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Valentina Ignatyeva, Sébastien Gadal

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ALTERNATIVE Energy Sources in the Russian Arctic

as a key element for regional geoeconomic development and sustainability

Valentina Ignatyeva

valentina.ignatyeva@etu.univ-amu.fr

Sébastien Gadal

sebastien.gadal@univ-amu.fr

Aix-Marseille Université, CNRS, ESPACE UMR 7300, Université Nice Sophia Antipolis, Avignon Université, 13545 Aix-en-Provence, France



Background & Key issues:

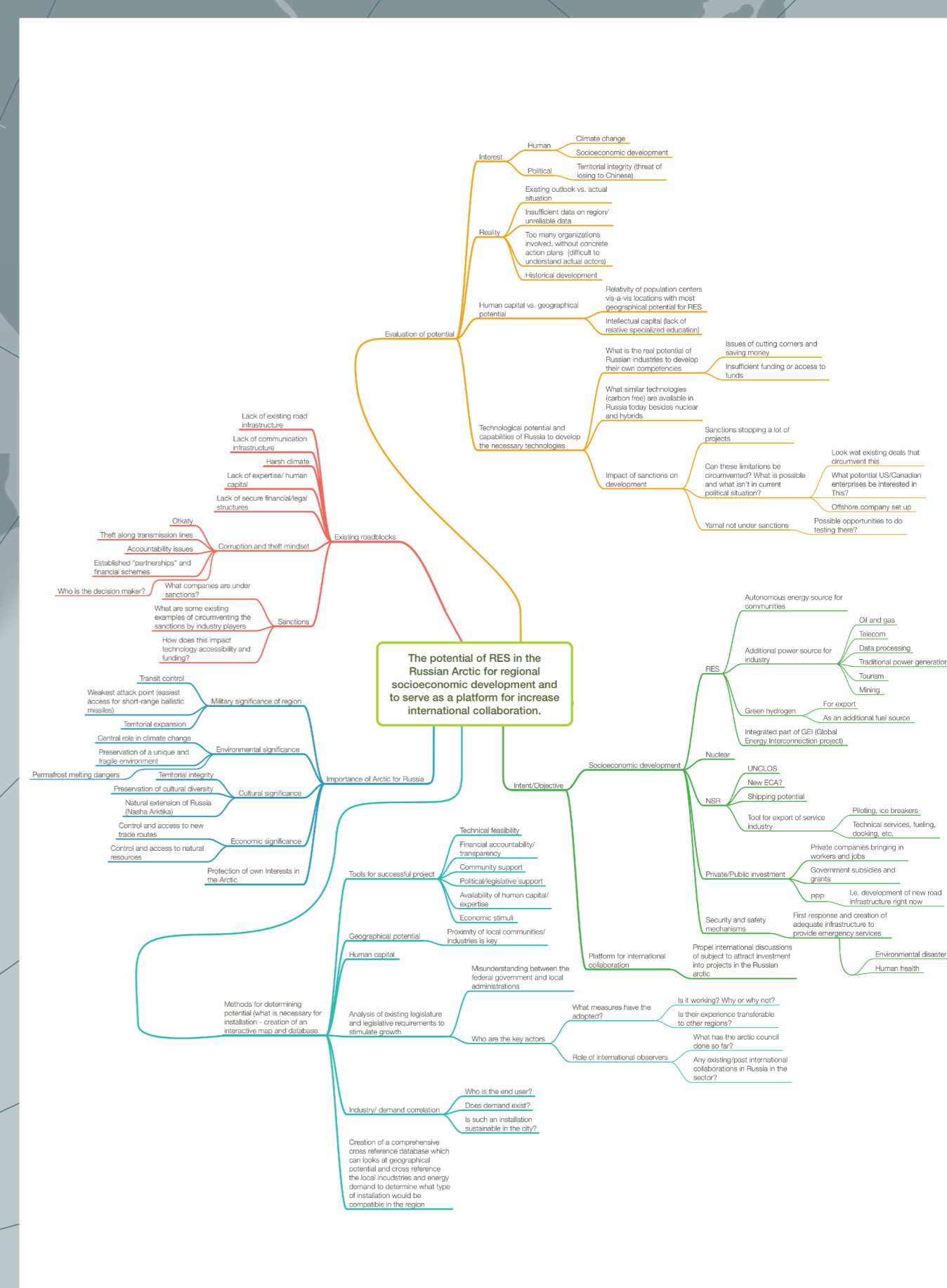
- The Arctic has become the most rapidly changing region in the world, warming at double the speed of other parts of the globe in just a few decades.
- Holding an abundance of natural resources (including an estimated 13% of world's total undiscovered natural gas and oil resources), the growing accessibility of the region has spurred significant interest in its development as the receding sea cover opens up new economic opportunities and trade routes.
- Russian Arctic spans 3 million km², accounting for 20% of Russia's total territory and is the home to nearly 2.5 million people (about 40% of total Arctic population).
- Varying resource-rich landscapes provide ample opportunities for renewable energy that could potentially, with the right political and economic incentives, provide the necessary framework to propel robust growth in the region.
- The region is laden with hazardous climatic conditions, poor or inexistent infrastructure, high energy costs, ageing technology with huge efficiency losses, as well as a lack of specialized human capital in the region.
- The isolation of many communities and economic hubs presents major issues in regard to logistics, as the lack of proper infrastructure significantly complicates the delivery and increases the cost of goods, in particular energy, as the majority of the Russian Arctic is not connected to the main electricity grid, leading to a reliance on imported coal and diesel to run regional generators.

RES potential in the Russian Arctic:

- Renewable energy systems (RES) have come forward as the go to solution to provide a sustainable energy future for generations to come. For Russia, renewable energy systems could serve as one of the foundations to combine necessary economic development of the region with the enhanced sustainability measures.
- Currently renewables make up less than 0,2% of Russia's total energy mix, new generation capacity has been doubling every year, with an end goal to reach 5% by 2035.
- Considering the volatility of the Arctic environment, purely renewable installations would be nearly impossible to carry out and would not provide the necessary level of energy security required. This why cogeneration projects will be the likely solution, as they can maximize renewable integration without compromising energy security by providing necessary back up for the intermittent generation of renewables, especially considering the volatile and extreme weather conditions of the region.
- There are currently some small-scale co-generation projects already in place in the Russian Arctic, including the largest solar power plant above the Arctic circle.
- RES cogeneration plants can help:
 - Natural resource development: can reduce the energy costs of production sites, optimize the output (for hydrocarbon development), increase energy security, as well as serve as testing grounds for developing new and customized RES technology solutions that can be adapted to the climatic environment of the Arctic regions.
 - Local communities: provide them with uninterrupted power (finally extending power/heat usage to 24 hours in some areas), reliable communication points, significant cost savings, as well as reducing the anthropogenic effect on the local environments.
 - Arctic tourism: with international companies offering specialty cruises and excursions in the region, the tourism industry is starting to develop. RES can be used to stimulate this trend, through the installation of these plants in remote hotels and tourist bases, providing additional sources for economic stimuli for the regions.
 - Northern Sea Route: NSR is looking to play a huge role the future of Russia's and the global economies, the economic development and energy security of these Arctic regions will be key in turning these waters into the new major trade artery

Implications of Research / Anticipated Results:

- Understand the potential for RES deployment in the Arctic region and the socio-economic effect that it would have on local communities
- Understand the long-term environmental and political implications and help influence relevant policies
- Incentivize technological innovation to develop technology solutions adapted to the regional environment
- Propel international collaboration and discussion on the subject matter



Methodologies:

- **Creation of a comprehensive GIS database** - integration of sustainable economic and geographic indicators into a geographic information system (GIS), to understand the applicability of remote sensing for their identification in order to create an economic and spatial model of the regional potential.
- **Economic analysis** - macro and microeconomic analysis to understand the potential budgeting constraints and incentive mechanisms.
- **Policy analysis** - overview of the existing policies in place that are aimed to accelerate RES implementation in Russia and analyze the deficiencies of these policies and what can be done to amend them in order to achieve the desired level of deployment.
- **Comparative analysis & Internationalization of research** - look at the potential of cross-sectional projects, that could combine and adapt sustainable agriculture, for example, in the region to the harsh environment with renewable energy production, as well as a comparative analysis of existing policies and projects in place in other Arctic states.
- **Case studies** - conduct several case studies, either based on existing project or if there is an opportunity to launch a new one to understand all of the limitations and benefits of RES deployment in the regions.