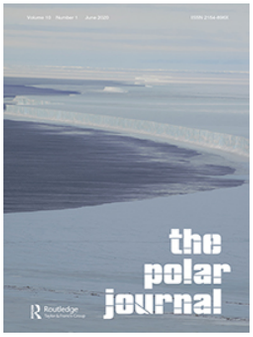

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ARTICLE

Why is exploitation of Arctic offshore oil and natural gas resources ongoing? A multi-level perspective on the cases of Norway and Russia

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ABSTRACT

The study focuses on the challenging complexity of the energy industry transformation. Despite sustainability and climate concerns the exploitation of conventional oil and natural gas resources is ongoing. We investigate the case of Arctic offshore oil and natural gas resources exploitation through a set of interviews, providing two national examples of Norway and Russia. The study design and methodology are inspired by a multi-level perspective framework (MLP) to large socio-technical systems. We focus on the interaction between the landscape and regime levels of the energy industry. The MLP analysis shows that Norway and Russia act differently under the same landscape factors and adjust on the regime level according to their national goals. We conclude that the landscape level does not shape the regime level equally, which complicates the transformational processes in the energy industry. The paper contributes to the sustainability transitions literature through a rarely investigated case, and suggests theoretical implications regarding the interactions between the regime and landscape levels of MLP. The paper introduces a different analytical perspective for scholars of Arctic studies.

KEYWORDS

Arctic; offshore; energy; oil and gas industry; transformation; multi-level perspective

1. Introduction

The Arctic has a long history of industrial activities related to oil and natural gas resources extraction. Commercial exploitation in the North began in the 1920s (Norman Wells in Canada's Northwest Territories, northern Russia, and Alaska),[1] and extensively developed during the World War II. In some countries, the Arctic became one of the major oil and natural gas provinces by the 1950s. In the 1980s, the interest shifted towards the sea, supported by huge discoveries on the Norwegian shelf, in the Beaufort Sea, the North Slope, and in the Barents and Kara seas. The assessment by the United States Geological Survey[2] promises significant amounts of the world's undiscovered conventional oil and natural gas resources in the offshore Arctic (Figure 1). The

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[1] AMAP, "Arctic Oil and Gas 2007."

[2] Gautier et al., "Assessment of Undiscovered Oil and Gas in the Arctic."

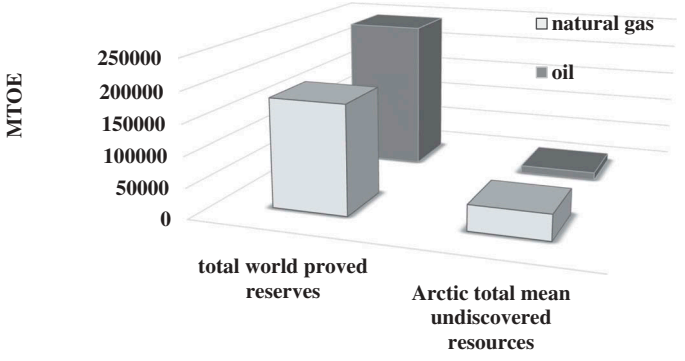

Figure 1. World proved reserves and undiscovered conventional oil and natural gas resources in the offshore Arctic, million tonnes of oil equivalent (mtoe).[3]
[3] Gautier et al.; BP, "Statistical Review of World Energy, 68th Edition."

substantial part of these resources remains to be explored but attracting significant attention.

A substantial number of studies discussed oil and natural gas exploitation in the Arctic. Earlier publications of the 2000s supported the growing interest towards the Arctic region and resource extraction. They predominantly use extensive qualitative discourse and a simplified political perspective.[4]

The topic received more attention during and in the aftermath of the economic crisis of 2008–2009, owing to the changing macroeconomic environment, low oil prices and transforming supply-demand geography of energy resources. In-depth studies on the future potential shares of offshore Arctic oil and natural gas resources in the global energy balance,[5] and demand for these resources[6] showed that the economics of these resources becomes more questionable. Growing energy resource competition (e.g., shale gas revolution, renewable energy) has placed many of the Arctic projects on long-term hold.

Current research has shown that economics is not always a decisive factor. Arctic socio-economic development and natural resources exploitation incorporates many other issues[7] including geopolitics and security; territorial nationalism; rising concerns regarding climate change; indigenous peoples' rights; sustainability and environmental impacts of oil and natural gas exploitation activities. One of the dominating motives is that these resources can potentially contribute to satisfying growing energy demand and increase energy security of some countries.[8]

[4] Young, "The Future of the Arctic: Cauldron of Conflict or Zone of Peace ?".
[5] Lindholt and Glomsrød, "The Arctic: No Big Bonanza for the Global Petroleum Industry."
[6] cf. Petrick et al., "Climate Change, Future Arctic Sea Ice, and the Competitiveness of European Arctic Offshore Oil and Gas Production on World Markets"; Harsem, Eide, and Heen, "Factors Influencing Future Oil and Gas Prospects in the Arctic."
[7] Morgunova and Westphal, "Offshore Hydrocarbon Resources in the Arctic"; van Bets, van Tatenhove, and Mol, "Liquefied Natural Gas Production at Hammerfest"; Kovalenko, Morgunova, and Gribkovskaia, "Infrastructural Synergy of the Northern Sea Route in the International Context"; Olsen, Anderson, and Heinze, "Arctic Carbon Cycle"; Dana, Meis-Mason, and Anderson, "Oil and Gas and the Inuvialuit People of the Western Arctic."
[8] cf. Johnston, "Arctic Energy Resources: Security and Environmental Implications."

There are eight Arctic countries, from which five – Canada, Denmark (via Greenland), Norway, Russia, and the United States – have an outlet to the Arctic Ocean. Three of these countries, namely, Canada, Russia, and the United States, have oil and natural gas onshore production in the Arctic region, and three of them – Norway, Russia, and the United States – produce offshore. Nowadays, mainly Russia and Norway show interest in developing these resources.

The exploitation of oil and natural gas resources is often positioned as the key driver of the socio-economic development of the Arctic.[9] However, the question of whether these resources are necessary from both the global and regional perspective is open.[10] Although global climate concerns are significant, and the energy industry is undergoing a transformation towards more sustainable energy production and consumption,[11] exploitation in the offshore Arctic continues. Therefore, there is a need for an in-depth understanding of the reasoning supporting the ongoing oil and natural gas exploitation activities.

The sustainability transitions literature widely discuss the current changes in the energy industry.[12] However, sustainability transitions studies predominantly focus on renewable energy deployment and renewable technology diffusion,[13] while tending to disregard the oil and gas industry. The Arctic cases are rarely present in the energy transitions literature, even though they can provide a much deeper understanding of transformational processes in the energy industry.

Thus, by investigating the case of Arctic offshore oil and natural gas resources exploitation in the context of energy industry transformation, this study has a double agenda. This is to contribute to the understanding of offshore oil and natural gas resources exploitation in the Arctic by suggesting a different analytical perspective for the Arctic scholars, and to introduce the Arctic case to transition scholars.

This paper has the following structure. Section two introduces the research design and methodology of the study. Section three is devoted to results. Section four suggests the discussion, followed by limitations and future research in section five, and conclusion in section six.

2. Research design and methodology

2.1. Theoretical background

The study builds on the multi-level perspective framework (MLP) to large socio-technical systems (LTS). Hughes[14] defines LTS as an entity of a variety of components, which are physical, managerial, scientific elements and artefacts. It interacts with many other dimensions (e.g., social[15]) and is a rather complex entity. During the interaction processes, changes occur in the system, while its components adjust to the new conditions. In the framework of this study, LTS is the global energy industry, which also includes

[3] Gautier et al.; BP, "Statistical Review of World Energy, 68th Edition."
[9] Larsen and Huskey, "The Arctic Economy in a Global Context."
[10] Koivurova, "Race to Resources in the Arctic."
[11] IEA, "World Energy Outlook."
[12] Köhler et al., "An Agenda for Sustainability Transitions Research."
[13] cf. Agostino et al., "What's the State of Energy Studies Research?"
[14] "The Evolution of Large Technological Systems", originally "large technical systems."
[15] Geels, "The Dynamics of Transitions in Socio-Technical Systems."

exploitation of oil and natural gas resources offshore Arctic with all the incorporated companies, scientific, technological, and legislative elements.

Aiming at investigating the complex interplay of different elements during Arctic offshore oil and natural gas resources exploitation in the context of the global energy industry transformation, we drew inspiration from MLP and similar studies that focus on aspects of energy[16] and other than energy LTS.[17] MLP was initially developed to describe and understand the change processes in the complex systems.[18] It maps and analyses them at three interdependent levels of the structural hierarchy – the socio-technical landscape, the socio-technical regime, and the niche level.

The landscape level is an outer environment including macroeconomic, politics and culture. It is rather stable but dynamic,[19] where other elements (levels or actors) in the system cannot directly influence it. Applied to the Arctic case, the factors which form the landscape level include external macroeconomic factors, patterns of energy consumption, international legislation and regulatory frameworks of the global energy system.

The meso-level is called 'a socio-technical regime'. It represents practices and routines of an engineering community and includes technological artefacts, and 'social' aspects– the routines and practices of scientists, policymakers, and other interdependent groups. All these interconnected elements keep the system rather stable and not eager to change. For the Arctic case, those are the existing practices of the oil and gas industry, as well as related national policies, and other market, industrial, and political shaping factors.

The niche level is a micro-level where radical innovations emerge. MLP studies pay much attention to niches because they are seen as key to giving birth to innovation and supporting their diffusion.[20] In the case of Arctic offshore oil and natural gas resources exploitation, innovations predominantly occur within the national and international energy and oil and gas companies.[21]

Having some limitations,[22] MLP shows its efficiency as a framework in revealing the multi-dimensional complexity and ongoing changes in the global energy system and other LTS.[23] However, many MLP-based studies pay significant attention to the niche level and the way it contributes to the transformation.[24] In this study, we deliberately exclude the niche level. Instead, we switch focus towards the links and connections between the landscape and regime levels.

According to transition scholars,[25] the landscape possesses the ability to facilitate change by exerting pressure on the regime level. However, the character of this pressure can be different. To understand interactions between the landscape and regime levels, as well as the characters of the landscape pressures and their effects, we refer to the study by

[16] Geels, "Regime Resistance against Low-Carbon Transitions."
[17] cf. Blomkvist and Nilsson, "On the Need for System Alignment in Large Water Infrastructure."
[18] Geels and Kemp, "Dynamics in Socio-Technical Systems."
[19] van Driel and Schot, "Radical Innovation as a Multilevel Process."
[20] cf. Geels and Kemp, "Dynamics in Socio-Technical Systems."
[21] Thune, Engen, and Wicken, *Petroleum Industry Transformations*.
[22] Smith, Stirling, and Berkhout, "The Governance of Sustainable Socio-Technical Transitions"; Meadowcroft, "Engaging with the Politics of Sustainability Transitions."
[23] Geels, "Ontologies, Socio-Technical Transitions (to Sustainability), and the Multi-Level Perspective."
[24] Sovacool, "What Are We Doing Here? Analyzing Fifteen Years of Energy Scholarship and Proposing a Social Science Research Agenda."
[25] Smith, Stirling, and Berkhout, "The Governance of Sustainable Socio-Technical Transitions"; Geels and Schot, "Typology of Sociotechnical Transition Pathways."

Suarez and Oliva[26] and use the typology on five types of environmental change: (1) regular, (2) hyperturbulence, (3) specific shock, (4) disruptive, and (5) avalanche. They differ by frequency, amplitude, speed, and scope. The type and character of the landscape pressure affect the way the regime level transforms.

2.2. Data collection and analysis

The study builds on a set of 13 interviews conducted in two rounds. The interview process was designed according to the guidelines by Saunders et al.[27] The first round consisted of three preliminary in-depth interviews in a conversational form with no predetermined questions aiming at acquiring rich data (average 47 min, March 2018). The general guide approach was made to ensure all of the same areas of interest were covered during the interviews. The second round consisted of 10 semi-structured interviews (average 30 min, July and August 2018).

We grouped the discussion topics around the following issues: perspectives of Arctic offshore oil and natural gas resources exploitation, and the corresponding attitudes and approaches in Russia and Norway. The second round of interviews aimed at finding similarities and differences in the views, attitudes, and approaches towards the Arctic offshore oil and natural gas resources exploitation between Russia and Norway. Specifically, the interest was to understand the justification of their presence in the Arctic, how they handle landscape pressures and manage the exploitation of oil and natural gas resources offshore. The questions in the interviews targeted both the landscape and regime levels.

The interviewees have affiliations in the industry (2 interviewees), academia (3), or both (8), while their professional activities are related to energy and/or oil and gas sectors predominantly in Norway and Russia (Table 1). All the interviewees have expertise related to the development and exploitation of oil and natural gas resources in the Arctic region and have participated in related industrial and/or educational projects. The careful selection of the interviewees with high expertise in the topic of investigation allowed gaining extensive and rich empirical data.

Table 1. Profile of interviewees.

#	Affiliation	Areas of expertise	Country
1	Industry, academia	Oil and gas, economics and management of energy resources	Norway, Russia
2	Industry, academia	Oil and gas, energy economics, energy technologies	Russia, USA
3	Industry, academia	Oil and gas, upstream, offshore, Arctic technologies	Norway, Russia
4	Industry, academia	Oil and gas, upstream	Austria
5	Academia	Industrial ecology, oil and gas	Russia
6	Industry	Oil and gas, Arctic exploration, energy economics	Russia
7	Academia	Oil and gas, logistics	Norway
8	Academia, industry	Oil and gas, upstream	Serbia, Austria
9	Academia, industry	Natural gas economics and management	Norway
10	Academia	Economics and management of energy resources	Russia
11	Academia, industry	Oil and gas, offshore, ecology	Norway
12	Industry	Oil and gas, upstream	Russia
13	Academia, industry	Oil and gas, offshore, ecology	Russia

[26] "Environmental Change and Organizational Transformation," 1022–23.
[27] *Research Methods for Business Students*.

We processed and analysed data using procedural qualitative techniques. We analysed data from different perspectives and levels[28]; within each interview, with relation to each focus country (Norway and Russia), the structural level of analysis (regime and landscape levels), and factors of influence indicated by the interviewees.

We ensured the reliability and credibility of the data collection process through a careful choice of interviewees with corresponding expertise and knowledge covering all the focus topics, but also assuring variation in the affiliation.[29] Anonymity helped to avoid any misinformation. We recorded and transcribed all interviews to avoid any misinterpretation. We verified the data through in-text quotations, as well as triangulation. Triangulation showed no contradictory evidence and helped deepen the analysis.[30]

3. Results

3.1. Landscape level

The following section analyses the landscape pressures identified from the interviews – growing energy demand, oil price, geopolitics, and climate change – according to the typology of environmental change.[31]

3.1.1. Growing energy demand

Growing energy demand can be characterised as a regular change of environment. As certain conventional energy resources are limited,[32] there is a continuous challenge to satisfy growing energy demand and ensure stable energy supply. According to the interviewees, these are some of the reasons why the interested parties are looking towards remote and harder-to-access conventional resources, such as Yamal peninsula or the Arctic seas:

> . . . companies start to fight for the Arctic to see if it is our last chance in order to break the pessimistic prediction for the oil and gas industry. (Interview 8)

Some interviewees see the Arctic as an 'oil and gas storeroom', which will restore declining production, contribute to satisfying growing energy demand and stimulate the development of the oil and gas industry.

Although the oil and natural gas resources potential in the Arctic is significant and promising, exploitation of these resources is questionable and sometimes very speculative due to numerous technological or economic risks. Interviewees acknowledge the need for complicated and costly technologies, massive long-run capital investments, unstable weather conditions, sensitive environment, and other challenges influencing exploitation of the Arctic offshore oil and natural gas resources. Further, because of technological progress, the interviewees consider other conventional and non-conventional oil and natural gas resources (e.g., shale gas, deepwater resources, oil shales, oil sands) to be more accessible and competitive compare to Arctic offshore oil and natural gas resources:

[28] Miles and Huberman, *Qualitative Data Analysis*.
[29] Saunders, Lewis, and Thornhill, *Research Methods for Business Students*.
[30] Eisenhardt, "Building Theories from Case Study Research."
[31] Suarez and Oliva, "Environmental Change and Organizational Transformation." The (5) avalanche type of environmental change is rare to occur and was not observed in this case.
[32] cf. Mitchell, Marcel, and Mitchell, *What Next for the Oil and Gas Industry?*

> If there were no Arctic, humanity would have done just fine, because there are many other alternative sources that can be cheaper and more profitable. (Interview 3)

Although the interviewees see growing energy demand as one of the main incentives for exploiting hard-to-access resources (Interviews 2, 5, 6, 7, 9, 10), Arctic offshore oil and natural gas resources seem to have lost its perceived urgency from the macroeconomic perspective. The production volumes from the offshore Arctic calculated to be less than 1% of the total world production.[33] Therefore, it is questionable if these resources may significantly contribute to satisfying global energy demand.

3.1.2. Oil price

There is a direct proven link between the intensity of oil and natural gas resources exploitation and crude oil price,[34] which is especially visible in the case of the offshore Arctic. Offshore Arctic oil and natural gas resources exploitation implies significantly higher costs compared with other conventional oil and natural gas resources. The oil price dependence becomes even more critical at the times of high oil price volatility, which is a case of hyperturbulence.

In the 1970–1980s, rising oil prices stimulated expansion to the North and extended further towards the Arctic frontiers. The global interest in the Arctic oil and natural gas resources occurred in the 2000s along with oil price increase. All the five Arctic states with sea outlets showed great interest in developing Arctic offshore oil and natural gas resources until the first economic crisis of 2008–2009, accompanied by a dramatic oil price drop. The second dramatic decrease in 2014–2015 ($45 per barrel in January 2015) affected future production plans and reduced investments.[35] Fewer companies and governments confirmed their interest in developing these resources. Oil price fluctuations and interest towards the offshore Arctic oil and natural gas resources exploitation may strongly correlate in the future. Oil price volatility, according to the interviewees, is one of the key factors influencing the exploitation of Arctic offshore oil and natural gas resources:

> Oil and gas companies are commercial companies. They go there primarily for profit. Therefore, the first is the price of oil (Interview 6)

Nevertheless, there is some exploitation going on in the offshore Arctic under low oil prices,[36] while the rationale of these activities is questionable. Interestingly, interviewees acknowledge that other than economic reasoning is more significant, while also supported by literature[37] (*'It is believed there are still many resources left. It easily becomes a political issue'*, Interview 11).

3.1.3. Geopolitics

The geopolitical context of the Arctic offshore oil and natural gas resources exploitation changed dramatically under regional and global geopolitical shocks. For example, during the 1960–1970s, instability in the Middle East was one of the key drivers for the commercial exploitation of the Arctic oil and natural gas resources. In the 2010s,

[33] Morgunova, "Arctic Offshore Hydrocarbon Resource Development."
[34] e.g., Mohn and Osmundsen, "Exploration Economics in a Regulated Petroleum Province."
[35] Morgunova, "Arctic Offshore Hydrocarbon Resource Development."
[36] Morgunova.
[37] cf. Koivurova, "Race to Resources in the Arctic."

geopolitical instability in some traditional oil-producing regions caused energy security concerns, making governments and companies look again for the Arctic oil and natural gas resources. The Arctic region rapidly became a subject for global competition.[38] Remarkably, interviewees perceive geopolitical issues in the Arctic as dominating over other factors:

> . . . there is very little unclaimed resources, thus interest towards the Arctic. It is the last undivided area between the developed countries. (Interview 1)

> . . . the priority is not given to economics, competition, technology, but to purely geopolitical issues. No matter how much it costs. (Interview 3)

Some interviewees put together geopolitical issues and global energy security challenges. They see Arctic offshore oil and natural gas resources as local energy resources (Interview 3), thus more preferable and secure than export. Another opinion expressed by an interviewee is that geopolitical competition around the Arctic occurs in a specific form of resource nationalism (' . . . *the global trend towards resource nationalism*', Interview 1), which means that the interest is to secure Arctic offshore oil and natural gas resources without any specific future exploitation plans.

Apart from resource and territorial claims, some of the geopolitical issues relate to sovereignty, and control over transport routes. Transportation and transit over the Arctic seas are seen as one of the most attractive business opportunities.[39]

The numerous and diverse geopolitical issues around the Arctic region seem to be the main driving force. Non-circumpolar countries such as China have also shown interest in entering Arctic projects to secure its future energy supply and expand its commerce.[40]

3.1.4. Climate change

The global energy industry is experiencing a transformation towards sustainability,[41] where climate change is one of the major landscape pressures with a disruptive character. Meanwhile, the ongoing exploration of conventional energy resources may be seen as a key controversy to these changes. Simultaneously, interviewees express readiness of the oil and gas industry to contribute to the mitigation of climate and environmental risks:

> . . . everything is done to prevent even a drop of oil in the sea. (Interview 6)

> With the development of technology we see that attention to environmental issues is increasing . . . environmental monitoring, the best available technologies, all sorts of innovations in production that are capable of protecting the environment from negative anthropogenic influence. (Interview 13)

These efforts are visible in the Arctic flagship projects Snøhvit and Prirazlomnoye through the implementation of a carbon injection and storage, a zero-emission system, etc. However, the recognition of environmental and climate issues and contribution to more environmentally friendly exploitation of oil and natural gas resources do not entirely level the climate and environmental risks. There are issues related to limited

[38] Morgunova and Westphal, "Offshore Hydrocarbon Resources in the Arctic."
[39] Dillow, "Russia and China Vie to Beat the US in the Trillion-Dollar Race to Control the Arctic."
[40] cf. Kobzeva, "China's Arctic Policy: Present and Future."
[41] IEA, "World Energy Outlook: Executive Summary."

knowledge on spill response in ice conditions, industrialisation of sensitive and nature-protected areas,[42] impacts on indigenous people lives,[43] direct and indirect effects of climate change (rising sea level, changing wave regimes, erosion),[44] etc.

Interestingly, some interviewees show scepticism concerning climate change:

> I support the position of those experts who argue that the issue of global warming is not so acute, and the climate changes that we are witnessing right now are just cyclical. (Interview 13)

Some studies argue the controversy of oil and gas industry development with climate change mitigation is not as sharp as it was before when international energy companies tended to prioritise profit maximisation over sustainability concerns.[45] Nevertheless, the risks seem to remain substantial.

To summarise, the landscape pressures – growing energy demand, oil price, geopolitics, and climate change – both facilitate and constrain Arctic offshore oil and natural gas resources exploitation. The strongest effect is visible from the specific geopolitical shocks. Disruptive climate pressures are marginal. Geopolitical issues seem to dominate over other landscape pressures. In the application to the Arctic case, the landscape pressures have no uniformity and show a limited and diverging effect.

3.2. Regime level

The analysis of the regime level is based on two countries – Norway and Russia – and includes their background and motives to develop offshore oil and natural gas resources in the Arctic.

3.2.1. Norway

The Norwegian oil and gas industry was initially born to develop offshore fields and is a leader in offshore oil and natural gas production. The offshore Arctic development has been a priority for Norway since 2005. Three offshore fields above the Arctic Circle are currently in production – Snøhvit, Skuld, and Goliat. There are also some recent significant discoveries in the Norwegian Arctic (e.g., Aasta Hansteen, Johan Castberg, Cape Vulture well, Kayak well, Blåmann well, Filicudi prospect). The province of great potential is the Norwegian Barents Sea. The recent re-evaluation has almost doubled its resource estimates,[46] resulting in higher activity during the licencing rounds.[47]

Both national and international companies can get access to the Arctic offshore oil and natural gas fields through licencing rounds.[48] The key actor on the Norwegian shelf is the governmental company Equinor (former Statoil). In the upcoming years, the Norwegian Petroleum Directorate (NPD) expects a total oil and natural gas production increase while also reaching record production volumes.[49]

[42] e.g., Kotchen and Burger, "Should We Drill in the Arctic National Wildlife Refuge? An Economic Perspective."
[43] Dana, Meis-Mason, and Anderson, "Oil and Gas and the Inuvialuit People of the Western Arctic."
[44] Burkett, "Global Climate Change Implications for Coastal and Offshore Oil and Gas Development."
[45] van den Hove, Le Menestrel, and de Bettignies, "The Oil Industry and Climate Change."
[46] NPD, "Doubling the Resource Estimate for the Barents Sea."
[47] NPD, "38 Companies Have Applied for Acreage in APA 2018."
[48] Shapovalova and Stephen, "No Race for the Arctic? Examination of Interconnections between Legal Regimes for Offshore Petroleum Licensing and Level of Industry Activity."
[49] NPD, "The Shelf in 2018."

Interviewees explain the ongoing activities as for Norwegian oil and gas industry '… *there is de facto no alternative to entering the Arctic*' (Interview 1). These resources are a supplement for the decreasing production in the country. The interviewees consider it as the primary motive for Norway going offshore in the Arctic (Interview 2, 7, 9). Further, the oil and gas industry in Norway constitutes 14% of GDP of the country,[50] not including the service sector. It is a mature industry which employs approximately 200,000 people. Interviewees underline its dramatic influence on the Norwegian economy:

> The country depends on its economy. The most important part of the Norwegian economy is the oil and gas industry and technologies related to the industry. The country, therefore, has such a high level of welfare. (Interview 7)

The dependency on oil and gas revenues for Norway is substantial and is one of the reasons for the intense exploitation of Arctic offshore oil and natural gas resources. The resource development goals relate to the governmental goals, while supported by well-developed regulation mechanisms and a clear adjustable governmental framework. Policies in the Arctic aim to create the proper conditions for further active oil and gas industry development. Cooperation agreements are supported by the government to secure investments. Tax rates are defined for each project individually and change through the project parameters so that risks are mitigated. Norwegian government co-finance projects via the State's Direct Financial Interest mechanism.[51] Governmental regulation also includes a very active position in industry development. The Norwegian government has created special protectionist measures to stimulate companies to facilitate positive socio-economic development of the country from offshore oil and natural gas resources exploitation through compulsory involvement of local companies and local workforce.[52]

However, the Norwegian government supports Arctic offshore projects only if they comply with the highest environmental standards. Industry development is not a priority if it is not meeting the ecological and environmental goals (Interview 3, 13).

The regional energy security aspects are also important in stimulating the exploitation of Arctic offshore oil and natural gas resources in Norway. Norway is the third-largest natural gas supplier in the world. Nearly all the natural gas goes to the European market,[53] satisfying approximately 25% of the European Union (EU) natural gas demand. This makes Norway one of the most important EU suppliers. Interviewees see the need to cover European energy demand as one of the reasons for Norway going further into the Arctic:

> Europe encourages Norway to produce as much as possible because it is much better to buy Norwegian gas than Russian. (Interview 9)

In general, the geopolitical situation around Norwegian offshore natural gas resources is perceived as stable, since their exploitation is bilaterally beneficial for Norway and the EU:

[50] Norskpetroleum, "The Government's Revenues."
[51] Pimenova and Bazaleva, "Comparative Analysis of Tax Regimes of Development of the Arctic Shelf of Foreign Countries and the Russian Federation (In Russian)."
[52] Kryukov, "Russia's Oil Dilemmas. Production: To Go North-East or to Go Deep? Exports: Is a Compromise Between Westward and Eastward Directions Possible?".
[53] Ministry of Petroleum and Energy, "Gas Exports from the Norwegian Shelf."

> . . . the country risk for Norway extremely low. (Interview 4)

The already well-developed export infrastructure between Norway and the EU is an additional prerequisite for the discharged geopolitical atmosphere around offshore Arctic oil and natural gas exploitation (Interview 9). Furthermore, the use of the existing pipeline infrastructure is more sustainable than any other new transportation projects.

3.2.2. Russia

The oil and gas industry in Russia is one of the largest in the world. It is also significant for the economy of the country, as it generates more than 40% of the budget revenues.[54] Arctic onshore fields have served as a basis for export since the 1960s but are depleting. The Arctic offshore and can potentially contribute to the falling production.

The majority of the discoveries of offshore fields the Russian Arctic were made in the 1980s in Barents, Kara, and Pechora Seas. These provinces have huge proved resource potential, are the most explored and accessible with the longest ice-free periods. However, there are currently only two fields in the production stage–Prirazlomnoye and Yurkharovskoye (partly offshore).

The Arctic is a strategic priority for Russia because of its huge perceived resource and socio-economic potential.[55] By an estimation from one interviewee, Russian Arctic oil and natural gas is a vast resource asset of total value up to 7 USD billion not including other types of resources (Interview 3). They constitute significant interest for the variety of actors (Interview 2).

The official documents on the Arctic region development[56] declare to provide economic and infrastructure development, support national sovereignty interests, and promote ecological safety. There is a declared aim to create the new oil and natural gas province in the Arctic. Moreover, according to the Energy Strategy of the Russian Federation,[57] one of the goals is to prepare large-scale exploitation of Arctic offshore oil and natural gas resources.

There are predominantly two instruments to stimulate Arctic offshore oil and natural gas resources exploitation in Russia – 'political will' and taxation. The overall view of the interviewees is that these activities require political support to be effective. The Russian government seeks to maximise the socio-economic potential associated with Arctic offshore oil and natural gas resources exploitation. However, the key parameters are investment returns and taxes. Some scholars[58] consider the tax regime of Russia to develop Arctic offshore oil and natural gas fields is relatively favourable compared with other Arctic countries since profit tax and royalties are rather low. However, the tax system is less adaptable to individual indicators of a field (Interview 1). Furthermore, governmental control implies limited access to the offshore fields (no public available geological data, limited access for international companies), because of 'resource protectionism' (Interview 1). The Russian

[54] Ministry of Finance of the Russian Federation, "Federal Budget of the Russian Federation."
[55] Russian Government, On the Strategy for the Development of the Arctic Zone of the Russian Federation and Ensuring National Security for the Period to 2020 (In Russian).
[56] Russian Government, State programme Socio-economic development of the Arctic zone of the Russian Federation for the period until 2020 (In Russian).
[57] Ministry of Energy, Energy Strategy of Russia for the period up to 2030 (In Russian).
[58] Pimenova and Bazaleva, "Comparative Analysis of Tax Regimes of Development of the Arctic Shelf of Foreign Countries and the Russian Federation (In Russian)."

government placed even more control on the Arctic data (e.g., geological, weather, logistics, transport) because of a rather tense geopolitical situation with some countries.

Further, the companies allowed to operate offshore in the Russian Arctic are the ones with governmental ownership and more than five years of experience in offshore operations. The only companies to fulfil those conditions are Rosneft and Gazprom, which have already received nearly 80% of the offshore Arctic licences. The two other private companies that have shown interest in participating in Arctic offshore projects – Novatek and Lukoil – have limited access to offshore Arctic projects, even though both of them have rich experience in working in Arctic-like conditions. Because of limitations, companies redirect investments from the Arctic offshore resources.[59]

Although interviewees seem to highlight opportunities in the Arctic, they also negatively evaluate the strong affiliation of the companies with the government accompanied by overarching governmental control:

> In Russia, state-owned companies perform a geopolitical task, but not an economic one (Interview 12)

> . . . the degree of affiliation of the companies involved in extraction with the state is so high that the interests of the companies completely coincide with the state interests. (Interview 10)

In general, interviewees acknowledge the strategic priorities of Russia concerning exploitation of the Arctic offshore oil and natural gas resources dominate over other issues.

The most substantial factor affecting Arctic offshore oil and natural gas resources exploitation in Russia is the implied sanctions.[60] They significantly altered investment programmes and forced international companies to leave (e.g., ExxonMobil, Eni, and Statoil). As a result, Russian companies have difficulties in ensuring sufficient funds for the exploitation and accessing technologies.[61]

4. Discussion

4.1. Comparing the two countries

The prerequisites for Arctic offshore oil and natural gas resources exploitation are similar for both Norway and Russia, but the background, motives, and the outcomes are different.

There are six main similarities. First, both Norway and Russia are oil and natural gas producing countries and are economically dependent on their export. Second, both countries have the challenge of compensating falling production while simultaneously satisfying growing energy demand. Third, both countries consider the offshore Arctic to have great potential for new huge commercial discoveries of oil and natural gas. Fourth, because the Arctic is a strategic national priority for both Norway and Russia, it affects the way the government engages in the Arctic offshore oil and natural gas resources exploitation. Fifth, political and economic interests concerning the Arctic region intersect very much. Finally, climate change issues have, in general, a rather weak effect on these activities in the two countries. Nevertheless, ecological issues are declared to be of

[59] Pritchin, "Russia's Untapped Arctic Potential."
[60] Congressional Research Service, "U.S. Sanctions on Russia."
[61] Mitrova, Grushevenko, and Malov, "Prospects for Russian Oil Production: Life under Sanctions (In Russian)."

high priority for both countries, even though Norway has a more advanced environmental regulation.

However, there are some critical differences. The most distinct one underlined by the interviewees is that Norway has limited options to maintain its falling oil and natural gas production. For Russia, Arctic offshore oil and natural gas resources are complex and to a large extent undiscovered, while other more accessible resources are available:

> For Norway, there is de facto no alternative to entering the Arctic. Russian companies have many more alternatives. It is possible to increase the oil recovery factor in operating deposits, which is much cheaper and easier. (Interview 1)

The intensity of exploitation also depends on the natural conditions of the Arctic offshore areas of Norway and Russia (freezing and non-freezing seas). Norway can apply existing engineering practices to its offshore fields in the Arctic, whereas Russia needs to further adapt them for the more severe ice conditions offshore the Russian Arctic.

Another substantial difference is in the strategic planning, regulatory measures and instruments (Interview 1, 2, 3). The fiscal regulation in Norway is more developed, even though the tax regime in Russia is more favourable. Other regulation mechanisms in Norway, including governmental co-financing, guidance, and support, are more stable and diverse.

Protectionist measures are also realised differently. In Russia, resource protectionism limits access to resources and information. In Norway, those measures are to involve local companies and workforce.

We observed the most dramatic difference in geopolitics. In Norway, there is in general high support for continuing operations in the Arctic if it complies with the highest environmental and safety standards. It also finds support on the EU level, as Norway is one of the main EU natural gas suppliers. In Russia, any business activity across the Arctic seas has been significantly lowered owing to EU and U.S. sanctions. Although highly supported by the government, Russian companies are not capable of ensuring sufficient investment and technologies.

4.2. MLP framework: what can we learn from the Arctic case?

The application of the MLP framework to the case of Arctic offshore oil and natural gas resources exploitation produced some interesting outcomes.

First, the landscape pressures have similar characters based on the typology of environmental change, but there is no uniformity in how they affect the regime level. This attracts attention to the role of the regime and its qualities and capacities,[62] which may cause these differences.

Second, despite the landscape pressures, the oil and gas industry continues developing according to existing routines and practices. Indeed, the dominance of the interconnected routines and practices at the regime level is what prevails under other reasoning for system change.[63] However, the MLP analysis shows the

[62] Berggren, Magnusson, and Sushandoyo, "Transition Pathways Revisited: Established Firms as Multi-Level Actors in the Heavy Vehicle Industry"; Genus and Coles, "Rethinking the Multi-Level Perspective of Technological Transitions."
[63] Geels and Kemp, "Dynamics in Socio-Technical Systems."

regime is even stronger since governments participate closely.[64] Norway and Russia act differently under landscape pressures but adjust on the regime level according to their national goals. The regime level objectives clearly dominate.

Finally, the view that the landscape level has the formatting function and ability to influence other layers of a system is inconsistent. The strongest globally recognised disruptive landscape pressure of climate change does not show considerable effect, as Norway and Russia continue the exploitation of Arctic offshore oil and natural gas resources. This leads to the observation that the landscape level cannot shape the regime level equally, arguing for more coordinated and well-thought landscape activities.[65]

5. Limitations and future research

Like any other study, this one is bound to some limitations.

A generalisation of the results should be made with care, as the study builds on a special case and a limited number of interviews. Nevertheless, the study is considered to comply with the requirements for reliability and validity, which were assured via careful planning and data collection.

Because of the system perspective, we cannot entirely detach the landscape and regime levels from each other during the interview process and analysis, which might have affected the results. Simultaneously, this characterises the interaction between the landscape and regime levels in the energy LTS, showing their much closer interrelation.

A similar MLP analysis will be of use for other circumpolar countries with differing interest to the Arctic offshore oil and natural gas resources exploitation. Researchers can enlarge the empirical scope by studying other special cases of oil and natural gas resources exploitation in challenging conditions.

6. Conclusion

Despite the ongoing transformation of the energy industry and significant challenges related to climate change, the extensive exploitation of conventional oil and natural gas resources is ongoing. One of the special cases is oil and natural gas resources exploitation offshore Arctic. Norway and Russia are the two circumpolar countries deeply engaged in developing these resources.

In this paper, we applied the MLP framework to the case of Arctic offshore oil and natural gas resources exploitation in Norway and Russia. It helped to gain a deeper understanding of countries' background and motives for these activities, and analyse the interactions between the landscape and regime levels. The four landscape pressures – growing energy demand, oil price, geopolitics, and climate change – both facilitate and constrain Arctic offshore oil and natural gas resources exploitation. Despite the similar character of the landscape pressures, they have no uniformity, and their effects on the regime level are divergent between Norway and Russia. The strongest influence is visible from the specific geopolitical shocks, whereby the climate change pressure is rather weak.

[64] Walker, "Entrapment in Large Technology Systems."
[65] e.g., Meadowcroft, "Engaging with the Politics of Sustainability Transitions."

The conducted MLP analysis shows that landscape pressures cannot penetrate and shape equally the regime level. Moreover, the study shows that the regime level objectives dominate the landscape. The study results lead to the conclusion that the current view on the formatting function of the landscape level and the qualities and capacities of the regime is imperfect and needs to be revised. Overall, this complicates the transformational processes in the energy industry.

Disclosure statement

No potential conflict of interest was reported by the author.

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