Researching Baltic Energy in a Transformative Period: The Energy Trilemma and Changing Agendas at the Energy Cluster

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When the Energy Cluster at IFZO began working on the "Fragmented Transformations" project, the primary transformation under examination was the gradual decarbonisation of regional energy systems: the shift from hydrocarbon dependence to green energy in pursuit of a "net-zero" agenda. Almost a year ago, the invasion of Ukraine proved a catalyst for a second transformation. As all regional states unequivocally voiced their support for Ukraine and Finland and Sweden initiated NATO membership bids in a new security environment, the role of Russia in regional energy systems has ushered in a second transformation: one where the threat of Russia to regional energy systems has been realised and the process of disengagement from dependency on Russian energy supplies has been accelerated; where sanctions and suspensions of supplies have reshaped energy flows and markets; and where energy security, the affordability of supplies, has come to the fore.

The rapid shift in geopolitical realities and energy flows has been accompanied by swift policy change. Energy security has come to the fore, yet the sustainable agenda has not been entirely forgotten. From non-Russian pipelines being expediated, to the redirection of gas supplies within the region and an increased emphasis on LNG, to pushes for new offshore renewables projects, the last year has witnessed a remarkable level of resilience and cooperation among BSR states in response to increased precarity in regional energy systems.

We have, then, two transformations: one born of long policy deliberations, of intense multilateral collaboration, with climate and environmentality sustainability at its core; the other, a rapid response to a constantly evolving geopolitical scenario, to insecurity, to uncertainty. Amid these transformations, and in part as a result, we are also witnessing high energy prices that place significant burdens on populations already struggling with a cost-of-living crisis. Attempts to reconcile the core elements of these transformations and crises – environmental sustainability, energy security, and energy equity in the face of rising in-affordability – is creating an energy trilemma for policy makers and regulators.

These changes have also necessitated a reconfiguration of the research agenda at the Energy Cluster. Studying the slow-and-steady green transition alone is no longer possible; rather, we must consider this transformation in conjunction with the renewed emphasis on energy security in the immediate term. At the same time, we must consider the implications of these

policies on the populations that are affected by energy transformations. Rapidly shifting supplies and suppliers, together with gas and coal shortages, an increasingly under-pressure global LNG supply chain, and the necessity for investment in new renewable, LNG, and hydrogen infrastructures are driving up prices. Ensuring a just and equitable energy transformation for all should be a consideration for all those investigating regional energy policy.

The Cluster has therefore pursued a new focus on the energy trilemma in the context of regional (energy) transformation. We are investigation how each of the three dimensions are manifesting, what they mean for energy flows and systems in the region, and how they can be reconciled in a rapidly changing environment. This has, in the initial stages, necessitated a consideration firstly of what the energy trilemma *is;* that is, the policy, legal, and academic foundations of a complex and nebulous phenomenon.

At its simplest, the energy trilemma refers to the inherent difficulties in balancing three core aspects of energy policy necessary to create a sustainable energy system: energy security, energy equity, and energy and environmental sustainability. The term originates with the World Energy Council, who each year use an index approach to measure and rank the trilemma. The WEC also provide policy recommendations to states to improve their energy sustainability and achieve a balance between the three core dimensions.

From an academic perspective, there's little agreement on how to measure the trilemma or, indeed, what exactly the three dimensions are. In part, this is due to the degree to which the three are contested terms in literature. Our first task was, therefore, to conceptualise the energy trilemma and its constitute parts and create a framework through which we could examine its manifestation in the BSR. We then considered how these concepts are studied and manifest in the region. The results of that conceptualisation but are outlined in short here, along with initial results of our research on this topic and the trilemma as a whole.

Energy security is the assurance of access by consumers to sufficient, affordable, and continuous supplies of energy resources. While it does not imply total freedom from risk, it does indicate that an energy system should be sufficiently robust to cope with and minimise interruption from sudden geopolitical, environmental, technical, or human issues that threaten energy security.

While lack of domestic hydrocarbon reserves and subsequent dependence on Russian fossil fuel imports has been the most pressing energy security issue in the region, our research

highlights significant divergence in levels of threat perceptions in this theme. These divergence in general are highlighted in our work on the Nord Stream project. However, research recently carried out for a recently submitted article on energy geopolitics suggests a convergence in threat perceptions and security risks since the onset of the invasion of Ukraine. It also highlights how high threat perceptions in the Baltic States encouraged a significant diversification campaign which, it concludes, contributed to higher resilience in the face of energy sanctions and the use of the Russian "energy weapon" which, it argues, was relatively ineffective for the most part. This argument is further explored in a joint policy paper with the Security Cluster, to be published February 2023, that analyses Lithuanian energy security and its energy independence from Russia.

We argue that *Energy equity* is not, in contrast to much of the literature, considered analogous with energy justice nor entirely an economic concept. Rather, it incorporates both economic and social impact -with the latter encompassing gender, racial, socio-economic, and geographic equity – and accounts for a strong correlation between economic energy equity and energy justice.

Initial research on the concept suggests that energy affordability is a significant challenge in the BSR. Increasing energy inaffordability is having a secondary impact on energy poverty levels (except in Sweden, which does not recognise energy poverty in any policy or legal context). Yet we point out that there is significant divergence on how this manifests in the region. Climatic conditions and energy inefficient pre-WW2 buildings contribute to heat loss and, consequently, higher energy costs in the Baltic States, particularly for those who cannot afford to upgrade to more efficient accommodation. Conversely, investment in heating systems and energy efficient buildings contributes to lower levels of energy poverty in the Nordic states.

Our research on this topic also addresses energy justice, including the fair distribution of benefits and burdens of the energy transition. Here, we point to accusations that the Nordic states do not take into account the interests of Sámi populations in planning renewable agendas. In Sweden, for example, courts are dealing with an increasing number of cases in which Sámi oppose wind energy developers that are focusing development of new wind farms in the reindeer-herding regions of the North. We point out that this calls into question the fairness of wind development and the consideration paid to the rights of indigenous populations. To this end, we are working on a paper with colleagues from Nordic Studies and

the History Cluster on a paper on indigenous pasts and renewable energy futures among the Sámi of Finland.

Energy and environmental sustainability refers to the impact the whole energy system has on the natural world. In the context of the energy trilemma, it also alludes to the ability of governments to supply energy to current populations without causing undue harm to current ecosystems or the wellbeing of future populations.

Data concerning the status quo of energy and environmental sustainability in the Baltic Sea Region is scarce. Many researchers study this concept from a quantitative indices approach, and we find that there is sufficient divergence depending on the particular variables included. These indicators include everything from energy related taxes to energy intensity and efficiency. It is particularly noticeable that these indices tend to be anthropocentric, with impacts of decarbonisation on other environmental features (ie of offshore windfarms on maritime biodiversity) omitted.

We note that regional sustainability agendas are shaped by EU sustainability agendas, but there is a significant divergence in policy applications. A recently submitted paper, for example, points to significantly different levels of renewable energy development in those states with some level of hydrocarbon resources (Poland, Germany, Estonia) and those without (Finland, Sweden, Latvia). Denmark is an exception here as a fossil fuel producer with high levels of renewables. We will be further pursuing research on environmentality and energy in our forthcoming research on energy islands, offshore renewable infrastructures, and green hydrogen in the region.

Overall, we define the *energy trilemma* as the conflict that arises between energy security, environmental sustainability, and energy equity in the pursuit of a sustainable energy system, and which is integrated with and affected by external processes and structures. For policy makers, the difficulty in resolving the trilemma lies in the difficulty of reconciling the oftenconflicting aims of the three dimensions. Frequently, the three are sufficiently conflicting that trade-offs are necessary: environmental sustainability, for example, has often suffered from the perceived security obtained from fossil fuels. Yet a question does arise as to whether the trilemma can, in fact, be resolved or evenly balanced. We agree with Yang et al's assessment that resolving the trilemma in policy terms is unlikely. Rather, policy makers should strive to minimise the impact of trade-offs on overall system stability.

It should be noted that different states in the region prioritise different aspects of the trilemma at different points. The Nord Stream is the most obvious example of this. Germany's willingness to continue – and increase – energy cooperation with Russia can partly be attributed to the importance of natural gas for economic growth (and hence economic growth); the strident opposition of the Baltic states and Poland to the project stems from the overlap of energy and territorial/sovereign security, while the initial opposition of the Nordic states was partly based on concerns over the environmental impact of the project – in other words, an overlap between environmental and energy security. In the German case, economic concerns overrode the potential threats of overdependence or Russia as an unstable supplier. In other words, affordability of supply was a key determining factor in decision making.

The Nord Stream 2 case represents a microcosm of diverging energy security perceptive in the region and there are plentiful other examples of particular states. The perception of nuclear power as essential to energy security and decarbonisation in Finland and Poland, for example, is at odds with the view of nuclear power as undesirable and dangerous in Lithuania and Germany, while the urgency with which sustainable energy diversification is pursued in the Nordic states is contrasted with the emphasis on affordability and continuity of supply in the Baltic states.

Policy changes in the last year has further emphasised these difficulties. Replacing Russian fossil fuels is essential to ensuring energy security and affordability in the short term, yet current investment in LNG infrastructures raises questions about longer term environmental sustainability. Plans to construct offshore energy islands and meshed grids, while in their infancy, speak to environmental and long-term security goals, but high implementation costs will have implications for equity. Through our research at the energy cluster, as well as the network we have created with others studying this topic, we intend to further study the implications of the energy trilemma in this transformative period and provide policy and regulatory specific analysis for regional policy makers.