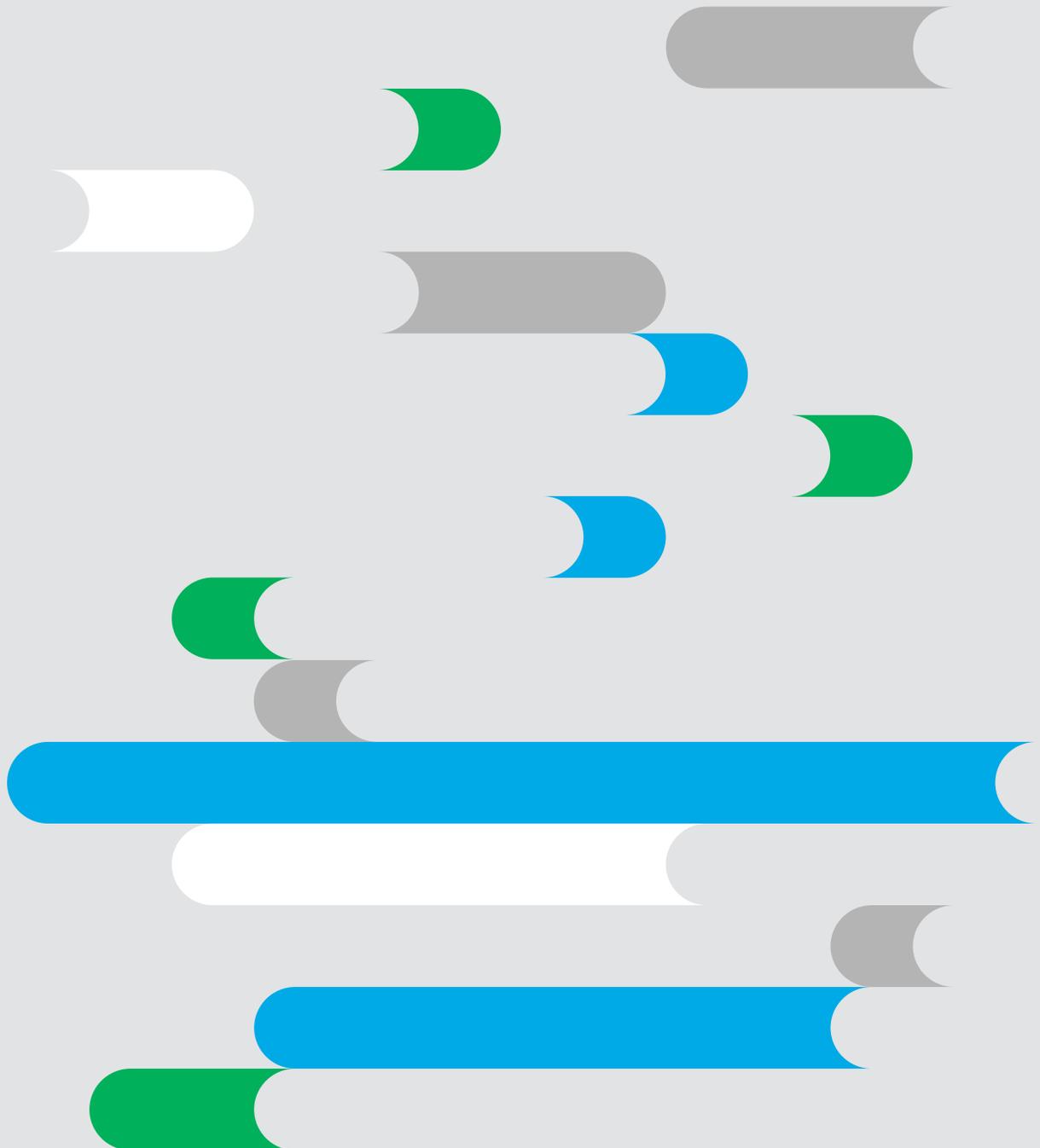


Nordic Energy Research Strategy 2015-2018



Foreword

The Nordic region has positioned itself as a leader in the development and deployment of competitive and sustainable energy solutions in well-functioning markets. However, the challenges of global competition and energy system transition must be continuously addressed if the region is to maintain this leadership and reach the individual Nordic countries' energy and climate targets for 2050.

Ambitious long-term goals require short and mid-term actions. The International Energy Agency (IEA) has stated that, in relation to their global 2°C scenario, the window of opportunity for shifting investments to more sustainable energy technologies is soon closing. The coming years will be particularly decisive, with COP21 in 2015 and EU goals being set for 2030. Technologies will play a central role in achieving an energy system transition, necessitating the strategic prioritisation of energy research and development (R&D) cooperation in the region.

This strategy builds on various sources, including evaluations of Nordic Energy Research, the Action Programme for Nordic Cooperation on Energy Policy 2014-2017, analytical input such as Nordic Energy Technology Perspectives and the Nordic Energy Way Arena, European and national research priorities, and finally a series of five national strategy workshops held in the spring of 2014.

It is our hope that the strategy for 2015-2018 provides a dynamic framework for realising the significant potential for more extensive and prosperous energy technology cooperation in the Nordic region.



Guðni A. Jóhannesson

Chair of the Board for 2014

25th of August, 2014

Nordic cooperation in energy research

Evaluations have underscored that Nordic cooperation in energy R&D is highly beneficial. Each Nordic country only represents approximately 1 % of public energy R&D funding in OECD member countries, a small resource with which to compete alone on the global stage. Together however, the Nordic region accounts for a more significant share, and would represent the world's 12th largest economy measured in nominal GDP. In addition, the five countries have highly complementary energy systems and R&D competencies that can be better leveraged through collaboration.

Nordic cooperation in energy research started 1975, leading to common pot research funding since 1985 and the establishment of Nordic Energy Research as an institution under the Nordic Council of Ministers in 1999. The Board comprises representatives from the authorities and ministries responsible for energy research funding in the five Nordic countries, who contribute the majority of the organisation's funding.

Nordic Energy Research operates in four-year strategy periods, which have been mirrored by its main funding programme over the same period. The strategy guides not only the main funding programme but all activities within the organisation.

Challenges for the Nordic energy system

EU targets for 2020 stipulate an increase in renewable generation, energy efficiency and reductions of CO₂ emissions. In some Nordic countries, national renewable energy targets go beyond EU goals. In the longer term, new EU targets for 2030 will come into effect, while all Nordic countries have adopted ambitious climate targets and visions towards 2050. These range from carbon-neutrality in Norway, to domestic emissions reductions of 80 % in Finland, to a 100 % renewable energy system in Denmark, for example. Achieving these ambitious targets will require a comprehensive transition of the energy system, which can in turn facilitate more competitive economies and sustainable societies across the Nordic region.

Analyses such as the IEA's Nordic Energy Technology Perspectives 2013 have highlighted the most critical technology challenges facing the region in this transition. The relevance of these challenges as potential focus areas for Nordic R&D cooperation has been confirmed during the strategy development process. The four main technology challenges from Nordic Energy Technology Perspectives are presented below, adapted to reflect additional insights gained from the five national strategy workshops held in the spring of 2014. These challenges will be used as a backdrop when designing the organisation's research funding instruments over the strategy period.

- **Infrastructure enabling system solutions**

Nordic integration in electricity infrastructure and markets is world leading, but challenges remain in adapting to future market designs and greater shares of

variable generation, as well as in incentivising necessary investments over the coming decades. Heat is another technology area with clear Nordic leadership, and one with significant potential to assist in balancing variable electricity generation. Cooperative research on new flexible energy networks can build on these core Nordic competencies.

- **Transportation fuels and the utilisation of biomass**

The geographically dispersed Nordic countries have a proportionally large demand for transport work, especially for long-distance sea, air and road transport, as well as in commercial and agricultural sectors such as fishing. The Nordic region also has a role internationally, with Nordic companies owning or operating a significant percentage of global sea trade. Research on advanced biofuels has the potential to reduce growing Nordic and global emissions from these demanding transport applications.

- **Energy efficiency improvements in demand sectors**

The Nordic region has an established building stock requiring energy efficient renovation, and significant energy intensive industry. Smart energy networks and markets have significant potential to accelerate energy efficiency improvements in these sectors. The Nordic region can take a lead in research into system solutions to facilitate energy savings in cities and in industry.

- **Decarbonisation of energy-intensive industry**

A significant share emissions from Nordic energy intensive industry are process-related, and in some cases these cannot be reduced by a greater utilisation of renewable energy sources. A complete decarbonisation will require technologies such as Carbon Capture, Use and Storage or the development of new industrial processes with lower process emissions. Nordic research cooperation on this issue can play an important role in the future development of energy intensive industry in the region.

In addition to these four thematic challenges, Nordic Energy Technology Perspectives highlighted the importance of Nordic cooperation in R&D, policy and infrastructure, as well as the far-reaching economic and societal benefits of the report's "no regret" decarbonisation actions.

By building and strengthening Nordic research networks and competencies, Nordic cooperation can lead to more robust research results that increase competitiveness for Nordic industry and support energy technology policymaking. Research cooperation is a powerful tool in branding the Nordic region as a sustainable energy forerunner internationally.

Vision, Mission and Goals

Nordic Energy Research adopts the following vision and mission for its work during the 2015–2018 period:

Vision: *Extensive Nordic cooperation in world-class energy research and development, facilitating national ambitions of sustainability, economic development and competitiveness.*

Mission: *To fund and facilitate Nordic cooperation in energy research and provide analytical input to energy technology decision-making.*

All activities under Nordic Energy Research during the period will contribute to achieving at least one of the following three goals:

Goal 1. Build research cooperation and competencies within the development of sustainable energy solutions.

Goal 2. Provide research-based analytical support to energy technology decision-making.

Goal 3. Enhance the knowledge base for increased competitiveness of the Nordic energy system and disseminate Nordic sustainable energy solutions.

Strategic direction

A set of three core principles will guide all activities under Nordic Energy Research in the next period and act as a basis for the evaluation criteria when funding future projects.

Principle 1. Nordic added value

- Activities should provide clear and explicit additionality to activities already supported by national or EU funding.
- Limited Nordic resources should be focussed where they can make a difference.
- Activities should address uniquely Nordic challenges common to at least three countries in the region.
- Activities should enhance Nordic integration and facilitate network-building and information exchange.

Principle 2. System perspective

- Activities should address challenges at the system level, and where feasible, address broader aspects of a sustainable energy system such as competitiveness and societal impacts.
- Activities should be multidisciplinary where needed, covering natural sciences, economics, social sciences, energy system modelling, or analysis of markets and regulatory frameworks as required in order to solve the targeted challenge.

Principle 3. Politically relevant research results

- Activities should address a limited number of critical challenges that are central in meeting national energy and climate goals.
- Research projects and results should be disseminated in a way that is tangible, understandable and interesting to a broad range of stakeholders, including the Ministers of energy and industry.
- Nordic cooperation should bring visibility to the work of research participants by establishing relevant partnerships with influential organisations and effectively publishing project results.

In addition, Nordic Energy Research will work strategically to facilitate cooperation between the different national funding programmes in the Nordic countries, thereby increasing the total resources contributing to Nordic research cooperation. This work will manifest both in individual projects to increase cooperation and as an underlying objective in Nordic Energy Research's main funding instruments explained below.

Activities

Nordic Energy Research has a portfolio of ongoing and planned activities with which to operationalise the aforementioned goals. As a follow-up to the organisation's main research funding programme for 2011-2014, entitled Sustainable Energy Systems 2050 (SES 2050), three new central instruments are planned. These three instruments cover all three goals for the period and will account for the majority of Nordic Energy Research's direct funding from member countries. The Board of Nordic Energy Research may initiate additional instruments during the period.

The largest instrument, Flagship Projects, provides project-based, in-depth and result-orientated cooperation, which is balanced by broader cooperation facilitated mainly through two other instruments: Network-Building Projects and Expert Groups. These are briefly explained below:

Flagship Projects

Research projects involving three or more Nordic countries will be the largest instrument in the new period, accounting for approximately 80 % of Nordic Energy Research's direct research funding from member countries. Funding will be focussed on a small number of large projects, which will facilitate greater dissemination effects and achievement of the aforementioned goals.

Projects will have a greater focus on delivering mid-term results, a focus that may be reinforced by a staggered funding format, the details of which will be determined when planning the programme. Industry involvement and co-financing will be sought. A share of Nordic Energy Research's direct research funding is earmarked for the integration of researchers from the Baltic Sea region. Half of these earmarked funds may be distributed through this instrument.

The thematic focus of the Flagship Projects will be determined by the project proposals that successfully receive funding, not by the strategy or call text. In addition to criteria for scientific quality, the two-stage call text will require that pre-proposals fulfil detailed criteria based on the three principles of the strategy: Nordic added value; System perspective; and Politically relevant research results.

Network-Building Projects

Network-Building Projects will aim to facilitate broader, hands-on cooperation between researchers than what is achieved through the Flagship Projects. The thematic focus of each Network-Building Project may align with the challenges addressed by the Flagship Projects, but may also cover other relevant Nordic challenges. These projects will build on national events and networks, and may take the form of PhD summer schools, research conferences or mobility grants, for example. Network-Building Projects will account for up to 10 % of direct research funding. Half of the earmarked funds for the Baltic Sea region may be distributed through this instrument.

Expert Groups

Nordic expert groups will involve stakeholders at a higher level than those involved in the Network-Building Projects, representing government, industry and academia. The groups will exchange best practices and jointly develop deliverables outlining further opportunities for Nordic cooperation in energy research. The groups may also be consulted in the evaluation of projects. The thematic focus of each expert group may align with the challenges addressed by the flagship projects, but may also cover other relevant Nordic challenges. The work of the Expert Groups may result in roadmaps, strategic research agendas or other forms of analysis indicating opportunities for Nordic research cooperation. The Expert Groups will account for up to 10 % of direct research funding.

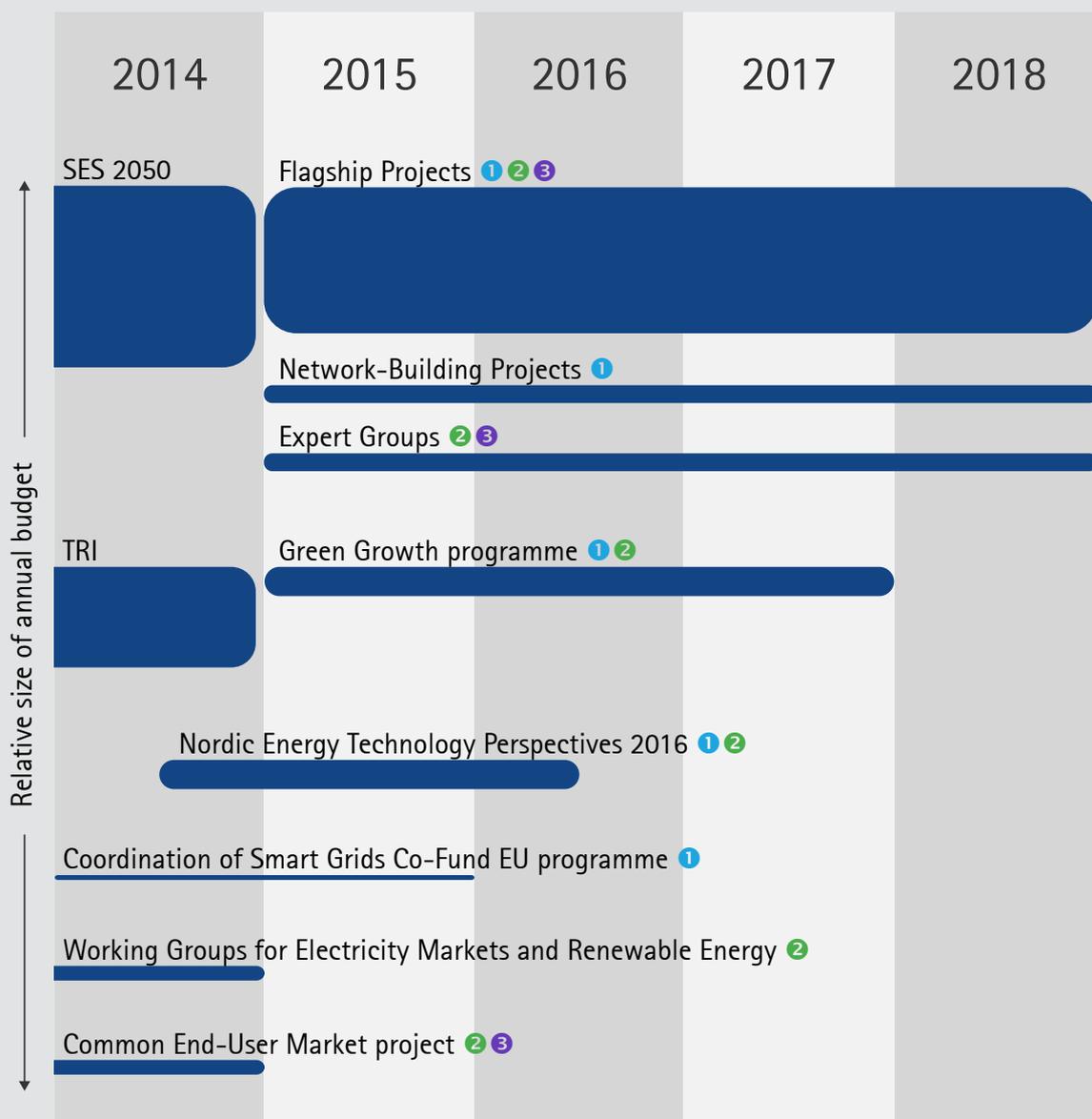
Ongoing activities

Nordic Energy Research has a number of well-established ongoing activities, which also work towards achieving the three goals for the period. A selection is presented below:

- **Nordic Energy Technology Perspectives 2016**
The second edition of a cooperative project between the IEA, leading Nordic research institutes and Nordic Energy Research. The project develops Nordic research competencies in energy system modelling and presents decision-makers with insight into how technologies can help to achieve the long-term energy and climate targets of the Nordic countries.
- **Green Growth programme**
A joint funding programme between Nordic Energy Research and its sister institutions Nordforsk and Nordic Innovation, with funding from the Nordic Council of Ministers. This programme is currently under planning and will be based on a similar funding model to the Top-Level Research Initiative (TRI).
- **Coordination of Smart Grids Co-Fund EU programme**
Nordic Energy Research is contracted to assist in coordinating the research administration of this large EU funding programme where Nordic countries are participating through a split pot format.
- **Working Groups for Electricity Markets and Renewable Energy**
Nordic Energy Research is contracted as secretariat to two Nordic working groups, which provide input to and support the decisions of the Nordic Council of Ministers.
- **Common End-User Market project**
NordREG, the organisation for the Nordic energy regulators, contracts Nordic Energy Research to manage a project to establish a common Nordic market for electricity consumers.
- **Cooperation between national programmes**
A series of activities working to facilitate cooperation between the different national funding programmes in the Nordic countries. This will begin with an internal feasibility study to be finalised mid-2015.
- **Other ongoing activities**
Nordic Energy Research also manages a number of other activities, often funded by the Nordic Council of Ministers. These currently range from a project mapping cleantech competencies in the Nordic countries, to a cooperation platform for energy and transport research and innovation.

The aforementioned selection of activities for the 2015–2018 period are categorised in the table below according to which of the three goals the activities work towards, and are sized approximately according to their annual budgets. It is important to note that this diagram excludes a number of smaller activities, the likely continuation of activities based on yearly contracts, and new activities that may be initiated during the strategy period.

Selected activities by annual funding and duration



Goals

- ① Build research cooperation and competencies within the development of sustainable energy solutions
- ② Provide research-based analytical support to energy technology decision-making
- ③ Enhance the knowledge base for increased competitiveness of the Nordic energy system and disseminate Nordic sustainable energy solutions

Further information on ongoing activities can be found at www.nordicenergy.org.