges,* projects ranged from technologies for construction and operating in cold climates (Shchepin, 2016) conducted at Novosibirsk University alongside Chinese partners, to a Shanghai-sponsored joint-investment forum competition for entrepreneurs to establish the best mutually attractive projects, supported by the Russian Federation/the People's Republic of China funding (Beijing International Exchange Association of China, 2018).

Secondly, creating *Science and Technology (ST) Parks* was the most significant aspect of the new partnership as both governments believe that with this infrastructure in place, bilateral cooperation can flourish. This area of cooperation is now being accelerated as part of the TIP, with both Academies of Science in formal discussions about further expansion of ST parks. In 2006 the Jilin provincial government and the Chinese/Russian Academy of Sciences, established the Changchun Sino-Russian S&T park. This has focused on collaboration in innovation,

and the transferring and commercialising of new innovations and technologies (CCRSSPacific ArcticRK). Another ST Park, in Shaanxi province (Chen, 2018) emphasises IT, Artificial Intelligence, and biomedical research, and their applicability and integration with the social infrastructure of both China and Russia. This suggests an agreement between the countries about which technologies can be actively beneficial to both societies – and where common challenges can be constructively shared, and solutions sought.

In 2017 Russia set up its own high-tech' Silicon Valley Park at Skolokovo (Liu, 2019), just outside of Moscow, aimed at supporting jointly funded (Tus Holdings and the Russia-China Investment Fund) new start-ups. That this park is in the heart of the Russian intelligence community's location is not coincidental and is indicative of the type of technologies developed there, and who their customer(s) are. This may therefore indicate some collaboration regarding intelligence coordination/planning too, between the two countries. This again suggests growing Sino-Russian mutual trust if such national security sensitive information is now being jointly developed and shared.

In Harbin, a ST Park was set up in 2018 looking specifically at Artificial Intelligence and populated today by 19 research companies which are incubating new ideas and collaborating with local government. Harbin is also the city selected for the "Two countries, Four Cities" programme, coordinating the efforts of Moscow, Yekaterinburg, Harbin, and Shenzhen (Bendett and Kania, 2019). This will serve as a model for an additional ST park in Shenzhen, focusing on IT, Big Data, and automation (Artificial Intelligence) systems. Geographically, this important joint programme is based in Heilongjiang province – one of the three north-easterly provinces in China that is already working closely with Russia's neighbouring

Russian Far East regions in other already established Sino-Russian regional integration, economic projects. This indicates that joint economic investment in this Sino-Russian border region is in line with suggestions *that regional integration (between southerly Russian Far East and China's three North East provinces) is also slowly taking shape*.

Thirdly by 2018, in *Academic Cooperation* terms, more than 67,000 Chinese scientists registered with the Chinese Academy of Sciences, are working with 55,000 colleagues of the Russian Academy of Sciences (International Cooperation Bureau, 2018). Joint research programmes (6 major research projects fields), and academic exchanges between the most prestigious academic institutions from both countries are the main aim of this longer-term initiative.

In the next section, some of the scientific and technical priorities for the latest, 2019 T&IP are outlined, which have either military or commercial applications and, in some cases, both. With the (above) structural Research and Development framework in place and recently augmented in some cases, Research and Development prioritization can be decided, and projects started and /or reinvigorated, under this major Sino-Russian TIP initiative.

Types of Technologies: Outputs and Implications of the TIP

It is clear also from the format and priorities of the TIP (discussed next) that there is a Sino-Russian multi-track approach to technology and how it is being deployed, directed, and monetized, with some technology spin-offs already deployed within the Pacific Arctic/Arctic. Technology investment in the form of TIP's priorities and outputs at this early stage suggest an interest in cold weather and dual use technologies (coordinated with weather satellite systems ensuing safe passage along

the NSR), and a decided interest in the Russian Far East and north-easterly Chinese provinces and their proximity to military sites, where some Research and Development centres are located.

There are those technologies - both Chinese and Russian that are simply technically advanced and innovative such as hypersonic weapons, unmanned aerial vehicles (UAVs), robotics, nanotechnology, bioengineering, Communications, Big Data, and Artificial Intelligence, and which are being developed at their respective national levels. These I would define as a mixture of Chinese techno-economic products, developed initially from reversed engineered western products, and now on the international market – such as 5G, and face recognition applications.

What is significant is that these types of game-changing technologies with *geo-economic potential*, are now being further jointly developed within the 2019 T&IP in a new, prioritised developmental phase, where the clear emphasis is on *integrated systems, regional networks, and dual-use applications*. This would seem to support the multi-regionalism mechanism and a possible Chinese strategy of planning for a techno-economic decoupling option (e.g., the use of infrastructure building Belt and Road Initiative, 5G, and satellite comms' connecting the Arctic space). New projects include dual application technologies such as an alternative Sino-Russian GPS products (Beidou/GLONASS respectively), 5G infrastructure, and a Russian OS system for Chinese mobile networks.

There are also major techno-military and techno-economic (i.e. dual-use) projects in communications, earth/space navigation, infrastructure, and the Internet of Things, for instance, that are clearly in support of geo-economic objectives, and a consideration of techno-military technologies designed for Arctic-associated geostrategic activities in Space. These are

partly the result of Russia's 20-year techno-military Research and Development incubation period, and now seen funded in the TIP scheme. In a 2020 (St Petersburg) interview with Dr Tulupov, a Russian academic who advises the Russian military and Foreign Service on Arctic matters, he underlined how the emphasis on Air Defence capabilities, military dispositions, and submarine forces making up the Bastion concept in the Arctic, are actually for deployment in the North Atlantic; and in fact, the weapon systems that are *specifically designed and deployed in the Arctic* theatre are a mixture of high technology hypersonic weapons, UAVs, sophisticated radars, and underwater mines. Many of these systems rely on Space-based satellite and communications, and infrastructure networks such as China's 5G system.

These latter technologies and applications (including techno-military) are being incorporated by Russia into the Arctic such as the Kinzhal hypersonic missile system (Nilsen, 2019) located on Russian islands, positioned along the NSR) and by China's Belt and Road Initiative (techno-infrastructure building) presence in the Arctic. Emerging systems include for instance, both Chinese and Russian weaponised anti-satellite-satellites, navigation and weather-monitoring drones, and alternative Chinese/Russian GPS systems as already noted.

Research and Development: The Priority for the Scientific Partnership

Telecommunications cooperation mainly centres around Huawei's presence in in Moscow, St Petersburg, Kazan, Novosibirsk and Nizhny Novgorod. A main Artificial Intelligence collaborative effort is with Russia's National Technology Initiative, designed to promote high-tech' projects in Russia (Moscow Institute of Physics and Technology, 2019). Huawei is also working closely with the Russian Academy of Sciences following an agreement in May 2019 (Huawei, 2019). By 2019, Russia was Huawei's

third ranking overseas research centre, following the U.S. and Europe according to Zhukova and Sukharevsakaia (2019). It is already testing its 5G network (Surkova, 2019) in Moscow, alongside Russia's telecom/mobile operator, Vimplecom. This is part of a joint research programme with the Skolkovo centre to address opportunities in 5G network technology, Artificial Intelligence and the Internet of Things.

Big Data and Artificial Intelligence opportunities are now a leading priority in the Sino-Russian Technology and Innovation Partnership. A Sino-Russian, Big Data Headquarters has been established according to Zhong (2018) to promote just such research. Meanwhile the Chinese Ambassador to Russia, Li Hiu, according to Bendett and Kania (2019, p.10), suggested in 2018 that there should be an increase in bi-lateral cooperation and an *emphasis put on the growing digital economy*, via research into Artificial Intelligence, Big Data, the internet, and smart cities.

In fact, the president of the Contemporary China-Russia Regional Economy Research Institute in Heilongjiang's province stated that *"High-tech' cooperation including Artificial Intelligence will be the next highlight of China-Russia cooperation"* (Russia will prepare a draft, 2018). Bendett and Kania (2019, p.11) go on to report that *"there are a growing number of indications that Chinese- Russian collaboration in Artificial Intelligence is a priority that should be expected to expand".* Wisniewski (2019, p.13) makes the key point that Artificial Intelligence's biggest contribution will be in taking Russian software capability (e.g., face recognition) into new areas of usage.

In *New Media and Communications*, the aim is to establish a common digital platform to facilitate their own respective medias and form up joint positions in global markets. One such obvious market may well be gigantic LNG/Gas market in the Pacific Arctic for instance. The aim is commonality

of media approach, and the means to broadcast *their own point of view on the world stage.* The collaboration is in media, internet governance, and propaganda aspects, and ranges from technical, to policy-oriented initiatives.

Finally, the *Digital Economy* is a key aspect of the Sino-Russian Technology and Innovation Partnership (as noted above). The Russian digital economy is still underdeveloped, so this represents an opportunity for Chinese companies as well as Russian to collaborate. China's Tencent is developing data storage infrastructure in Moscow for instance, that assists Russia to accumulate marketing information – which underpins the developing digital economy, and at the same time allows Tencent to capture and develop Russian gaming and cloud businesses. Khrennikov and Khrennikova (2018) reported that in 2018 Russia's internet firm Mail.ru signed up a $2Billion deal with China's Alibaba Group to jointly exploit Russia's e-commerce sector.

In my view the nature, scale, and strategic depth of this Sino-Russian technology (TIP) partnership within their geo-economic framework, can only but serve at least three important and inter-related functions: it undoubtedly builds geostrategic Sino-Russian trust; in similar experimental form, the Research and Development projects and their outcomes whilst intrinsically extremely valuable, are also *de facto*, vital Sino-Russian Confidence Building Measures as well. Finally, it is obvious in the 21st Century that initiatives like TIP provide the technology which is also the vital underpinning of - and route to geostrategic - dual use capabilities in Space. This suggests that the Sino-Russian relationship will almost inevitably - and necessarily become something more than a "partnership" in the Arctic and be a significant factor (especially from a Digitization point of view) - in occupying and determining new, regional

market spaces. If established the partnership can then govern, via such technology-networked systems that are themselves derived from the institutionalization of technology Research and Development – in the form of the Sino-Russian TIP.

4. Phasing Aspects of Science Development & Consequences of TIP

The Sino-Russian *institutionalization* of science, technology, and innovation represented by the TIP, alongside its dual applications, techno-regulation, and commercial manifestation (Novatek LNG in the Pacific Arctic) is I surmise, a fundamental indicator of agreed Sino-Russian political intent, joint techno-scientific purpose and increasing geo-economic coordination.

This is reflected in the three phases of Sino-Russian techno-geostrategy, which I have identified previously: Research and Development phase; Techno-Economic phase; and Techno-Space/Military, and which the T&IP illuminates, endorses, and is indeed a key component of. If successful, my concept of technology-enhanced Polycentric Regionalism, tested first in the Arctic/Pacific Arctic via the gas/LNG instrument, may then be also rolled out across Eurasia's Arctic *and Space domain*, as part of the continued /expanded experimental model for an alternative (non-western) governance system across the Eurasian Arctic region(s).

Phase One of the Sino-Russian Technology Development

A Chinese aim (and a Russian one too), since the break-up of the USSR in the early 90s and the emergence of a unipolar world, was to achieve technology *parity*, militarily and economically with the U.S. Economically, China effectively stole American/European technology IP and concurrently invested in overseas education for its brightest and best students, focusing on STEM subject areas. As a former senior State

department official Tom Christensen - now of the Brookings Institute confirmed in a 2018 interview I had with him, the real issue facing the U.S. administration by the early/mid noughties, was that China had already stolen all that it needed from the U.S./west to reach a level of technological parity.

Concurrently, Chris Donnelly, a British former Special Adviser to the Secretary General of NATO, in an interview with the author in 2018, stated that with Russia no longer able to afford a large-scale procurement programme following the break-up of the USSR, an alternative approach to military readiness was developed. The Russian strategy commissioned in the 90s and operational in the early noughties emphasised three key areas for investment: Military/technology Research and Development; the maintenance of testing facilities/laboratories; and accelerated software development. The outcome of that strategy and investment, is now appearing in Phase Two (Sino-Russian economic technology parity with the U.S./west), and Phase Three (militarization of technologies and ascendency over U.S. in Space) in the form of advanced technologies, such as hypersonic weapons, virtually silent submarines, and sophisticated satellite-directed, air defences. All three of which are stationed in the Russian Arctic.

Background to Phase One

Deteriorating relations with the west predated the China trade war and the third ramping up of sanctions on Russia (and this T&IP initiative in 2019), but their present manifestation only reinforced this already underway state of affairs, and partly resulted in a Sino-Russian “comprehensive strategic partnership of coordination for a new era“ (Ding, 2019). This statement was on the back of a series of new agreements finalised by Xi and Putin which culminated as far back as 2016 with a joint announcement by

Russia's Ministry of Economic Development and China's Ministry of Science and Technology (Embassy of the People's Republic of China, 2016), on signing a "Memorandum of Understanding on Launching Cooperation in the Domain of Innovation". Referring to this Sino-Russian announcement, Bendett and Kania (2019, p.5) comment that this science and technology partnership is "one of the major pillars of this relationship".

In other words, there is historical continuity here by the very creation of the TIP in 2019 – and the likes of the 2016 announcement, of Sino-Russian strategic intent and their thinking about the *investment in and political output* of techno-scientific cooperation, as Bolt (2014) notes. Sanctions imposed after 2014, and the Sino/U.S. trade war have only accelerated, as Kshetri (2014) argues regarding reference to cyberspace competition, such collaborative thinking and its consequent acceleration and implementation.

Thus, one consequence of the Chinese trade war with the U.S. and increasing sanctions against Russia, as well as western attempts to confine China and disrupt Russia following Crimea, has been over the last year/18 months this accelerated Sino-Russian Technology and Innovation Partnership, which according to Bendett and Kania (2019, p.5), may well be signalling *an agreed economic-led strategy to de-couple China (and Russia too) from the U.S.* economically, and possibly geopolitically as well.

I now suggest that this recent 2019 Sino-Russian T&I Partnership is a major component and public signal of that Chinese intent, and a concrete indicator of the *direction* of Sino-Russian thinking – and action, to which Christensen referred in 2018. I suggest that what we are seeing now is the next developmental stage; the Sino-Russian strategically agreed

coordination, and *institutionalization* of technology and science Research and Development of which TIP I state is the latest and most important manifestation. This will lead to the growth of China's own indigenous technology capability, which once thoroughly institutionalized, could lead to it eventually overtaking the U.S. as the world's leading T&I developer.

The regional arena identifiable as playing out this *experimental* strategy I suggest, is the Arctic. The Sino-Russian use of a geo-economic strategy to house dual-use technologies, project power quietly (along the pathway of the NSR) in a deliberately non-kinetic way (that otherwise would alert the U.S.) using an innocuous industry such as oil and gas, is an ingenuous means of affecting Eurasian connectivity (NSR and LNG markets *in both* Eastern and Western Eurasia). This thereby creates new digitized spaces – such as the Arctic space, from where one can initiate activities into Space (and from there control of cyberspace) - where U.S. global hegemony can be technologically thwarted, and US global governance and its technology status undermined; all achieved largely peacefully by China and Russia.

In this Phase One, Russia had the ascendency in defence system technology over the People's Republic of China, and sold it capable equipment (Bellacqua, 2010) including for instance, the world's best air defence system, the S-400. This system is now stationed on various Russian Arctic islands too, running parallel with the NSR today. Concurrently Russian commercial product/systems substitution (technology-based) had begun with the onset of European Union/U.S. sanctions. Meanwhile, Chen and Yuan (2007) suggest that in entrepreneurial technology start-ups, China has made good headway with technology applications aimed primarily at the commercial/economic sector especially in the areas of communications, Artificial Intelligence,

and Big Data. The People's Republic of China's overall technology-building strategy in Phase One appears to have been one of acquire IP from the west, buy-in from abroad where appropriate, reverse-engineer U.S. technology, and cooperate - in the military's STEM sphere especially, with Russia.

The main thrust of Sino-Russian planning according to Lo (2020), in this initial phase was to strive toward *technology independence* (Lo, 2020) from the west. Incubation of Russian techno-military Research and Development was ongoing as described by Donnelly earlier. A major interim measure applied was product/service substitution which hailed mixed results for both Russia and China especially in the Arctic offshore oil and gas sector (Pomfret, 2005). With the increase in the severity and type of sanctions on Russia following Crimea in 2014, and the later eruption of the trade war between China and the U.S., I argue that the centrality of technology capability for both military and economic reasons was prioritised, and its development capacity accelerated by both governments. For China for instance, a significant issue and vulnerability driving this initiative was/is the superiority of U.S. "chip" technology, a key component for much of its technological applications. TIP itself therefore should be clearly understood and signposted as a direct result of Russian sanctions and China's trade war and thus western confrontation.

The Transition from Phase One to Phase Two

By the end of this Phase One (early-noughties - 2013), Chinese technology was advancing and beginning to develop commercial applications that served the growing global services' economy. One such obvious – and much publicised capability, was the 5G communication system. Great commercial headway had been made in Robotics, Big Data

and Artificial Intelligence too, especially face recognition technology and tele-medicine, for instance. Militarily too, in conjunction with Russia, China had increased the capability and capacity of its Armed Forces, and scientifically, China had begun to educate its scientists abroad where the west was still in the ascendency regarding technology Research and Development, and its commercial spin-offs. Meanwhile Russia's techno-military strategy (largely research-oriented), was still incubating but being incorporated into a new Russian doctrine of warfare (hybrid), along with the emergence of a new category of conventional capabilities, including kinetic weapons and hypersonic capabilities.

China too had come to similar conclusions about modern warfare, and even the definition and purpose of war, with its own version of Unrestricted Warfare (UW); both efforts emphasised the dual use of technology, the *blurring of economic and traditional warfare tools and tactics*, and the concept of borderless, uncontained total war. As Liang and Xiangsui (2017, p.235) state:

"…faced with warfare in the broad sense that will unfold on a borderless battlefield, it is no longer possible to rely on military forces and weapons alone to achieve national security in the larger strategic sense…"

What Liang and Xiangsui (2017, p.5) describe as an *"age of technological integration and globalization"* led to their emerging concept of Unrestricted Warfare. This polemical policy work, now the subject of much scrutiny in the Washington establishment was written in the late '90s by two officers serving in China's PLA. It addressed the ways in which a technologically superior U.S. could be defeated by using non-military means, primarily law and economics. The strategy was to use these non-violent instruments to hinder an "enemy" and by doing so, negate the need to use military force. In the U.S.' military and intelligence communities and

amongst China-hawks, UW was seen as the blue-print for Chinese strategic and multi-ministry/agency planning. In a world where technology has assisted in making globalization a form of warfare (Brooks, 2016), the development of UW is unsurprising.

In this sense these UW/hybrid theories (and their strategic applications now evident by the use of dual-use technology applications), endorses my central conviction that China's rise to peer-power equilibrium with the U.S. is largely not by means of 20th Century geopolitics, but applied the 21st Century geo-economics - *within which unrestricted warfare resides*: The unrestricted warfare concept neatly accommodates both the vital geo-economic battle for technology ascendency which underpins the world's emerging service sector – developed in Phase Two, and the philosophy and practice that gives China (and Russia) potential technology ascendency in geostrategic capabilities too (in Phase Three), such as hypersonic weapons, space-based communications systems, and satellite defence capability; all of which are key in challenging the U.S.' superpower and leadership status and relate directly to the Arctic and Space as described in the introduction to this chapter.

In this transition phase, the move towards achieving Chinese techno-economic "superiority" status demands a step change in Sino-Russian technology and innovation planning. This includes firstly a move away from just a Sino-Russian *manufacturing* view of technology - to one of technology's institutionalization and global regulation to make it scale-able, and internationally competitive in the global marketplace. Thus, in the TIP, numerous projects already discussed, are designated as *entrepreneurial in design*. The emergence of an indigenous technology capability in this transitional phase (instead of acquiring it from abroad), and in both countries' cases, relying on an interim substitution policy

(invoked in Phase One and seen in some gas technologies noted in the Gas chapters), requires the scientific coordination and institutionalization of a STEM and technology Research and Development “pipeline”.

The TIP is a contributor to this scientific objective (STEM from the Russian Federation and technology from the People’s Republic of China), but its primary aim in my opinion, is as *coordinator of this institutionalization* of Sino-Russian science and technology Research and Development, for *subsequent political and geostrategic purposes*. One such initial purpose in Phase Two is Belt and Road Initiative-facilitated *economic governance of the Arctic* and the second is the *regulation and governance of Space* as outlined by Zeng, Stevens, and Chen (2107). What is really at stake is that it is Space-based technology that leads to the Holy Grail of governance and *territorial ascendancy* - *Space domain awareness*.

Discussions about this technology, its nature, and its implications (Security at the Frontier: the UK-Japan Perspectives on Cyberspace, Outer Space, the Arctic and Electronic Warfare, 2020), were conducted at Chatham House in December 2020 and attended by the author. The critical discussions were about the centrality of Cyberspace - not BDM in Space, and that Russia’s view is that the threat to Space systems (the United Kingdom view for instance) is not the issue, but rather the threat *from* Space. Thus, for example, Russia is actually looking to *institutionalize Space governance* by promoting a Space Treaty (Engelhart, 2008). This explains in part the Sino-Russian emphasis on regulation and governance of Space. China’s key objective as Broeders, Adamson and Creemers (2019, p.7) comment, is in fact *stability* in cyberspace for this exact reason: *“China focuses on the economy as a force multiplier for global power projection in cyberspace and beyond,*

banking on the waiting game", whilst Russia's primary interest has been international peace and stability in cyberspace.

Jointly however the Chinese emphasis on economic prowess as an instrument of power, fits well with the Sino-Russian decision to deploy a geo-economic strategy for promoting a change in the international order. Technology in this sense is a game-changing facilitator of geoeconomics in the Arctic whilst obviously still an instrument of geopolitical persuasion in the region as well – *but only if necessary*. The fact is that the observable relationship between technology (TIP), Space and the Arctic - through a geo-economic lens, is very apparent in this example of the attempted institutionalization of Space by Russia and China.

Phase Two

Techno-Economic Parity and De-Coupling

In Phase Two therefore, the *institutionalization of technology Research and Development* that this 2019 T&IP coordinates, is a significant inflection point for China - and Russia, as it is only with Sino-Russian technology and innovation Research and Development institutionally funded, housed, and systematically ringfenced I argue, that technology can then be *internationally* regulated and subsumed (Ji, 2014), into the Sino-Russian geo-economic framework, where it can be deployed competitively, to win global market share in say, the global services sector.

It is at this point therefore that its "ownership" can deliver to China and Russia further *strategic choice*; to economically decouple or not from the international order. So, whilst this T&IP is clearly not *sufficient* evidence of an associated Sino-Russian de-coupling strategy underway, it is

certainly a *necessary* Research and Development pipeline-platform for the institutionalization – and coordination of joint science/technology planning – which is a precursor for, any subsequent *economic* decoupling.

From a societal point of view, Khanna argues (2016, p.19) that digital connectivity will enable new forms of community. That "community" in the Pacific Arctic (in this case very definitely the Russian Federation and the People's Republic of China) may well be regionally de-coupled from the west/U.S.' "community", precisely because of the economic, political, and geostrategic advantages bestowed upon them because of technological advances. For instance, Glanz and Nilsen (2020) report on Russia's Losharik submarine that is expressly designed to operate at depths of 20,000 feet, where it is equipped to disrupt undersea cables on the sea floor. These are the undersea cables connecting the U.S. and Europe via the Atlantic. As commented on by Siddiqui (2019, p.1) in some detail:

"However, with this access to deep-sea cable networks, China could monitor or divert data traffic, and even cut off links with entire countries if it wished. Relaying 98% of global telecommunications data and situated in international waters, these cables are vulnerable to cyber-intrusion, particularly in underdeveloped countries, where such tampering cannot be monitored".

In relation to UW tactics and the use of the Belt and Road Initiative for proposed Scandi-Sino undersea cables, the clear importance of the governance of the NSR (along which much of the cable would run east-west) to China - and Russia is clear.

At the same time Russia is also involved with placing undersea cables along the NSR, for the express purpose of connecting-up the "new" Eurasia. In terms of broader "community de-coupling" potential, Staalesen

(2016, pp.1-2) reports on the Russian Minister of Transport's announcement about a new integrated information system for the Russian Arctic, that concentrates on access to navigation and security information systems. He states that such a system offers *independence from foreign* systems and will also include the introduction of a fleet of UAVs in the region with special centres set up too, for the handling of all this data.

"The new integrated United Protected Information and Communications System will be based on fibre-optic, radio, and satellite technology, including the GLONASS, Gonets, Luch, Inmarsat and more".

As Newman (2019, pp.1-2) suggests, what we are experiencing is a kind of Cold War where the *"global networks that were supposed to tie countries together have become a distributed and complex battlefield".* He goes on to comment that, *"global networks could be weaponised"*. In terms of Unrestricted Warfare's aim and objectives there is a large element of truth in both statements.

As a first *technical step* in any such Sino-Russian de-coupling strategy, Sino-Russian technology research and development, and commercial and strategic applications may well be steadily separated out from established western-owned and operated technology Research and Development, systems, legislation, institutionalization, and control. Lee-Makiyama (2019, p.2) goes further with this thinking and suggests that:

"…. the case of 5G is different and unlikely to be a part of such an accord. It is not the typical run-of-the-mill protectionism as the US does not even have any manufacturers to protect. Instead, the U.S. and China's telecom standards may even diverge further, to the point where telecom equipment may no longer be interoperable".

Substitution is one interim policy that is being used today (the case of alternative Chinese and Russian GPS systems, for instance) which hints at (eventual) de-coupling - whilst further indigenous and joint capability is being built: Russia's development of various LNG technologies noted earlier in the Gas/LNG section ("Arctic Cascade" and the Gravity-Based Structure system); the application of UW is another useful time-buying strategy as well. Both represent /augment research incubation, technology substitution and the regulation and institutionalization of dual-use technologies. Phase Two's TIP initiative is I suggest, in fact a Sino-Russian foundation stone of that aim of *having the option* to introduce technological independence from the west. Bendett and Kania (2019, p. 16), reinforce this sentiment by saying that:

"China and Russia are seeking to develop and demonstrate the dividends from a new model for scientific cooperation that relies less and less on foreign, and especially American expertise and technology, instead seeking independence in innovation and pursing developments that may have strategic implications".

The Phase Two Techno-Belt and Road Initiative and Governance Aspect

The more subtle endpoint of Phase Two's emphasis on technology integration and networked systems - when linked with its institutionalized Research and Development and international regulation (in China's favour), is the subsequent facilitation of *economic governance*. Within a Sino-Russian geo-economics framework such an ambition should not be surprising to observers. For China in the Arctic for instance, the fruits of decades of intellectual theft of western technology, and the institutionalization of science and technology – coordinated most recently by the T&IP initiative, is now combining with the CPC's own geo-economic project – the Polar Silk Road investment, an Arctic sub-set of Belt and

Road Initiative. This is building strategic techno-infrastructure (e.g., 5G, undersea optic fibre cables, and navigation aids along the NSR), along with its funding role in Russia's/Novatek's LNG project in the Arctic.

This is perhaps unsurprising; as Sino-Russian technological programmes move toward more sophisticated networked and integrated technological developments - because of T&IP efforts, so too will there be a commensurate effect on Arctic governance and politics as well. It is paradoxically in the Arctic, where China is the minor player (in comparison to the U.S. and Russia, as Arctic powers), that this potential for technology facilitated Belt and Road Initiative governance is occurring most visibly.

During an interview conducted on 18th May 2018, Associate Professor Zhao Long, of the Shanghai Institutes for Global Governance Studies, stated that an additional part of the thinking driving Chinese science diplomacy in the European Arctic, was that of a new governance system emerging, prompted by the impact of environmental processes, which China predicts will alter economic, political, and cultural life in the region.

The fact that Belt and Road Initiative was hinted at by Zhao Long as being that new *political* governance vehicle in the Arctic (replacing the Arctic Council) has its own logic; as Khanna (2016, p.18) states:

"…when we map functional geography - transportation routes, energy grids, forward operating bases, financial networks, and internet servers – we are also mapping the pathways by which power is projected and leverage exercised".

Belt and Road Initiative is involved in every one of the industries/applied technologies (functions) mentioned here by Khanna in this Russian/Pacific Arctic context. For instance, the NSR is a functioning maritime pathway/route geographically linking Eurasia; it therefore acts as

a backbone transportation structure for China, allowing it to project economic/trade and political power into the Pacific Arctic and European Arctic whilst simultaneously gaining security of (energy) supply leverage from projects such as Novatek's LNG, facilitating deliveries of gas/LNG to China/North East Asia.

Furthermore these Asian/Sino-Russian/Chinese inter-connected Global Value Chain highways (physical and virtual) are *not based* on control over sovereign, territorial spaces, beloved of western governments, but instead on functional concepts such as technology-enhanced continental-linking, and logistic and supply chains connecting regions, as these are the emerging the 21st Century pathways of political power; as Khanna remarks (2016, p.33) *"…future conflicts will no longer be about laying down more borders but instead about controlling connections".* The Sino-Russian Gas chapter's contribution neatly illustrates every one of these points.

It is technology's ability for instance, to provide safety and security for Russian gas /LNG operations in the Pacific Arctic and along the NSR, via SAR, Oil Field Response, Satnav, escort services (ice breakers), and Communications technologies, that facilitates such connectivity and linkage, leading to the emergence of economic growth and the subsequent creation of an autonomous, economically powerful, Sino-Russian sponsored region such as the Pacific Arctic.

In the Pacific Arctic, the Belt and Road Initiative-supported techno-governance of the NSR (including its effect on UNCLOS rulings, for instance) delivers an alternative global trade route to China. The prize for Novatek for instance is economic, but the gain is geopolitical - for both the supplier (security of demand) and the LNG consumers in the Pacific Arctic (security of the gas marketplace) and the power that commands.

For these reasons it is not surprising that China considers Belt and Road Initiative in the Arctic context not just an economic governance tool, but as a potential governance agency in its own right - as well. This fits with my argument that the formation of the Pacific Arctic (applying my Polycentric Regionalism concept), as part of a possible alternative world order framework is somewhat experimental for both Putin and Xi.

It is certainly so in the case of the Russian "owned" and Chinese, Belt and Road Initiative-financed NSR for instance. This pathway is in effect already de-coupling from U.S. *influence* (and its Navy), and the UNCLOS framework. This is testament to the criticality of technology's role in the geo-economics of the NSR (i.e., its *future monetization)*. The Arctic is identified by Putin as a crucial economic region of the Russian Federation in the 21st Century. It is a region high on his agenda for applying tech' that can overcome the challenges of weather/climate, economic isolation from urban metropolises, the huge space and time issues (distances) involved, and hitherto failed regionalization policies that negated economic growth on Russia's enormous northern continental periphery. With the NSR under the new political geography of Eurasia, and the TIP representing a technology Research and Development pipeline, the Arctic is now of supreme importance in that it links these two regions; and by strategically exploiting technologies it could make the Russian Federation a swing political player in Eurasia, partly via the use of the NSR.

Whether this commercial type of thinking will lead to just a technical de-coupling of the NSR from western influence/use, or morph into a regionally defined, geo-economically oriented Sino-Russian geostrategic alliance, underpinned by techno-superiority and attendant governance, is too early to say. However, the Belt and Road Initiative example in the Arctic region shows the lesson learnt by China and Russia in the Arctic/ Pacific Arctic:

the crucial geostrategic impact of networked technology on regional economics and political governance. This is what in my opinion China and Russia are prioritising, and to some experimenting within the Pacific Arctic region, and in the Space domain of the Eurasian Arctic.

Diplomacy in Phase Two

In line with this approach toward the Arctic, China uses scientific diplomacy assiduously and intelligently to gain credibility and influence in the region with neighbouring Arctic nations. The Belt and Road Initiative in the Arctic is seen by China as a major (dual-use) techno-infrastructure component of this science/techno-diplomacy. Scientific diplomacy is unashamedly a part of China's UW's inventory as well and part of the overall geo-economic strategy ("win-win"). This includes diplomatic policy strategies, discussions, and the associated decision-making processes in both the Sino-Russian, and Sino/Russian-U.S. relationships. It is unsurprising that this methodology is deployed by China, as technology is also at the heart of the Arctic Council's science diplomacy too, as has been pointed out by at least one commentator (Bertelsen, 2020).

In line with the Arctic Council's own scientific diplomacy, Su and Meyer (2018, pp.24-25) cite this parallel use of scientific/techno-diplomacy by China by noting an Arctic-based Aurora Observatory built recently by China and Iceland, and research work carried out by China, Denmark, and Greenland examining new technologies for ice-core drilling. I cite these examples however, because they capture two fundamental Chinese interests in the Arctic; one technology probing above the Arctic into Space with a possible geo-strategic purpose, and the other drilling below the Arctic into the earth's core, with a probable commercial purpose. Diplomatically, these are both successful endeavours undertaken with important Arctic Council states. They have tangible, mutual benefits,

which illustrate how China sees collaborative science and technology as a useful diplomatic and cooperative tool to gain Arctic knowledge; thus, furthering its credibility in the Arctic Council, its geo-economic positioning in the region, and a means to achieve its political aim; increasing influence over Arctic governance – with time.

Summary of Phase Two – Transition to Phase Three

Western fears are that global governance, politics, and leadership will be further transformed by the nation(s) which can harness dual-application technology most efficiently and comprehensively, in pursuit of global wealth *and* geostrategic advantage. An example used of dual-use technology is 5G; as Medin and Louie (2019, p.2) note, China's 5G will *"change the standard of public and private sector operations, from autonomous vehicles to smart cities, virtual reality, and battle networks".*

In the military sphere, Medin and Louie (2019, p.23) go on to say that in the U.S. context commercial usage of 5G:

"…dwarfs that of DoD, and it is no longer practical for DoD to build and operate on siloed, bespoke systems and architecture. As a result, DoD is increasingly dependent on commercial off-the-shelf (COTS) equipment and commercial services, and the same will hold true for the future 5G ecosystem".

This cost, military *dependence on commercial* systems, and the duality of technologies – and their myriad effects, has national security implications for the U.S. regarding its relations with the People's Republic of China and the Russian Federation especially in the European Arctic and Pacific Arctic. The critical benefit to the Sino-Russian relationship for instance, of dual purpose Belt and Road Initiative, institutionalized science/technology research, and a regulated technology pipeline supporting economic

technology integration, as seen in Phase Two, is expanding *strategic choice*, especially in the Arctic.

In Phase Two I have shown how technology will demand institutional changes – which will in turn perhaps impact governance in the Arctic in the 21st Century (in this case via Belt and Road Initiative acting as a governance agency). This is both extremely significant and worrying for the U.S. and other western governments, as Sino-Russian technology institutionalization and the establishment of an alternative and /or additional technology ecosystem, defies a hitherto accepted truism that authoritarianism is incompatible with innovation. Zhu (2014) argues however that vertical administrative centralization and fiscal decentralization - combined with local personnel competition, has led to signs of *increasing* innovation in China. Whilst this alone is insufficient evidence of institutional change, it is, along with the strategic, step-change in investment and political sponsorship seen in the 2019 Sino-Russian Technology and Innovation Partnership, a very necessary first step toward the institutionalization of technology and innovation policy in China, and Russia too.

Despite the limitations on science/technology innovation known to occur under authoritarian regimes, the (inevitable) more prominent and institutionalized technology position for China will lead to attempts to determine international technology industry standards and regulations (across Eurasia initially). I have already alluded to one such potential example of an (authoritarian-determined) economic/political governance mechanism – a Gas OPEC; determining international gas/LNG regulation, and the facilitation of economic (and political) linkages between gas-rich MENA countries, Russia's Arctic gas reserves, and LNG markets in the Pacific Arctic region(s).

This T&IP strategy fits into the Sino-Russian geo-economic framework which is vitally dependent on the acquisition and implementation of technology and innovation to maintain global, economic, competitiveness with the U.S. At this regional level of analysis, the creation of the Pacific Arctic by means of the Gas/LNG industry, which is geo-economically significant, superbly physically linked - infrastructure-wise, and technologically networked, is critical. If successful in establishing a major North East Asian gas /LNG trading hub in the Pacific Arctic in Phase Two, this could materially support and accelerate the process of an initial China/Sino-Russian de-coupling, at a regional level.

This is an important phase for China regarding not only the technology Research and Development partnership and its service and product outputs, but its economic and political implications for China in Eurasia and the Arctic - with or without Russia. The T&IP gives China access to first order research and capability in Russian STEM subject matter and facilities. This is crucial as STEM is the underpinning of all technologies - and for other purposes such as military and Space activities. Secondly Sino-Russian commercial agreements (5G infrastructure, Russian OS system in Chinese mobile networks, shared alternative GPS system, etc), in essence opens up the economic markets for China across Eurasia and in the Arctic; both now assigned as two of the three key political geographies in the 21st Century by the U.S. As rehearsed elsewhere, technology is the key factor in creating the 21st Century services sector, the source of future global GDP. T&IP has a small but significant role in indirectly assisting in capturing that sector of the global economy. In strategic terms, with a techno-enabled service sector within reach of China, the ability to decouple at least technically from the west is increasingly possible; to do so politically as well is now imaginable.

With this techno-framework in place and the increasing ability to de-couple technically from the west, applying some UW means, Beijing may then be seen as no longer just as an economic competitor to the U.S. – but as a rising geopolitical alternative to the western neo-liberal order. The geostrategic significance of the NSR for instance, as an emerging global maritime *trade route* spanning Eurasia and the Arctic decoupling from the west, is a sobering thought for Washington and the west.

For Russia, this phase and the T&I partnership represents at this stage, an opportunity to monetize its Arctic gas industry, (LNG technology) gain access to Chinese technologies and their developments (both commercial and otherwise), and further its asymmetric strategy regarding Chinese economic power in North East Asia, as discussed in the Sino-Russian Gas chapter. Clearly the evolving role of the Belt and Road Initiative in the Arctic (in relation to say, NSR infrastructure) in terms of the People's Republic of China governance is a worry to Russia, but alternatively the T&IP also serves as a Confidence Building Measure, and trust-testing mechanism. Technological advantages in terms of savings in time and space, connectivity, and physical linkage across Eurasia/the Arctic, also strengthens Putin's technical ability to be a "swing" player across Eurasia. Lastly, the sale of high technology weapons (eg S-400 air defence system) to China, has served to maintain national revenues, and consolidate Sino-Russian relations and confirm by doing so a common Sino-Russian view about the role of the US in the region(s). The fact that much of this Sino-Russian technology is tested and deployed in Russia, and in the Arctic where Russia is strategically strongest (and most confident), is also a key factor in Russia's continued technology partnership with China.

Phase Three

Technology, Space and Geostrategic Capability

In this Phase Three, the emphasis on TIP's strategic Research and Development and its implications, as well as its Space focus, illustrates scientific technological cooperation at the highest geostrategic level. A national Space programme with dual civilian/military uses is telling about the implied level of Sino-Russian trust, and their growing scientific collaboration. Space exploration is one of the most technology-advanced undertakings known to mankind and China has clearly made great bounds in harnessing this capability and is consequently catching up with U.S. Space technology. Of note too is that the China space programme although civilian in purpose, is run by the Chinese military which suggests that the programme has dual purposes in space.

The key aspect of Phase Three's focus on geostrategic and Space *parity/ascendency* in the Arctic, is that such activities - *de facto* elevate China's status to that of a Space superpower - and therefore a direct technological and geostrategic rival to the U.S. It is not lost on Beijing that a characteristic of superpower status is being the global leader in technology, exemplified most of all by its association with geostrategic capabilities in Space and Cyberspace. This technology-led Space scenario in conjunction with Russia, aims at technological superiority, which places the partnership in a position to challenge the present (western) *governance model* in Space and of course in the Arctic where much Space-associated connectivity is based.

In Phase Three, both China and Russia's incursion into the Arctic's space and near space, includes experimenting now with dual-use satellite systems for NSR navigation, and 5G infrastructure for instance, but also

work on geospatial, military (e.g., anti-satellite) and Space communications capabilities. These factors are critical in cyberwarfare. As described, their potency and robustness (including resilience) are now a clear TIP priority. As Byers (2019, p,8) comments:

"In space, hundreds of satellites support military communications, surveillance, situational awareness and targeting. F-35 jets and armed drones cannot operate to their full capabilities without space-based broadband. GPS was developed for military purposes and is a key component of precision-guided missiles and bombs".

But today, China's own Bediou and Russia's GLONASS (GPS) systems are already up and running in Space, as is China's 5G infrastructure (that facilitates broadband connectivity); all operating independently of the west's established GPS. As Byers observes, in and until recently, since the Cold War era, Space was a region for cooperation /discussion between the superpowers; now it is most definitely an arena for geostrategic competition in terms of a reinvigorated global Space race, to determine territorial ownership and thus control of earth from space; but as Reilly (2019) comments, *"it is technology that is the crucial link between space and mankind on Earth".*

Unsurprisingly therefore, the growing competition between great powers in the Arctic, is also increasingly about the region's economic/digitization advantages; for instance, the pole's high latitude position facilitates superb connectivity with low-orbital polar satellites, for commercial, scientific, and increasingly, strategic reasons. This is directly connected to the critical issue of data transference latency, and is inevitably turning the Arctic into a strategic, *regional sphere of interest* for the superpowers, and its Arctic-based great powers. This echoes the

development of the Pacific Arctic with its possible (inter-)regional gas trading hub that will make the Pacific Arctic a significant, Sino-Russian regional economic sphere of *global energy* interest as well.

In sum, both Sino-Russian oil and gas and technology initiatives are powerful geo-economic tools, and potential governance and technology platforms, as well as critical industrial prosecutors of multiregionalism, throughout the Eurasian Arctic. Nowhere else is the full geo-strategic significance of Belt and Road Initiative as a technology-platform for Space activities, more obvious than in the Arctic region. Phase Three is the Sino-Russian research and operationalization phase of TIP, that is the precursor of a move towards instrumentalizing technology for Space activities, alongside a concurrent attempt to dominate Cyberspace - and thus the possible governance of this "public" space too. Because of the physical and virtual connectivity with the Arctic region for both these aspirations, the region will *de facto* become an arena of superpower competition in the 21st Century.

Today there are now geo-strategic tensions arising because of the growing linkage between the high-latitude Arctic, Space, and technology. These include the established disposition of Ballistic Missile Defence systems located in Space - and connected to the Arctic region (location of numerous land-based radar/navigation/ satellite communications stations), and newly emerging Space-based technologies, involved in and controlling *cyberspace*, the new and rapidly weaponizing instrument of the 21st Century superpower rivalry – and status. Space technology here (as opposed to LNG in the Pacific Arctic) is the primary Sino-Russian geo-economic means deployed to achieve a geopolitical aim; the geo-strategic governance of the Eurasian

Arctic and with it, a concomitant diminution in U.S. global power *and leadership status*.

A Sino-Russian view of a cancelled western technology transfer policy against China/Russia, and (subsequent) increased Sino-Russian indigenous technology capability, is seen in the form of public statements from senior military and policy officials in the U.S. government. In fact it is the U.S. military (O'Shaughnessy, 2020), which has been most forceful in the naval and military context of the Arctic, Space, and Sino-Russian Phase Three developments (including TIP's strategic Research and Development role), suggesting to the Senate Armed Forces Committee, that the North American Aerospace Defence Command (NORAD), and the Sound Surveillance System (SOSUS) covering the Iceland/Greenland-UK gap, are now considered either *operationally insufficient or even redundant*.

Furthermore, in a 2019 interview I conducted in Cambridge with a senior intelligence officer in the U.S. European Command structure, he also acknowledged that in the Arctic's Military-Space domain, U.S. global governance (its geostrategic and superpower status) is already undermined by Sino-Russian technologically underpinned and developed, military Space systems. Nilsen (2020, p.3) draws attention to two Russian satellites for instance, COSMOS 2542 and 2543, that the U.S. suggest have *"exhibited characteristics of a space weapon"*. The U.S. interviewee specifically drew attention to the ineffectiveness now of U.S. anti-satellite weapons systems against the latest Russian satellite platforms. MacKinnon (2020, p.2), a former special assistant for policy and communications at the Pentagon during the George. W. Bush administration recently confirmed this view when he stated in a journal

that, *“China’s space program already has the capability to take out our satellites if needed”.*

In relation to this technological Sino-Russian capability, at a 2019 Canadian Embassy Arctic briefing in London, comprised of NATO guests to which the author was invited, U.S. staff stated that the Pentagon now classifies Belt and Road Initiative as a key facilitating element of this growing Sino-Russian techno-military capability in Space - endorsing Pompeo’s civil/military fusion concerns and public comments. In this sense, I classify Space, as much as I do already the Pacific Arctic, as another experimental region, testing out an alternative Chinese/Sino-Russian techno-governance model. The former (Space), is facilitated by a techno-geostrategic leap, and the latter (the Pacific Arctic), a techno-economic step. The U.S. reaction to Phase Three military techno-developments is the reason I suggest that China and Russia – having crossed this *geostrategic/Space Rubicon* in this Phase Three, are further on their way to *feeling more confident about a de-coupling* possibility - and will then have no alternative but to soon consider/ establish an alliance – against the U.S., at least in the Arctic region.

In May 2020, the Chinese civilian space programme (Didi Tang, 2020) successfully launched an experimental rocket designed to carry a space station to the Moon with its crew. At the time, Zhou Jianping, Chief designer of China’s manned space programme publicly stated its role in this technical de-coupling strategy:

“The main goal of the space station is to turn our country into one that independently has the abilities to fly astronauts in the near-earth space, to carry out manned, near-earth scientific experiments, and to exploit space resources”.

This is a significant statement as it illustrates several themes alluded to already, including Bendett and Kania's assessment of the strategic implications of applied technology independence (my Phase One), including the ability to de-couple (at least technically, as per Phase Two) from the west. It is notable also that much of the technology for this Long March 5B rocket is Russian (Liu, 2019), and that there is a Sino-Russian *geostrategic dimension* to this Chinese Space programme which comprises much of Phase Three.

Moreover, the blurring of Sino-Russian military and commercial technological applications continues apace. The integration of Belt and Road Initiative funded infrastructure with commercial technologies (such as the proposed under-sea optic fibre linking Finland with China, via the NSR) is seen as having increasingly dual-use applications by U.S. officials; as the Sino-Russian destabilising of the western SOSUS systems in the Arctic region illustrates. As a FT article reports (Williams, 2020), quoting U.S. Secretary of State, Pompeo, a significant emerging USG concern is precisely this fusing of civil and military technologies.

Technology and Space: Implications

Technology's dual-use capability has strategic and governance applications too in the Space/cyberspace domain of the Arctic; this already has global governance and international order implications; Professor Bertelsen, a Danish Arctic expert, in an interview with the author in 2020 in Cambridge, suggested that Arctic science and technology is destabilizing the region today, because unlike issues of Ballistic Missile Defence in the Cold War era, when key relations were essentially bi-polar (between two superpowers) and the technology was relatively simple, today's issues involve Space itself and cyberspace, and are multi-agency, and the technology is highly complex - and dual use. This engenders a

fear and distrust between the principal Arctic (nuclear) powers, Russia, and the U.S., and with the arrival of China in the region -and Space, demonstrating strategic ambitions in cyberspace too, this adds to regional tensions.

In relation to this (Phase Three) growing weaponization of technology, at a cyber-resilience workshop in Finland in January 2019, sponsored by the U.S. Department of Defence and NATO (at which the author was a Co-Team Leader), the view of the American military/intelligence contingent was that both Russia and China were already ahead in techno-cyber applications in the Arctic region. This was seen as a serious and myriad threat to sustainable techno-infrastructure in the Arctic in the following three ways: The methodology by which Arctic resilience is validated (need for adaptation of present methodologies employed); the lack of data back-up in the harsh Arctic environment (a key contingency against a cyber-attack); and the significant knowledge gap vis-à-vis Sino-Russian techno-cyber capability and capacity, in terms of sustainable engineering, resilient infrastructure, and risk/resilience-based security assessments.

Lee-Makiyama (2019, p.1), suggests that at a broader level of international relations too, U/W including cyber, is most certainly in action and he stresses the economic disruption aspect of technological capabilities, like cyber:

"..cyber operations are now relatively common strategic instruments deployed by world powers. But in the age of economic statecraft, where commercial interests are at the heart of foreign policy objectives, cyber operations are also a potent tool for industrial policy".

In fact, Bertelsen surmises that unless Arctic science and technology is carefully governed, regulated, and institutionalized soon, it may well

destabilise international security and specifically, strategic stability and Space security. In this sense whilst technology is a critical multi-regionalism instrument for China and Russia in the Arctic, its dual-nature, and the universality of its ownership – and applications in Space, can lead to a lack of stability and predictability in the region; two critical factors required for successful Polycentric Regionalism to flourish. The fact that the Polar Silk Road fund is a significant part of the Novatek LNG operation, with infrastructure and customer networks across the entire Russian Arctic from Murmansk to Kamchatka- it is also a potential technology platform - and an economic governance instrument too. This too heralds a feeling of change underway in the regional order.

An alternative view, of the likes of Bekkevold and Lo (2019), is that Arctic geography mitigates emerging great power conflict in the region; I argue that in fact technology's ability to now *transcend* time and space, and environmental obstacles, *and* link non-contiguous regions virtually, in and beyond the Arctic region, means that this theory is no longer necessarily true. This may therefore mean that superpower competition, if not conflict, in my opinion will occur in the Arctic region in the 21st Century. Paradoxically it is China, the one non-Arctic located superpower that is investing most heavily in regional technology infrastructure, and Space-oriented, dual use applications. China perhaps most of all understands the full implications of the fact that Technology provides the key to this Arctic scenario; *Space domain awareness* – which is coordinated and controlled by satellite systems, many in low and rapid orbits.

The broader geo-economic context of this is that the global competition for dual-use technology "ownership" in the Arctic, also heralds strategic connectivity and physical infrastructural linkage across Eurasia on land, sea, and now in Space too: The prize being the operation of – and more

importantly the geo-economic *use of,* alternative pathways of trade and power, leading to an inevitable recalibrated form of Space, and an alteration in the nature of its governance.

Possible Alliance Developing in Phase Three?

The reason that a Sino-Russian alliance may become unavoidable in Phase Three I argue is because with Chinese /Sino-Russian techno-economic governance gained in Phase Two (via Belt and Road Initiative and its role with Sino-Russian Gas and NSR aspects in the Pacific Arctic), the U.S. will be determined that such governance is not further developed into *geostrategic governance* of the broader Arctic and Space. This alliance would consist of a joint (but initially Russian-led) *techno-military* capability, in conjunction with the already established Chinese *techno-economic* superiority, gained in Phase Two; the latter affording China global revenues, via technology's underpinning of the global/regional service sector. My crucial point here, is that the presumption that the U.S. response to the *existential threat* posed by Phase Two will be largely economic in nature and not militarily, is in fact an assumption but by no means a certainty.

Concrete evidence, of at the very least – a fledgling Sino-Russian techno-driven alliance in the Arctic region includes: Putin's recent offer to militarily assist China in developing its own ballistic missile defence system, and commercially; China's integration of 5G with Russia's mobile (Megafon) network; and the reciprocal replacement of a western OS system for Chinese mobile networks, with a Russian alternative. It is of note that all three capabilities are hugely technologically underpinned, dual-use, dependent on the T&IP "pipeline" - and Sino-Russian technology's commercial institutionalisation and regulation. This is entirely in line with the Phase Two de-coupling option – cradled in the geo-economic

framework. This may promote perhaps inevitably a subsequent challenge to established political governance (in Phase Three), possibly in the Arctic region where geostrategic concerns at sea, land, and now in Space are coalescing, and where Russia is strongest.

I assert too, that these three joint Sino-Russian technology developments alone, strongly support three broad conclusions: non-alliance partners do not share vital national security technologies/know-how; those nations that do, clearly are by definition, in an alliance against a third party (as per NATO in Soviet times); and thirdly, the significance of such geo-strategic/geo-economic cooperation and associated scientific collaboration reinforced by this T&I Partnership, is *at the very least,* a strategic Sino-Russian Confidence Building Measure that is directly addressing the acknowledged issue of historical (mis)-trust; the primary impediment to any potential Sino-Russian alliance.

What is also obvious already from the Sino-Russian T&IP is the degree of connectivity-integration that it actively promotes, finances and researches: as Bendett and Kania have observed (2019, p.5) regarding the geopolitical implications of this partnership, *"this technological cooperation has extended into joint exercises, including joint air patrols and naval drills"*, as seen in the Far East with joint bomber patrols (Wisniewski, 2019) in the Sea of Japan, and Russia's major joint naval exercises, (Paul, 2019), such as Vostok 2018. The T&IP also questions the western assertion that authoritarian systems are not innovative and creative regarding technological endeavour and advancement, and on the contrary opens the possibility that Sino-Russian technology ownership may very well also assume the role of a governance agency in the 21st Century, with Belt and Road Initiative assuming that role in the Arctic region, for instance.

To summarise the alliance scenario: China and Russia appear to see *usable* global power in terms of techno-economic superiority in the 21st Century but realize that the US's belated response to this perceived economics based, existential threat, is more likely to be military in nature - as this is where the US still maintains military techno-superiority (as opposed to the techno-economic domain). In this sense, a second inflection point – the formation of a Sino-Russian strategic alliance in Phase Three, to achieve *techno-military parity or specific techno-superiority in the Arctic's Space domain*, makes sense to Moscow and Beijing as a way of *defending* the economic progress/benefits made in Phase Two, whilst simultaneously convincing the U.S. that Sino-Russian inroads are being made into destabilising its Arctic-based Ballistic Missile Defence capability, and positioning themselves as a global cyberwarfare player(s). Furthermore, Putin and Xi understand that the US' loss of its sobriquet as global technology leader (which Phase Two would warrant), is also a very public sign of the diminution of its superpower power and status.

Geo-Strategic Consequences of TIP – A Summary

I consider the role of the T&IP as part of a Sino-Russian techno-institutionalization (of science and technology) process. It is an enabler of multi-regionalism activities in both the Pacific Arctic regarding gas/LNG activities and the lynchpin of future Arctic-Space linked Sino-Russian activities and their relationship to cyberspace.

The kinds of developments (as part of the geo-economic framework), seen through this Sino-Russian techno-strategy lens, the Russian Federation's geostrategic gas/LNG deliveries from the Pacific Arctic to China and North East Asia as part of the multi-regionalism mechanism funded somewhat by Belt and Road Initiative - and the Space aspects

discussed in this chapter, can be seen as a blue-print for understanding the strategy, shape, and manifestation of techno-governance in the Arctic arena, potentially leading to a regionally-confined Sino-Russian alliance.

The very strategic gas/LNG industry's technology-enhanced ability to create, connect and link regions such as the Pacific Arctic (*and its link to Space-based activities such as NSR navigation satellite*), as per my Polycentric Regionalism theory, I believe, is by definition experimental - testing for instance: Sino-Russian trust; their geo-economic strategy including the dual use of the Belt and Road Initiative; and the *application of technology to affect a change in governance at a regional level* of engagement - in specifically chosen and circumscribed parts of the world - the Pacific Arctic and latterly, Space.

Much of China's technology know-how is derived from shared Russian STEM knowledge, Research and Development, and scientific infrastructure - the backbone for subsequent Chinese technological innovation, design, and development (and the raison d'etre of the T&IP). But as this techno-scientific collaboration between Russia and China is now being projected onto a profoundly strategic level in Phase Three - as Bendett and Kania (2019, p.5) note, it is probable that the option to (somewhat) economically de-couple from the west, and the subsequent move towards techno-military developments in Space especially, may provide the impetus and/or *necessity* to transform the (now de-coupled) strategic partnership between China and Russia into an alliance, in Phase Three.

The challenge however is the following for China and Russia: An alliance will demand that the technology-enabled economic governance capability (a la the Arctic Belt and Road Initiative model achieved in Phase Two), be matched in Phase Three with *political governance* too. But that transition

can only be achieved by having to match or better, U.S. *techno-geostrategic* and military capability in Phase Three. Here lies the rub for China and Russia; the danger of a decisive geostrategic response from the U.S. at this very vulnerable, transitional juncture of techno-development from Phase Two to Three.

Overall, the inference of a Sino-Russian techno-strategy is becoming clear; a steady progression in Phase One, from technological inferiority to techno-manufacturing parity with the U.S./west, leading to, in Phase Two, economic techno-economic superiority. This advance in Phase Two is being partly facilitated by the Sino-Russian institutionalization of STEM and Technology and Innovation by both governments, (and where T&IP plays its vital institutionalization part), and the attempted international regulation of the commercial technology industry, primarily by China.

At a regional level, in the Arctic/Pacific Arctic setting, this is then aided by the Polar Silk Road fund acting as both an infrastructure vehicle for technology distribution and *de facto* then, an agent/platform of economic governance in the region. This is essentially where we are today. In this phase many individual technologies now become networked (5G), integrated (GPS), and coordinated; a reflection of their future (other) role in more strategic, economic-political applications including Space/cyberspace operations in Phase Three. This technology instrument of geo-economics, alongside Belt and Road Initiative funding/platforming is a possible Chinese experiment in regional governance (thus the emphasis on/need for networked and integrated technologies in the T&IP), that may provide insights and possibly a roadmap of further Chinese/Sino-Russian global and institutional order ambitions. The Chinese Phase Two “bridgehead” was/is the Arctic Gas/LNG play and especially the use of the NSR, the deployment of Belt

and Road Initiative into the region, and the acceleration of scientific cooperation amongst Arctic states. However, I argue, this is just a most welcome entre and precursor of Phase Three Arctic ambitions, which includes regional governance, technology-led Space activities, and the exploitation of Cyberwarfare; this is part of a “soft” Unrestricted Warfare doctrine, conducted for geostrategic reasons.

The T&IP and Sino-Russian Consequences and Implications

A major consequence of the Sino-Russian techno-economic relationship apparent in Phase Two is Strategic choice - which also undermines western sanctions. For example, Novatek’s LNG project’s technological operation (a highly technical endeavour, using state of the art technologies from pipeline flow rates, to accounting systems, and metering, etc) enormously improves its monetization and global competitiveness. The project (exploiting the Techno-NSR) *can supply both western Europe (EU) and/or China/Asia*. That *choice* of destination in Eurasia now gives Putin international gas competitiveness, and *strategic leverage* over Brussels and to some extent China, when next negotiating gas deliveries to Europe and Asia.

The lessening effectiveness of energy sanctions on Russia - as a result of this technology-enabled strategic choice, is highlighted by the breaching of specific-to-industry technology sanctions by countries such as France and Germany, regarding their substitution (Tokarev, 2017) of U.S. technical support for Novatek’s LNG project in Yamal. Similarly, regarding the U.S./China trade war, the likes of Google have demanded the USG reverse its restrictions on their use of China’s 5G infrastructure, according to Zhang (2019, p.1). Thirdly this enhanced Sino-Russian decision-making capacity, based largely on techno-economics’ centrality in modern economics/International Political Economy (via Big Data

analysis with excellent latency) is in fact making the - at least virtual isolation and “containment” of both countries by the west harder, and the chances of China economically de-coupling, greater.

For Russia, the T&IP is important as it gives the country access to high technology products and services from China, an increasingly world class technology developer. The emphasis on placing several joint Research and Development facilities in the T&I partnership in the Russian Far East, and the development of some technologies for cold weather conditions is (i.e., the Arctic) as well, is critical for its economy. This is especially significant as Russia continues to endure U.S./EU sanctions, requiring it to find western technology substitutes, as discussed by Kryukov (2017). Whilst in the short term this is partly (in the gas industry) covered by European technology players, the unintended consequence of western sanctions on Russia is that it has now committed to developing its own generic technologies – with China; this was not what the European Union/US had planned.

Nonetheless, *economic* decoupling as the end point of Phase Two, will not occur I have suggested, until Sino-Russian technology and innovation - as a *geo-economic instrument*, is formally institutionalized and globally (better) regulated, and a degree of resulting *techno-economic governance* is tested and demonstrated – in a targeted region, such as the Pacific Arctic. Without these two actions in place beforehand, China is not commercially competitive in terms of the global service economy, and therefore cannot afford to decouple. That China’s Belt and Road Initiative is involved in its infrastructure build-out (including techno-navigating aspects) is not coincidental; neither is Russia’s legal approach to the international/domestic legal status (UNCLOS) of the routing of the NSR. Both aspects influence the Arctic’s economic regulation and governance.

However, having achieved parity or even superiority in the techno-econ' domain in Phase Two - and reaped the attendant economic governance benefits of techno-economics in say, the Arctic (LNG), this will still be the critical de-coupling inflection point for the People's Republic of China and the Russian Federation, but for the US as well, as it then sees Sino-Russian relations as an existential threat, with China seen as a declared geopolitical, and serious economic adversary.

The Geostrategic Impact of Phase Three in Great Power Relations

The most obvious region where both technology-derived de-coupling and a subsequent strategic alliance could form-up *unobtrusively therefore*, is in the Russian-dominated Pacific Arctic, where Belt and Road Initiative's limited techno-economic governance is gaining traction – but where it is confined to (U.S. perceived) innocuous, commercial activities (i.e., the Sino-Russian, LNG/gas projects), as outlined in the Sino-Russian Gas chapters. The Eurasian Arctic is also where there is scant U.S. economic or military capacity and capability, but where China's presence is "sponsored" by Russia and where it is strategically strongest.

Up to this point, the Sino-Russian relationship has used the geo-economic framework (including UW means and exploitation of dual use technology) to disguise its Phase Three ambition(s). Phase Three is in effect therefore as much a geo-political governance challenge to the U.S. as it is also a geostrategic techno-military threat. As such by the end of Phase Two, if successful, China will have no alternative at that point but to pursue techno-parity/superiority (Phase Three), in the geostrategic domain too; this includes the domain of space where it collaborates (technically) with the Russian Federation. Russia is most likely to support China, not the U.S. in this last phase.

Within the geo-economic strategy however - which I insist throughout this thesis is the favoured framework being adopted by the Sino-Russian relationship abroad, the techno-military incursion into the Arctic/Space by China and Russia in Phase Three is as much about undermining the U.S.' superpower status – *politically and governance-wise* (by the application of these technology instruments*)* - as it is about matching or superseding U.S. geostrategic/military hardware capability, to defeat the west in strategic areas like NORAD (Ballistic Missile Early Warning System), and SOSUS. All three of these defence systems are positioned in/around the geographical Arctic.

It is therefore likely that the Arctic is and will be - the region in which we will observe any early indications of Sino-Russian techno-strategy and the unfolding in the *future*, of its dual-use implementation, as well as econo-governance experimentation (via Belt and Road Initiative), and geostrategic activities, namely in the Space domain. Concurrently, in the Pacific Arctic specifically, the Sino-Russian Gas relationship and the role of the NSR in that, is the *present* test case that examines this assertion, illustrating Belt and Road Initiative's techno-infrastructure role in both those activities (Space/Gas-LNG) in the region.

Concurrently, the deployment of Sino-Russian's geo-economic framework including unrestricted warfare, in Phase Two and Three is critical, as it carefully negates or at best, makes America's conventional/nuclear military power less relevant and/or increasingly *inappropriate to use* in response to Phase Three, which is primarily aimed at Space and Cyberspace, and as such it potentially further undermines America's superpower status in the Arctic. At the same time however, China is developing its own hypersonic weapon (DF-17), that together with Russia's Kinzhal missile system enables Russia and China to dominate

what Goldstein (2019, p.5) refers to as conventional capabilities that “go well beyond the much-discussed “grey zone”, but rather seek to dominate in the potentially decisive middles rungs of military conflict”. The take-away here is that these techno-enhanced military capabilities are still sub-geostrategic *enough* (i.e., predominantly conventional in nature) to avoid a major U.S. military response that neither Russia nor China want at this stage – that is, before Phase Three is achieved.

This assertion refers to my earlier point about Sino-Russian use of dual-use technologies and advanced techno-weapons (e.g., hypersonic missiles) in the Arctic and in Space (anti-satellite systems, etc), to undermine - economically and politically, the U.S.’ superpower and global governance status in the region.

5. Summary of Sino-Russian Advantages of the Phased Technology Plan

Technology in its broadest sense, as part of the wider geo-economic strategy employed in the Sino-Russian relationship in the Arctic, offers some key advantages and opportunities. Essentially, technology is deployed to undermine the status of the U.S. as the superpower; Secondly, technology inherently ameliorates the debilitating effects of time and space across Eurasia and the Arctic, and thus reduces the challenge of asserting governance across these vast regions. Thirdly, adopting a governance strategy that is based on technology-endowing connectivity and linkage across these regions, is a “win-win” proposal to potential economic allies, some of which are/were previously U.S./western political allies.

The use of Belt and Road Initiative as a technology-distributor, a Sino-Russian governance mechanism and possibly a political agency as well - in the Arctic at least, combined with critical benefits of dual use

technologies for economic and Space/cyber use, further complicates an U.S. response. This buys technology Research and Development incubation time for the Sino-Russian partnership. Finally, the techno-geostrategic aspect of Sino-Russian Space activities in the Arctic region is a direct challenge to the U.S.' technology status, its hitherto military domination of Space (for geostrategic reasons) and thus de facto the U.S.' global "right to govern" the international order in the 21st Century.

I conclude from these findings and interviews that the Sino-Russian relationship can no longer be described as (just) a strategic partnership but is now displaying characteristics of an experimental and regionally confined alliance. Experimental, because it is not yet clear whether rapid technological innovation is determining the evolving rate, nature, and reality of the Sino-Russian relationship, or whether Moscow and Beijing already have an established geo-strategic plan are simply actioning it with technology-underpinned geo-economic endeavours.

What is universally clear however, is that the global technology industry needs to be regulated for it to be internationally competitive. To achieve that it will firstly require technology-developing states having a way of institutionalizing technology via Research and Development coordination, scientific innovation, funding, and market competitiveness. T&IP suggests that such a Sino-Russian technology and innovation strategy is being put in place and as far is as possible to extrapolate, it is playing a large part within the agreed Sino-Russian geo-economics framework, by providing an Research and Development facility that creates a strategic scientific/technology product *pipeline*.

Since Phase One, China and Russia have decided to further broaden, deepen, and according to Bendett and Kania (2019, p.5), formally institutionalise their joint T&I research and development. That places the

T&IP in context: It is a part of the Sino-Russian geo-economic framework that includes the concept of UW (in line with dual-use technologies), leading initially towards an economic decoupling from the west, and then a possible transition into a (regional) geo-strategic Sino-Russian alliance.

For China, technology and its applications are being rolled out via the Belt and Road Initiative/Polar Silk Road mechanism, which I argue is a key economic (not yet political), regional governance mechanism clearly operating now in the Russian Arctic / Pacific Arctic. This subtle shifting (within a Sino-Russian geo-economic framework) from a globalizing to a regionalizing approach, exemplified in the Sino-Russian gas/LNG industry relationship in the emerging Pacific Arctic region as well, is perceived by China and Russia in my opinion, as a less threatening and risky way of altering the international order; from the bottom-up and not the reverse, which would/will attract U.S. attention.

The Space/Cyberspace aspect however - hugely dependent on TIP-type outputs - is a more aggressive move by China and Russia, and a clear geo-strategic challenge to U.S. regional governance in both the Arctic and Space; hence the need for a Sino-Russian alliance *in order to be ready* for an U.S. response to such an assault on U.S. power and its global leadership status.

This is partly the purpose I believe, of the phasing mechanism; it is a mixture of buying time to incubate its scientific/technological Research and Development capability and undertaking the development of a strategic, intra-regional industry (gas/LNG), linking the Arctic with eastern Eurasia via the NSR – and which may lead to some sort of economic de-coupling. It is also a linear strategy aiming at the preparation of the techno-infrastructure build-out of Space, including Cyberspace - and with all that entails, for potential regional governance.

The phases' cumulative purpose is to alter the global order in the 21st Century, by fundamentally undermining U.S. power in three areas: Economic; technology and Space. Over the course of the three phases, the role of technology transitions in the Arctic from being a powerful geo-economic instrument, to a political, governance agency. For this reason, the concept of an alliance between China and Russia, makes overwhelming strategic sense in Phase Three, when Sino-Russian geostrategic intentions eventually crystallise. If nothing else a Sino-Russian alliance negates the dire possibility (for them) of the U.S. playing China and Russia off against each other (Zakharov, 2019), or at worst teaming up with one of them, a la Kissinger in the 70s with China and the USSR.

CHAPTER 6

CONCLUSIONS

The Research Questions introduced in the Introduction chapter were: *what is the aim of the Sino-Russian partnership in the Eurasian Arctic region(s)? Secondly, what is the mechanism of Sino-Russian cooperation in the Eurasian Arctic? I finally asked if contemporary International Relations theory can explain the Sino-Russian partnership in the Eurasian Arctic today?*

The following four paragraphs *summarise* the answers to these three central questions.

The post-cold war unipolar world order is being challenged in North East Asia not by the emergence of multilateral political institutions, but rather by what I conceptualise as a geo-economic process of Polycentric Regionalism. The rising great power ambitions (and aim) of Russia and China - with substantial economic spheres of overlapping regional interests, has led to their adoption of this geo-economic strategy to alter the present international system by creating a new, physical, and political regional "space" in North East Asia, called the Pacific Arctic, which is connected to the European Arctic, through Russia's Arctic corridor (NSR), and partly funded by China's Polar Silk Road initiative.

Through original case studies of the natural gas/LNG industry, situated in Russia's Arctic, and related Sino-Russian technology infrastructure and cyberspace developments in the region's fourth dimension – Space, I argue that the combination of the energy industry's *geo-economic* power in the Pacific Arctic - and its economic influence over global institutions / states – *coupled* with the *geostrategic* implications and regional governance benefits of technology-enhanced Sino-Russian Space efforts

coordinated and directed from the Arctic, are key determinants in facilitating the development of these “spaces” and the physical connectivity (in the Pacific Arctic), and virtual linkage aspects (in Space) of associated polycentric regionalism roll-out in – and above, the Eurasian Arctic.

By applying this multi-regional mechanism (the physical manifestation of Polycentric Regionalism theory) - generating new geo-economic and geo-strategic dynamism in these shared spaces (Space and the Arctic), Russia and China have created an initial, terrestrial region, the Pacific Arctic, as an *experimental* step in establishing a viable alternative to the economic and security order in Asia, shaped largely by the U.S. It is by this means that China and Russia can then convert the polycentric regionalism processes of creating space, promoting projects of scale and developing technology-enabled networking practices, into the crucial underpinnings of their geopolitical aim, a new regionally based international order for the 21st Century.

The creation of Polycentric Regionalism theory was an attempt to order and interpret Sino-Russian regionalization activities in the main geographical location of the Pacific Arctic that could not be adequately understood via established Regionalism / Regionalization theories. The reasons were a lack of consideration of the input from the altering International Political Economy and the impact of technology too, in the process of established regionalism theory. Secondly the absence of an adequate explanation for the appearance of powerful, scalable spaces (including Space) of networked centres, reflecting an altering definition of power in the region also undermined established Regionalism theories, as well as the emergence of regulation and governing institutions

appearing *before or concurrently* with regionalism developments - on the ground, which according to some theorists is not intellectually possible.

Polycentric Regionalism theory's critical contribution is that it revealed the centrality of geographical, technological, and economic factors in Sino-Russian geo-economic thinking (such as *virtual* connectivity not just physical) and the *form and process* by which a more *multiregional* (not multipolar) great powers' led order may emerge in North East Asia - seen initially in the creation of the Pacific Arctic, and latterly in the Sino-Russian techno-governance aspiration of the Arctic's Space domain. The use of Global Production Network analysis to examine the Sino-Russian LNG industry in Chapter Four for instance, showed how the LNG market in the Pacific Arctic was developing and taking form; it illustrated how by applying a fintech networked approach to gas/LNG trading, a regional gas hub could be created that could trade *virtually* with non-contiguous regions, via swap arrangements with other gas producing countries such as in the Middle East region; thus illustrating polycentric regionalism in action, working *beyond* the Pacific Arctic arena. This project reflected the Polycentric Regionalism processes too of firstly, new space development, which must be secondly, inherently scalable, and the formation of thirdly, associated network practices that can facilitate local manufacturing and governance, as well as virtual connectivity, which the International Political Economy now demands in Asia, especially.

The Polycentric Regionalism *outcomes* - manifested through the on-the-ground mechanism of multi-regionalism, and seen in the LNG and Technology case studies, are it seems a mixture of three principal, New World Order drivers. This is unsurprising as we are already aware that change and a transition in global power is underway but remain unsure of what any new international order will look like. However, the two case

studies suggest that a *combination* of three possible international order frameworks are emerging from observation of the Arctic arena, through the Polycentric Regionalism lens.

a). A Structural Outcome

If Polycentric Regionalism/multi-regionalism represents a structural outcome of the redistribution (and reclassification) of power - and it has little to do with multipolarity emerging from rising powers in the aftermath of unipolarity – or challenging U.S. power militarily, as per Waltzian's structural realism; then this may be suggestive of major structural changes in *regionally*-oriented/originated economic networks and diverse spatial centres of capital projects (in the Pacific Arctic and in Space/cyberspace); and which together are now morphing into strategic and economic power bases alongside new regional institutions, such as a Gas OPEC in the Pacific Arctic and the call by China and Russia for a Space Treaty to regulate, and stabilise international governance of Space and cyberspace activities.

b). A Sino-Russian Grand Strategy

On the other hand, as demonstrated by the Technology chapter's *phased progression* of the TIP's Research and Development schedule, China and Russia have no intention of "taking on" the U.S. militarily (yet), but instead are coordinating their efforts toward *regional connectivity (Space) and economic integration (the Pacific Arctic)*; by this means they may achieve internal balancing by such better economic and geostrategic coordination/structuring; that then strengthens their Greater Eurasian Project, alluded to in the Framework chapter. By this means they may tip the strategic balance with the U.S., in North East Asia /the Pacific Arctic and possibly in Space too. The former space is more suggestive of a

more limited, carefully *geographically* contained (i.e., the Pacific Arctic space) multi-regionalism outcome, whilst the latter (Space) symbolises a wish for a more assertive geostrategic result.

c). A Displacing of Globalization

Finally, of course, there is Livesey's view of partial de-globalization - because of changes in the International Political Economy (especially the effects of technology on it), and lessening therefore of global *physical* interdependence, and the subsequent emergence of major *regional* markets – via and by regionalization - sponsored by great powers like China (via Belt and Road Initiative) and Russia in their spheres of interests - the Pacific Arctic, Space, and Dongbei/Russian Far East regions. In this sense the Sino-Russian partnership's multi-regionalism is riding the wave of more global economic trends in Asia (automation, manufacturing technologies, virtual connectivity, de-globalization, etc), noted in the Power section of the Framework chapter; this may mean a strategy evolving for the financing, infrastructure support, and adaptation of regional institutions to create in the Sino-Russian case, an economically viable space for example, in the Pacific Arctic for future markets, and the subsequent morphing of nodes of redistributive *economic power into geopolitical power*. This is in other words, an Eurasian regional order based on Sino-Russian sponsored multi-regionalism, and not multipolarity. In this scenario technology also plays a governance-type role in determining the commanding heights of communications/ broadband, economic linkage, and regional connectivity (and governance) from Space for instance - for the benefit of China and Russia and their designated regions of terrestrial interests.

In sum, it is clear that Russia and China are already great powers in Eurasia and are most certainly taking advantage of the *structural*

redistribution of global power to create a type of New World Order, that is both experimental and regional in shape and *looks like* a grand strategy. Alterations in the International Political Economy, reflected in the LNG case study and in Space/cyberspace (reflecting major technological advances) clearly enhance China and Russia's great power status - and capability in the Arctic and Pacific Arctic regions. The fact that a geo-economic strategy was deliberately adopted by both countries suggest that these three New World Order models, identified in Polycentric Regionalism theory, have credibility, as the changes in the International Political Economy, technology advances, and subsequent power shifts are certainly a part of a geo-economic model, that is operating in the Pacific Arctic, and perhaps in Space too.

I conclude that there is indeed a grand Sino-Russian strategy underway, that is also attempting to benefit from a steady deglobalization trend in the eastern Asia region (resulting from a change in the International Political Economy). The Sino-Russian geo-economic strategy includes the harnessing of multi-regionalism's alternative regionalization process, to further the restructuring of the international order. This present order is now subject to change, as the basis of its power is shifting from a type of 20th Century geopolitical power - in the form of military ascendency, to a more the 21st Century geo-economic, usable type of power.

In the Framework chapter I noted that the mechanical *processes* of polycentric regionalism, were exposed by the Global Production Network analyses of the Novatek project, and the technology-driven move into Space. It is the implementation of these three Polycentric Regionalism processes which facilitates the three possible global order outcomes, reviewed above. Firstly, there is the process of creating new economic *spaces* in the Arctic region such as the Pacific Arctic region. Secondly

Polycentric Regionalism theory dictated that the spaces created were also capable of *scale*, in order to attract inward investment, potential regional partners, and allow sustainable growth that could make them independent from centralised control, and eventually lead to the creation of specific, regional institutional support. This would enhance regional governance and lead to further regionalization. Finally, the internal process by which a region could proposer was if it were sufficiently *networked* - within the region, especially from an economic and communications/transport viewpoint.

Both the Novatek LNG operation and the technology / Space case studies have illustrated exactly how these processes manifest themselves in these Sino-Russian endeavours. The Novatek project is creating the Pacific Arctic space and is of such enormous scale that it is attracting additional investment too, as noted in Chapter Four. The network practices were also revealed by the Global Production Network analysis of Novatek's operations, and this explained how polycentric regionalism was managed, in an industrial setting, that led to the geopolitical aim – the creation of the Pacific Arctic space.

The scale of Space alone is obvious however from a Polycentric Regionalism process point of view, and the Chinese determination to dominate cyberspace there, is the ultimate expression of the Polycentric Regionalism process of multi-purpose network building. This certainly supports in this domain, the Polycentric Regionalism outcome of establishing a *structural* advantage in Space by advancing polycentric regionalism into this arena, as part of an undeniable Sino-Russian grand strategy to exploit cyberspace - and the use of dual use technologies for both geo economic reasons (technology as the underpinning of the 21st Century global Services' economy), and geo-strategic advantage,

delivering potential Sino-Russian governance over a key geopolitical region of the world, in the 21st Century.

The Shape Emerging

This thesis' evidence indicates the Pacific Arctic region as a creation of and being "sponsored" by, two powerful countries with a mutual interest in both the means of creation of the region - via a joint investment in wealth-creating Arctic gas deals and their associated infrastructure/gas market development, and the judicious application of emerging regionalization instruments, leading to the eventual geostrategic outcome of their investment; a heavily technology-networked, cross-border, *regional econo-political bloc* in North East Eurasia, the Pacific Arctic. It is the product of a geo-economics strategy which itself is in line with global changes in the International Political Economy and technology innovation, as well as the rise of regionalization – the latter at the cost of increasing deglobalization.

This may begin to bring about a change in the world order as the Pacific Arctic represents in my opinion, the first example of Polycentric Regionalism in action, leading not to a multipolar global order but instead a more subtle multiregional-shaped New World Order, in the form of regional spheres of interest which are sponsored and directed by (re)emerging great powers in Eurasia including the Arctic.

Polycentric Regionalism's Governance Implications

The governance of the Arctic is being challenged in the longer-term from instruments such as China's Belt and Road Initiative which, whilst facilitating Russia's monetization of its Arctic regions, is also an economic governance instrument that may challenge the Arctic Council's institutional/regulatory role, in due course. Secondly, U.S. intelligence

already considers the Polar Silk Road fund (a sub-set of Belt and Road Initiative) in the Arctic as a technology platform for Space-based military and cyber activities that if successful, will challenge the U.S.' global position as the beating heart of leading-edge technologies. If that crucial status is questioned it will raise questions amongst U.S. allies about its global leadership and right to govern; especially in an emerging world of great power competition. As China and Russia's oft-stated aim is to alter the established international order led by the U.S., this means that this "status" point is no idle move by Moscow and Beijing in the Arctic, or in Space. It is most definitely a signal of geostrategic intent.

Strategically, technology advances are already eroding U.S. geostrategic competitiveness in space over the Arctic region, rendering early warning systems such as NORAD, practically "blind". In addition, recent Sino-Russian discussions about deploying nuclear armed Chinese Destroyers in Russia's Arctic Exclusive Economic Zone, in response to U.S. deployment of THAAD systems in North East Asian countries (bordering China), and Putin's subsequent offer to assist China in developing its own Ballistic Missile Early Warning System to be deployed in the Asian theatre, near the Bering Strait, is a geostrategic threat to the balance of nuclear power in eastern Eurasia between the U.S., the Russian Federation, and the People's Republic of China.

In conjunction with other products of the Sino-Russian TIP's research such as hypersonic weapons (e.g., Russia's Kinzhal missile), technology has now tipped the conventional balance of conventional forces too in the European Arctic, in Russia's favour. The fact that a Chinese guidance station is located in Sweden, linking it to China's military space facility on Hainan Island in the South China Sea (SCS), further emphasises technology's strategic ability to ameliorate the issue of great distances and

provide rapid, virtual, linkage and connectivity between incubating spheres of these great powers' regional interests. This move is extremely significant when combined with the *additional* role of Belt and Road Initiative as an *economic governance instrument* that institutionally sustains and links (the Arctic and Space) two geographically separate spaces/domains. This is an early indicator of how Sino-Russian tech'-assisted multi-regionalism will operate in the future, linking up great powers "sponsored" regions across time and space, both physically and virtually.

The LNG/Gas market in the regionalized Pacific Arctic will also be a contested and critical sphere of interest; as a result of established neo-liberal alliances which formerly coalesced in the region around U.S.-led globalization, may now be challenged by the great powers' switch, to the pursuit of regionalization strategies. Clearly, Sino-Russian influenced institutions and governance systems reflecting this shift (and great powers' spheres of interest(s)) will act as disrupters for many U.S. allies in North East Asia in the years to come. Already institutions like China's Asian Infrastructure Investment Bank and Belt and Road Initiative, and Russia's led Shanghai Cooperation Organization (Shanghai Cooperation Organization) and Eurasian Economic Union (EAEU are causing considerable consternation in U.S.-allied North East Asian countries as they clearly signal their involvement in growing Asian spheres of interests and de facto, the process of regionalization by which such areas are secured – and financed, and often influenced and sometimes governed. In addition, the fight for technology superiority (and its role in regionalization and multi-regionalism) in Space will include great power rivalry over its governance too: Regulation, legislation, and institutionalization will be the battlefield with China attempting to replace

western norms, values and concepts that influence such governance measures, with Chinese/Asian variants thus influencing global trade and the shape of future international relations and the global order. The outcomes for China and Russia are summarised next.

China and the Arctic

China's use of geo-economic means to enter the Arctic region is altering the nature of international relations, global competition, and the definition – and utility of power itself. This will increasingly matter, as the status of the nation state today is as much determined by the balance of *economic* power, as it was by 20th Century strategic power. China's growing theoretical ability to technologically decouple from western governance systems and financial institutions is evident from this thesis, as the TIP phasing process described in the Technology chapter, suggested.

By its strategic presence in the Novatek gas/LNG operation in Yamal and its steady encroachment into Space from Arctic territories (Nordic), China is subtly challenging the AC's governance by means of its soft diplomatic, technological, and economic power. The technology developments from within the Sino-Russian, TIP relationship, position China to enter Space too, which has both economic and geostrategic as well as governance implications, as detailed in the Technology chapter. In combination with the strategic power inherent in the Sino-Russian Gas relationship in the Pacific Arctic, this represents a regional geo-economic strategy that will enhance China's global status and solidify its geopolitical influence in the Arctic, which is itself a gateway for China to/across northern Eurasia - and ultimately into Space from the Arctic's terrestrial platform.

China's application of this geo-economic and soft power is steadily accruing pan-Arctic allies, facilitating trade via technology enhanced

means, influencing the economics of the region by investing in infrastructure (such as the NSR and ice-breaker ports as described in Chapter Four), and encouraging the process of regionalization of the Pacific Arctic. In effect China as a great power is carving out the Arctic and more carefully, Space, as regional spheres of geo-economic and geo strategic interests. Chinese immediate goals include access to the NSR, disruption of the geo-strategic balance in the region (vis-a-vis the West), future trans-Arctic trade opportunities, access to Arctic natural resources, and the *integration* of the Pacific Arctic region with geostrategic interests (Space) in the broader region, as rehearsed in both the Technology and Framework chapters. Instruments such as its Polar Silk Road fund act as quasi-governance instruments in the region too, questioning the *exclusive* governing of the region by the AC, and by doing so undermining western/U.S. leadership status.

Russia in the European and Pacific Arctic

Russia shares with China a geo-economic framework in the Arctic as Putin states that the Arctic is Russia's priority economic focus. The High North "Bastion" naval concept, its upgrading of Space activities and its technologically enhanced conventional capability in the region, partly attributed to the Sino-Russian TIP partnership, are all coordinated in support of this emerging Arctic economy. All three of Russia's foreign policy objectives, aimed at building the Russian Federation as a modern global and regional great power, are displayed in the Energy/Arctic scenario: energy as political instrument; technology modernization leading to a more broad-based economy; and integration of the post-Soviet space, which includes the Pacific Arctic in North East Asia and more latterly, Space itself and the cyberspace domain.

Russia supports the governance role of the AC, its founding mandates, scientific Research and Development, and UNCLOS, which in combination determine the Arctic's governance. Putin's concept is to position Russia as the crucial, interlocutor in the Arctic, spanning Eurasia and connecting the European Union (western Eurasia) with Asia (China). Control of the Arctic and NSR is therefore vital to this process, and for the Russian Federation monetization of the European and Pacific Arctic. To this end the Yamal LNG project is as important to Putin for raising international LNG sales revenues is it is for using such revenues to maintain and improve the efficiency of the NSR, for the reasons given above.

In addition, projects such as Novatek LNG, gift Russia geostrategic leverage over North East Asian/Chinese manufacturing ability, via its massive (power-generating) LNG deliveries. This exemplifies Luttwak's point from the Framework chapter, about geo-economic instruments, usually having a geopolitical outcome or aim.

The Russian strategy however necessitates an asymmetric economic approach to China in which Western allies in Asia (the Republic of Korea/Japan) are cultivated as Russian LNG customers, in order to check China's goal of *total* economic dominance and thus prevent it from converting this dominance into political power in Eurasia including the Pacific Arctic. From the analysis of the Sino-Russian LNG project in Chapter Four, Russian asymmetric (quid pro quo) positioning with China is easy to discern: firstly the People's Republic of China gains access to the NSR in exchange for Belt and Road Initiative support of the Russian Federation's Arctic infrastructure (e.g. the NSR); the People's Republic of China investment in Arctic gas & LNG is in exchange for the Russian Federation's "sponsorship" of China in the European Arctic, as also seen

in Chapter Four; the Russian Federation's LNG is sent to the People's Republic of China, but it is also supplied to South Korea & Japan as well; and lastly in terms of the TIP relationship, the Russian Federation's STEM input into TIP project is in exchange for the Russian Federation access to the People's Republic of China technology and financing of future *commercial* applications and systems. The relationship is of course largely asymmetrical, but as joint economic projects (acting as Confidence Building Measures) in the Pacific Arctic's hinterland have imbued mutual trust in the Sino-Russian relationship, so the policy and the Sino-Russian geo-economic-oriented partnership is becoming more strategic, and the emergence of joint Space/cyber activities – of extreme national security importance, illustrates a deepening in mutual trust and a concomitant progression to far more sensitive cooperation in the Arctic and in Space in particular. The progression appears to be from one of initial geo-economic cooperation (in the Pacific Arctic), to one of geo-strategic partnership – in Space/cyberspace.

The Sino Russian Partnership in the Pacific Arctic and Space

Russia and China share a vision of the 21st Century global governance which is not anti-U.S. *per se,* but rather, opposed to the Unipolar system, which centres around the U.S. and which it directs. The establishment of the Pacific Arctic is an experimental prototype of a future Sino-Russian multi-regionalism order that may challenge that arrangement; an alternative global governance framework that is deliberately neither multipolar nor top-down directed, partly for fear of crossing an unseen U.S. "tolerance" threshold.

The use of technology's linkage and connectivity characteristics are paramount in this framework, in order that *dis-contiguous regions may be virtually* as well as physically aggregated (by the Russian Federation/the

People's Republic of China), thus facilitating *future* multi-regionalism *beyond* the Pacific Arctic. This is a critical characteristic of Polycentric Regionalism theory in that it recognizes that technology facilitates virtual connectivity - and thus the viability of multi-regionalism as a future international governance mechanism. The example given in Chapter Four, was the formation of an LNG trading hub in the Pacific Arctic which would have the technological capability to conduct *virtual swap arrangements* with other LNG-producing countries in non-Pacific Arctic regions, such as the Middle East. So, whilst this appears to be a form of globalization occurring, it is in fact a very sophisticated form of multi-regionalism in action as the physical Global Value Chains /logistical connections involved in it are made somewhat redundant, and those it replaces are "virtually" shortened, and re-oriented, not just by traditional market forces as Globalization theory would predict, but by techno-assisted Sino-Russian determinism. This was noted in Chapter Four when Global Production Network analysis revealed that it was the altering International Political Economy structure and resultant organizational and materiality changes in Novatek, reflected in their new LNG trading practices, that determined the *shape and scale* of the LNG new market in the Pacific Arctic, and *not* vice versa.

The Sino-Russian partnership will increasingly confront the U.S. in Eurasia and in the Arctic (both arenas where China and Russia are respectively dominant), as they are confident that their joint mastery and financing of technologies (initially with an emphasis on economic/commercial applications – a product of TIP's input), the attraction of their win-win geo-economic strategy to win over western Asian allies in North East Asia - such as LNG customers of the likes of Japan and the South Korea - as discussed in the framework Chapter, the

integration-by-gasification strategy evident in the Pacific Arctic gas play, and their *Eurasia/Arctic integrating* projects in the Pacific Arctic's hinterland, will begin to geographically stretch and undermine the U.S.' containment strategy. The Arctic's NSR straddling Eurasia is a further dilemma for the U.S., as logically, it demands confinement of Russian territory too.

The use of Belt and Road Initiative, joint technology, and Russian military capabilities in the Arctic is also a looming threat to U.S. space-based defence systems such as NORAD and SOSUS as discussed in detail in Chapter Five. Near space activities and cyber warfare will characterise great powers' sphere of geostrategic interests leading to competition and geopolitical tensions in the Arctic in the 21st Century. This will be alongside the Sino-Russian relationship's next development phase of regionalization: Sino-Russian oriented techno-regulations, and the appearance of region-based institutions supporting multi-regional, geo-economic interests. This was in effect Phase Two of the TIP analyses seen in Chapter Five. This will have significant regional governance implications in the coming years in terms of strengthening Polycentric Regionalism.

More broadly, the Sino-Russian partnership encourages *targeted* regionalization (at the cost of U.S.-led globalization) and sees both northern Eurasia, Space, and the Arctic as great powers' regional spheres of interest that they will compete for, against the west. By doing so they illustrate their *recognition of the shift* in the nature and locus of global power (from military to geo-economic), and which when coordinated in a Polycentric Regionalism framework, will begin to undermine the present technological, militarily, and economic *status* of the U.S., initially in the Arctic and its Space domain.

The Sino-Russian incursion into Space from the Arctic region is one such example from the Technology chapter of how new technologies offer the Sino-Russian partnership the opportunity to create new public, *non-terrestrial* spaces too, in the region (of which Space is one). The TIP collaboration is a vehicle for exploiting science and innovation which can assist China and Russia in this process of expanding multi-regionalism. It also represents how the partnership shifts from a terrestrial- bound geo-economic relationship - a process seen in the Pacific Arctic with their joint LNG activities, to a possible geo-strategic partnership, in the domain of Space, where it represents a direct challenge to U.S. technology capabilities and superpower status, and thus its right-to-govern the Arctic region and its celestial Space domain above it. So, whilst geoeconomics is the framework in which the regionalization process and polycentric regionalism advances it is critical to appreciate though that the outcome and aim of Sino-Russian economic strategy in the Arctic region is geopolitical and /or geostrategic.

The associated potential therefore for a phased Sino-Russian techno-economic *decoupling from the west* as described in the TIP section of the Technology chapter, is seen as a geopolitical challenge to globalization and U.S. global leadership and may well be considered an *existential* threat to the U.S.; perhaps warranting consideration of a *geostrategic response.* At this stage or perhaps even before (as Putin/Xi *anticipate* this US reaction), the Sino-Russian geo-economic partnership may *necessarily therefore broaden into a geostrategic alliance* in the Arctic region. Space/cyberspace is a critical territory in this scenario, and significant and sudden changes in this domain should be considered a *harbinger of such a geo-strategic shift underway*.

For these principal reasons, the Arctic and its Space domain will become an arena for great power rivalry in the 21st Century; this suggests that Polycentric Regionalism theory's identification of the rise of China and Russia as part of a grand strategy, responding to global structural changes and riding the wave of major economic alterations in the International Political Economy, is probably increasingly realistic and probable. With major North/South connectivity transport projects underway in the Pacific Arctic's hinterland as well, linking North East China with Russia's Arctic coastline, it is equally probable that North-eastern Eurasia will be integrated more with the Pacific Arctic region, complicating matters further (containment-wise) for the west. The implication of - by then, Space-based satellite and communication network systems offering navigation, broadband networks, and the rapid transfer of economic data into/from the Pacific Arctic region, only enhances the Pacific Arctic's future economic sustainability, but also its global status as the first functioning example of multi-regionalism's creation of polycentric regionalism; a New World Order model in

Sino-Russian Border Projects - Next Steps?

As mentioned in the Introduction the Dongbei/Russian Far East region is an important Sino-Russian region, located to the South of the Pacific Arctic, in North East Asia, but its inclusion in this dissertation was excluded as it would have dissipated the analyses gleaned from the main Novatek LNG case study in the Pacific Arctic, and the technology chapter's emphasis on its applications in the Arctic's Space domain.

However, a brief synopsis of the region's importance was put in Chapter Four for one specific reason. To illustrate how the polycentric regionalism mechanism occurring in the gas/LNG industry in the Pacific Arctic is linked to developments in the Dongbei/Russian Far East region too. The critical

point is that the link between the Pacific Arctic region and the Dongbei/Russian Far East regions to its South, reinforce Polycentric Regionalism theory's transferability, applicability, and relevance to the geo-economic events taking place in that region. This suggests that the theory is robust across regions, as well in them.

Fundamental Dongbei/Russian Far East regional Polycentric Regionalism themes include: the drive to link the region to the Russian Arctic coastline in the Pacific Arctic, via major transportation projects such as the Baikal-Amur Mainline rail system, and riverine access using the Lena River's northerly access, to the Arctic coastline; the merging of Sino-Russian sponsored Dongbei refining operations for instance, with major strategic projects in the Pacific Arctic, such as Russia's Power of Siberia gas pipeline routing across North East China; There is also the case of shipbuilding; Zvezda port on the Russian Pacific coast has been commissioned by Novatek to provide Polar Class, LNG shipping to the project for its latest Arctic LNG-2 train for instance. At the same time, the scale and importance of Novatek's LNG project(s) along the NSR means that the Russian Federation and China will also become powerful regional sea powers in the Arctic, North East Asia, and the *western Pacific too*; de facto the Dongbei region(s) will also become a *maritime sphere* of Sino-Russian regional interest as well, in the sense of the great powers' (Sino-Russian) strategy of expanding multi-regionalism by both land, and sea. Unquestionably China's western Pacific coastline is now *directly linked* to the Arctic's NSR in as much that their connectivity is crucial for deliveries of Arctic/Novatek LNG into the western Pacific market (in Dongbei provinces) and berthing at its numerous ports in the Dongbei region, where LNG regasification terminals are increasingly located.

The purpose of these projects is not only to expand polycentric regionalism in the Sino-Russian border areas, but to also build trust in the Sino-Russian relationship; these linked inter-regional projects *de facto* begin also to reinforce China's hinterland regions, bringing wealth to the region. But they also imply that by doing so, and linking the southerly regions to the Arctic, Russia economic presence is in fact also guarding China's Dongbei / hinterland back yard.

These are the sorts of International Relations themes occurring in the Dongbei/Russian Far East regions that hopefully will be analysed by future scholars, interested in Sino-Russian affairs in North East Eurasia and International Relations Theory alike.

To conclude, the geo-economic strategy deployed by the Sino-Russian partnership is endorsed by my evolving Polycentric Regionalism theory which adequately explains the partnership's form, function, instruments, and aims. The exposition of the regionalization process leading to a Sino-Russian concept of a *multiregional* New World Order, has gained credibility (and validated PR theory) as a direct result of the successful (to date) creation of the Pacific Arctic. The elevation in strategic sensitivity of both gas/LNG projects and other geo-economic projects in the region, alongside the output of the TIP in Space, will allow for by the completion of TIP's Phase Two, a Sino-Russian *option* to techno-economically decouple from the west - if they wish. This most importantly represents *strategic choice* for both China and Russia in the Eurasian Arctic and possibly in Space too. This a most significant point and usually missed entirely by western audiences.

These two major project activities are *de facto* the backbone of the Sino-Russian relationship. Moreover, both Sino-Russian projects are also natural Confidence Building Measure tests and indicators for both China

and Russia, and their success has cemented the politically vital ingredient in the Sino-Russian partnership in North East Asia: mutual trust and respect.

Polycentric Regionalism theory, I contest is a reliable, robust, and significantly - transferable International Relations theory which I believe has been able to adequately explain the form, mechanism, and aim of the Sino-Russian partnership in the Pacific Arctic region and the Arctic's Space domain.

Reference List/ Bibliography

[n.d.]. *Opening-up and Cooperation Innovation and Win-Win* [Online]. CCRSSPARK. Available: http://www.crtpark.com/about/?152.html [Accessed].

2014. International Energy Agency. *Handbook of Governance and Security.* Edward Elgar Publishing.

2018. 中俄大数据基地年底将在哈尔滨建成 Zhōng é dà shùjù jīdì niándǐ jiàng zài hā'ěrbīn jiànchéng [China and Russia big data base will be built in Harbin at the end of the year] *Harbin Daily*, 11 March 2018. Available: https://web.archive.org/save/https:/zj.zjol.com.cn/news.html?id=890364 [Accessed 11 March 2018].

2018. Россия подготовит проект программы цифрового сотрудничества с Китаем весной 2019 года [Russia will prepare a draft program of digital cooperation with China in the spring of 2019]. 4 November 2018. Available: https://tass.ru/ekonomika/5754864 [Accessed 4 November 2018].

2019. Huawei и Сибирское отделение РАН договорились о сотрудничестве [Huawei and the Siberian Branch of the RAS agree on cooperation]. 21 May 2019. Available: https://ria.ru/20190521/1554775163.html [Accessed 21 May 2019].

2019. Russia, China sign deal to set up $1bln venture fund. 6 June 2019. Available: https://tass.com/economy/1061947 [Accessed 6 June 2019].

2021. How Polar Security and Space Security are Linked—and Why the US Coast Guard Should Bridge the Gap - Modern War Institute.

AALTOLA, M., KÄPYLÄ, J., MIKKOLA, H. & BEHR, T. 2014. Towards the Geopolitics of Flows. *Ulkopoliittinen instutuutti. FIIA reports,* 40.

ACHARYA, A. 2007. The emerging regional architecture of world politics. *World politics,* 59**,** 629-652.

AGNEW, J. 2017. *Globalization and sovereignty: Beyond the territorial trap*.

AMOORE, L. 2018. *Progress in Human Geography,* 42**,** 4.

ANDERSSON, P. S. (2021). The Arctic as a “Strategic” and “Important” Chinese Foreign Policy Interest: Exploring the Role of Labels and Hierarchies in China’s Arctic Discourses. *Journal of Current Chinese Affairs*.

ARCTICINSTITUTE 2020. The Emergence of a Sino-Russian Economic Partnership in the Arctic? | The Arctic Institute. Washington,DC: @arcticinstitute.

ASIA PACIFIC FOUNDATION OF CANADA, 2015. *Russian LNG projects*. Available at: www.asiapacific.ca/blog/russia-natural-gas-supplier-asia-pacificregion-conversation [Accessed:23 February 2016]

ÅSLUND, A. 1999. Russia's virtual economy: a comment. *Post-Soviet Geography and Economics,* 40**,** 98-102.

ÅSLUND, A. 2010. Gazprom: challenged giant in need of reform. *Russia after the global economic crisis***,** 151-168.

ÅSLUND, A., GURIEV, S. & KUCHINS, A. 2010. *Russia after the global economic crisis*, Columbia University Press.

BALDWIN, D. A. 2012. Power and International. *Handbook of international relations,* 273.

BALDWIN, D. A. 2016. *Power and international relations: A conceptual approach*, Princeton University Press.

BARSUKOV, Y. 2019. The Northern Sea Route is Pumped up by Gas *Kommersant, [online] 29 January .*

BARSUKOVA, S. Y. 2016. Novyy rossiyskiy kapitalizm: institutsionalizatsiya korruptsii [New Russian Capitalism: Institutionalization of Corruption]. *Rossiya i sovremennyy mir***,** 21-39.

BEESON, M. 2018. Geoeconomics with Chinese characteristics: the BRI and China's evolving grand strategy. *Economic and Political Studies,* 6**,** 240-256.

BEIXI, D. 2021. Shipping matters: The role of arctic shipping in shaping China's engagement in arctic resource development. *China's Arctic Engagement,* 9**,** 217.

BEKKEVOLD, J. I. & LO, B. (eds.) 2018. *Sino-Russian Relations in the 21st Century*: Springer.

BELLACQUA, J. 2010. *The future of China-Russia relations*, University press of Kentucky.

BELYI, A. V. Gazprom-Rosneft Competition for Asian Gas Markets: Opportunities and Challenges. *Russian Analytical Digest;10/26/2015,* **,** p13.

BELYI, A. V. 2015. Russia's gas export reorientation from West to East: economic and political considerations. *The Journal of World Energy Law & Business,* 8**,** 76-86.

BENDETT, S. & KANIA, E. B. 2019. A new Sino-Russian high-tech partnership. 09.

BENNETT, M. M. 2014. North by Northeast: toward an Asian-Arctic region. *Eurasian Geography and Economics,* 55**,** 71-93.

BENNETT, M. M. 2016. The silk road goes north: Russia's role within China's Belt and Road Initiative. *Area Development and Policy,* 1**,** 341-351.

BENNETT, M. M. 2018. Singapore: The “global city” in a Globalizing Arctic. *Journal of Borderlands Studies,* 33**,** 289-310.

BERTELSEN, R. G. 2018. The GCC-Russia-China LNG Triangle: The Role of Transnational Knowledge Networks and Epistemic Communities to Govern Complex Systems. *Asian Journal of Middle Eastern and Islamic Studies,* 12**,** 484-499.

BERTELSEN, R. G. & GALLUCCI, V. 2016. The return of China, post-Cold War Russia, and the Arctic: Changes on land and at sea. *Marine Policy,* 72**,** 240-245.

BIRCH, K. & CALVERT, K. 2015. Birch & Calvert: Rethinking ‘Drop-in’Biofuels: On the Political Materialities of Bioenergy. *Science & Technology Studies*.

BIROL, F., CORBEN, J., ARGIRI, M., BARONI, M., CORBEAU, A., COZZI, L. & YANGISAWA, A. 2011. Are we entering a golden age of gas. *IEA World Energy Outlook*.

BLACKWILL, R. D. & HARRIS, J. M. 2016. *War by Other Means*, Harvard University Press.

BLOCK, F. L. & KELLER, M. R. 2015. *State of innovation: The U.S. government’s role in technology development*.

BLUNDEN, M. 2012. Geopolitics and the northern sea route. *International affairs,* 88**,** 115-129.

BOLT, P. J. 2014. Sino-Russian relations in a changing world order. *Strategic studies quarterly,* 8**,** 47-69.

BOWKER, G. C. & STAR, S. L. 2000. *Mind, Culture, and Activity,* 7**,** 147.

BRADSHAW, M. 2009. The Kremlin, national champions and the international oil companies: The political economy of the Russian oil and gas industry. *Geopolitics of Energy,* 3.

BRADSHAW, M. 2010. A new energy age in Pacific Russia: lessons from the Sakhalin oil and gas projects. *Eurasian Geography and Economics,* 51**,** 330-359.

BRADY, A.-M. 2017. *China as a polar great power*, Cambridge University Press.

BRATTON, B. 2016. *The stack – On software and sovereignty*.

BRIDGE, G. & BRADSHAW, M. 2017. Making a Global Gas Market: Territoriality and Production Networks in Liquefied Natural Gas. *Economic Geography,* 93**,** 215-240.

BRIEFING, R. 2017. Russia, China Agree On Primorye-1 Corridor; Opens Up Heilongjiang To Asia-Pacific Markets - Russia Briefing News. *Russia Briefing.*

BROEDERS, D., ADAMSON, L. & CREEMERS, R. 2019. Coalition of the Unwilling? Chinese and Russian Perspectives on Cyberspace. *Chinese and Russian Perspectives on Cyberspace (October 1, 2019). Broeders, D., L. Adamson and R. Creemers*.

BROOKE, J. 2006. Russia rattles Asia with attack on Shell's Sakhalin-2 project. . *Bloomberg [online].*

BROOKS, R. 2016. *How everything became war and the military became everything: Tales from the Pentagon*, Simon and Schuster.

BRUTSCHIN, E. & SCHUBERT, S. R. 2016. Icy waters, hot tempers, and high stakes: Geopolitics and Geoeconomics of the Arctic. *Energy Research & Social Science,* 16**,** 147-159.

BRZEZINSKI, Z. 2016. *The grand chessboard: American primacy and its geostrategic imperatives*, Basic books.

BULL, H. 2012. *The anarchical society: a study of order in world politics*, Macmillan International Higher Education.

BUTLER, N. July 27 2010. The era of global oil giants is over. *Financial Times*.

BUZAN, B. 2011. The inaugural Kenneth N. Waltz annual lecture a world order without superpowers: decentred globalism. *International relations,* 25**,** 3-25.

BUZAN, B. 2018. How and How Not to Develop IR Theory: Lessons from Core and Periphery. *The Chinese Journal of International Politics,* 11**,** 391-414.

BYERS, M. 2019. Cold, dark, and dangerous: international cooperation in the arctic and space. *Polar Record,* 55**,** 32-47.

CALLAHAN, W. A. 2016. China 2035: from the China dream to the world dream. *Global Affairs,* 2**,** 247-258.

CANTERO GAMITO, M. 2018. *Yearbook of European Law,* 37**,** 395.

CAO, W. & BLUTH, C. 2013. Challenges and countermeasures of China's energy security. *Energy Policy,* 53**,** 381-388.

CARR, E. H. 2001. The Twenty Years' Crisis. An Introduction to the Study of International Relations, 1919-1939. Basingstoke, Palgrave.

CASASSUS, B. 2020. China predicted to outspend the US on science by 2020. *Nature News*.

CASTELLS, M. 2011. Network theory| A network theory of power. *International Journal of Communication,* 5**,** 15.

CHAMBER OF SHIPPING OF BRITISH COLUMBIA, [n.d.]. LNG Transport Cycle. *Safe Shipping BC.*

CHAN, G. 2018. *Understanding China's new diplomacy: Silk roads and bullet trains*, Edward Elgar Publishing.

CHARAP, S., DRENNAN, J. & NOËL, P. 2017. Russia and China: A New Model of Great-Power Relations. *Survival,* 59**,** 25-42.

CHEN, Y. & YUAN, Y. 2007. The innovation strategy of firms: empirical evidence from the Chinese high-tech industry. *Journal of Technology Management in China*.

CHEN LIAN. 2018. "Шелковый путь" приглашает российских бизнесменов ["Silk Road" invites Russian businessmen]. *Rossiiskaia Gazeta*, 14 June 2018. Available: https://rg.ru/2018/06/14/v-siane-otkrylsia-mezhdunarodnyj-innovacionnyj-park-shelkovyj-put.html [Accessed 14 June 2018].

CHENG, Y. 2015. Do National Policies Contribute to Regional Cross-border Integration? The Case of the Program of Cooperation between Northeast China and Russia's Far East and Eastern Siberia (2009–2018). *International Cooperation in the Development of Russia's Far East and Siberia.* Springer.

CHIACU, D. 2015. U.S. adds Russian oil field to sanctions list. *Reuters [online] 7 August.* [Online]. Available: Available at: https://www.reuters.com/article/us-usa-russia-sanctions-idUSKCN0QC1UJ20150807 [Accessed [17 March 2016]].

CHINA, B. I. E. A. O. 2018. *"The first China-Russia Innovation and Entrepreneurship Competition finals will be held in Shanghai on September 25"* [Press release].

CHINA. MINISTRY OF SCIENCE AND TECHNOLOGY & PRC EMBASSY IN RUSSIA. 2016. ***科技部副部****长阴和俊率团访问莫斯科 [MoST Vice Minister Yin Hejun led a delegation to visit Moscow, 4 July 2016* [Online]. Ministry of Science and Technology. Available: https://web.archive.org/web/20190923004735/http:/ru.chineseembassy.org/chn/kjhz/hzgk/t1377446.htm [Accessed].

CHINA. MINISTRY OF SCIENCE AND TECHNOLOGY. 2016. ***中俄正式建立****创新对话机制* ***zhōngÉ zhèngshì jiànlì chuàngxīn duìhuà jīzhì*** *[China and Russia formally establish an innovative dialogue mechanism] , 12 July 2016* [Online]. MoST. Available:

http://www.most.gov.cn/kjbgz/201607/t20160711_126542.htm [Accessed 2020].

CHINA. MINISTRY OF SCIENCE AND TECHNOLOGY. 2017. The first China-Russia Innovation Dialogue was held in Beijing. June 14, 2017.

CHINA, T. S. C. I. O. O. T. P. S. R. O. 2018. *China's Arctic Policy*. Beijing: The State Council Information Office of the People's Republic of China

CHINA, T. S. C. O. T. P. S. R. O. 2018. *China's Arctic Policy*. Beijing, China: The People's Republic of China.

CHRISTOFFERSEN, G. 2018. Sino-Russian accommodation and adaptation in Eurasian regional order formation. *Asian Perspective,* 42**,** 439-462.

CHU DAYE. 2019. AI new impetus for China-Russia ties. *Global Times*, 20 January 2019. Available: http://www.globaltimes.cn/content/1136416.shtml [Accessed 20 January 2019].

CHUNG, J. H., LAI, H. & JOO, J.-H. 2009. Assessing the" Revive the Northeast"(zhenxing dongbei) Programme: Origins, Policies and Implementation. *The China Quarterly***,** 108-125.

COE, N. M. & YEUNG, H. W.-C. 2015. *Global production networks: Theorizing economic development in an interconnected world*, Oxford University Press.

COHEN, A. 2001. The Russia-China Friendship and Cooperation Treaty: A Strategic Shift in Eurasia? *The Heritage Foundation,* 18.

COHEN, A. 2007. Gas OPEC: A Stealthy Cartel Emerges. *Heritage Foundation WebMemo*.

COHEN, J. E. 2019. *Between truth and power: The legal constructions of informational capitalism*.

COWEN, D., GILBERT, E., COWEN, D. & GILBERT, E. 2008. *War, citizenship, territory*.

COX, M. & CARR, E. H. 2001. *The twenty years' crisis, 1919-1939: an introduction to the study of international relations*, Palgrave Macmillan.

CSIS 2021. The Return of the Quad: Will Russia and China Form Their Own Bloc?

DAILY, C. 2016. China-Russia strategic partnership set to open new horizons. *China Daily, [online] 6 June. Available at:* 06, p.11 May 2020.

DAILY, C. 2020. *China-Russia strategic partnership set to open new horizons* [Online]. Xinhua, China. Available: http://www.chinadaily.com.cn/world/2016liattendsSCOCCEEC/2016-11/06/content_27288768.htm [Accessed].

DE MARIA, A. 2019. *The "Polar Silk Road" and Chinese interests in the Arctic.* Università Ca'Foscari Venezia.

DEAN, R. & LACKENBAUER, W. 2019. Geostrategy and Canadian Defence: From CP Stacey to a Twenty-First Century Arctic Threat Assessment. *Journal of Military and Strategic Studies,* 20.

DECREE, P. 2008. The Fundamentals of State Policy of the Russian Federation in the Arctic in the Period up to 2020 and Beyond. September.

DENARDIS, L. 2020. *The Internet in Everything*

Freedom and Security in a World with No Off Switch, Yale University Press.

DIDI TANG, B. 2020. China makes great leap upward with Long March rocket launch. *The Times*.

DIESEN, G. 2017. *Russia's Geoeconomic Strategy for a Greater Eurasia*, Routledge.

DING, D.-K., LIU, M. & ZHANG, X.-X. 2011. Fusion of Military-civilian Industries: Strategic Choice of Optimization and Upgrading of Industrial Structure in Western Regions of China [J]. *Journal of Xi'an Jiaotong University (Social Sciences),* 1.

DING, H. 2019. China, Russia agree to upgrade relations for new era. *Xinhua, (online) 5 June. Available at: http://www.xinhuanet.com/english/2019-06/06/c_138119879_2.htm*.

DOBRONRAVIN, N. 2010. Maritime issues in Russia's energy politics in the Baltic Sea Region (Expert article 614). *Baltic Rim Economies***,** 25.

DOSHI, R., DALE-HUANG, A., & ZHANG, G. (2021). *Northern Expedition: China's Arctic Activities and Ambitions*. https://www.brookings.edu/research/northern-expedition-chinas-

DOURISH, P. & MAINWARING, S. 2012. *Proceedings of the 2012 ACM conference on ubiquitous computing*.

DOWNS, E. 2006. Energy Security Series. *The Brookings Foreign Policy Studies*.

DUDLEY, B. 2015. BP statistical review of world energy 2016. *London, UK*.

EASTERLING, K. 2016. *Extrastatecraft: The power of infrastructure space*.

ED CROOKS, H. F. 2017. US oil groups feel Russia sanctions freeze more than Europeans. *Financial Times*.

EISEMANN, J., HEGINBOTHAM, E. & MITCHELL, D. 2007. China and the developing world.

ELDEN, S. 2013. *The birth of territory*.

ELLEMAN, B. A. 2010. *Manchurian Railways and the Opening of China*, ME Sharpe.

EMBASSY OF THE PEOPLE'S REPUBLIC OF CHINA 2016. *'MoST Vice Minister Yin Hejun led a delegation to visit Moscow' [Press release].*

ENCYCLOPÆDIA BRITANNICA, INC., 2011. Sedimentary basins and major oil and gas fields of Europe, Russia, Transcaucasia, and Central Asia.

ENERGY SECURITY COOPERATION, 2020. Russia's Gas Development & Export Plan. *Springer Link.* [Online]. Available at: https://www.Link.springer.com [Accessed 2020].

ENGLEHART, A. B. 2008. Common ground in the sky: extending the 1967 Outer Space Treaty to reconcile US and Chinese security interests. *Pac. Rim L. & Pol'y J.,* 17**,** 133.

ERICKSON, A. & COLLINS, G. 2007. Beijing's energy security strategy: the significance of a Chinese state-owned tanker fleet. *Orbis,* 51**,** 665-684.

EROKHIN, V., TIANMING, G. & XIUHUA, Z. 2021. Arctic Blue Economic Corridor: China's Role in the Development of a New Connectivity Paradigm in the North. *China's Arctic Engagement,* 9**,** 63.

EURASIA, D. 2017. Gazprom fears Yamal LNG may hurt pipeline gas supply to Europe: EADaily. *Eurasia Daily, 6th December*.

EVANS, P. 2004. Between regionalization and regionalism: policy networks and the nascent East Asian institutional identity. *Remapping East Asia: The Construction of a Region***,** 195-215.

FARRELL, H. & NEWMAN, A. L. 2019. Weaponized interdependence: How global economic networks shape state coercion. *International Security,* 44**,** 42-79.

FEDERATION, R. 2009. Energy Strategy of Russia for the Period up to 2030. *In:* ENERGY, M. O. (ed.) *Moscow: Ministry of Energy.* Moscow, Russia

FENG, B. 2014. Russia Uses Its Natural Gas to Play the China Card, Again. *The New York Times*, September 25, 2014.

FERRERO, A. & SUPERTI-FURGA, G. 1991. A new approach to the definition of power components in three-phase systems under nonsinusoidal conditions. *IEEE Transactions on Instrumentation and Measurement,* 40**,** 568-577.

FILIMONOVA, N. 2017. Gazprom and China's "Breakthrough" in the Russian Arctic. *The Diplomat.*

FOUNDATION, T. J. 2017. Putin aims to profit from China's Silk Road initiative. *oilprice.com* [Online].

FRANK, T. 2001. *One market under God: Extreme capitalism, market populism, and the end of economic democracy*, Anchor Canada.

FRIEDMAN, T. L. & WYMAN, O. 2005. *The world is flat: A brief history of the 21st century*, Audio Renaissance.

FUCHS, C. 2012. Some Reflections on Manuel Castells' Book" Networks of Outrage and Hope. Social Movements in the Internet Age". *tripleC: Communication, Capitalism & Critique. Open Access Journal for a Global Sustainable Information Society,* 10**,** 775-797.

FUKUYAMA, F. 2006. *The end of history and the last man*, Simon and Schuster.

GADDY, C.G. & ICKES, B. 2015. Putin's rent management system and the future of addiction in Russia. *In:* OXENSTIERNA, S. (ed*.) The Challenges of Russia's Politicized Economic System* Abingdon: Routledge.

GALAZIN, M. K. M. 2019. WMD and the Arctic. *Comparative Strategy,* 38**,** 118-138.

GAMBLE, A. & PAYNE, A. 1996. *Regionalism and world order*, Macmillan London.

GAO, T. & EROKHIN, V. 2020. China-Russia collaboration in arctic shipping and maritime engineering. *The Polar Journal,* 10**,** 353-374.

GAUTIER, D. L., BIRD, K. J., CHARPENTIER, R. R., GRANTZ, A., HOUSEKNECHT, D. W., KLETT, T. R., MOORE, T. E., PITMAN, J. K., SCHENK, C. J. & SCHUENEMEYER, J. H. 2009. Assessment of undiscovered oil and gas in the Arctic. *Science,* 324**,** 1175-1179.

GAZPROM, 2004. Energy Fields and Licensed areas in the Sakhalin Region. Moscow. Gazprom PJSC.

GAZPROM, 2020. Russian Pipeline Routes to China. Moscow. Gazprom PJSC.

GEHRKE, J. 2019. State Department preparing for clash of civilizations with China. *The Washington Examiner,* 30.

GILLESPIE, T. 2010. *New Media & Society,* 12**,** 347.

GIRGORYEV, Y. 2007. The Russian Gas Industry, its legal structure, and its influence on world markets. *Energy LJ,* 28**,** 125.

GLANZ, J. & NILSEN, T. 2020. A Deep-Diving Sub. A Deadly Fire. And Russia's Secret Undersea Agenda. *The New York Times*, 20200420.

GOLDSTEIN, L. J. 2019. Hypersonics Are Speeding up Great Power Competition | The National Interest. *The National Interest*.

GOLDTHAU, A. & WITTE, J. 2009. Back to the future or forward to the past? Strengthening markets and rules for effective global energy governance. *International Affairs,* 85**,** 373-390.

GOLDTHAU, A. & WITTE, J. M. 2010. The role of rules and institutions in global energy: An introduction. *Global energy governance: The new rules of the game***,** 1-25.

GOLUBKOVA, K. 2016. *Russia's Gazprom plans to launch third LNG train at Sakhalin-2 in 2012* [Online]. Reuters. Available: https://www.reuters.com/article/us-russia-oil-forum-lng/russias-

gazprom-plans-to-launch-third-lng-train-at-sakhalin-2-in-2021-idUSKCN11Z0J6 [Accessed].

GOLUBKOVA, K. 2017. *Russia's Gazprom plans to launch third LNG train at Sakhalin-2 in 2021* [Online]. Available: https://www.reuters.com/article/us-russia-oil-forum-lng/russias-gazprom-plans-to-launch-third-lng-train-at-sakhalin-2-in-2021-idUSKCN11Z0J6 [Accessed].

GORST, I. 2014. Rosneft and Gazprom: two behemoths battle it out. *Financial Times, 2 Jul. p.8c*, 2014-07-02.

GOVERNMENT, R. 2021. *Mikhail Mishustin approves Russian Energy Strategy to 2035* [Online]. Moscow: Russian Government. [Accessed 12 April, 2021 2020].

GRAEBER, D. J. 2017. *Gazprom looks to build up Asian market position* [Online]. United Press International, Inc. Available: https://www.upi.com/Gazprom-looks-to-build-up-Asian-market-position/4321504267938/ [Accessed 2017].

GRAY, C. S. 1988. *The geopolitics of super power*, University Press of Kentucky.

GRUBLER, A. & WILSON, C. 2014. *Energy technology innovation*, Cambridge University Press.

HE, X.-W., HOU, G.-M. & WANG, Y. 2011. Industrialization Path of Defense Science & Technology Industry: A Strategic View of Military and Civilian Integration [J]. *Scientific Management Research,* 2.

HEADRICK, D. R. 1988. *The tentacles of progress: Technology transfer in the age of imperialism, 1850–1940*.

HEATH, J. 2009. Strategic Protectionism-National Security and Foreign Investment in the Russian Federation. *Geo. Wash. Int'l L. Rev.,* 41**,** 465.

HEININEN, L. & FINGER, M. 2018. The “Global Arctic” as a New Geopolitical Context and Method. *Journal of Borderlands Studies,* 33**,** 199-202.

HENDERSON, J. & MOE, A. 2019. *The Globalization of Russian Gas: Political and Commercial Catalysts*, Edward Elgar Publishing.

HENDERSON, J. & PIRANI, S. 2014. *The Russian gas matrix: How markets are driving change*, Oxford University Press.

HERWIG, H. H. 1999. Geopolitik: Haushofer, Hitler and lebensraum, *The Journal of Strategic Studies, ,* 22:2-3,**,** 218-241,.

HETTNE, B. 1999. Globalization and the new regionalism: the second great transformation. *Globalism and the new regionalism.* Springer.

HILLMAN, J. 2019. *Influence and infrastructure: The strategic stakes of foreign projects*.

HIRSCHMAN, A. O. 1980. *National power and the structure of foreign trade*, Univ of California Press.

HO, E. 2018. *Journal of International and Public Affairs,* 1**,** null.

HOLSTI, K. J. 1964. The concept of power in the study of international relations. *Background,* 7**,** 179-194.

HOLT, J., VONDERAU, P., PARKS, L. & STAROSIELSKI, N. 2015. *Signal traffic: Critical studies of media infrastructures*.

HONG, Y. 2017. *Networking China: The digital transformation of the Chinese economy*.

HOSSAIN, K. China’s BRI expansion and great power ambition: The Silk Road on the ice connecting the Arctic. *Cambridge Journal of Eurasian Studies,* 3**,** F3OSGP.

HOWLAND, D. 2016. *International law and Japanese sovereignty: The emerging global order in the 19th century*.

HU, A. G. 2007. Technology parks and regional economic growth in China. *Research Policy,* 36**,** 76-87.

HUANG, J. & KOROLEV, A. 2015. *International Cooperation in the Development of Russia's Far East and Siberia*, Springer.

HUMPERT, M. 2020. Novatek Orders 10 Arc7 Carriers for Arctic LNG 2 from Zvezda Shipyard. *The Barents Observer* [Online]. Available: https://www.highnorthnews.com/en/novatek-orders-10-arc7-carriers-arctic-lng-2-zvezda-shipyard.

HURRELL, A. 2007. One world? Many worlds? The place of regions in the study of international society. *International Affairs,* 83**,** 127-146.

ICKES, G. A. 2015. Putin's rent management system and the future of addiction in Russia. *In:* OXENSTIERNA, S. (ed.) *The Challenges of Russia's Politicized Economic System.* Abingdon: Routledge.

IEA, 2016. A wave of LNG spurs a second natural gas revolution.

IEA ENERGY, P. 2011. International Energy Agency. *Energy Prices and Taxes,* 2011.

IKENBERRY, G. J. 2011. *Liberal Leviathan: The origins, crisis, and transformation of the American world order*, Princeton University Press.

INTELLIGENCE, N. G. 2004. Petro-Canada, Russia's Gazprom Eye LNG Supply, Regasification Joint Venture - Natural Gas Intelligence. [online]. *Natural Gas Intelligence.* Washington,DC:: @NGInews.

INTERNATIONAL COOPERATION BUREAU. 2018. 中国科学院与俄罗斯科学院签署合作协议 Zhōngguó kēxuéyuàn yǔ èluósī kēxuéyuàn qiānshǔ hézuò xiéyì [Chinese Academy of Sciences and Russian Academy of Sciences sign cooperation agreement]. 10 June 2018. Available: http://www.cas.cn/tt/201806/t20180611_4652220.shtml [Accessed 10 June 2018].

INTERNATIONAL ENERGY AGENCY, I. E. A. & BANK, W. 2014. *Sustainable Energy for All 2013-2014: Global Tracking Framework Report*, The World Bank.

JAKOBSON, L. 2010. China prepares for an ice-free Arctic. *SIPRI insights on Peace and Security,* 2010.

JAKOBSON, L. 2011. *China's energy and security relations with Russia: hopes, frustrations and uncertainties*, SIPRI, Stockholm International Peace Research Institute.

JENSEN, J. T. 2004. *The development of a global LNG market: is it likely? If so, when?* Oxford Institute for Energy Studies.

JI, Y. 2014. Friends in need or comrades in arms: The dilemma in the Sino-Russian weapons business. *The Global Arms Trade.* Routledge.

JIA, L., WENYING, C. & DESHUN, L. 2011. Scenario analysis of China's future energy demand based on TIMES model system. *Energy procedia,* 5**,** 1803-1808.

KALININ, A., LAZARIVA, A., NURGALIEVA, G. & REMYGA, O. 2019. Chinese Grand Strategy in the Eurasian Heartland. Belt and Road Initiative in Russia, Belarus, Central Asia and the Caucasus. *Central Asia and the Caucasus (June 13, 2019). SKOLKOVO Institute for Emerging Market Studies (IEMS)*.

KAPLAN, R. D. 1994. The coming anarchy. *Globalization and the challenges of a new century: A reader***,** 34-60.

KARAGANOV, S. 2015. Eurasian way out of the European crisis. *Russia in Global Affairs,* 8.

KASHIN, V. 2013. The sum total of all fears: The Chinese threat factor in Russian politics. *Russia in Global Affairs,* 15.

KATZENSTEIN, P. J. 2005. *A world of regions: Asia and Europe in the American imperium*, Cornell University Press.

KEFFERPÜTZ, R. 2010. On thin ice?(Mis) interpreting Russian policy in the high north.

KEOHANE, R. O. & NYE JR, J. S. 1998. Power and interdependence in the information age. *Foreign Aff.,* 77**,** 81.

KHANNA, P. 2016. *Connectography: Mapping the Global Network Revolution*, Hachette UK.

KHRENNIKOV, I. & KHRENNIKOVA, D. 2018. Alibaba Sets Up $2 Billion Russia Venture with Kremlin Help. 11 September 2018. Available: https://www.bloomberg.com/news/articles/2018-09-11/alibaba-teams-up-with-kremlin-fund-mail-ru-for-russia-expansion [Accessed 11 September 2018].

KIM, T. 2009. Impassive to Imperial? Russia in Northeast Asia from Yeltsin to Putin. *Northeast Asia.* Springer.

KISSINGER, H. 2002. *Does America need a foreign policy? Toward a diplomacy for the 21st century*, Simon and Schuster.

KLARE, M. 2009. *Rising powers, shrinking planet: the new geopolitics of energy*, Macmillan.

KLARE, M. T. 2020. From Globalization to Regionalization?

KLOCHIKHIN, E. 2013. *Public policy in (re) building national innovation capabilities: a comparison of S&T transitions in China and Russia.* The University of Manchester (United Kingdom).

KLOCHIKHIN, E. A. 2013. Innovation system in transition: Opportunities for policy learning between China and Russia. *Science and Public Policy,* 40**,** 657-673.

KOROLEV, A. 2016. Systemic Balancing and Regional Hedging: China–Russia Relations. *The Chinese Journal of International Politics,* 9**,** 375-397.

KRASNER, S. 2001. *Problematic sovereignty: Contested rules and political possibilities*.

KRUGLOV 2018. Gazprom: Business Growth, Financing Supply Security. Moscow.

KRYSIEK, T. F. 2007. *Agreements from another era: production sharing agreements in Putin's Russia, 2000-2007*, Oxford institute for energy studies.

KRYUKOV, I. V. 2017. Import substitution of technology and equipment in the Russian energy sector. *Problems of Economic Transition,* 59**,** 58-71.

KSHETRI, N. Cybersecurity and international relations: The US engagement with China and Russia. Proc. FLACO-ISA Joint Conf., 2014.

KUČEROVÁ, I. 2014. The Economic Regionalism and Its Linguistic Aspects. The Model of Inside-Outside Regionalism. *Annual of Language & Politics & Politics of Identity,* 8.

KUHRT, N. C. 2014. Russia and Asia-Pacific: From 'Competing'to 'Complementary'Regionalisms? *Politics,* 34**,** 138-148.

KYNGE, J. 2020. Chips are down for artificial intelligence. *FT*, 2020-05-11.

LAGUTINA, M. & LEKSYUTINA, Y. 2019. BRICS countries' strategies in the Arctic and the prospects for consolidated BRICS agenda in the Arctic. *The Polar Journal***,** 1-19.

LAGUTINA, M. L. 2019. *Russia's Arctic Policy in the Twenty-First Century: National and International Dimensions*, Lexington Books.

LAKE, D. A. 2011. *Hierarchy in international relations*, Cornell University Press.

LAMPLAND, M. & STAR, S. L. 2009. *Standards and their stories: How quantifying, classifying, and formalizing practices shape everyday life*.

LARUELLE, M. 2015. *Russia's Arctic strategies and the future of the Far North*, Routledge.

LASKAI, L. 2018. Civil-military fusion and the PLA's pursuit of dominance in emerging technologies. *China Brief,* 18**,** 12-16.

LAYNE, C. 2006. The unipolar illusion revisited: The coming end of the U.S.' unipolar moment. *International security,* 31**,** 7-41.

LEE, R. W. & LUKIN, A. 2016. *Russia's Far East: New dynamics in Asia pacific and beyond*, Lynne Rienner Publishers.

LEE, W. 2017. Russia's Far East. New Dynamics in Asia Pacific & Beyond. Taylor & Francis.

LEE-MAKIYAMA, H. 2019. Geopolitics & Technology–The Core of the 5G Problem. *RSIS Commentaries, 245-19*.

LEE-MAKIYAMA, H. 2020. Geopolitics & Technology – The Core of the 5G Problem | RSIS. *RSIS,* CO19245.

LEIPONEN, A. E. 2008. *Management Science,* 54**,** 1904.

LELYVELD, M. 2017. China's Oil Investment in Russia Raises Questions. *Radio Free Asia* [Online].

LERNER, J. & TIROLE, J. 2015. *Journal of Political Economy,* 123**,** 547.

LEUNG, G. C. 2011. China's energy security: Perception and reality. *Energy Policy,* 39**,** 1330-1337.

LEWIS, M. 2018. *The fifth risk: undoing democracy*, Penguin UK.

LIM, C. & XIN, S. X. 2019. BRI as a Regional Enterprise: Headwinds in the Way? *Rajaratnam School of International Studies, NTU Singapore,* No 74/2019. Dated 17.04.19.

LIM, K. S. 2018. China's Arctic Policy and the Polar Silk Road Vision. *Arctic Yearbook,* 2018**,** 420-432.

LIU, X. 2006. China's energy security and its grand strategy. *Policy Analysis Brief*.

LIU, Z. 2019. Russia offers rocket engine tech as China's Long March 5 stalls at launch. *South China Morning Post*, 2019-08-28.

LIU XUAN. 2019. China and Russia to establish high-tech center. *China Daily*, 8 December 2017. Available: http://www.chinadaily.com.cn/a/201712/08/WS5a2a87d8a310eefe3e99ef6f.html [Accessed 8 December 2017].

LIVESEY, F. 2018. *From global to local: The making of things and the end of globalization*, Vintage.

LO, B. 2009. *Axis of convenience: Moscow, Beijing, and the new geopolitics*, Brookings Institution Press.

LO, B. 2020. The Sino-Russian partnership and global order. *China International Strategy Review,* 2**,** 306-324.

LOCATELLI, C. & ROSSIAUD, S. Russia's gas and oil policy: the emerging organizational and institutional framework for regulating access to hydrocarbon resources. IAEE Energy Forum, 2011. 23-26.

LOE, J. S. P. 2018. Lead, now, go! (LNG): the Shtokman field and Gazprom's challenging partnership with Total and Statoil. *Post-Communist Economies,* 30**,** 755-774.

LUKIN, A. 2014. The Emerging Anti-American Axis of Russia and China: Implications for A. *미국학,* 37.

LUKIN, A. 2015. Why the Russian Far East is so important to China. *Huffington Post,* 14.

LUKIN, A. 2016. 11 Russian perceptions of the power transition. *Power Transition in Asia***,** 179.

LUKIN, A. 2018. *China and Russia: The New Rapprochement*, John Wiley & Sons.

LUNDEN, L. P., FJAERTOFT, D., OVERLAND, I. & PRACHAKOVA, A. 2013. Gazprom vs. other Russian gas producers: The evolution of the Russian gas sector. *Energy policy,* 61**,** 663-670.

LUTTWAK, E. N. 1990. From geopolitics to geo-economics: Logic of conflict, grammar of commerce. *The National Interest***,** 17-23.

LUTTWAK, E. N. 2010. *Endangered American Dream*, Simon and Schuster.

LYE, H. 2020. AI, data, space and hypersonics set to be 'strategic disruptors': NATO. *Army Technology*.

MAÇÃES, B. 2018. *The Dawn of Eurasia: On the Trail of the New World Order*, Penguin UK.

MACKINDER, H. J. 1904. The geographical pivot of history. Royal Geographical Society.

MACKINDER, H. J. 1904. The geographical pivot of history. In: DITTMER, J. and SHARP, J. (ed.) 2014. *Geopolitics.* London: Routledge.

MACKINNON, D. 2020. *The looming threat from China in space. [online]* [Online]. Washington DC: thehill.com Available at: https://thehill.com/opinion/national-security/492260-the-looming-threat-from-china-in-spac. [Accessed [16 May 2020]].

MADDISON, A. 2007. *Contours of the world economy 1-2030 AD: Essays in macro-economic history*, Oxford University Press.

MAHAN, A. T. 2013. *The influence of sea power upon history, 1660-1783*, Read Books Ltd.

MALECKI, E. & WEI, H. 2009. *Annals of the Association of American Geographers,* 99**,** 360.

MANSFIELD, E. D., MILNER, H. V., MILNER, H. & MANSFIELD, E. L. 1997. *The political economy of regionalism*, Columbia University Press.

MAREX 2017. Novatek Signs Chinese Deals for Arctic LNG 2. *The Maritime Executive*.

MARITIME-EXECUTIVE, T. 2017. *Russia to Build LNG Transshipment Terminal for Arctic Traffic* [Online]. Available: https://www.maritime-executive.com/article/russia-to-build-lng-transshipment-terminal-for-arctic-traffic#gs.Di_iLpI [Accessed].

MARSHALL, T. 2015. *Prisoners of geography: Ten maps that tell you everything you need to know about global politics*, Elliot and Thompson.

MARTINOT, E., SINTON, J. E., HADDAD & M, B. 1997. International technology transfer for climate change mitigation and the cases of Russia and China. *Annual review of energy and the environment,* 22**,** 357-401.

MASTEPANOV, A. M. 2014. On the development of the new Energy Strategy of Russia (ESR-2035). Japan–Russia Energy and Environment Dialogue in Niigata, October 30th.

MASTEPANOV, A. M. 2015. Energy Cooperation Under New Geopolitical Conditions. *Energetika i Geopolitika,* 1**,** 13-23.

MAXWELL, R. & MILLER, T. 2012. *Greening the media*.

MAYER, M. & ACUTO, M. 2015. *Millennium: Journal of International Studies,* 43**,** 660.

MCREYNOLDS, J. 2017. *China's Evolving Military Strategy*, Brookings Institution Press.

MEDIN, M. & LOUIE, G. 2019. The 5G Ecosystem: Risks and Opportunities for DoD. Defense Innovation Board Washington DC U.S.

MIKULSKA, A. J. P. 2020. *The Future of Russian gas: A tale of Two Cities* [Online]. Houston, Texas: Rice University's Baker Institute for Public Policy, Houston, Texas. Available:

https://www.bakerinstitute.org/media/files/files/d9a0a4fd/bi-brief-062920-ces-russiangas.pdf [Accessed 2020].

MILLER, T. 2017. *China's Asian dream: Empire building along the new silk road*, Zed Books Ltd.

MITROVA, T. 2013. Russian LNG: The long road to export. *Paris: IFRI-Russia/NIS Center*.

MITROVA, T., GALKINA, A. & KULAGIN, V. 2015. The transformation of Russia's gas export policy in Europe. *Proceedings of the ICE - Energy,* 168**,** 30-40.

MITSUI O.S.K LINES, 2020. Overview of LNG Transportation Routes and Transhipment Points. [online]. Tokyo: Mitsui O.S.K Lines.

MOE, A. 2010. Russian and Norwegian petroleum strategies in the Barents Sea. *Arctic Review,* 1.

MOE, A., ROWE, E. W. & WILSON, E. 2008. Northern Offshore Oil and Gas Resources: Russian Policy Challenges and Approaches. *Fridtjof Nansen Institute Report*.

MOE, A. & ROWE, L. 2008. Petroleum Activity in the Russian Barents Sea. *Constraints and Options for Norwegian Offshore and Shipping Companies,*‖ *Fridtjof Nansen Institute Report*.

MOSCOW INSTITUTE OF PHYSICS AND TECHNOLOGY. 2019. MIPT and Huawei Started Cooperation in the Field of Artificial Intelligence. 19 August 2019. Available: https://mipt.ru/english/news/mipt_and_huawei_started_cooperation_in_the_field_of_artificial_intelligence [Accessed 19 August 2019].

MOSCOWTIMES 2014. Novatek and China's CNPC Sign LNG Supply Deal.

MUNN, L. 2020. Red territory: forging infrastructural power. *Territory, Politics, Governance***,** 1-20.

MURPHY, J. T. 2012. Global production networks, relational proximity, and the sociospatial dynamics of market internationalization in Bolivia's wood products sector. *Annals of the Association of American Geographers,* 102**,** 208-233.

MUSIKHIN, V. I. & BALAKIREVA, S. M. Russia on the global LNG market: trends and prospects. International Conference on Business Economics, Engineering Technology, Medical and Health Sciences, 2019. 16-29.

NATIONAL BUREAU OF ASIAN, R. 2013. NBR special report No 44. *NBR special report.*

NEILSON, B., ROSSITER, N. & SAMADDAR, R. 2018. *Logistical Asia: The labour of making a world region*.

NEWMAN, A. 2019. US and China are weaponising global trade networks. *FT*, 2019-09-01.

NICHOLSON, G. (2002). The Common Heritage of Mankind and Mining: An Analysis of the Law as the High Seas, Outer Space, the Antarctic and World Heritage. *New Zealand Journal of International Law*, *6*, 177–198.

NIKITINA, Y. A. 2009. ODKB i ShOS: modeli regionalizma v sfere bezopasnosti. *Moscow: Navona*.

NILSEN, G. A. 2020. A Deep-Diving Sub. A Deadly Fire. And Russia’s Secret Undersea Agenda. *The New York Times*, 20200420.

NILSEN, T. 2019. Russia's top General indirectly confirms Arctic deployment of the unstoppable Kinzhal missile. *The Barents Observer [online]*, 19 December.

NILSEN, T. 2020. Anti-satellite weapon tested from Plesetsk. *The Barents Observer*.

NILSEN, T. 2020. Trans-Arctic fiber cable can make Kirkenes to high-tech hub. *The Barents Observer*.

NOVATEK, P. A. O. 2017. Novatek Home Page *[online]* [Online]. Available: https://www.novatek.ru/en/ [Accessed].

NOVATEK, 2017 Transforming into a Global Gas Company from 2018 to 2030 PowerPoint. [Online]. Available at: https://www.novatek.ru/en/ [Accessed 12 December 2017]

NOVATEK, P. A. O. 2020. *Novatek Home Page [online]* [Online]. Available: https://www.novatek.ru/en/ [Accessed].

NOVATEK, 2020 Unlocking Arctic Potential: Expanding Our Global LNG Footprint to 2030 Energy Affordability, Security & Sustainability. PowerPoint. [Online]. Available at: https://www.novatek.ru/common/upload/doc/IR_June_2020_Investor_Meetings.pdf [Accessed June 2020]

NULL, N. 2012. *Investigation of the security threat posed by Chinese telecommunications companies Huawei and ZTE*.

OBSERVER, T. B. 2021. Chinese and Turkish shipbuilders fight over Russian icebreaker dock. *The Barents Observer* [Online]. Available: https://thebarentsobserver.com/en/arctic/2021/04/chinese-and-turkish-shipbuilders-fight-over-russian-icebreaker-dock.

OBSERVER, T. B. 2021. Total buys stake in Murmansk LNG terminal. Available: https://thebarentsobserver.com/en/arctic-lng/2021/04/total-buys-stake-murmansk-lng-terminal.

OBSERVER, T. I. B. 2017. *Ready for first shipments of Yamal LNG to market* [Online]. Available: https://thebarentsobserver.com/en/2017/10/ready-first-shipments-yamal-lng-market [Accessed].

O'SHAUGHNESSY, T. 2020. *Statement of General Terrence J. O'Shaughnessy, U.S. Air Force commander U.S. Northern command and North American Aerospace Defense command In:*

SENATE ARMED SERVICES COMMITTEE, U. S. G. (ed.) *U.S. Government.*

O'SULLIVAN, S. 2016. *Third -party access under pressure from China's big three oil companies* [Online]. Available: https://www.linkedin.com/pulse/third-party-access-under-pressure-from-chinas-big-three-o-sullivan/ [Accessed].

OUTLOOK, B. E. 2019. 2019 edition. *London, United Kingdom2019*.

ØVERLAND, I. 2010. Russia's Arctic energy policy. *International Journal,* 65**,** 865-878.

OVERLAND, I. & KUBAYEVA, G. 2018. *Did China Bankroll Russia's Annexation of Crimea? The Role of Sino-Russian Energy Relations*.

OXENSTIERNA, S. 2015. *The Challenges for Russia's Politicized Economic System*, Routledge.

PAIK, K.-W. 2012. *Sino-Russian Oil and Gas Cooperation*, Oxford: Oxford University Press/OIES.

PAIK, K.-W. 2015. Sino-Russian Gas and Oil Cooperation: Entering into an era of Strategic Partnership? OIES Paper WPM 59, April 2015. [Online]. Available at: http://www.oxfordenergy.org/wpcms/wp-content/uploads/2015/04/WPM-59.pdf ; [Accessed January 2022].

PAIK, K.-W. 2021. Russian Energy Firms in the Eastern Market, in Elizabeth Buchanan, ed., Russian Energy Strategy in the Asian-Pacific : Implications for Australia (Canberra : ANU Press, 2021), pp. 105-139.

PARASKOVA, T. 2017. Rosneft, China to Fepen Strategic Cooperation. *Oilprice.com* [Online].

PAUL, M. 2019. Partnership on the high seas: China and Russia's joint naval manoeuvres.

PEGIN, N. A. 2016. National Arctic Transport Line: problems and prospects. *Арктика и Север/Arctic and North. 2016. № 23***,** 28.

PENG, J. & WEGGE, N. 2015. China's bilateral diplomacy in the Arctic. *Polar Geography,* 38**,** 233-249.

PETERS, K., STEINBERG, P. & STRATFORD, E. 2018. *Territory beyond terra*.

PETROL, B. 2010. BP Statistical Review of World Energy June 2010. *London, BP*.

PIROG, R. L. The role of national oil companies in the international oil market. 2007. Congressional Research Service, Library of Congress.

PODOBEDOVA, L. 2015. Rosneft'napisala plan razdela 'Gazproma'v trekh chastyakh. *Rosneft has Written a Plan to Divide Gazprom in Three Parts.] RBK, August,* 31.

POINT, M. W. I. W. 2021. How Polar Security and Space Security are Linked—and Why the US Coast Guard Should Bridge the Gap - Modern War Institute.

POMFRET, R. 2005. Trade policies in Central Asia after EU enlargement and before Russian WTO accession: Regionalism and integration into the world economy. *Economic Systems,* 29**,** 32-58.

PONTE, S. & STURGEON, T. 2014. Explaining governance in global value chains: A modular theory-building effort. *Review of International Political Economy,* 21**,** 195-223.

POSEN, B. R. 2009. Emerging multipolarity: why should we care. *Current History,* 108**,** 347-352.

PRICES, I. E. 2011. International Energy Agency. *Energy Prices and Taxes,* 2011.

PUTIN, V. The Arctic: Territory of Dialogue International Forum. Speech at the Fourth International Forum, The Arctic: Territory of Dialogue. Retrieved from http://en. kremlin. ru/events/president/news/54149, 2017.

PUTIN, V. 2017. Putin to Russian children on Knowledge Day. *In:* PUTIN, V. (ed.) *Putin at Knowledge Day 2017.*

QIAO, L. 2002. *Unrestricted warfare : China's master plan to destroy America / Qiao Liang and Wang Xiangsui*

[introduction by Al Santoli], Panama City, Panama, Panama City, Panama : Pan American Pub., c2002.

QIN, H. 2015. *World scientific reference on globalisation in Eurasia and the Pacific Rim*.

QINHUA, X. 2007. China's energy diplomacy and its implications for global energy security. *FES briefing paper* [Online], 13.

QINHUA, X. F. E. S. 2007. *China's energy diplomacy and its implications for global energy security*. *FES briefing paper.* Berlin.

QUAH, D. 2011. The Global Economy's Shifting Centre of Gravity. *Global Policy,* 2**,** 3-9.

RAGLAND, L. A., MCREYNOLDS, J., SOUTHERLAND, M. & MULVENON, J. 2014. *Red cloud rising: Cloud computing in China*.

RAINWATER, S. 2013. Race to the north: China's Arctic strategy and Its implications. *Naval War College Review,* 66**,** 62-82.

RAJAEE, B. 2000. Regional geopolitics and legal regimes: the Caspian Sea and US policy. *International Politics,* 37**,** 75-98.

RAPOZA, K. 2017. To Counter U.S., Russia allows Gazprom to sell LNG "At any price". *Forbes*.

RASKA, M. 2013. China's [Secret] Civil-Military Megaprojects.

RAZMANOVA & STEBLYANSKAYA, 2020. Arctic LNG cluster: new opportunities or new threats? *IOP Conference Series: Earth and Environmental Science*, 2020. IOP Publishing, 012165.

REILLY, T. 2013. China's ambitions make Arctic a global hotspot. *The Financial Times,* 23 May. Letters page.

REILLY, T. 2019. The US cannot rule the new global tech order. *The Financial Times,* 16 Dec. p.22.

REUTERS 2008. Russia's Gazprom drops Baltic LNG project. [online]. @Reuters.

REUTERS 2014. UPDATE 1-Rosneft challenges Gazprom monopoly to export Russian pipeline gas.

REUTERS 2014. Yamal, Russia's gas megaplan, becomes symbol of sanctions defiance.

RICHTER, P. M. & HOLZ, F. 2015. All quiet on the eastern front? Disruption scenarios of Russian natural gas supply to Europe. *Energy Policy,* 80**,** 177-189.

ROBERTS, S., SECOR, A. & ZOOK, M. 2012. *Antipode,* 44**,** 5.

ROLLAND, N. 2017. *The Washington Quarterly,* 40**,** 127.

ROMANOVA, T. 2016. Is Russian Energy Policy towards the EU Only about Geopolitics? The Case of the Third Liberalisation Package. *Geopolitics,* 21**,** 857-879.

ROSECRANCE, R. 1991. Regionalism and the Post: Cold War Era. *International Journal,* 46**,** 373-393.

ROSETH, H. A. 2019. The Arctic Dimension in Sino-Russian Relations *In:* J.BEKKEVOLD AND B.LO, E. (ed.) *Sino-Russian Relations in the 21st Century.* Switzerland: palgrave macmillan. Ch.8.

ROSSITER, N. 2017. *Fibreculture Journal,* 29**,** 152.

ROSSITER, N. 2017. *Software, infrastructure, labor: A media theory of logistical nightmares*.

ROUT, U. K., VOB, A., SINGH, A., FAHL, U., BLESL, M. & GALLACHÓIR, B. P. Ó. 2011. Energy and emissions forecast of China over a long-time horizon. *Energy,* 36**,** 1-11.

RUPPERT, E., ISIN, E. & BIGO, D. 2017. *Big Data & Society,* 4**,** 1.

RUSH DOSHI, A. D.-H. & GAOQI, Z. 2021. Northern expedition: China's Arctic activities and ambitions.

RUTA, M., HERRERA DAPPE, M., LALL, S. & ZHANG, C. 2019. *Belt and Road Economics*, Washington, DC: World Bank.

SASSEN, S. 2018. *Territory, Politics, Governance,* 6**,** 5.

SAUNAVAARA, J. 2018. Arctic subsea communication cables and the regional development of northern peripheries. *Arctic and North,* 32**,** 51-67.

SCHOLVIN, S. & WIGELL, M. 2018. Power politics by economic means: Geoeconomics as an analytical approach and foreign policy practice. *Comparative Strategy,* 37**,** 73-84.

SCIENMAG 2020. MIPT and HUAWEI started cooperation in the field of artificial intelligence | Scienmag: Latest Science and Health News. *https://scienmag.com/.*

SCOTT POLAR RESEARCH INSTITUTE, U. O. C. *The Russian Far East, Arctic and China: Reshaping Northeast Asia in the 21st Century?* , May 25-26, 2017 2017 Cambridge, UK,. Univeristy of Cambridge

SERGUNIN, A. & KONYSHEV, V. 2019. Forging Russia's Arctic strategy: actors and decision-making. *The Polar Journal***,** 1-19.

SEROVA, N. A. & SEROVA, V. A. 2021. Transport Infrastructure of the Russian Arctic: Specifics Features and Development Prospects. *Studies on Russian Economic Development,* 32**,** 214-220.

SHADRINA, E. 2014. Russia′ s natural gas policy toward Northeast Asia: Rationales, objectives and institutions. *Energy Policy,* 74**,** 54-67.

SHAN, B.-G., XU, M.-J., ZHU, F.-G. & ZHANG, C.-L. 2012. China's energy demand scenario analysis in 2030. *Energy Procedia,* 14**,** 1292-1298.

SHATALOV, I. 2016. Gazprom Neft. Moscow.

SHCHEPIN, K. 2016. Russia and China unite innovation potential. *Rossiyskaya Gazeta*, 11 January

SHCHEPIN, K. 2018. Россия и Китай объединяют инновационный потенциал [Russia and China are Uniting their Innovation Potential]. *Rossiiskaia Gazeta*, 1 November 2018. Available: https://rg.ru/2018/11/01/rossijskie-nii-i-tehnoparki-predlozhili-rasshirit-sotrudnichestvo-s-knr.html [Accessed 1 November 2018].

SHEN, H. 2018. *International Journal of Communication,* 12**,** 19.

SHESTAKOV, Y. 2015. China and Russia plan greater Eurasian integration–Expert. *Rossiyskaya Gazeta,* 6.

SIDDIQUI, S. 2019. BRI, BeiDou and the Digital Silk Road. *Asia Times*, 2019-04-09.

SIDORTSOV, R. 2014. The Myth of Liberalization: The 2013 Changes in the Russian LNG Export Regime. *Energy LJ,* 35**,** 323.

SIDORTSOV, R. 2017. The Russian offshore oil and gas regime, When tight control means less order.

SIMES, D. 2020. *Huawei plays star role in new China-Russia AI partnership* [Online]. @NAR. Available: https://asia.nikkei.com/Spotlight/Asia-Insight/Huawei-plays-star-role-in-new-China-Russia-AI-partnership [Accessed].

SIMPFENDORFER, B. 2011. *The New Silk Road: How a rising Arab world is turning away from the West and Rediscovering China*, Springer.

SMITH, L. 2011. *The new north: The world in 2050*, Profile Books.

SOLANKO, L. & SUTELA, P. 2009. Too much or too little Russian gas to Europe? *Eurasian Geography and Economics,* 50**,** 58-74.

SORENSEN, E. K. C. T. 2017. *The status of Chinese-Russian energy cooperation in the Arctic* [Online]. Available: https://www.sipri.org/commentary/topical-

backgrounder/2017/chinese-russian-energy-cooperation-arctic [Accessed].

SOROKA, G. 2016. The Political Economy of Russia's Reimagined Arctic. *Arctic Yearbook 2016***,** 359-389.

SPUTNIK, N. 2014. Putin confirms plans to meet Chinese president during APEC summit in Beijing. *Sputnik News, [online] 10 November.*

SPYKMAN, N. J. 2017. *America's strategy in world politics: the U.S. and the balance of power*, Routledge.

STAALESEN, A. 2017. Gazprom hints it might share Yamal gas with Novatek. *The Barents Observer.*

STAALESEN, A. 2020. In the making, a new integrated info system for Russian Arctic. *The Barents Observer*.

STAALESEN, A. 2021. Total buys stake in Murmansk LNG terminal. *The Barents Observer, [online]*.

STAROSIELSKI, N. 2015. *The undersea network*.

STAROSIELSKI, N., PARKS, L. & STAROSIELSKI, N. 2015. *Signal traffic: Critical studies of media infrastructures*.

STEBLYANSKAYA, A. N., ZHEN, W., RAZMANOVA, S. V. & ISKRITSKAYA, N. I. 2018. Sino-Russian transregional gas cooperation: Key issues.

STEINBERG, P. E. 1994. Territory, territoriality and the new industrial geography. *Political Geography,* 13**,** 3-5.

STERN, J. 2006. *The new security environment for European gas: worsening geopolitics and increasing global competition for LNG*.

STERN, J. 2012. *The pricing of internationally traded gas*, Oxford University Press.

STERN, J. 2017. Challenges to the Future of Gas: unburnable or unaffordable?

STERN, J. P. 2005. *The future of Russian gas and Gazprom*, Oxford University Press, USA.

STEVENS, P. 2010. The'Shale Gas Revolution': Hype and Reality. Chatham House London.

STOREY, D. 2012. *Territories: The claiming of space*.

STRONSKI, P. & NG, N. 2018. Cooperation and Competition: Russia and China in Central Asia, the Russian Far East, and the Arctic. Washington: Carnegie Endowment for International Peace.

SU, P. & MAYER, M. 2018. Science Diplomacy and Trust Building:'Science China'in the Arctic. *Global Policy,* 9**,** 23-28.

SUM, N. L. 2018. *Territory, Politics, Governance,* 7**,** 528.

SUN, Y. 2018. The Northern Sea Route. The Myth of Sino-Russian Cooperation. *Stimson.org, [online]* [Online]. Available from: Available at: https://www.stimson.org/wp-content/files/file-attachments/Stimson%20-%20The%20Northern%20Sea%20Route%20-%20The%20Myth%20of%20Sino-Russian%20Cooperation.pdf.

SURKOVA, L. 2019. Конфликт с Huawei вызовет технологическое отставание США от России [Conflict with Huawei will cause US technological lag behind Russia]. *Vzgliad: Delovaia Gazeta*, 10 June 2019. Available: https://vz.ru/society/2019/6/10/963694.html [Accessed 10 June 2019].

SUTTER, R. G. 2012. *Chinese foreign relations: Power and policy since the Cold War*, Rowman & Littlefield.

TAO, C., LIU, S., TIAN, Y., GU, X. & CHENG, B. 2019. Effects of China's OFDI on Exports: A Context Analysis with the "21st-Century Maritime Silk Road" Regions. *Journal of Coastal Research,* 94**,** 903-907.

TECHNOLOGY, M. O. S. A. 2016. *"China and Russia formally establish innovative dialogue mechanism"[Press release]*.

TELLIS, A. J. 2007. China's Military Space Strategy. *Survival,* 49**,** 41-72.

TOAL, G., TUATHAIL, G. Ó., DALBY, S. & ROUTLEDGE, P. 1998. *The geopolitics reader*, Psychology Press.

TOKAREV, A. 2017. Can Oil Company Imports Be Substituted? *Problems of Economic Transition,* 59**,** 100-112.

TOTAL PLC, 2013. Alaska Natural Gas Transportation Projects, Yamal LNG Shipping Options. [PPP] Yamal, Russia.

TRAVKINA, E., ILYASOV, R., SAMYLOVSKAYA, E. & KUDRYAVTSEVA, R. A. Northern Sea Route: Formation of Russian Transport Policy in the Arctic. IOP Conference Series: Earth and Environmental Science, 2019. IOP Publishing, 012088.

TRUBNIKOV, V. & RICHTER, U. H. 2020. China energy policy: evidence of china-russia cooperation. *International Journal of Energy Economics and Policy,* 10**,** 145.

TSENG, K. H.-Y. & LIM, T.-W. 2019. The Belt and Road Initiative (BRI) and the Chinese Vision of Regionalization. *China and the World,* 2**,** 1950013.

TSYGANKOV, A. P. 2015. The Sino-Russian Challenge to the World Order: National Identities, Bilateral Relations, and East versus West in the 2010s. By Gilbert Rozman. Washington, DC: Woodrow Wilson Center Press with Stanford University Press, 2014. x, 304 pp. $50.00 (cloth). *The Journal of Asian Studies,* 74**,** 731-732.

TUSIANI, M. D. & SHEARER, G. 2007. *LNG: a nontechnical guide*, PennWell Books.

TV-NOVOSTI 2016. Yamal LNG contacts mostly tied to Asia-Pacific - CEO.

U.S. ENERGY INFORMATION ADMINISTRATION, 2007. World Natural Gas Consumption (1990-2040). *International Energy Outlook.*

VASILYEVA, N. A. & LAGUTINA, M. L. 2016. *The Russian Project of Eurasian Integration: Geopolitical Prospects*, Rowman & Littlefield.

VIHMA, A. 2018. Geoeconomic Analysis and the Limits of Critical Geopolitics: A New Engagement with Edward Luttwak. *Geopolitics,* 23**,** 1-21.

WALCOTT, S. M. 2017. *Chinese science and technology industrial parks*, Routledge.

WALTON, C. D. 2007. *Geopolitics and the great powers in the 21st century: multipolarity and the revolution in strategic perspective*, Routledge.

WALTZ, K. N. 1979. Theory of international politics/Kenneth N. Waltz. Reading, Mass.: Addison-Wesley Pub. Co.

WALTZ, K. N. 1988. The origins of war in neorealist theory. *The Journal of Interdisciplinary History,* 18**,** 615-628.

WATKINS, S. 2020. *Iran Sets Its Sights On LNG Superpower Status [online]* [Online]. London: @YahooFinance Available at: https://finance.yahoo.com/news/iran-sets-sights-lng-superpower-180000503.html?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAAHozjrT3tEEWyN2-iACFj8T2PiE30PQMSN1tQqWZFIkkKS12Zrg7Ng9rPf7u9qy74LvZLxocIJVcK2DTMX6YoImsjUaA9qH8xVe8h-RJkALAsw. Available: https://finance.yahoo.com/news/iran-sets-sights-lng-superpower-180000503.html [Accessed [16 June 2020] 2020].

WEAVER, C. 2013. Rosneft gains control of Itera. 2 July. *Financial Times*.

WEBSTER, C. T. K. 2020. Full Translation: China's 'New Generation Artificial Intelligence Development Plan' (2017). *New America*.

WEIDACHER HSIUNG, C. 2016. China and Arctic energy: drivers and limitations. *The Polar Journal,* 6**,** 243-258.

WENMU, Z. 2006. Sea power and China's strategic choices.

WESTPHAL, K. 2006. Energy policy between multilateral governance and geopolitics: whither Europe? *Internationale Politik und Gesellschaft,* 4**,** 44-62.

WILHJELM, L. B. 2019. Public lecture: Political Economy and Military Power. Transition to a new power structure: From Globalization to regionalization.

WILKINS, T. S. 2008. Russo–Chinese strategic partnership: A new form of security cooperation? *Contemporary Security Policy,* 29**,** 358-383.

WILLIAMS, A. 2020. US eyes China military as it tightens tech export rules. *FT*.

WINSECK, D. 2017. *Journal of Information Policy,* 7**,** 228.

WINSECK, D., HAGGART, B., HENNE, K. & TUSIKOV, N. 2019. *Information, technology and control in a changing world: Understanding power structures in the 21st century*.

WIŚNIEWSKI, R. 2019. Military-Technical Cooperation between Russian Federation and People's Republic of China–drivers and perspectives of future evolution. *The Copernicus Journal of Political Studies*.

WOMACK*, B. 2004. Asymmetry theory and China's concept of multipolarity. *Journal of Contemporary China,* 13**,** 351-366.

WOOK-PAIK, K. 2016. Sino-Russian oil and gas cooperation: where it stands and how far can it expand? *Canadian Energy Research*

WOOK PAIK, K. "Russian Energy Firms in the Eastern Market", in Elizabeth Buchanan, ed., Russian Energy Strategy in the Asian-Pacific : Implications for Australia (Canberra : ANU Press, 2-021), pp. 105-139.

WRIGHT, T. 2013. Sifting through interdependence. *The Washington Quarterly,* 36**,** 7-23.

WRIGHT, T. 2017. *All measures short of war: the contest for the twenty-first century and the future of American power*, Yale University Press.

WU, Z. 2019. Towards naval normalcy: 'open seas protection' and Sino-US maritime relations. *The Pacific Review***,** 1-28.

XIANGSUI, L. A. 2017. *Unrestricted warfare : China's master plan to destroy America / Qiao Liang and Wang Xiangsui*

[introduction by Al Santoli], Panama City, Panama, Panama City, Panama : Pan American Pub., c2002.

XUE, L. Universities in China's national innovation system. United Nations Educational, Scientific, and Cultural Organization's online Forum on Higher Education, Research, and Knowledge, November, 2006. 27-30.

YENIKEYEFF, S. M. & KRYSIEK, T. F. 2007. The battle for the next energy frontier: The Russian polar expedition and the future of Arctic hydrocarbons.

YIZHOU, W. 2013. Opportunities and challenges for China's new leaders in building mutual trust with the world. *Global Asia,* 8**,** 32-37.

YONG, S. 2005. An introduction to China's science and technology policy. *Lecture at the Kennedy School of Government, Cambridge, Massachusetts*.

YU, Q. 1999. *The implementation of China's science and technology policy*, Greenwood Publishing Group.

YULONG, L., LINGHAO, K. & JIA, L. 2016. Yamal LNG project and Made-in-China equipment going globally. *CHINA OIL & GAS中国油气,* 23**,** 13-17.

ZAKHAROV, A. 2019. The Geopolitics of the US-India-Russia Strategic Triangle. *Strategic Analysis,* 43**,** 357-371.

ZASEDANIE. 2013. *Meeting of the Commission for Strategic Development of the Fuel-Energy Complex and Environmental Safety. [online]* [Online]. Moscow: Russian Government. Available: Available at: http://kremlin.ru/events/president/news/by-date/13.02.2013 [Accessed 12 February 2016].

ZE, S. 2017. Developing Siberia and the Russian Far East: A Perspective on China-Russia Cooperation. *China Int'l Stud.,* 63**,** 133.

ZENG, J., STEVENS, T. & CHEN, Y. 2017. China's Solution to Global Cyber Governance: Unpacking the Domestic Discourse of “Internet Sovereignty”. *Politics & Policy,* 45**,** 432-464.

ZHANG, J. 2019. The West’s insecurities in the Sino-US tech war. *Asia Times*, 2019-06-19.

ZHANG, K. & CAI, Z. 2015. Globalization 4.0, Regional Coordinated Development 4.0, and Industry 4.0: the background to the ‘One Belt, One Road” strategy and its intrinsic nature and critical power. *Erina Report***,** 37.

ZHANG, L., SOVACOOL, B. K., REN, J. & ELY, A. 2017. The Dragon awakens: Innovation, competition, and transition in the energy strategy of the People’s Republic of China, 1949–2017. *Energy Policy,* 108**,** 634-644.

ZHANG, W. 2006. Sea power and China's strategic choices. *World Security Institute,* Summer 2006**,** 17-31.

ZHDANNIKOV, D. 2019. Novatek, Shell see Russian gas keeping edge in Europe over U.S. [online] [Online]. Reuters. Available: Available at: https://www.reuters.com/article/us-russia-novatek-sanctions-idUSKCN1QG21K [Accessed 1 January 2022].

ZHONGPING, F. & JING, H. 2014. China's Strategic Partnership Diplomacy.

ZHOU, N., WU, Q., HU, X., XU, D. & WANG, X. 2020. Evaluation of Chinese natural gas investment along the Belt and Road Initiative using super slacks-based measurement of efficiency method. *Resources Policy,* 67**,** 101668.

ZHU, X. 2014. Mandate versus championship: Vertical government intervention and diffusion of innovation in public services in authoritarian China. *Public Management Review,* 16**,** 117-139.

ZHUKOVA, K. & SUKHAREVSKAIA, A. 2019. Huawei усиливает российский центр разработки [Huawei strengthens its Russian Development Centre]. 14 August 2019. Available: https://www.vedomosti.ru/technology/articles/2019/08/14/808833-huawei-usilivaet [Accessed 14 August 2019].

ZUENKO 2018. A Chinese-Russian Program ends with a whimper. *Carnegie Moscow Centre*.

ZYGAR, M. 2016. *All the Kremlin's men: Inside the court of Vladimir Putin*, Public Affairs.

Appendices:

Appendix A

Part One. Interviews: Research Period of PhD: 2016 – Present

Interviews were carried out mainly face to face in the U.S., China, Russia, and UK. In the UK and U.S., the interviews were contemporaneously electronically recorded, and in China and Russia, written up concurrently or immediately after the termination of the session. Two interviews (with the Russian Far East Development Fund and an U.S. Think Tanks, CSIS and CNA) were conducted by e-mail exchange and one (with Christofferson), by Zoom.

Subsequent permission to cite the views of the interviewees was sought (and obtained) from all participants.

All interviews were designed semi-structurally, in a somewhat iterative manner but with a common theme however, and questions were posed as much as possible in an open-ended way. Discourse Analysis (DA) was considered initially but difficulties in linguistic (the Russian and Mandarin languages) and associated cultural differences, negated any advantage that DA methodology may have revealed such as external/cultural influences over argument, narration, and exposition.

In addition to the challenge of foreign languages and their commentaries' actual meaning (when translated), the interviewer was aware in the subsequent analyses of interviews with Chinese (and less so Russian) candidates, other factors, including a requirement for some of them to follow a/the party line, the strategic sensitivity of the subject matter, and the understandable commercial intelligence aspect of Russia's and China's respective energy industries, and their Space collaboration. These last two commercial considerations explain why the questions

asked were necessarily, often general rather than particular in form, and why several overseas interviewees working in government and/or government sponsored academic posts, would only speak to me under conditions of anonymity** and off-the-record briefings. This reflected the fact that the nature and content of this PhD was/is somewhat sensitive.

For this reason and those outlined above, I have not revealed all the names of interviewees in this dissertation, although their occupations (below) are noted, which should give the reader an indication of their level of authority, and the impact on the range of data gathering performed, and its subsequent analysis.

The interviewees from various countries (see list below), were mainly employed in the following occupations and/or had backgrounds in:

- Military and Naval personnel
- Intelligence & Security officers
- Diplomats (specialists in Arctic matters)
- Members of Parliament/Governments
- Civil Servants
- Strategic Industry - business leaders.
- Academia
- Think Tank policy specialists
- Media and Press officers
- Special Advisers (Russia/USA/China)
- Congress Members (USA)

Part Two. Interviews: Dates & Locations

A. UK

(**Page:** 72) Dr F. Livesey. May 2018, POLIS (Cambridge University)

(80, 313) Professor R. Bertelsen, Dr Ash, & Dr Bennett. June 2019, SPRI (Cambridge University)

(392) Professor M. Bradshaw. June 2017, SPRI Arctic Conference (Cambridge University)

(392) Dr S. Yanikeyeff. May 2019, City Conference Centre, London

(175) Professor K-W. Paik. June 2017, SPRI Arctic Conference (Cambridge University)

(289) Professor T. Christensen. July 2016, Khalili Lecture Theatre, SOAS, London

(284) Senior NATO Intelligence officer, U.S. European Command. July 2019, POLIS (Cambridge University)

(313) Professor R. Bertelsen. August 2020, SPRI (Cambridge University)

(289) Dr C Donnelly, 2016-2019, Special Adviser (former) to the Secretary General of NATO

(275) Professor Ho Kin-Chung, Polar Research Institute of Hong Kong, May 2018, SPRI (Cambridge University)

B. China

(**Page:** 135) Professor Zhengyu Wu. June 2017, School of International Relations (Renmin University)

(186, 249) Professor: Shi Ze. June 2017, China Energy Strategy Centre, China Institute of International Studies (MFA)

(142) Professor Yang Jian. May/June 2017, Shanghai Institute of International Studies (Shanghai)

(185) Professor Guo Sujian. May 2017, Fudan University (Shanghai)

(135) Professor Chen Shaofeng. June 2017. Peking University (Beijing)

(273) Associate Professor Zhao Long 18th May 2018, Institute for Global Governance Studies at the Shanghai Institutes for International Studies

** Other anonymous interviewees represented *some* of the following institutions:

- Shanghai Technical University, Shanghai
- China Institute for Maritime Affairs, China Foundation for International Studies (Shanghai)
- East China Normal University (Shanghai)

C. <u>Russia</u>

(**Page:** 138, 285) Dr D. Tulupov. May 2017, [Zoom call] International Relations Department, St Petersburg State University

(116) Kremlin “insider” close to Russian Finance Minister, RF. November 2016. Moscow MFA

(390) Mr A. Bobrakov. November 2016, Far East Development Fund, Moscow

(126,136) Gazprom “insider”. November 2016, Metropolitan Hotel, Moscow.

D. <u>USA</u>

** Other additional anonymous Western interviewees represented *some* of the following institutions:

- Department Of Defence, Washington, DC
- Department of Energy, Washington, DC
- State Department, Washington, DC
- Congressional Members, Capitol Hill, Washington, DC
- Academic Advisers to US Intelligence Community and State Department, Washington, DC
- NATO Defence College, Rome
- Think tanks: Center for Strategic & International Studies, and Center for Naval Analysis

Appendix B

Institutions, Workshops, Organizations and Conferences Attended

UK

Chatham House, Royal Institute of International Affairs	2016-19
Royal United Services Institute.	2017
The International Institute of Strategic Studies	2017
FCO. Polar Regions Department.	2016-18
Ministry of Defence	2019-20
RAF Wyton, Cambrigeshire	2018-19
The Institute for Statecraft	2016-20
University of Cambridge, Centre for Geopolitics	2019
Scott Polar Research Institute: Sino-Russian Arctic Conf'	2017
House of Lords Select Committee on the Arctic	2016

House of Commons Environmental Committee on Arctic 2015

HOLLAND

Clingendael. Netherlands Institute of International Relations 2019

RUSSIA

Moscow State Institute of International Relations 2017

St Petersburg University Faculty of International Relations 2017

CHINA

Renmin University Beijing 2017

Liaowang Institute, Beijing 2017

Shanghai Institute for International Studies 2017

China Institute for International Studies 2017

USA

Centre for Strategic and International Studies 2017

Project for the New American Century 2018

NATO

NATO Defence College – Rome, Italy 2019

Estonia Defence College 2019