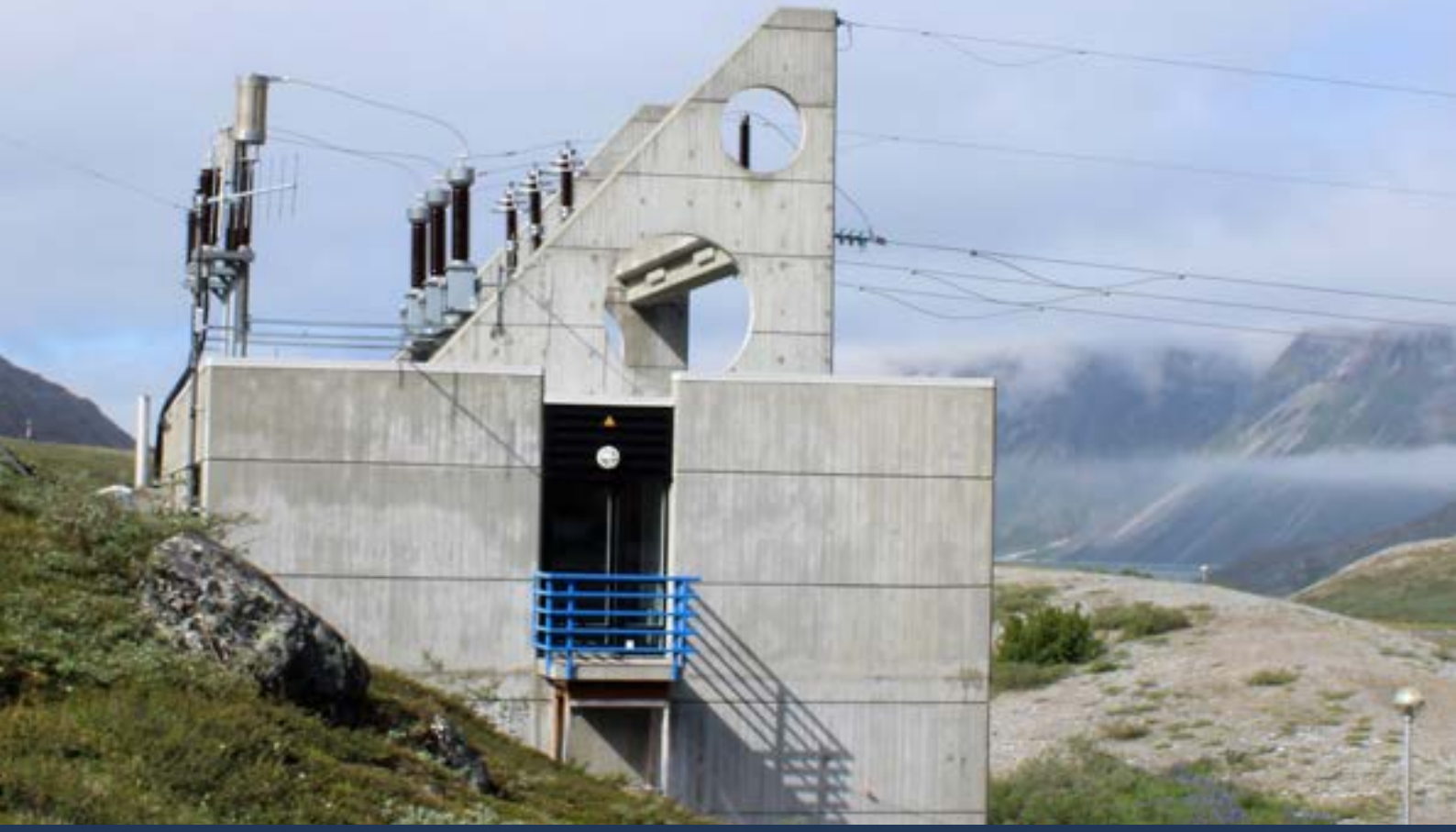
Economic Brief 1

Energy Transition in the Arctic: Governance and Justice Implications



Which role should energy service have in the Arctic?

What impact and challenges does the energy crisis bring?

How can the energy governance in the arctic improve?

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869327

ECONOMIC BRIEFS in the Series

JUSTNORTH Economic Brief 1:
ENERGY TRANSITION IN THE ARCTIC: GOVERNANCE AND JUSTICE IMPLICATIONS

JUSTNORTH Economic Brief 2:
ARCTIC TRANSPORT: ENVIRONMENTAL, SOCIAL AND GEOPOLITICAL CONCERNS

JUSTNORTH Economic Brief 3:
NON-ENERGY RESOURCE EXTRACTION (MINING AND FISHERIES): GOVERANANCE, JUSTICE AND SUSTAINABLITY

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RECREATION & TOURISM

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SOCIAL SERVICES, SOCIAL WELFARE AND COMMUNITY DEVELOPMENT IN THE ARCTIC

JUSTNORTH
Economic Brief 1

Energy transition in the Arctic: Governance and Justice Implications

January 2023

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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869327

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About the Economic Briefs

JUSTNORTH economic briefs are topical outputs drawing upon research previously conducted in the JUSTNORTH project, an undertaking funded by the European Union under Horizon 2020 programme. In these briefs, we build on the findings of the research conducted in 17 case studies (Work Packages 2-4) and underpinned by the comprehensive overview of various forms of justice and of the idea of ecosystem services (Work Package 1). The objective is to assess the sustainability of the regulatory frameworks supporting the main economic activities and sectors developed in the Arctic. Sustainability, understood here as the responsible use and management of spaces, common goods and shared resources with the aim of guaranteeing a fair use and enjoyment of them by future generations, is intrinsically linked to the idea of justice, the core concept upon which JUSTNORTH relies.

With the aim to reach a wide audience and to disseminate the previous work developed by JUSTNORTH work packages 1-4, the economic briefs constitute short and accessible analyses on different aspects of regulatory, policy and governance frameworks in the Arctic. As such, they are knowledge resources for policymakers, scholars and stakeholders/rightsholders. They will also serve as background papers in the process of co-producing the EU Policy Analysis Report and Recommendations.

Beyond the personal contributions made by the authors in their economic briefs, they all share a common outline. Each brief opens with the main key messages on the topic under consideration. They continue by outlining relevant findings of the JUSTNORTH case studies, highlighting issues identified by researchers and research participants as problematic, challenging or having implications for the actors' perception of justice. Third, the economic briefs analyse the governance regulatory mechanisms and gaps and policy frameworks related to the earlier identified findings. Which frameworks correspond to or address these problematic issues? What public goods are to be promoted and harms mitigated? Are future generations considered? What is the spatial scale of these policies and regulations? Fourth, we consider the justice implications derived from the economic sectors and their governance regulatory frameworks. The procedural, distributive, recognition and restorative forms of justice are considered, alongside the rights, balance of different values and interests and opportunities for participation. We ask if the governance frameworks themselves can be sources of social ills and injustices. Fifth, the relevance of discussed policies and regulations is analysed from the perspective of the Sustainable Development Goals and of ecosystem services – regulating services, provisioning services, cultural services and supporting services – that is, the varied benefits obtained by humans from healthy environments.

Finally, we provide initial thoughts on recommendations or areas where recommendations could be proposed – these will become subjects for discussion with Arctic stakeholders and rightsholders leading towards proposing recommendations at the end of JUSTNORTH project.

The briefs build on the findings of the case studies, written outputs of which have not been made public at the time of publication of these briefs. The ideas included in the briefs originate from these written outputs as well as discussions between case study leaders and the drafters of the briefs. However, for reasons of scope, the briefs consider only some aspects of the economic sectors analysed here and do not cover the entirety of said sectors.

The JUSTNORTH Economic Briefs

1. ENERGY TRANSITION IN THE ARCTIC: GOVERNANCE AND JUSTICE IMPLICATIONS

This brief focuses on the governance and justice implications of the energy sector in (Sub-)Arctic in the context of ongoing energy transition. It presents case study-derived insights into: (1) energy demand and energy services; (2) renewable energy and energy storage; and (3) oil and gas extraction. Energy, particularly oil and gas, has played a critical role in the economic development of the Arctic while contributing to the narrative of the region as an extractive frontier. The ambition of the relevant JUSTNORTH case studies and this brief is to contribute to ending this narrative. The brief takes a critical view of the current governance mechanisms and identifies vertical and horizontal fragmentation problems. Placing justice-based conditions as part of permitting and licensing (leasing), wide implementation of strategic energy planning, accounting for equity and justice in rate and tariff-making, and incorporating collective and individual capabilities into environmental and social assessments are identified as possible solutions for the shortcomings.

The brief also criticises the current supply-centric approach and proposes incorporating the concepts of energy justice and services into energy decision making. This approach is linked to the current energy crisis that poses a challenge for winding down the ongoing hydrocarbon projects in the Arctic and not launching new ones. The issue of a post-extraction development looms large for policymakers, but it also presents opportunities for sustainable redeveloping of post-industrial spaces. The brief also notes conflicts and opposition to energy development are not unique to the O&G sector and that it is not necessary the technology or energy type but the approach to project development that matters. Therefore, renewable energy development cannot be solely justified by the decarbonisation effort and SDG7 considerations must be carefully balanced with complementary sustainable development goals.

2. ARCTIC TRANSPORT: ENVIRONMENTAL, SOCIAL AND GEOPOLITICAL CONCERNS

As the second largest contributor to greenhouse gas emissions, the transport sector significantly contributes to environmental degradation. Given this context, this JUSTNORTH Economic Brief considers how Arctic countries have taken different paths towards energy transition in line with European climate change goals. In particular, we consider private transport electrification and the opening of new railway networks in the region. Special attention has been given to justice issues that have emerged during the research process, as well as to the impact of these initiatives on the Sustainable Development Goals and on ecosystem services. considerations must be carefully balanced with complementary sustainable development goals.

3. NON-ENERGY RESOURCE EXTRACTION (MINING AND FISHERIES): GOVERNANCE, JUSTICE, AND SUSTAINABILITY

The brief provides an overview of the governance of (Sub-)Arctic fisheries and mining – two key economic sectors in the Arctic. Justice, sustainability and ecosystem services are discussed building on the findings of the JUSTNORTH case studies. Fisheries and mining are governed by a patchwork of policies, regulations, resource ownership frameworks, and standards. Governance shapes the distribution of benefits and burdens, and affects sustainability potential and justice outcomes. Justice and sustainability in mining and fisheries needs to be analyzed at different spatial scales, as global sustainability benefits may be intertwined with unsustainable practices when considered from the local perspective. Contrast between the distribution of positive socio-economic impacts and the distribution of environmental impacts remains a central concern. In fact, extractive industries can exacerbate existing inequalities. The process, timing and stakeholder/rightsholder composition of consultations are the key issues for procedural justice. opposition to energy development are not unique to the O&G sector and that it is not necessary the technology or energy type but the approach to project development that matters. Therefore, renewable energy development cannot be solely justified by the decarbonisation effort and SDG7 considerations must be carefully balanced with complementary sustainable development goals.

4. ECONOMIC BRIEF: RECREATION & TOURISM

This report presents findings from across several case studies of the JUSTNORTH project as they relate to tourism in the Arctic.

The Arctic features a landscape and ecosystem that exert a strong pull for visitors. However, climate change is threatening the long-term viability of the region in its current bio-geochemical form and, therefore, the socio-economic foundations of Arctic societies as well. Barriers to sustainability in the economic sector of tourism arise from structural problems associated with the industry, including differential bargaining powers of employment contracts and the broader lack of capacity for stakeholders to engage in consultation processes at national and international contexts. In addition, the lack of overarching regulatory mechanisms or frameworks beyond consumer rights and safety measures means that a number of UN Sustainable Development Goals (SDGs) are adversely affected.

This report sketches distributive, regulatory and procedural issues of justice as well as different dimensions of ecosystem services as they relate to the SDGs. The report closes with a list of potential regulatory recommendations, including a certification scheme, approaches for employment, and integrated spatial planning.

5. SOCIAL SERVICES, SOCIAL WELFARE AND COMMUNITY DEVELOPMENT IN THE ARCTIC

This JUSTNORTH Economic Brief explores the relations between some economic sectors (transport, resources extraction, search and rescue activities) and the social development of Arctic countries and communities. Special attention has been given to how these different economic activities can potentially contribute to or hinder "community viability" in the region. The current governance and regulation of public transport, of welfare state provisions, of corporate social responsibility, and of search and rescue activities have all been analysed under the light of justice considerations and in relation to environmental sustainability. While progress in Arctic social welfare is clearly observable, major challenges remain.for employment, and integrated spatial planning.

JUSTNORTH Case Studies informing JUSTNORTH Economic BRIEFS

Transport 1

Opportunities For Sustainable Mobility and Addressing Transport Poverty in Iceland

Lead researchers:
Benjamin Sovacool, Sussex University
Paul Upham, Sussex University

DataCentres 2

Sustainable Digitisation & Resilient Communities: Low Carbon Data Centres in Greenland, Iceland & Norway

Lead researchers:
Benjamin Sovacool, Sussex University
Chukwuka Monyei, Sussex University

WindNO 3

Renewable and Ethical?: Motivation for Wind Power Resistance in Sápmi & the Norwegian Arctic

Lead researchers:
Ragnhild Freng Dale, Western Norway Research Institute
Halvor Dannevig, Western Norway Research Institute

Post Industrial 4

Liabilities into Assets — Reviving Post-Industrial Communities Through Repurposing Industrial Infrastructures in the Swedish Arctic

Lead researchers:
Roman Sidortsov, Sussex University,
Timothy Scarlett, Michigan Technological University

OilGas 5

Stranded Assets, Path Dependencies & Carbon Lock-in: Short/Medium/Long Term Implications of Oil & Gas Development in the Russian, Norwegian and U.S. Arctic

Lead researchers:
Roman Sidortsov, Sussex University
Anna Badyna, Sussex University

Energy 6

Corporate Cultures & Geopolitical Aspirations: Exploring Socio-Political Barriers to the Energy Transition in Russia & Norway'

Lead researchers:
Darren McCauley, Erasmus University Rotterdam
Ryan Holmes, Erasmus University Rotterdam

Fisheries 7

Changing coastal communities, fisheries governance and equity issues in Iceland

Lead researchers:
Níels Einarsson, Stefansson Arctic Institute
Catherine Chambers, Stefansson Arctic Institute

Tourism 8

Communities, Globalisation and Marine Tourism in Northern Iceland

Lead researchers:
Niels Einarsson, Stefansson Arctic Institute,
Edward Huijbens , Wageningen University,
Edward Ariza, Universidad Autonoma Barcelona
Silvia Gomez, Universidad Autonoma Barcelona

Mining 9

Socio-economic Development, Self-determination and Global Change Impacts in Greenland

Lead researchers:
Joan Nymand Larsen, Stefansson Arctic Institute
Jon Ingimundarson, Stefansson Arctic Institute

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Lead researchers:
Hele Kiimann, Uppsala University
Susan Millar, Uppsala University

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Northern Seas, Global Connections: Shipping, Search & Rescue and Small Communities in Canada & Norway

Lead researchers:
Corine Wood-Donnelly, Nord University
Hannes Hansen-Magnusson, Cardiff University

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Polar Tourism, Cruise Ships and Northern Communities: Competing Interests and Resource Use

Lead researchers:
Hannes Hansen-Magnusson, Cardiff University
Charlotte Gehrke, Cardiff University
Corine Wood-Donnelly, Nord University

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Transportation Links and Power Disparities: the Arctic Railway Plans in Finland

Lead researchers:
Soili Nystén-Haarala, University of Lapland
Pigga Keskitalo, University of Lapland
Juha Kähkönen, University of Lapland

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Mining in the Finnish Arctic

Lead researchers:
Jukka Similä, University of Lapland
Henri Wallen, University of Lapland

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Lead researchers:
Mia Landauer, University of Lapland
Juha Joona, University of Lapland

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Lead researchers:
Tanja Joona, University of Lapland
Soili Nystén-Haarala, University of Lapland

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Empowering Equitable and Robust Indigenous Economy through Indigenous Entrepreneurship in the Swedish & Russian Arctic

Lead researchers:
Elena Bogdanova, Northern Arctic Federal University
Ildikó sztalos-Morrell, Swedish University of Agricultural Sciences

Forms of Justice

Distributive Justice: "to give everybody their due shares in benefits and costs" (Deplazes-Zemp 2019); equitable distribution of social and economic benefits and burdens within and across different generations and geographies.

Procedural Justice: "to give everybody their due voice and participation in decision-making processes" (Deplazes-Zemp 2019); adherence to due process and fair treatment of individuals under the law; justness of procedures that are used to determine how benefits and burdens of various kinds are allocated to people; not necessarily determining the substantive justice.

Recognition Justice: "respecting identities and cultural differences; the extent to which different agents, ideas and cultures are respected and valued in intrapersonal encounters and in public discourse and practice." (Martin et al. 2016); Inclusion of the vulnerable, marginalised, poor, or otherwise under-represented or misinterpreted populations and demographic groups.

Restorative Justice: acknowledging past harms and possibly finding pathways for compensation and reconciliation, as well as ensuring that past conflicts, injustices and harms are not repeated; it should not be confused by the purely "retributive" form of justice, which is primarily concerned with punishment of wrongful acts (e.g. polluter pays principle).

Ecosystem Servcies

Ecosystem services[1]

Cultural Services
Intangible benefits derived from interactions with nature that contribute to the cultural or spiritual development of people, including the aesthetic appreciation and inspiration for culture; spiritual experience and cultural identity; tourism and recreation, etc.

Regulating Services
Benefits provided by ecosystems through their regulation of environmental processes. Examples: carbon sequestration; erosion and flood control, climate regulation and pollination, etc.

Provisioning Services
Provision of natural resources by ecosystems that are subsequently used by human communities for their survival and development. Examples: food, water, medicine, raw materials, etc.

Supporting Services
Fundamental ecosystem processes and functions that support and enable the other types of services, such as photosynthesis, nutrient cycling, the creation of soils, and the water cycle.

[1]For more on ecosystem services, see: https://www.nwf.org/Educational-Resources/WildlifeGuide/Understanding-Conservation/Ecosystem-Services and http://aboutvalues.net/ecosystem_services/.

JUSTNORTH Economic Brief 1

Energy transition in the Arctic: Governance and Justice Implications

Lead author: Roman V. Sidortsov

KEY MESSAGES

This brief focuses on the governance and justice implications of the energy sector through the lens of JUSTNORTH's case studies. Therefore, this brief does not constitute a comprehensive sectoral overview but rather represents case study-derived insights into: (1) energy demand and energy services; (2) renewable energy and energy storage; and (3) oil and gas extraction. Energy, predominately oil and gas (O&G), has played an important role in the economic development of the Arctic. This contributed to the narrative of the region as an extractive frontier. As the world moving away from fossil fuels, the Arctic can do so as well breaking the old and tired narrative and becoming an integral part of the global energy transition. The following takeaways from the JUSTNORTH case studies can contribute to achieving this ambition:

• Incorporating energy justice as a foundation for a descriptive, evaluative, and prescriptive analysis is an important means to bringing human and social element into energy decision making.

• Energy services must play a much larger role in energy decision making. Currently, the supply-based approach dominates government offices and corporate conference rooms even though its effectiveness has been undermined by the decarbonisation challenges and the ongoing energy crisis. To remedy this, the concept of energy serviced needs to be incorporated in energy governance mechanisms.

• The current energy crisis poses a challenge for winding down the current O&G projects and not launching new ones in the Arctic. Given the current project timeframes, long-term sustainability objectives must supersede the short-term relief actions.

• Conflicts and opposition to energy development are not unique to the O&G sector. Renewable energy projects, onshore wind farms in particular, frequently draw ire of local communities. Thus, it is not necessary the technology or energy type but the approach to project development that matters. An early, meaningful, and collaborative engagement is key to building partnerships and turning sceptics into allies.

• Renewable energy development cannot be solely justified by the decarbonisation effort. Distributional, recognition, procedural, and restorative justice considerations must be taken into account while engaging with Arctic communities.

• A patchwork of policy, legal, and regulatory frameworks governing the sector, as well as vertical and horizontal governance fragmentation are a cross-sectoral problem and are a source of many energy injustices.

• Energy governance in the Arctic can be improved, among other things, through (1) placing justice-based conditions as part of permitting and licensing (leasing); (2) wide implementation of strategic energy planning; (3) accounting for equity and justice in rate and tariff-making; (4) incorporating collective and individual capabilities into environmental and social assessments.

• Government and corporate decision-makers need to look for opportunities for redeveloping post-industrial spaces for electricity generation and storage, instead of targeting greenfield sites.

• The issue of a post-extraction development looms large for policymakers. It is not confined to the decommissioning of the infrastructure and must include energy communities.

Energy Sector through the lens of JUSTNORTH Case Studies

JUSTNORTH researchers examine energy sector as comprised of a diverse collection of industries covering production, processing, transportation, and use of primary energy, energy carriers, and energy services.[2] This approach differs from the conventional view that puts energy production and transportation as the defining feature of the energy sector. The conventional understanding of the energy sector is particularly entrenched in the Arctic because of the region's legacy of fossil fuel extraction. This understanding is bolstered by the recent bnarrative of the Arctic being the last energy frontier.[3] This narrative prompted a surge of O&G exploration and development projects in the 2000s, many of which were subsequently abandoned. The holistic view of the energy sector employed by JUSTNORTH researchers should not be interpreted as recategorization of industries that use energy to belonging to the energy sector. After all, energy is instrumental to the functioning of all modern societies and economies. JUSTNORTH approached studying energy and justice implications associated with its production, transportation, processing, transportation, and use from a bi-directional perspective – from supply to consumption and vice-versa.

JUSTNORTH researchers investigated 6 interlinked case studies which were strategically selected and included in a single work package to explore both barriers to and opportunities for energy transition. They included several cross-cutting ranges present in the energy system: (i) subsectors – oil and gas, renewable energy, and electrical power including energy storage; (ii) lifecycle – production, transportation, and conversion; (iii) uses and services – mobility, heating and cooling, and industrial applications; issues and problems – energy poverty, stranded assets, carbon lock-in, environmental degradation, digitisation, cultural heritage, and geopolitics. In addition, JUSTNORTH researchers explored issues surrounding wind power development in and traditional activities in Case Study (CS) 16 (reindeer herding) with an emphasis on stakeholder and rightsholder participation.

These case studies are not representative of all activities associated with the energy sector in the Arctic. Yet they provided both the reach and depth necessary to compare our results with the results of previous studies targeting similar sets of issues and to achieve some level of generalisation. In addition, we began our work on the case studies with conducting a sectoral background review and further designing research in the context of the issues common for the entire sector.

For the purposes of this brief, we grouped energy sub-sectors into three categories: (1) energy demand and energy services; (2) renewable energy and energy storage; and (3) oil and gas extraction. The summary of our findings is as follows:

[2] It is important to note that the term "energy production" is used as a catch for primary energy extraction (e.g. crude oil), as well as the generation of energy carriers (e.g. electricity).
[3] Roman Sidortsov, "A Perfect Moment during Imperfect Times: Arctic Energy Research in a Low-Carbon Era," Energy Research & Social Science 16 (June 2016): 1–7, doi:10.1016/j.erss.2016.03.023.

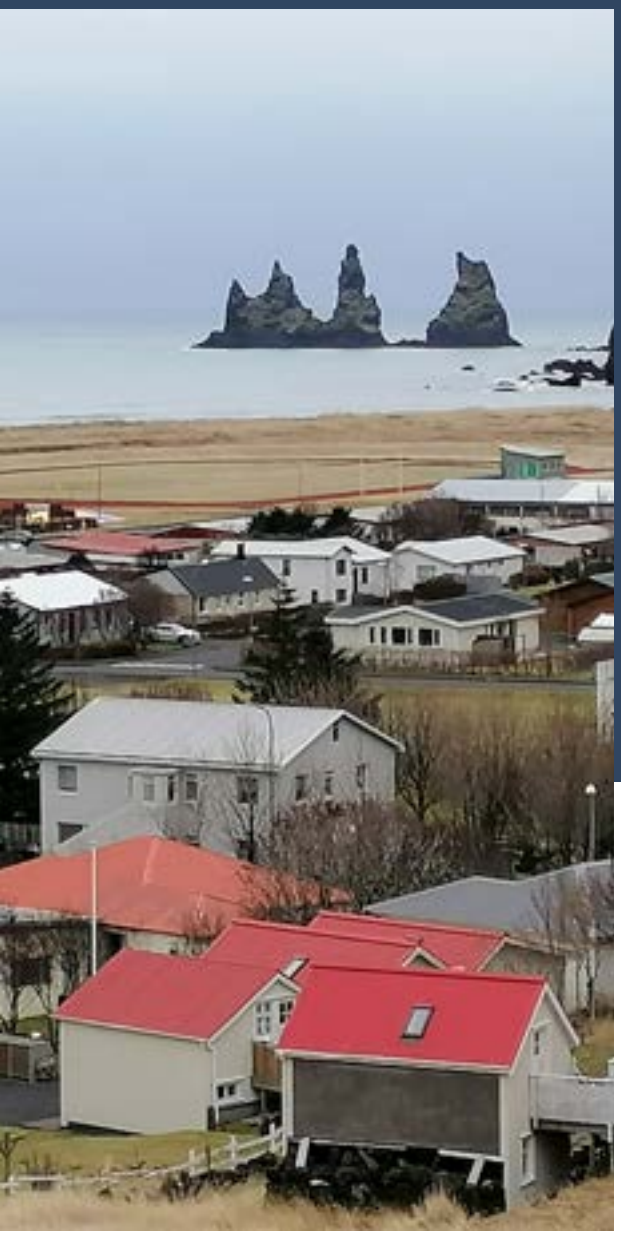
Energy demand and energy services

CS1[4] and CS2[5] comprised the first group. In CS1, we learned about the relationships between mobility needs and poverty and injustice. Taken together, the household and transport sectors consumed 56.6% of the final energy in the EU-28 in 2018 and low-carbon transitions are likely to see increased integration and connection between energy and transport systems. In 2018, on average EU households spent 13.2% of their income on transport and 24% on housing, water, electricity, gas and other fuels.[6] The average share of household expenditure on the 'operation of personal transport equipment' is higher than that on 'electricity, gas and other fuels' within the home in the majority of the EU-28 (6.5% vs. 3.9%). [7]

We suggest that Iceland's dispersed pattern of urbanisation are likely to exacerbate the relationships between mobility needs and poverty and injustice, increasing the costs of public transport provision. Few of our interviewees can easily afford to buy or maintain a private car. Arguably the most direct route to improving access to mobility services (functionings) would be via additional investment in the public transport system. To ensure that a just and inclusive decarbonisation can be achieved, we offer the following recommendations. First, we identify the need for policy makers to better recognise the existence of poor and vulnerable persons in Iceland and to design policies that better protect them. Second, we point to the need to match the pace of the decarbonisation agenda for the transport sector with mitigation measures that enable all to achieve necessary mobility functionings. Thirdly, we identify the need to better distribute the benefits of public transport to currently marginalised, non-metropolitan areas – via an increase in the number of bus routes and more frequent buses. Finally, we recommend improving the inclusivity of public transport policymaking processes: again, we have not been able to elaborate upon this here, but alongside the resourcing of Iceland's public transport system, its governance was also raised as an issue for further attention.

In CS2, we focused on the impacts of the rapid Information Technology (IT) sector growth in these countries. In the late 2000s, datacentres already consumed about 3% of the global electricity supply and accounted for about 4% of total greenhouse gas (GHG) emissions.[8] Industry growth forecasts are of the order of 12–14% annual growth in datacentre capacity over the next two to five years, resulting in 20% of global electricity consumption by 2025.[9]

[4] CS1-Transport.
[5] CS2-DataCentres.
[6] Eurostat (Brussels: Eurostat, 2020), https://ec.europa.eu/eurostat/statistics-explained/index.php/Household_consumption_by_purpose#:~:text=In%202018%2C%20EU%20total%20household,%2C%20gas%20and%20other%20fuels.
[8] Jonathan Koomey, "Growth in Data Center Electricity Use 2005 to 2010.," 2011.
[9] Pei Huang et al., "A Review of Data Centers as Prosumers in District Energy Systems: Renewable Energy Integration and Waste Heat Reuse for District Heating," Applied Energy 258 (January 2020): 114109, doi:10.1016/j.apenergy.2019.114109.



The CS2 dealt with a common perception that digitization economy comes with a much lower environmental and socio-economic footprint than the analogue economy of the past. Contrary to this perception we observed across all our participant groups the existence of contestations (of varying degrees) between (1) the need to accept the changes that come with datacentre adoption especially in the areas of diversification (for resilience), investments (for job creation and income generation), and development (for improved infrastructure and services); and (2) the need to preserve and sustain their culture (practices, tradition, landmarks etc.) or manage other environmental trade-offs (energy use, heat, land use, life below water). This contestation exists, for instance, in the acknowledgment by participants of declining revenue from existing industries and their inability to guarantee sufficient jobs for the younger population on the one hand, and fears over the intrusive and debilitating impact of the development of datacentres on their environment on the other hand.

Datacentre operators, policymakers, and planners therefore need to promote a broader, more holistic notion of sustainability that extends beyond servers and computers to encompass the whole system. Although this broadens the challenge of datacentre sustainability, it also enables the identification of a multitude of options to ensure future digital services are more affordable and resilient but also more energy-efficient, more climate friendly, less wasteful, and better optimised. Whether our digital future degrades communities and natural systems or helps decisively dematerialise societies and decarbonise activities, remains to be seen.

Renewable energy and energy storage

Globally, wind power is one of several rapidly increasing energy technologies that are part of the renewable or 'green' energy spectrum. In 2019, global electricity production form wind sources reached 1,427 TWh, which accounted for 5.3% of all electricity produced world-wide.[10] The pace of wind development in the Nordic countries varied as Norway has been slower than its neighbouring countries Finland and Sweden. [11] In CS3 ,[12] we examined a conflict between the drive to decarbonise the electric power sector and the need to preserve a traditional economic activity and way of life, as well as the community that practiced it for generations.

The case study focused on the justice implications of a proposed wind power plant in East Finnmark. Today the area is one of the largest areas without large-scale infrastructure in Norway (or wilderness-like areas as they are also sometimes described). The Davvi wind power plant is proposed as a project consisting of between 66 and 160 wind turbines in an area covering 63 square kilometres, with a total capacity of 800 MV. The planned area is located by the mountains of Vilgesrašša and Vounjalrašša, in a mountainous plateau mid-way between the coast and the Finnish border and in close proximity to the mountain of Rástigaissa, which is considered a sacred mountain according to Sámi tradition. The associated infrastructures and the wind turbines will also impact livelihoods of reindeer herders who are resident in Karasjok municipality, and local tourism operators in the region. Our findings show a diverse range of reasons for both support and opposition for the project, all of which are concerned with human flourishing and nature at different scales. The most common reasons to show support or non-opposition towards the wind power plant were the possibility of providing local jobs and income for the municipality, as well as the contribution to a global energy transition. The most common reason residents opposed the plant was because the area itself is currently without large-scale infrastructure, valued for reasons ranging from protecting indigenous livelihoods (reindeer herding), nature-based tourism, protecting nature for its own sake, community well-being, and cultural practices in the outfields. There is no easy way to reconcile these differences in stakeholder positions, and an assessment of what a just outcome would be therefore depends on which of these aspects are valued the most.

In CS4 ,[13] we studied how a carbon-intensive industry, metal ore mining, and a community in northern Sweden (Kiruna) could use available energy storage technologies to advance sustainability transitions in ways that accommodate regional and local needs. Energy storage is a key to the success of the ongoing energy transition as it is poised grow significantly world-wide. Pumped Storage Hydro (PSH) accounts for nearly 90% of the current global energy storage capacity amounting to 160 GW.[14] Yet the pace of PSH deployment has been slowed by the scarcity of suitable sites, as well as environmental and aesthetic concerns by the surrounding communities. In this case study, we targeted an emerging variation of PSH, that is premised on siting such a facility inside of an underground mine.

[10] IEA, "Key World Energy Statistics 2021 – World Total Energy Supply by Source," IEA, 2021b, https://www.iea.org/reports/key-world-energy-statistics-2021/supply.
[11] Johanna Liljenfeldt, "Legitimacy and Efficiency in Planning Processes—(How) Does Wind Power Change the Situation?," European Planning Studies 23, no. 4 (April 2015): 811–827, doi:10.1080/09654313.2014.979766.
[12] CS3-WindNO.
[13] CS14-Post-Industrial.
[14] IEA, "World Energy Outlook 2022," 2022, https://www.iea.org/reports/world-energy-outlook-2022.

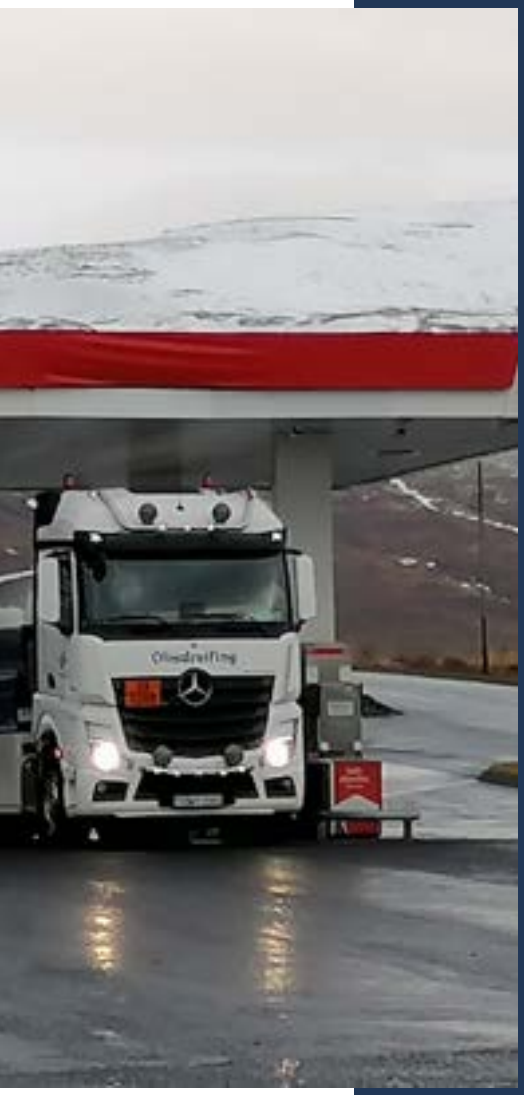
The clean technology innovations within Kiruna are largely celebrated by different stakeholders since they allow the industry and community to avoid carbon lock-in and create the necessary conditions for other stakeholders to invest in the community. Differences however start to emerge when it comes to more nuanced assessments because the respondents utilise their real-life knowledge and experiences. Discrepancies are particularly obvious between those representing the local community and LKAB, the operator of the Kiruna mine. On environmental aspects, the mine is acknowledged to have significant negative climate and environmental impacts. LKAB's current plan to replace coking coal with hydrogen and potential Pumped Underground Storage Hydro (PUSH) installation in the mine are perceived to lessen those impacts and bring further benefits to the community in the form of repurposing the mine, sustainable electricity and heating services, and green transportation. Overall, the PUSH installation is seen to pose much less risks to natural systems if compared to LKAB's current sustainability plans. A central concern over the hydrogen initiative revolves around the uncertainty over the socio-environmental impacts of expanding green electricity systems into what is currently rural greenspace.

CS16[15] focused on wind power development in northern Finland, especially in Western Lapland, where the largest wind farm in country, Honkavaara – Isovaara, was planned.The project raises many equity and justice issues that the proponents of the project also recognize. Local stake- and rightsholders saw project's benefits and disadvantages as unfairly distributed and feared existing industries and livelihoods will be jeopardized.The question of property rights and their protection and identifying of the role of the other (decision-maker, project operator) were identified as of high importance. Reindeer herding, fishing, hunting, and tourism in the area contribute to cultural, regulating, and provisioning ecosystem services and form a basis for the sustainable community (SDG 11). In the reindeer herding community, the principles of sustainable development seem to be built-in because reindeer husbandry would not be possible without respecting and protecting nature. Therefore, preserving reindeer husbandry and nature simultaneously are essential. In addition, there is a desire to pass on those skills and values to future generations.

All interviewees understood the importance of green energy as the main energy source in the future and as a critical tool in the fight against climate change. However, several challenges were identified by the Finnish Defence Forces at the onset of project development, including potential interference with the operation of their radar system. Yet the project developer chose to promote it. In April 2022, shortly after Russia's invasion of Ukraine, the Finnish Defence Forces informed the project operator and the municipality of Ylitornio that the design of the wind farm could not be approved due to defence reasons for the time being. CS16 intertwines human and national security issues during the time of geopolitical tension. On one hand, the EU's move away from Russian natural gas towards renewable sources is a long-term measure aimed strengthening Finland's national security. On the other, deficiently designed wind power facilities pose a national security risk short-term.

[15] CS16-WindFIN.

Oil and gas extraction



It is difficult to envisage a more volatile fluctuation in demand, supply, and prices that the ones experienced by the O&G sector the between the start of 2020 and early 2023. The sector began 2020 in seemingly fine economic shape. Generally positive economic growth provided optimism for robust demand, especially in North America.[16] What followed were calls for withdrawal from the sector by the investment community, oil price war between Russia and Saudi Arabia (two out of the top three world oil producers), and the COVID 19 pandemic. The initial price depression accelerated due a dramatic decline in demand for petrochemicals and refined products resulting from COVID 19 restrictions.[17] The easing of COVID 19 restrictions around the world and restarting of national economies in the second half of 2021 created a sudden demand for O&G, which the industry was struggling to meet. This had led to a sharp increase in O&G prices.[18] Russia's aggressive invasion of Ukraine supercharged what some energy analysis saw as a global energy crisis.

A combination of national bans on Russian oil exports, Gazprom's near complete withdrawal from the European market, and market fears over the supply of critical minerals needed for electrification of energy services ushered a period of a monumental reshuffling of the global energy landscape.[19] With the bulk of Russian O&G coming from the Arctic and sub-Arctic, the future the Russian O&G industry, massive infrastructure, and communities whose survival is interlinked with O&G business are highly uncertain. The E.U. rapid, holistic, and multipronged effort to minimise its dependence on Russian energy is perhaps the most significant factor determining the future of O&G in the Arctic.[20] It is likely that Russia's grandiose plans to expand its liquefied natural gas (LNG) capacity and develop new on-shore and offshore Arctic oil fields will never materialise.

However, what happens in the Norwegian and U.S. Arctic remains an open question. The gravity of the short-term supply squeeze might prove to be too tempting for some O&G companies and provincial and national governments to ignore. One thing certain, the long-term prospects for new Arctic O&G are even worse than at the start 2020.

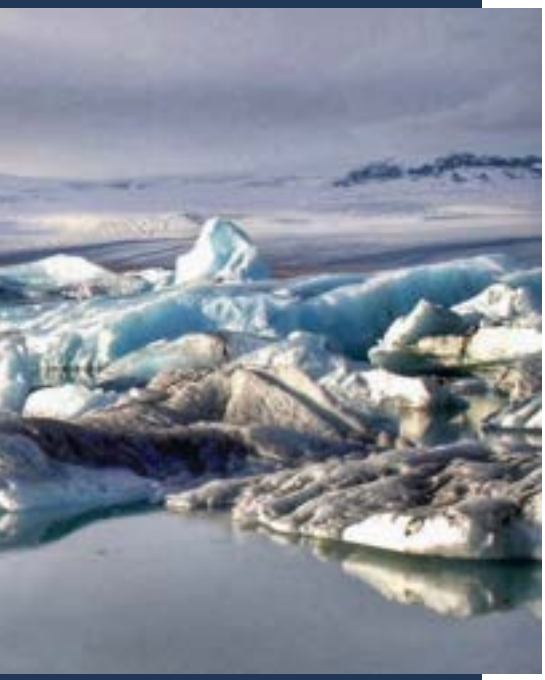
[16] Chakrabarti et al., "How North American Downstream Oil and Gas Can Reimagine Its Future | McKinsey," September 2020, https://www.mckinsey.com/industries/oil-and-gas/our-insights/downstream-oil-and-gas-amid-covid-19-succeeding-in-a-changed-market.

[17] Deloitte Global, "COVID-19's Impact on Oil, Gas, and Chemical Organizations | Deloitte Global," Deloitte, 2020, https://www2.deloitte.com/global/en/pages/about-deloitte/articles/covid-19/covid-19-s-impact-on-oil--gas--and-chemical-organizations.html.

[18] U.S. EIA, "Europe Brent Spot Price FOB (Dollars per Barrel)," 2023, https://www.eia.gov/dnav/pet/hist/RBRTED.htm; IEA, "Natural Gas Prices in Europe, Asia and the United States, Jan 2020-February 2022 – Charts – Data & Statistics," IEA, 2022, https://www.iea.org/data-and-statistics/charts/natural-gas-prices-in-europe-asia-and-the-united-states-jan-2020-february-2022.

[19] U.S. EIA, "International - Russia - U.S. Energy Information Administration (EIA)," January 2023, https://www.eia.gov/international/analysis/country/RUS.

[20] European Concil, "Energy Crisis: Three EU-Coordinated Measures to Cut down Bills," October 2022, https://www.consilium.europa.eu/en/infographics/eu-measures-to-cut-down-energy-bills/.



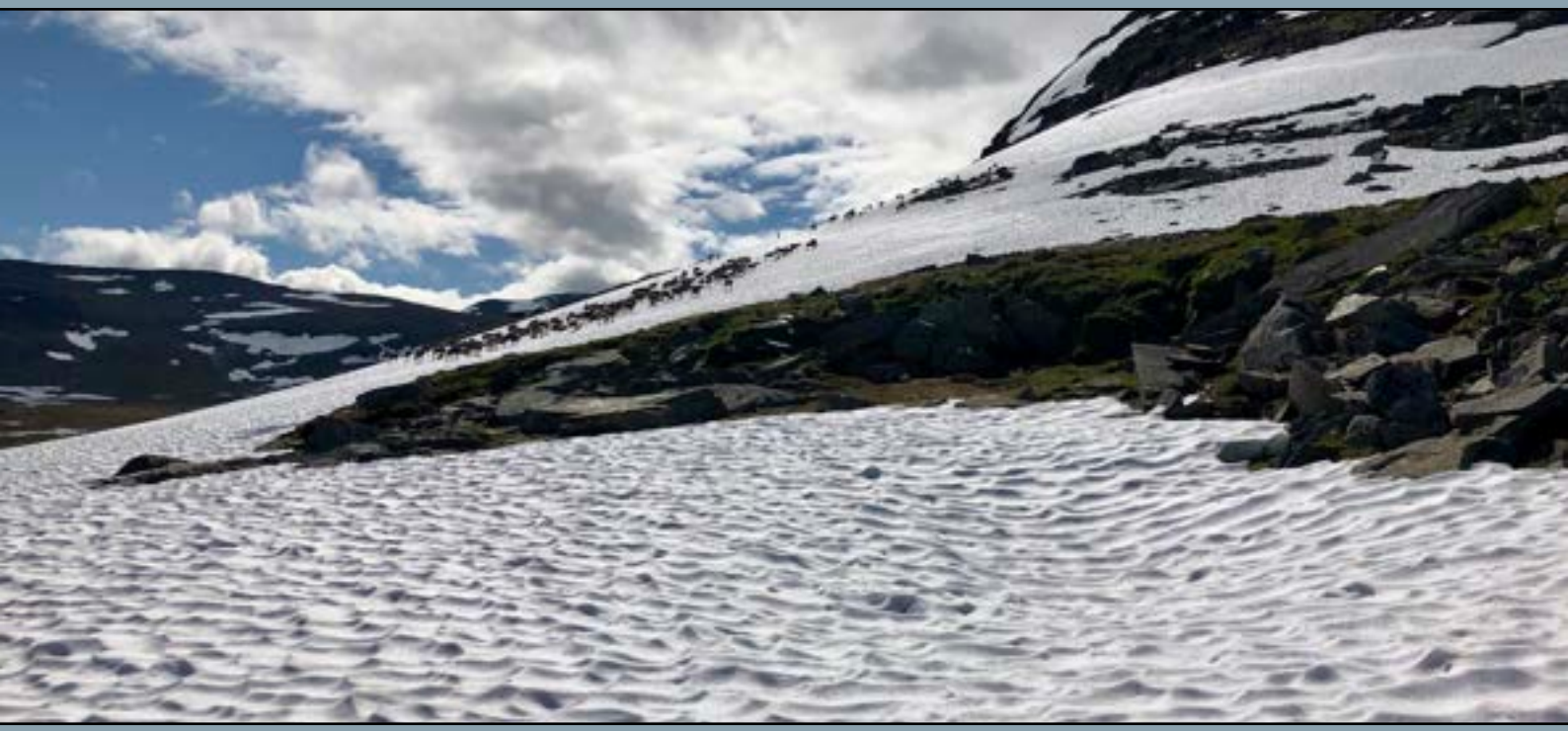
In CS5[21] , we examined how Arctic communities, O&G businesses and government could effectively manage the inherent risks of stranded assets and enable long-term sustainability in the Arctic's. On social sustainability, the actors have stressed geopolitical stability, international cooperation, and long-term economic development of the Arctic region; creation of long-term value for the society in the form of national revenues and welfare support and GDP growth; local and regional spin-offs, contributions to local and regional socio-economic development; and support for indigenous communities. In addition, the lack of long-term sustainability vision for the hosting region in the O&G development processes, the lack of a stronger national politics and regulations on local content/social contract, and the need of an Arctic fund formed from national taxes from major investors in the Arctic to influence the social development of the Arctic were highlighted among the hardest social sustainability challenges.

Regarding environmental sustainability, the respondents noted high environmental standards under which the O&G projects operate, progress towards net zero greenhouse gas emissions during the development and extraction process and energy efficiency among O&G companies. Zero discharges and biodiversity improvement practices have also been stressed, as well as collaboration with the fishing industry on oil spill preparedness. LNG has been highlighted as a transitional means to support the ongoing energy transition and decarbonisation, as well as the O&G industry entry into the renewable energy and carbon capture and sequestration space. The respondents have also raised several justice concerns, including the impact of the national obligations under the Paris Agreement on the supply of hydrocarbons, difficulty to create a sufficient local supply industry and infrastructure to support the O&G sector's transition to renewable energy business, limited knowledge on the impact of oil spills on ecosystem services, the difficulty of developing other renewable energy sources because of perceived high costs.

Other issues have included the lack of constructive dialogue with environmental NGOs, gaps in environmental regulations and the lack of a cumulative environmental impact assessment from several projects. The identified issues have impacted the human and natural systems undermined individual and collective capabilities at the national (Russia), state (Alaska), and local (Hammerfest) levels by settling the societies with a debt in the form of the stranded assets. We also determined that Norway is in better position than the United States (Alaska) and Russia to handle the problem of stranded assets.

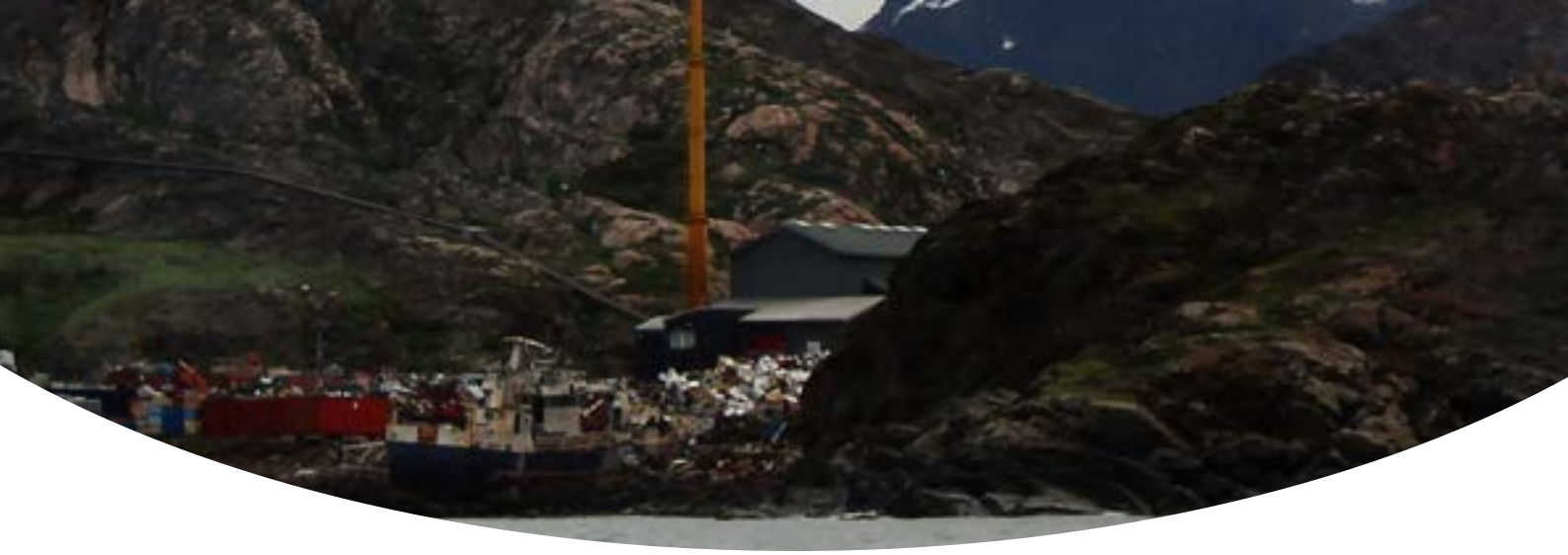
[21] CS5-OilGas.

In CS6 [22], we learned that Norwegian companies were more supportive of tougher environmental standards, prohibiting harmful environmental action. The Norwegian companies emphasize financial mechanisms, but place more of its trust in governmental support as an inspiration for making better decisions on projects and including extended interest, for ensuring the adherence to environmental standards. The focal point for Norwegian companies in this regard was placed upon those communities that could afford or offer affordability for future renewable energy projects presented a form of injustice regarding those that could not.



For Russian companies, emphasis was placed firmly upon the need to shift towards natural gas for the benefit of Russian people in Arctic regions. The Russian reflection tended to be more instrumental and focus upon financial recompense, rather than the more transformative acceptance to move beyond fossil fuels held by some Norwegian companies. Russian perceptions highlighted the need for delivering gas to remote areas of the Arctic as integral to their scope of action. The dominant narrative among Russian companies with regards to making decisions in a project was more focused upon stakeholders than local communities from this perspective. The affirmative sense of justice from a positive perspective here was to promote greater recognition for stakeholders, both societal and commercial.

[22] CS6-Energy.



Energy Sector Governance in the Arctic: Key Mechanisms and Gaps

The state plays the main role in the governance of the O&G sector when it comes to the matters of access to O&G deposits, permitting, and environmental requirements including oil spill prevention, air quality, decommissioning, and waste disposal.

However, the role of private actors and networks in ensuring the compliance with these standards should not be understated. In fact, technical standards and best practices developed by O&G companies and trade associations are widely incorporated into operations manuals and even in the governing administrative regulations under the performance-based model. The same is true for the electrical power sector and the wind power industry, as well as for the digital services and electrical vehicle (EV) industries. O&G and electricity markets can be efficient but they also tend to undervalue resilience. And resilience is at a premium in the Arctic because of the severe climate, remoteness, and darkness.

Sub-sectoral horizontal fragmentation is a common thread for all studied jurisdictions. Simply put—by and large, the three sub-sectors do not speak to each other. The lack of spatial and temporal coordination and joint planning is prevalent. The entry of demand side management and flexibility into electricity markets is a rare exception to the rule but as the data centres example shows it is yet to become a permanent feature of all industries, let alone, the energy intensive ones.

Vertical fragmentation is prevalent as well. CS3[23] and 16 show deficiencies in coordination between local governments, citizen groups, including indigenous peoples, central governments and wind project developers. The latter two groups often categorize the resistance as absolute and unreasonable. Meanwhile, we saw evidence in Northern Sweden of the developer engaging with the community and local government early and in a meaningful manner, and, as a result, forging a working partnership.

The pace of O&G development is generally driven by the market. Only recently, the investment community began to factor in climate considerations and the risk of a shrinking demand for O&G. Yet the discrepancy between the current pace of development and where the pace should be given the climate goals remains out of synch, which raises questions about market's effectiveness as a governance actor. This gap can be bridged via strategic planning in which government agencies align state's climate goals and commitments with a gradual phase out of O&G development and production and facilitating energy communities' transition into a post-hydrocarbon future.

[23] CS3-WindNO; CS16-WindFIN.

Energy demand and energy services

Although the concept of energy services has been long recognised in academia, it is yet to enter the mainstream of energy governance. As a result, often an energy service problem, mobility, for example, is viewed as a transportation problem and addressed in a fragmented manner. Thus, transportation emissions are handled via stricter fuel economy standards and fleet electrification. This precludes solutions like walkable city planning and developing cycling infrastructure. As we learned in CS1[24], improving mobility as a service via public transportation can help the Icelandic government achieve benefits and mitigate negative impacts and risks that are strongly complementary to supporting the proliferation of electric vehicles. Aside from clean air and climate benefits, EVs are not seen as a comprehensive solution as public transport, particularly within urban areas. Moreover, environmental degradation due to increased mining and charging infrastructure expansion and the security of critical minerals are listed among government's concerns about EVs.

As evidenced by the EU's response to the decrease in the supply of natural gas from Russia, demand side management and flexibility can be an effective tool in ensuring that the bloc's economies keep functioning and its citizens have access to the energy services that they need. Lowering thermostats' temperature by 1C can compensate for significant amounts of lost supply. Data centres are major electricity consumers but also at times can serve as electricity sinks when the supply is high and demand is low. In addition, the resilience of data centre operations is prioritised over the resilience of residences during power outages, and residential consumers end up competing with data centre operators over access to renewable power. Unfortunately, we did not find evidence of either consideration incorporated in the governance of date centres that we studied, which represents a sizeable gap and shortcoming in the way both data centres and energy systems that power them are governed.

[24] CS1-Transport.

Renewable energy and energy storage

By virtue of being a part of an electrical grid where supply must match the demand instantly, a renewable energy facility is subject to the interconnection and operating requirements that apply to generation facilities. The permitting process for wind facilities comprises several parts that can be grouped into two large categories: (1) facility's expected performance as part of the grid; and (2) the expected environmental, social, economic, and cultural impacts during the construction and operation. In addition, the process comprises several stages, from scoping to impact assessment and to detailed plans regarding the plant operation. The permitting process is usually handled by a national authority. For example, in Norway it is the Norwegian Water Resources and Energy Directorate (NVE). In addition, a wind facility is subject to the jurisdiction of a national transmission system operator (TSO).

Location matters—and not just in terms of wind speeds and proximity to transmission infrastructure. If a facility is to be located in a particular area, in Finnmark, for example, an additional legal regime might apply. In CS3, it is the Finnmark Act that facilitates the management of land and natural resources in a balanced and environmentally sustainable manner for the benefit of its residence and for maintaining Sami culture. Although a national permitting authority has the overall jurisdiction over the permitting process coordination with municipal government is important. There have been cases in Norway when municipalities were able to exercise an informal veto. [25]

As of the writing of this brief, no PUSH facility has been constructed and put into service. Therefore, many legal and regulatory issues related to siting, permitting, and operating PUSH facilities are yet to be determined. A PUSH facility has several legal identities. Firstly, it is a hydropower generating facility and energy storage facility capable of providing a full range of grid services. This makes a PUSH facility similar to any generation or storage facility the governance contours of which are described above. Secondly, it is an enabler of intermittent renewable energy, and, therefore, an important tool and consideration for system planning. Thirdly, it is a type of post-extraction mine redevelopment, for example, in lieu of conventional decommissioning. Fourthly, it is a tool for historic and heritage preservation and local economic development.

These identities are likely to create additional permitting layers that might complicate the development process. However, these multiple identities are aimed at solving environmental and social problems and not creating new ones. Therefore, the budding governing legal and regulatory framework must account for that. In addition, under the current electricity market structure, positive externalities such as reuse of industrial sites instead of developing greenfield ones are unlikely to be recognised.

[25] Tor Håkon Jackson Inderberg et al., "Who Influences Windpower Licensing Decisions in Norway? Formal Requirements and Informal Practices," Energy Research & Social Science 52 (June 2019): 181–191, doi:10.1016/j.erss.2019.02.004.

Oil and gas extraction

The Norwegian policy, legal, and regulatory framework governing O&G activities serves as an example of a largely predictable, logical, and sensible system of the sector's governance at a national level. Perhaps the most important feature of the Norwegian system is the alignment of the government actors with the functions that they perform, decisions that they make, and the level of legitimacy that they have. The Storting (Parliament) is responsible for making petroleum policy whereas the Ministry of Foreign Affairs is responsible for the nation's Arctic policy. An assessment of environmental, economic, and social impacts, including climate change considerations, precedes the opening of new areas for hydrocarbon development and includes public consultation. The Department of Petroleum and Energy (NPD) overseas licensing rounds An operator must compose a plan for development and operation (PDO) and an individual (project-specific) environmental assessment (EA) to receive a license.[26]

In contrast, the governing oil and gas extraction in Russia is as convoluted as it is politically driven. Although the Russian legal system is de jure premised on a hierarchy of laws, de facto, the hierarchy is not always followed by both governmental and private actors. Conflicting administrative regulations and statutes and regulatory gaps are not uncommon, which makes legal compliance a difficult task.[27] Ultimately, decisions involving the right to explore, develop, and extract significant O&G resources are made in the Kremlin.

The United States employs a unique approach to governance of O&G activities. This approach arises from the fact that the property right to hydrocarbons can be held by a private person or a municipal, state, or the federal government. Whereas the United States is an exception to the global mineral rights ownership regime, the State of Alaska is an exception to the US mineral rights ownership regime. The difference stems from Alaska's rather late entry into the Union and its decision to retain the subsurface rights on all lands that it received as part of becoming a US state. As a result, O&G extraction in the Alaska can be subject to any of the three divergent legal and regulatory regimes: (1) applicable to offshore O&G exploration, development, and production on state, or federal, or state and federal submerged lands; (2) applicable to exploration, development, and production on state lands; (3) applicable to exploration, development, and production on federal lands; applicable to exploration, development, and production on private land with further variations depending whether the land is held under so-called federal or state titles.

[26] Roman Sidortsov, "Reinventing Rules for Environmental Risk Governance in the Energy Sector," Energy Research & Social Science 1 (March 2014): 171–182, doi:10.1016/j.erss.2014.03.013.
[27] Roman Sidortsov, "The Russian Offshore Oil and Gas Regime, When Tight Control Means Less Order," in Governance of Arctic Offshore Oil and Gas (Taylor&Francis Group, 2017), https://digitalcommons.mtu.edu/michigantech-p/1478.

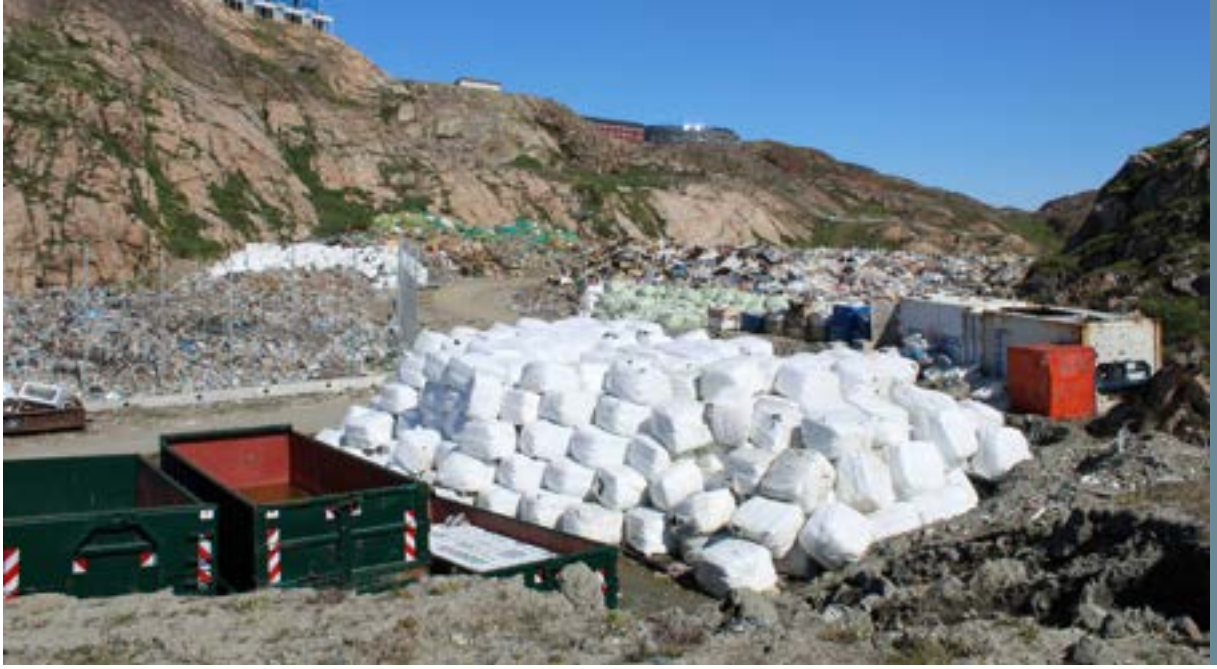
Justice Implications of Energy Governance in the Arctic

Distributive

The magnitude of the energy sector's impact on societies, economies, and the environment can only be matched by the number of disparities in distribution of negative impacts, risks, and benefits. We have found evidence supporting this in all three sub-sectors that we studied. Horizontal fragmentation of mobility governance in Iceland is impacting the distribution of benefits and burdens of transport electrification in Iceland as it unlikely to help the most vulnerable population stricken by mobility poverty. The same governance problem impacts distribution of economic benefits and burdens of data centres. As noted above, local economic benefits generally fall short of the expectations, whereas it's not uncommon to see increases in residential electricity rates. CS3 and 16 exemplify spatial inequities of wind energy development. Imbalances of power between national government agencies and companies and municipalities leave communities with the bulk of negative impacts – some members are de facto forced to abandon practices that their predecessors carried out for generations. CS5 and 6 highlight temporal distributional inequities. The failure by the market and state to align climate risks and commitments with phasing out O&G is likely to settle future generations with a large bill.

Recognition

Recognition justice boils down to ensuring that no person or interest is left out of consideration in the process of decision-making. As CS1 shows, an emphasis on personal transportation and not on mobility as a service can lead to non-recognition of the mobility poor. When interests and corresponding vulnerabilities of residential electricity consumers are not recognised vis-à-vis data centres, which are industrial consumers, communities end up seeing their electricity prices rise. Non-recognition of reindeer herding as a culture- and identity-defining practice equates it with any other economic activity that can be costed against the potential benefits of a wind project. Finally, non-recognition of future generations as stakeholders in O&G decision-making perpetuates the collision course of climate and O&G development policies.



Procedural

Procedural justice is not just about following a formal process. After all, the process might exclude unrecognised persons and interests. In addition, exclusion can come in the form of de facto ignoring stake- or rightsholder's concerns while de jure involving them in the process. Unfortunately, public meetings, which are often part of environmental and social assessments, are held only to satisfy the requirement of conducting a meeting. Protest and litigation are signs of a deficient process when the feedback and concerns are not addressed, and the aggrieved party feels that it has to go outside the process to make their case. The resistance to wind power in Norway and Finland invoke some concerns over the procedural fairness. The Russian approach to governing the O&G sector is perhaps the clearest case of procedural injustice when the Kremlin can get any decision through the process or equally stop any.

Restorative

It is common in the energy industry and mechanisms that govern it to associate restorative actions with decommissioning of a site and/or infrastructure. This all but completely ignores human and societal dimensions. Energy communities that are left behind, mobile poor who lack the capacity to flourish, households left with higher electricity prices, and reindeer herders without pastures for their herds are examples of it. Righting distributive, recognition, and procedural injustices begins with restoration of capabilities, which sometimes involves compensation. Unfortunately, most governance systems that we examined treat compensation as more of a buyout than such a first step.

The Impact of Energy Governance on SDGs and Ecosystem Services in the Arctic

SDG 7, Affordable and Clean Energy plays a dominant role. Therefore, the discussion below reflects the relationship between SDG7 and other SDGs that are relevant to the examined activities and projects, in the context of the desired and perceived benefits, impacts, and risks of the activities and projects.

The importance of incorporating the concept of energy services into decision-making processes for achieving SDG7 cannot be overstated. Doing so unlocks pathways for achieving several SDGs. In the case of mobility SDG1, No Poverty and SDG10, Reduced Inequalities. Both public and individual transport can be electrified and fuelled by clean and affordable energy, although electric public transport offers a more pronounced positive impact than individually owned EVs. The same is true in relation to digitization -although data centres can be powered by electricity derived from fossil fuels, utilising renewable energy helps achieving SDG12, Responsible Consumption and Production and SDG13, Climate Action. Our analysis shows that putting energy services as the starting point for charting a pathway for achieving SDG7 is likely to lead to a greater cumulative effect in terms of achieving other SDGs than focusing solely on the environmental impact and cost of energy production

Wind power development and energy storage are part of increasing the share of renewable energy in the global energy mix (sub-target 7.2). Proponents of wind power development in Northern Fennoscandia understand this as part of their contribution to a global energy transition and a pathway to create economic opportunities and work in the region, which relates to both SDG8 Decent Work and Economic Growth, and SDG11, Sustainable Cities and Communities, as jobs and municipal income will contribute to people wanting to live and stay in the region. Here SDG7, 8 and 11 come into conflict, as the development of energy in one location, even if it contributes to jobs and community development there, may have negative effects on residents of other communities that will not be able to use the area if the wind park is designed without consideration of their occupation, culture, and livelihoods. In addition, hydrogen production for steel making and, therefore, contributing to Climate Action (SDG13) and SDG 9, Industry, Innovation, and Infrastructure, should not come at the expense of making a city or community unsustainable. Therefore, energy services and end uses not only need to be recognised, they also need to be equitably balanced and prioritised to achieve comprehensive and complementary sustainable development.

Studying economic impact of oil and gas development is key to understanding whether stakeholders see SDG7 as a lesser priority than other SDGs. Oil and gas production serves as a significant source of economic wherewithal for Hammerfest, Alaska, and Russia, that, according to the industry and some government actors, is needed for achieving all but a few of the SDGs. However, oil and gas development can also lead to path dependence and carbon lock-in that transform productive economic assets into stranded ones thereby creating a sizeable burden on local, subnational, and national economies. In addition, corporate approaches to sustainable development are hampered by a tunnel vision. This vision puts temporal limits on a corporate entity, does not consider the intrinsic value of both human and natural systems, and treats sustainability as part of a business transaction.

Energy development, production, processing, transportation, and use come with a large environmental and social footprint. After all, the climate crisis is a by-product of the current still largely fossil-fuel based energy system. Inevitably, the energy system deeply impacts provisioning, regulating, and supporting ecosystem services on land and water. The studied governance regimes do account for the impacts on ecosystem services, albeit unevenly and without much consistence. The regimes recognise the threat of sudden and extensive loss of ecosystem services due catastrophic events such as large oil spills. The gradual impacts are recognised to a lesser extent. Cultural ecosystem services are an emergent concern as they came to fore in CS3 and 16.

Charting a Way Forward - Recommendations for a Just and Sustainable Energy Sector in the Arctic

Our research confirmed that although the Arctic has been an energy playground for over a century, largely because of the fossil fuel extraction, it cannot and should not be left out of the energy transition. Although the stakeholder views on what energy transition pathways should be taken vary, there plentiful instances in which main actors agree on the desired outcomes. Because of the extractive past, path dependences remain strong but, with a few exceptions, not unsurmountable. In fact, there is a strong decarbonisation effort in several Arctic countries both on the demand and supply sides. However, policy makers need to be cautious and not fall into the trap of green extractivism. Utilising the concept of energy services can improve not only achieving SDG7, Clean and Affordable Energy but also facilitate efforts towards other SDGs. However, energy services and uses need to be carefully balanced. Whilst oil and gas development can help achieve some SDGs, albeit at the expense of SDG7, it is not necessary, and, therefore, can be replaced by other types of economic development. There are divergences in values among different types of stakeholders and to the extent that reconciliation is possible, it will require trade-offs and compromise.

It would be difficult if not impossible to provide recommendations in the context of the governing legal and regulatory regimes across all seventh cases within the constraints of this brief. Therefore, we opted for crafting our recommendations based on the legal and regulatory mechanisms and concepts that are present in some form in each of the studied jurisdictions. We merged our recommendations into the mechanisms and concepts and organised the latter based on the functions that they perform.

1. Strategic energy planning

Some jurisdictions, such as Norway and the United States, already utilise integrated energy planning, which often involves the use of all available generation and non-generation resources, energy efficiency for example. However, this already innovative approach does not account for perhaps the most important question of energy planning – "what is energy for?" the inclusion of the concept of energy service–the application of energy to benefit human well-being–is central to remedying this shortcoming. For example, including this concept as part of administrative rulemaking aimed at the decarbonisation of a nation's transportation sector can advance seemingly unrelated goals like poverty alleviation. It can also help with understanding the temporal limits of some industrial energy services, such as hydrogen production. Climate change impacts is a recent addition to energy planning. However, the risk of an energy asset becoming a stranded one is usually not a part of this analysis. There is plentiful evidence of energy infrastructure becoming obsolete before it is fully depreciated in and outside the Arctic and not enough mechanisms to prevent it.

2. Permitting, licensing, and siting

Imposing conditions on power consumption is not a new thing. Therefore, doing so via placing conditions on an operating permit or license of a data centre should not be shocking to its operator. Local residents will likely appreciate that their neighbour, data centre and not just their homes are subject to energy efficiency requirements. Justice-based conditions of operations should also be the basis for licenses given to oil and gas companies.

3. Rate and tariff-making

The electricity rate or tariff structure that is common in Western countries rests on the division of all electricity consumers into industrial, commercial, and residential classes. The division, even bolstered by further sub-grouping, is problematic because it lacks recognition of the social value that different uses and consumers have. The electricity to heat an emergency worker's residence should not cost more that the electricity spent to mine cryptocurrencies. Recognising the social value of different uses in rate- and tariff-setting might help with easing tensions between local residents and data centre operators.

4. Environmental and social assessment

The concept of a "significant impact" as part of environmental and social assessments is problematic as it lacks the context of who, what, and why is impacted. Therefore, this problematic concept needs to be replaced. We recommend the concept of unduly interference with individual and collective capabilities. This concept accounts for environmental, social, and economic impacts and places an individual, for example, a reindeer herder, and/or a community, for instance, a reindeer herder's cooperative, and the impact on their flourishing at the centre of the analysis.

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