

# Seminar Report

NORIA-Energy Policy Seminar, 1 Dec 2008

## Background

The NORIA-energy programme aims to bolster the Nordic research and innovation area with regard to energy research and technology development, as well as to provide strategic recommendations for policy development in the areas of science, technology and investment in RD&D and innovation. The programme was launched in 2007 by Nordic Energy Research following the Nordic Council of Ministers' report "NORIA - White Paper on Nordic Research and Innovation", which called for the formalisation and strengthening the Nordic region as a single Research and Innovation area.

Within the framework programme, Nordic Energy Research has commissioned seven studies between 2007 and 2008. These studies focused on different policy aspects, possibilities and strategies for increased cooperation, as well as on opportunities for Nordic actors in emerging markets. On the 1st of December 2008, a seminar was held to present and discuss the policy implications of the findings from the projects, as well as to identify further actions needed for the creation of a strong and competitive Nordic energy research and innovation area. The seminar was divided into four themes:

- Technology development and innovation
- Tools to promote private investments in energy research and development
- International research cooperation, technology transfer export opportunities
- Next steps

The following text is a synthesis of the discussions at the seminar. Presentations and project reports are [available online](#). Nordic Energy Research will also publish a report summarising the main policy recommendations of the various projects.

## The Seminar

The NORIA-energy policy seminar was opened by the director of Nordic Energy Research, Birte Holst Jørgensen, and Estathios Peteves of the Institute for Energy within the European Commission's Joint Research Centre.

Birte Holst Jørgensen offered an overview of today's challenges in the field of energy technology development and presented Nordic initiatives that have been undertaken to address these issues.

Stathis Peteves emphasised the need for concerted actions in his presentation entitled "European Strategic Energy Technology Plan (SET-Plan) and the need for increased RD&D efforts". Peteves explained that while the European community has traditionally been at the forefront of setting targets and goals, the realisation that these targets must be backed up with comprehensive tools has led to the establishment of the SET-Plan to bolster European RD&D.

There are challenges ahead – our energy budgets do not match the energy and climate challenges we are facing. Private sector investments in energy R&D are considerably larger than those from the public sector. But even with private RD&D investments making up 71% of the total, there is a shortage in funding from private sources. In short, there is huge demand in Europe for new investments.

Furthermore, there is a documented shortage of innovation in Europe. We have an energy system that has been with us for a long time – it has taken a very long time to build and will take a long time to transform.

For Europe, the vision is to draw on its research excellence and leadership in various areas, and use these to move faster and become a global leader in renewable energy technology. This may also give us the technological and competitive edge we need to get through the ongoing financial crisis. There is indeed excellence in Europe in many areas, yet we often lack the critical mass to take the necessary steps to make use of it.

In the area of joint programming we are moving from cooperating on single projects to cooperating on whole programmes. The programming will follow the concept of "variable geographic joint programming" which means that flexibility will be ensured and that cooperation on programmes will take place only between interested and committed parties.

With regard to effective implementation, key discussions are ongoing as to the roles the Commission, individual member states and the financial community should play. There are plans to launch two concrete initiatives in

2009, and the rest in 2010. Frontrunners for thematic focuses are wind, solar and CCS. However, other areas are also being discussed; for example, the Sustainable Nuclear Energy Platform announced their plans for an initiative on fission in November, and bioenergy and smart grid initiatives have also been suggested. The commission is working on a proposal in 2009 to produce more coherent views on existing initiatives as well as investigating the need for new types of instruments. Close cooperation with the European Investment Bank has been initiated on these issues.

## Technology development and innovation

In order to promote the transition to more sustainable energy systems, there is a need to strengthen the energy innovation systems, promote the deployment of existing solutions and create the critical momentum needed for scientific breakthroughs. During this first session of four, participants discussed Nordic strongholds and the actions required to strengthen cooperation and ensure the framework conditions needed to promote technological development and innovation.

The session was led by Associate Professor Birgitte Gregersen of Aalborg University and included project presentations by Antje Klitkou of NIFU-STEP "Competitive policies in the Nordic Energy Research and Innovation Area (eNERGIA)", Mads Borup of Risø DTU "Patterns of need integration and co-operation in Nordic energy innovation systems" and Annele Eerola of VTT "Governance and Research of Nordic Energy System Transition (GoReNEST)".

**Birgitte Gregersen** first emphasised the need for a broad concept of innovation. The studies indicated that a range of different energy actors at various stages and levels need to be integrated in a functional energy system. This is a unique quality of energy systems that may have a considerable impact in the successful transition to renewable energy systems. As Gregersen explained, the studies highlighted the strategic role of public policies

in supporting the energy system, and the need for stability in public energy policies to achieve a transition to renewable energy. Furthermore, the studies indicated the importance of a combination of the STI-mode of learning (with an emphasis on RD&D) and experienced learning to stimulate the development of renewable technology. Gregersen also pointed to the importance of local participation and ownership in stimulating the development of renewable technology, and the significance of innovation diffusion: many of the technologies are sufficiently developed but are not yet in use.

According to Gregersen, there is a need to further assess the "design" of institutions, which can have negative or positive effects on the development of innovation policies. Moreover, there is a need for greater coordination and integration of different policy areas, as opposed to discussion limited to either energy and industry or energy and environmental policies, for example. Instead we must discuss all of these together.

These ideas were also addressed by **Antje Klitkou** of NIFU-STEP, who emphasised the need for knowledge-based policy actions in order to support the successful development of energy technologies. This was the main motivation for carrying out their study - an analysis of framework conditions for the energy sector and its innovation systems. It is important to acknowledge the links between policies and competence systems, and to take a wider perspective including education policy. In order to ensure a successful transition, increased national and regional Nordic efforts are needed to achieve a critical mass. This entails knowledge sharing across borders and the opening of national programmes in line with the objectives of the European ERA-net cooperation.

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Benchmarking could help foster the development of better policies: A scoreboard to measure innovation performance and stimulate better policy co-ordination, not only between energy and environmental policy but also between industrialised and RD&D innovation policy.

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To ensure sustainability, the environmental implications of the deployment of new technologies must be assessed properly, for instance through strategic planning, Life Cycle Assessments, international regulation and the organised monitoring of CO<sub>2</sub> storage. Actions to promote the transition could include the establishment of a Nordic Venture Capital Fund for Renewable Energy, strengthening of joint Nordic funding, and the establishment a

common Nordic incentive mechanism for renewable energy.

**Mads Borup** of Risø DTU explained that the innovation perspective is becoming increasingly important in understanding the energy field. Globalisation is affecting the energy field and we must understand the dynamic changes caused by the increasing integration of multiple actors and activities.

For technological development it is essential that there is an integration of needs and the articulation of demands between the users and technological research providers. Here we see an important Nordic stronghold with competencies in collaborating across borders, stimulating cooperation between different actors under a flat power structure.

However, due to the high levels of diversity in Nordic energy systems – between countries and between technology areas - there may never be a ‘common Nordic energy system’. Instead the energy innovation systems belong to the national level more than to the international or regional (Nordic) level. This internal Nordic variation must be considered in policy formation, as policies must not be generally formulated but focused on specific technologies. Energy innovation systems are closely connected to specific industries and competence areas.

A crucial factor for moving forward is the ability to learn by doing – an important type of knowledge creation found throughout the Nordic energy systems. Policies must ensure we continue learning by doing, and in a strategic way.

According to **Annele Eerola** of VTT, prevailing energy systems show a tendency to be ‘locked in’ to familiar and conventional technologies and institutions. Overcoming lock-in barriers requires new governance approaches, the involvement of a wide range of stakeholders, and cross-border collaboration and communication. It is therefore crucial to improve our understanding of systemic changes and governance responses and increase our awareness of the challenges and opportunities posed by multi-level dynamic processes.

The Nordic region has been very active in supporting energy system transitions, however, there is a communication gap between the communities of energy and innovation research. To move forward, it would be beneficial to use multi-level perspective approaches as integrative tools for harnessing knowledge and resources behind long-term strategies supporting the Nordic energy system transition.

## Tools to promote private investments in energy research and development

Public investments in research and development are not sufficient to ensure a swift transition to a more sustainable energy system. The private sector plays an important role in ensuring the growth and competitiveness of the Cleantech energy sector. The global market for Cleantech is increasing at a rapid rate, and if the Nordic countries are to attain a leading position they must increase their focus on innovation and commercialisation. During this second session participants discussed new methods for promoting private investments in energy technologies and the motivations of private actors to invest in sustainable solutions.

The session was led by Director of Economics, Energy and the Environment, Torstein Bye from Statistics Norway and included project presentations by: Anders Sandoff of the School of Business, Economics and Law, Göteborg University, [Nordic Energy Perspectives](#). The project [“How to Bring Renewable Energy Technologies Down their Learning Curves”](#) led by Camilla Josephson, Lund University, was also discussed.

According to **Torstein Bye**, in order to promote investments in renewable energy it is important to consider factors such as depreciation and policy uncertainties. Other key issues to consider are cooperation, integration, communication and innovation strategies. When evaluating investments in technologies deemed sustainable, it is necessary to look at methods for measuring sustainability and various strategic approaches such as product stewardship and cleaner production.

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Nordic strongholds in energy and innovation are making the Nordic area visible on a global level. This is evident in the export statistics for bioenergy, combined heat and power, wind power and solar cell technology.

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**Anders Sandoff** explained the need for understanding the driving force behind sustainable strategies within the utility sector, so that the positive results there can be duplicated in other industries.

He also addressed issues in the development of the cleantech industry. There is currently insufficient contact between the cleantech industry and the wider energy sector. While cleantech has the potential to be a crucial instrument of change within the energy sector, these opportunities have yet to be recognised by many stakeholders. Furthermore, there is a crucial lack of venture capital, especially expansion funding, which is essential for the development of cleantech energy companies. There could be significant benefits from a closer integration of the energy sector and the cleantech industry. This integration could provide cleantech companies with the necessary access to technological competencies, a long-term focus, stable cash flows, large customer bases, access to experts in non-direct competition and access to lobbyists. A closer cooperation could be beneficial not only for future profits, but also for building commitment and capabilities within the energy sector.

In order to move forward, it is important not to focus exclusively on radical innovation and technological breakthroughs, but to also cater for an increased interest in incremental development. There is a need for authorities to increase their dialogue with industry trade organisations and the actors that perform change. It is important not only to focus on policies but also on partnerships and measures to stimulate utilities to adapt to a change paradigm based on innovation. Further efforts are needed to establish industry-driven innovation platforms and strengthen access to venture capital for cleantech companies within the energy industry. Risk management for example is an instrument that could be used to a greater extent.

### **International research cooperation, technology transfer and export opportunities**

Cooperation in transnational research and innovation adds important value to national innovation activities. We live in a globally intertwined world and increased collaboration is crucial for ensuring the development and spread of technologies aimed at reducing negative environmental impacts. The increasing international focus on renewable energy sources

can provide the Nordic region with a market for its green tech companies, and a good basis for attracting skilled workers and researchers from other parts of the world. Nordic strengths in other areas such as governance, competitiveness and social welfare could prove to be beneficial to the energy sector too.

During this third session participants discussed opportunities for increased research cooperation, technology transfer and how the Nordic countries can support and participate in energy RD&D and innovation in expanding markets.

The session was led by Associate Director Loren Cox, MIT Joint Programme on the Science & Policy of Global Change, and included project presentations by Indra Øverland of the Norwegian Institute of Foreign Affairs, "Russian energy research and innovation: Prospects for cooperation on renewables and efficiency Nordic", and Young Chen of the Nordic Institute of Asian Studies, "Opportunities for Collaboration with China in Energy Research and Innovation".

**Loren Cox** emphasised the need to consider energy costs as an important driver and barrier to renewable energy development, re-evaluate the role of Kyoto mechanisms as a driver for closer cooperation, and develop strategies for dealing with issues pertaining to technology and proprietary information. Furthermore, there may be a need to reassess policy recommendations in light of the changes brought about by the financial crisis.

As explained by **Indra Øverland**, a global strategic race is on in renewable energy. If the Nordic countries should have a chance in this race, they need to cooperate. This is true for all countries, but especially true for small countries such as those in the Nordic region. Russia is important for Nordics countries due to its geographical proximity and its importance in the Kyoto protocol.

Renewable energy is problematic in Russia for several reasons, including the substantial subsidies for natural gas and lack of subsidies for renewable energy. There are also major issues in connecting renewables to national and regional grids. This is partly for regulatory reasons, and partly because of Russian energy market politics. However, there is a surprisingly strong tradition for scientific research into renewables in Russia. Over 20 institutions are dedicated to renewable energy there, but many have been under-funded over the last 20 years.

To move cooperation with Russia forward, the Nordic countries should focus on areas of joint opportunity, such as solar power and hydrogen.

The Nordic countries should also work on building the Nordic brand name. With regard to research cooperation and the global competition for talent, the Nordic countries need to become more attractive to scientists. Without strong branding, peripheral areas - such as Russia - may be inadvertently included in some descriptions of the Nordic region. The Nordic brand is something that can be used to sell products and services, but properly establishing this brand internationally requires significant effort.

The recent financial crisis has had implications in Russia. Russia has been hit very badly and was less prepared than other countries. Russian stocks are down well over 80 percent, and as a country heavily dependent on commodity export it has been hit very hard by the fall in demand. This means that in theory they should be more interested in western technology and capital. However, politics and economics are very much intertwined in Russia so there may be difficulties getting through.

As explained by **Chen Young**, China is the world's second largest consumer of energy; the prediction from IEA is that the energy demand in China will double before 2030. Significant renewable energy RD&D is needed to address this increase. The Chinese leadership has taken serious measures to guide the development of the energy sector. While coal remains a key energy source, more renewable energy is being produced, and self-reliance is seen as a top priority. The negative effects of pollution have become increasingly prevalent in China, which has prompted a change in policies.

For international players, considerable benefits can be gained from the transformation process in China's energy sector and there are significant opportunities for Nordic involvement in R&D. It is important not to let fears concerning IPR constitute a barrier to cooperation. There is no off-the-shelf technology suitable for China, since technologies need to be adapted to the local conditions. Without collaboration with Chinese researchers the application of the technology becomes more difficult.

In order to move forward there is a need to develop a strategic approach for Nordic-China collaboration; focus on renewable energy, move from small to large scale, from cooperation to collaboration and to promote a common agenda for mitigation of climate change with renewable energy as a platform.

The recent financial crisis will have a serious effect on the Chinese economy. The emergency packages in China may be beneficial to the renewable energy sector.

Technology transfer is the main issue in China, but on the other hand they have a very strong tradition for indigenous innovation. Chinese companies are now achieving greater market share on the world market in renewable energy.

## Next steps

The Nordic countries should take an active role in facilitating sustainable development globally, including newly industrialised economies and developing countries. To make this a genuine win-win strategy, the Nordic actors should actively utilise new business opportunities related to the global energy transition. Proper governance tools are needed to reach these aims. This final session was a panel discussion with the participation of:

- **Johan Vetlesen, Ministry of Petroleum and Energy in Norway and the Committee of Senior Officials for Energy in the Nordic Council of Ministers**
- **Nikolaj Zargainis, Danish Energy Agency, Nordic Energy Research Board Member**
- **Loren Cox, MIT Joint Programme on the Science & Policy of Global Change**
- **Sven Faugert, Faugert Utvärdering/Technopolis Group**

The session was moderated by **Birte H. Jørgensen, Director of Nordic Energy Research.**

**Loren Cox** began by mentioning that it is notable that the projects discussed did not engage the existing structure and are instead looking at the existing structure as a hindrance for a new energy system. Cox also pointed to the limitations of renewable energy technologies. Work at MIT indicates that if you were to replace one half of fuel for transportation with second generation biofuels, the U.S. will have to use all of its agricultural land. Another study indicates that a huge wind (5–7GW) park reduces the surface velocity of the lower atmosphere, so behind the windmills you have dead air, increasing the temperature by several degrees. These are aspects that need to be considered when planning a transformation of the energy system.



**Sven Faugert**, referring to the recent evaluation of Nordic Energy Research, set up a matrix to illustrate various opportunities. The evaluation showed that while Nordic Energy Research is not a large funding agency, it does have a significant role to play in Nordic energy cooperation, especially in the promotion of platform-building and as an operator and promoter of networks.

**Nicolai Zarganis** explained that in order to improve NORIA, it is important to take steps at both national and regional levels. From a Danish perspective, the strategy now is to focus on the entire development chain. Getting new technologies out on the market is becoming important. EUDP, the Danish programme for energy technology development and demonstration, is focused on demonstrating technologies to facilitate commercialisation. From the Danish point of view it is important to include industry wherever possible as they contribute skills, capital and professionalism.

On a common Nordic level, we should build on what we have learned to this point. We should take advantage of our differences to produce a wide range of competitive solutions in a global market.

**Johan Vetlesen** pointed out that the ongoing the Nordic energy cooperation initiative of RD&D activities has its mandate in an action plan that expires in 2009. Future Nordic cooperation is currently being developed in a new strategy. His opinion is that we should build on the work done by Nordic Energy Research.

One of the pillars of Nordic energy cooperation has been the creation of effective energy markets. Part of the reason for this success has been a mutual trust between Nordic actors. A second pillar is the creation of sustainable energy solutions; renewable energy and energy efficiency have become increasingly important in recent years.

The actions of the Nordic countries have an impact on the international stage. With all the Nordic countries

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Events on the international arena will have a significant impact on our ability to increase the share of renewables. There are various future scenarios that could significantly affect progress, these include the possibility that the U.S. will not make a decision to participate in any global climate regime or alternatively, the U.S. says that it "will do something", but because of the current crisis, this will take several years. Both of these outcomes could lead to a collapse of the Kyoto regime.

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being part of either the EEA or the EU, the rules and regulations are similar, as are the political challenges.

The committee of senior officials will create a draft plan for the meeting of Energy Ministers in Iceland in June. In this context it is a question of how energy technology policy and RD&D activities should be included. A good dialogue is foreseen between Nordic Energy Research and the new Top Research Programme. The next few months will be influenced by a few key events: the COP15 and the Swedish EU chairmanship, both of which should open up more opportunities for Nordic energy cooperation.

Following up on the speech by Stathis Peteves who described the EU SET-plan as a potential stepping stone towards a common EU energy policy, Birte

Holst Jørgensen asked the panel for their views on this possibility, as well as on how to 'pick winners'.

According to Johan Vetlesen, the SET plan and other initiatives show us that energy technology policies have become more prominent in the mindsets of policy-makers. Loren Cox noted that the U.S. has not had a very good record in this area and that their experience is one that should be avoided. It was agreed that picking a winner can be extremely difficult. Nikolai Zargainis explained that we need to avoid trying to pick winners, and that technologies should be developed for the global market, not the needs of a single country. Birte Holst Jørgensen proposed that successfully picking winners is more about engaging the right stakeholders in investment decisions than choosing technologies.

## Conclusions

The seven projects presented aimed to explore the possibilities for a transition to a cleaner energy future. During the seminar, insights and new perspectives for strengthening innovation and development, increasing

research collaboration and promoting investments in renewable energy technologies were discussed.

An improved coordination of policies including industry, environment, education and energy is needed in order to create cohesive and predictable framework conditions for the energy innovation system. Policy coordination could benefit from the development of an innovation performance scorecard for the energy field. New inclusive governance approaches may be needed to develop policies and programmes to push development forward.

Efforts are needed to increase investments in energy technology development and innovation. Access to venture capital should be improved and cooperation between small Cleantech start-ups and large energy companies should be better facilitated.

There are significant opportunities for and benefits connected to increased research collaboration between the Nordic region and other countries. However, efforts should be made to identify areas where the greatest benefits can be attained. A comparative advantage can be gained from joint Nordic initiatives compared to bilateral cooperation especially with regard to larger economies. Similarities between Nordic countries, both in terms of industry and policy, can facilitate such joint initiatives and achieve a critical mass.

The Nordic brand should be strengthened to assist Nordic technologies in breaking into lucrative and expanding global markets, and to facilitate technology transfer in large dynamic national markets such as Russia and China.

Further steps should build on the work previously done in the Nordic region, and should aim to pick winning partners and not necessarily technologies.

Visit [www.nordicenergy.net](http://www.nordicenergy.net) to access conference documents, and stay tuned for a coming report summarising the main policy recommendations of the various projects presented in the seminar.

For further information contact Amund Vik [av@nordicenergy.net](mailto:av@nordicenergy.net) or Vida Rozite [vr@nordicenergy.net](mailto:vr@nordicenergy.net)

Nordic Energy Research | [www.nordicenergy.net](http://www.nordicenergy.net) | Stensberggata 25, NO-0170 Oslo | +47 4761 4400