

Nordic Energy Research Strategy 2022-2024

1. Background

Nordic Energy Research is the platform for co-operative energy research and analysis under the auspices of Nordic Council of Ministers. Nordic Energy Research collaborates closely with national energy research funding institutions.

As a Nordic institution and as part of the formal Nordic collaboration in the Nordic Council of Ministers, the general framework of Nordic Energy Research is specified in our statutes (vedtægter/stadgar), which specifies our objectives and general working areas.

The Nordic Vision 2030, for the Nordics to become the most integrated and sustainable region in the world, as well as the Nordic declaration on carbon neutrality are key drivers behind this present strategy for Nordic Energy Research. The strategy also takes into account the rapid changes in energy technologies and national policies, as well as Nordic co-operation possibilities and research gaps.

The Nordic countries combined as a region is the 11th largest economy in the world. The Nordic countries should join forces in the global market, where energy research and co-operation could play an important role for strengthening the region's competitiveness. Especially the relation to EU/EEA has gained more importance in the last years. Within our framework, the emphasis is on the Nordic interests - including common activities with the Nordic region's neighboring areas, i.e. The Baltic Sea region and delimited Arctic areas.

The following strategy is valid for the years 2022 – 2024.

2. Nordic link, and our vision and mission

The overall Nordic Vision 2030 includes three strategic goals; A Green Nordic Region, a Competitive Nordic Region, and a Socially Sustainable Nordic Region. The Nordic Vision is supported by both national policies as well as Nordic cooperation, i.e., the work of the Nordic Council of Ministers adds to national contributions in order to reach the goals.

The Nordic Council of Ministers' overall Nordic Action Plan for the period 2021-24 specifies twelve objectives for all of us in the Nordic collaboration to strive towards as well as 45 development/impact indicators for measurement of the progress towards these goals and objectives. The Vision also builds on the UN sustainable development goals (SDGs) wherefore these are reflected in the indicators as well.

Nordic Energy Research contributes to several of the twelve objectives. The main contributions are within five of these:

Carbon neutrality – Strengthen research and development and the promotion of solutions that support carbon neutrality and climate adaptation (Objective 1),

Sustainable and circular - Promoting a circular and bio-based economy, sustainable and competitive production, sustainable food systems, and resource-efficient and non-toxic cycles in the Nordic Region (Objective 3),

International co-operation – Contribute to the positive development of international co-operation on the environment and climate, such as by promoting Nordic green solutions in the rest of the world (Objective 5),

Knowledge and Innovation – Support knowledge and innovation, and make it easier for companies throughout the Nordic Region to take full advantage of the development

opportunities created by the green, technological, and digital transformation and the growing bioeconomy (Objective 6),

An inclusive green transition – Work to involve everyone living in the Nordic Region in the green transition and digital developments (Objective 10).

Nordic Energy Research's vision and mission reflect these objectives of the action plan and the Nordic Vision 2030.

Vision for Nordic Energy Research:

The Nordics as the world's most sustainable and integrated energy region.

Energy is the fulcrum for the green transition, as energy related emissions account for the main part of greenhouse gas emissions. The Nordic electricity and heat sectors are on track to become carbon neutral, and with energy efficient electrification and sector couplings to other sectors we can create **a sustainable and integrated energy region for all Nordic citizens.**

The energy co-operation between the Nordic countries has been strong for many years and may be even stronger tomorrow (Jorma Ollila, 2017). This is reflected in our Mission which also specifies the impact we would like to have.

Our Mission:

Sustainability, integration, and progress through Nordic cooperation.

Nordic Energy Research **creates the knowledge basis for policy makers and the energy sector to lead the transition** towards a sustainable and integrated region.

Joining forces in energy research, energy cooperation, and outreach leverages resources and thus, increases the impacts from results. Through collaboration we will **obtain added value and strong impacts** of the transition in the Nordic countries, while creating business opportunities in new and renewed areas on the global market.

The Nordic countries, through close collaboration, could also have a **stronger impact in the EU and globally.**

3. Prioritised areas of energy collaboration

Nordic Energy Research especially promotes co-operation within six thematic areas in the 2022-24 strategy. This increases the visibility of NER's contribution to the fulfilment of the visions and our strategic mandate as well as relevance. Furthermore, the areas correspond well with national research policy and can be said to be NER's response to the thematic priorities in Nordic energy research policy and energy co-operation.

Thematic areas for Nordic energy cooperation



1. Smart energy systems – Several functions optimized simultaneously in the overall system of energy flows



2. Sustainable energy – Sustainable use of resources and climate-responsible energy



3. Green transport – Green transition of the transport sector value chain, from energy resources to energy storage, -transport and -use



4. Energy markets – Design and development of future energy markets for efficient utilization of resources, across Nordic borders and energy systems



5. Energy and society – Social sustainability, public acceptance and fair distribution in the green transition



6. EU-Nordic collaboration – Nordic coordination and a common Nordic voice in the EU energy co-operation

Smart Energy Systems – *Energy systems* is a term for seeing the whole picture of energy flows from resources, technologies, energy carriers, energy conversion to energy consumption. Due to differences in resources, technologies and applications, there is a clear advantage in cooperating in the Nordic region at energy system level.

That it is *smart* refers to several functions being optimized at the same time, e.g. that high security of supply is ensured at the same time as flexibility in the system ensures the greatest possible value of varying renewable energy production from wind and solar power. Other examples are efficient energy use / system integration / sector switching across energy forms / infrastructures (e.g., P2X between electricity and other energy carriers such as district heating and renewable gases / e-fuels).

Sustainable Energy – contributes to achieving the goal of a green and sustainable Nordic region on the road to CO₂ neutrality. We must ensure sustainable use of our resources and climate-friendly energy. E.g., transition to renewable energy, sustainable cultivation and use of biomass; ensure biodiversity through major energy infrastructure expansions; cooperation on a climate-neutral energy system; carbon capture and storage (CCS), as well as sustainable (low overall carbon footprint / lifecycle) CO₂ recycling from carbon capture (CCUS).

Sustainable Transport – The green transition of the transport sector is absolutely crucial if the ambitious climate goals of the Nordic countries are to be achieved - transport cannot take place without the use of energy. Sustainable national solutions will depend on close cooperation with neighboring countries on the entire value chain, ranging from where energy is created, stored, transported and used.

Energy Markets – Co-operation and market-driven development are essential to achieve the lowest possible costs / energy prices for Nordic citizens. At the same time, energy markets can help to ensure efficient utilization of our resources across the Nordic borders and energy systems. The co-operation in the Nordic electricity market is unique in the world and is considered a global model. But also within gas, bio- / efuels, carbon (CO₂), renewable energy certificates and trade across energy carriers, there are trade advantages regionally as well as locally. The structure of these markets and the connection to the electricity market are therefore of great importance for Nordic energy co-operation.

Energy and Society – Energy and climate policy are linked to business and social policy to ensure a competitive Nordic region and a socially sustainable Nordic region. There are many green jobs in investing in greener and cleaner energy technologies. At the same time, sustainability is also about social sustainability.

The Nordic countries have a tradition and a political desire for sustainable development. This will become even more important in the coming years, when the green transition will lead to major

changes in energy production and consumption, transport, spatial planning and large energy installations on land and water. A lack of popular acceptance can slow down and block this.

EU-Nordic Cooperation – EU / EEA issues and other international energy issues have been on the agenda since the start of official Nordic energy co-operation. At the political level, we have wanted a common Nordic energy professional voice. At the ministerial level, it is often the interpretation and implementation of directives. Finally, international energy research co-operation is important for the Nordic region to maintain its leading position in the green transition. Participation in international R&D co-operation in the field of energy is an important supplement to national and Nordic research. In addition, Nordic coordination gives the Nordic region the opportunity to influence the EU research agenda and strengthen national initiatives in an international context.

The most important international research partner is the EU and our immediate area in the EU - especially the Baltic countries. In addition, NER already works closely with several international organizations on analysis. Among others, the International Energy Agency (IEA) and the OECD, which together with NER have created the Nordic ETP, Nordic Maritime Transport Outlook, and more. Finally, it should be mentioned that NER has been active in the COP meetings for several years.

4. Approaches /Tools for Nordic Collaboration

At Nordic Energy Research (NER), we facilitate Nordic research co-operation, and we are part of the formal collaboration between the Nordic governments. Therefore, we apply a number of different approaches and tools to reach our goals. E.g. we:

- Initiate and ensure funding of Nordic research collaboration
- Act as Call Manager in joint Nordic research programs
- Facilitate and support exchange programs/mobility of and networks between researchers
- Act as secretariat for Nordic intergovernmental working groups and networks
- Assist Nordic policy and decision making by supplying analyses, reports and data in the field of energy
- Support the Nordic Council of Ministers, its secretariat, its councils and committees.

The first part of these approaches and tools mostly serve to facilitate the Nordic research co-operation and meet the research objectives agreed with the Board of NER. Whereas the second part of these procedures and tools mostly serve to facilitate the formal collaboration between the Nordic governments within the objectives of the Nordic Council of Ministers.

The section below focuses on our work on research, mainly performed for the national research funding agencies in close collaboration with the Board of NER.

4.1 Funding and Research Principles

A strategy for joint energy research cooperation 2022-24 must guide us through choices and priorities. When compared to national and international research funding agencies, the resources of Nordic Energy Research are modest. But they can be powerful in the sense that Nordic Energy Research is the only one who fully focuses on Nordic energy collaboration and the added value that lies therein. This is where we must focus.

Research dialog meetings

Involvement of stakeholders is key to identify and respond to strategic priorities for Nordic research co-operation. This involves consultations with National stakeholders regarding joint Nordic actions and co-funding of research.

Regular dialog meetings are arranged between NER, the Board of NER, national funding agencies, and experts. The dialog meetings should identify research priorities with high common added value - building on national initiatives / priorities as well as identifying areas for tomorrow's large programs.

Researcher mobility, exchange and networking

Our joint Nordic research activities do not only aim at creating scientific results. They also include the important aspect of creating networks, mobility and exchange of teams and individual researchers.

Researcher mobility creates trust and long-term cooperative relationships - it may be the most impactful tool for actual cooperation and knowledge sharing. As such, mobility programs for researchers are important in facilitating and increasing research collaboration between the Nordic countries. Combining Nordic research milieus through strong collaborative bonds increases their critical mass and can thus add value in terms of quality and relevance in the global research arena. At Nordic Energy Research, instruments to encourage and stimulate mobility and exchange between researchers and their teams have a prominent place in our toolbox.

Applied research and collaboration with the industry

Our joint Nordic research calls should aim for a high Technology Readiness Level (TRL). It may be applied research which is challenge-based or cross-disciplinary research. The focus is at (eco-) systems-based approaches with a positive societal impact (Nordic added value) within the next 10-20 years. Establishing value chains, building on national efforts and for the benefit of each country. Our funding should facilitate competence building *in* research communities *for* the industry.

Fully financed calls versus large Nordic calls with top-up funding

A balance must be found between launching research calls backed by Nordic Energy Research funding, and an approach where our funding from Nordic Energy Research serves as "to-up"-funding to larger Nordic research calls together with key Nordic research funding agencies.

At Nordic Energy Research, we will explore both options, but we would opt for the latter: Putting our efforts into bringing together funding for large, Nordic research call, with participation from a wide range of Nordic research funding agencies.

Outreach

Outreach in the Nordics and other regions is an important tool for transforming research results into impacts in terms of innovation, commercialization, and policy decisions. NER should have a focused communication / outreach strategy.

One of the key objectives of Nordic Energy Research is to assist the Nordic counties in having a "Nordic voice" in international fora.

Closer collaboration between all relevant institutions under the Nordic Council of Ministers could be advantageous. Nordic research will benefit from such co-operation, particularly research dealing with wider societal challenges where energy is one part, cross-border issues, and cross-sector perspective.

Nordic collaboration on European Union research programs

Energy policies and energy research in the Nordics are closely linked to European policies and research. An important forum is the EU/EEA. In Europe, not only the Nordic region but also the Nordic-Baltic region can play a key role. There are a number of aspects in this European collaboration: The joint Nordic effort to influence and inspire work and programs in international fora; the Nordic voice when it comes to EU/EEA legislation and research programmes; and the operational task of managing the calls – the task of a "call manager" so to speak.

At Nordic Energy Research, we recognize the key aspect of performing the task of a Call Manager, while at the same time would like to put more emphasis on the collaborative groundwork to help formulate a Nordic voice and position.

Highest impacts / Nordic Added Value

Our research calls should build on our national/Nordic strengths and needs to ensure effectiveness and highest impact.

The call procedures should be transparent, the research focuses should be timely, at the right level of focus, and aiming at high impact. Stakeholder involvement in the procedure may enforce the engagement of the relevant applicators.

Impact assessment (Nordic added value) should be given relevant priority in the evaluation of research proposals for our calls as well as in project reporting.

Nordic Grand Solutions

To successfully address grand societal/Nordic challenges such as climate change/carbon neutrality, we need to combine knowledge, skills and resources from different areas of expertise and societal institutions. E.g., research, innovation and citizen engagement. This requires a shared ambition and route to walk.

NEF should aim to create transformative change by breaking down high-level grand challenges into more granular energy related angels/components where concrete actions can be developed. This is done by identifying opportunities to address grand challenges, proposing energy related innovations that can help overcome these challenges.

By making a large, broad call running for the entire strategy period, we encourage more applicates and ensure a critical mass at a high level for grand solutions. A broad call can e.g. cover all our thematic research areas where the best applications can be selected. Simultaneously, more sector specific calls can be made within single areas – typically as top-up fundings for common Nordic problems. I.e. a large, broad call can run in parallel with establishing and running co-funded programs and calls for specific research gaps.

NEFs role and cooperation with other organizations

NEF employees have a high professional level within energy and Nordic energy cooperation.

NEF works at the triple helix / crossroad between policy, research, and industry. Our political network and cooperation with ministries under the Nordic Council of Ministers is an advantage to ensure political relevance of our work, as well as to facilitate that our work reaches high level decision-making bodies. A stepstone for high Nordic added value of the work. We need to understand the demand from the political network in order to push demand-driven research.

Likewise, our close cooperation with the national funding bodies ensures national relevance of our research and that it supports national research priorities and ongoing work.

NEF should strengthen the cooperation with research environments as well as with industry. More stakeholder interactions / involvement could make NEF more known. One way could be through cooperation with our sister organisations, e.g., NordForsk (Research) and Nordic Innovation (Industry). Another way is to strengthen the cooperation with other sectors under the Nordic Council of Ministers.