

## **OPEN CALL: NORDIC ENERGY TECHNOLOGY PERSPECTIVES 2016**

This call text outlines an open call for research participation in the "Nordic Energy Technology Perspectives 2016" project, financed by Nordic Energy Research.

The deadline for submissions is 08:00 CET, Friday June 6<sup>th</sup> 2014.

All research calls by Nordic Energy Research are published online ([www.nordicenergy.org](http://www.nordicenergy.org)).

The call includes the following attachments:

- Attachment 1. Guide to Work Package Combinations
- Attachment 2. Project Description

### **Introduction**

**Nordic Energy Research** is a public funding institution under the auspices of the Nordic Council of Ministers, supporting energy research cooperation in the Nordic region. Read more at [www.nordicenergy.org](http://www.nordicenergy.org).

**Nordic Energy Technology Perspectives 2016** (NETP2016) is a research project that aims to:

1. Develop Nordic research competencies and cooperation
2. Provide research-based analysis to inform Nordic decision-makers
3. Share knowledge to inform decisions on decarbonisation outside the Nordic region

NETP2016 builds on the Nordic Energy Technology Perspectives 2013 project (NETP2013). NETP2013 was a research collaboration between the IEA, research institutions from the Nordic countries and Nordic Energy Research. One of its outputs was a report published in January 2013 that presented technology pathways towards a carbon-neutral Nordic energy system in 2050.

### **Objective and scope**

The NETP2016 project comprises a range of activities fulfilling the three aims listed above.

**For a complete description of the project, please see *Attachment 2 - Project Description*.**

This is the only research call that will be released for the NETP2016 project. The successful applicants to the various Work Packages will join to form the Research Consortium.

Updated 12 may 2014

See [nordicenergy.org/funding](http://nordicenergy.org/funding) for a list of the 4 minor changes

This call is divided into 5 Mandatory Work Packages that must be covered by the proposal, and 5 Additional Work Packages:

Mandatory Work Packages (the proposal must cover one of the five)

1. Analysis of National Energy System / Participation in Research Consortium - DENMARK  
500 000 NOK
2. Analysis of National Energy System / Participation in Research Consortium - FINLAND  
500 000 NOK
3. Analysis of National Energy System / Participation in Research Consortium - ICELAND  
500 000 NOK
4. Analysis of National Energy System / Participation in Research Consortium - NORWAY  
500 000 NOK
5. Analysis of National Energy System / Participation in Research Consortium - SWEDEN  
500 000 NOK

Additional Work Packages

6. Analytical Project Leadership  
500 000 NOK
7. Analytical Work Package A  
400 000 NOK
8. Analytical Work Package B  
400 000 NOK
9. Liaison Researcher A  
600 000 NOK
10. Liaison Researcher B  
600 000 NOK

To achieve a balanced Research Consortium, only selected combinations of Additional Work Packages will be permitted in the proposals. Please see *Attachment 1 Guide to Work Package Combinations* for the permitted combinations.

It is strongly encouraged that any proposal submitted includes more than one combination of Additional Work Packages to increase the chances of success.

**Mandatory Work Packages 1, 2, 3, 4 and 5. Analysis of National Energy System / Participation in Research Consortium**

These Work Packages broadly include all activities described in the project description, with a focus on one national energy system in the

Nordic region. Data gathering and analysis will also be required on a Nordic and International scale. Tasks may include:

- Development of methodological frameworks
- Scenario and assumption development
- Data collection at international, national and sub-national levels
- Modelling of international, national and urban energy systems
- Modelling and analysis of energy system integration
- Analysis of technology implementation needs and actions
- Technology policy analysis
- Indicator development
- Report formulation

Desired competencies:

- Expertise within scenario development and international/national energy system modelling
- Expertise within quantitative analysis of urban energy system integration and/or the integration of regional electricity systems (Nordic electricity export and balancing)
- Expertise within system integration and flexibility, mobility and urban planning, biomass utilisation and other thematic areas central to fulfilling the activities described in the project description
- Expertise in technology policy analysis
- Expertise in indicator development

It is not necessary for the proposal to cover all tasks and competencies. Work Packages 1-5 have a maximum budget of 500 000 NOK per Work Package, covering all labour, travel, data and other expenses, including taxation if applicable. The contract period is September 2014 to May 2016.

### **Additional Work Package 6. Analytical Project Leadership**

This Work Package covers the leadership of the Research Consortium and responsibility for completion of the analysis. Tasks include:

- Lead and manage analysis and outputs of the Research Consortium
- Lead development of Research Plan outlining a detailed division of work within the Research Consortium and thematic focus of analysis

- Lead development of methodological approach in cooperation with IEA
- Lead consolidation of content for NETP2016 report
- Coordinate with IEA, NER and the Liaison Researchers

Desired competencies:

- Experience and results from leading international cooperation projects in the field of energy systems analysis.

Work Package 6 has a maximum budget of 500 000 NOK, covering all labour, travel, data and other expenses, including taxation if applicable. The contract period is September 2014 to May 2016.

### **Additional Work Packages 7 and 8. Analytical Work Packages A and B**

These Work Packages cover yet to be defined analytical tasks beyond those covered in the Mandatory Work Packages 1-5. It is expected that the Research Consortium defines a set of Analytical Work Packages in the Research Plan they submit to the Steering Group. Tasks in these Work Packages will resemble those in Work Packages 1-5, but will entail detailed contributions to specific parts of the analysis (see four core elements of the analysis in the Project Description). Examples may include:

- Running side analyses of system integration based on existing models
- Analysing specific cases of urban system integration
- Analysing technology implementation needs and actions

Desired competencies:

- Quantitative analysis of urban energy system integration, including mobility, renewable integration, CHP/DH, demand side management, and related fields.
- Quantitative analysis of electricity export and balance opportunities for the Nordic countries and related infrastructure requirements.

Further information about potential topics for the Analytical Work Packages can be found in the activities listed in the Project Description. Proposals should provide a brief overview of the topics and analytical approaches envisioned by the proposal for this Work Package.

Work Packages 7 and 8 have a maximum budget of 400 000 NOK each, covering all labour, travel, data and other expenses, including taxation if applicable. The contract period is September 2014 to May 2016.

### **Additional Work Package 9. Liaison Researcher A**

An experienced Nordic researcher will be seconded to the IEA for approximately six months covering the first half of 2015. Liaison Researcher A's tasks will include:

- Contributing to the integration of demand and supply sectors in the IEA's ETP TIMES model to be used for the Nordic analysis
- Coordinating the integration of urban system integration and local energy system aspects into the modelling framework
- Supporting the Analytical Project Leader by liaising between the IEA and Research Consortium
- Conducting analysis common to both ETP2016 and NETP2016 projects

Desired competencies:

- Energy system modelling and the optimisation of supply and demand in energy system models such as TIMES
- Quantitative analysis of local (urban, rural) energy systems within modelling, indicator development, or related fields

Work Package 9 has a maximum budget of 600 000 NOK, covering all labour, travel, data and other expenses relating to the accommodation and moving costs of the seconded researcher, including taxation if applicable. The IEA will provide office space for the duration of the stay. The proposal should clearly indicate the candidate for secondment to the IEA, provide a CV, and details regarding when they will be available for secondment. The contract period will depend on the proposal, but should aim to cover the first half of 2015. Proposed secondments shorter than six months will also be considered.

### **Additional Work Package 10. Liaison Researcher B**

An experienced Nordic researcher will be seconded to the IEA for approximately six months covering the second half of 2015. Liaison Researcher B's tasks will include:

- Development of ETP buildings model and other demand-side modelling to be used for the Nordic analysis
- Supporting the Analytical Project Leader by liaising between the IEA and Research Consortium
- Conducting analysis common to both ETP2016 and NETP2016 projects

Desired competencies:

- Quantitative analysis of buildings and urban planning, ideally in combination with other aspects of the energy system (e.g. mobility or CHP/DH).

- Energy system modelling competencies

Work Package 10 has a maximum budget of 600 000 NOK, covering all labour, travel, data and other expenses relating to the accommodation and moving costs of the seconded researcher, including taxation if applicable. The IEA will provide office space for the duration of the stay. The proposal should clearly indicate the candidate for secondment to the IEA, provide a CV, and details regarding when they will be available for secondment. The contract period will depend on the proposal, but should aim to cover the second half of 2015. Proposed secondments shorter than six months will also be considered.

## Timeline for call

Call released	April 25 <sup>th</sup>
Deadline for proposals	June 6 <sup>th</sup> , 08:00
Evaluation process begins	June 6 <sup>th</sup>
Completion of evaluation, notification	End of June (tentative)

## Formal criteria

The proposal for participation from each country must:

1. Be sent by email with "NETP2016 proposal" in the subject line.
2. Include a scanned copy of a dated and signed proposal letter.
3. The proposal letter and any attached documentation must be in English.
4. Clearly state which of the seven possible combinations of Work Packages the proposal covers (see Attachment 1). It is strongly encouraged that proposals cover more than one combination. Clearly differentiate between different combinations of Additional Work Packages.
5. Contain a budget including a division of work between the project members. The proposal should include alternative budgets and divisions of work to show how resources will be allocated for each combination of Work Packages that the proposal covers.
6. In the case of Work Packages 7-10, the proposal must detail which areas of analysis listed in the Project Description the proposal covers and how this analysis could be conducted.
7. Provide an overview of experience and competences of the applicant team relating to the tasks specified.
8. Provide a CV for the responsible project manager for the proposal and summary CVs for involved researchers.
9. Document access to relevant data, models and informal cooperation partners necessary to conduct the analysis.
10. Proposals may include participants from more than one institution, but no more than two institutions per proposal. Proposals with more than two institutions require prior approval from NER.

## Evaluation Criteria

<b>Competence</b> The depth and diversity of specific knowledge and experience of the team with the topics and competencies listed for each Work Package.	60% weighting
<b>Cost effectiveness</b> The amount and quality of research resources that can be dedicated to the project within the maximum budget.	20% weighting
<b>Proposal</b> The relevance of the proposal to the project description, its ambition level, and its overall quality and structure.	20% weighting

## Application process

Proposals should be submitted electronically to Nordic Energy Research, attn. Benjamin Donald Smith ([bs@nordicenergy.org](mailto:bs@nordicenergy.org), with [fe@nordicenergy.org](mailto:fe@nordicenergy.org) in copy) with "NETP2016 proposal" in the subject line.

Proposals are encouraged but not required to use formatting guidelines, which will be distributed by email upon request.

**Proposals are to be submitted no later than 08:00 CET, June 6<sup>th</sup> 2014.**

The proposals will be evaluated and selected by the Steering Group, with assistance from Nordic Energy Research. For more information about the steering group, see *Attachment 2 Project Description*.

The leading institution of each successful application will sign a research contract with Nordic Energy Research, which is the legal contracting party on this project. In addition, an IPR contract will be signed between the involved research institutes, the IEA and Nordic Energy Research, whereby the research institutes retain IPR created during the project as joint owners.

For any questions regarding the project or application process, please contact administrative project manager Benjamin Donald Smith ([bs@nordicenergy.org](mailto:bs@nordicenergy.org), mobile + 47 90 40 62 03), or Filip Ehrle Elveling ([fe@nordicenergy.org](mailto:fe@nordicenergy.org), mobile + 47 97 73 44 83).

## Attachment 1. Guide to Work Package Combinations

Please indicate which of the possible combinations are being applied for. It is strongly encouraged that any proposal submitted includes more than one combination of Additional Work Packages to increase the chances of success.

### Combination A

Work Package	Maximum budget
1-5. Participation in Research Consortium	500 000
<b>Total (NOK)</b>	<b>500 000</b>

### Combination B

Work Package	Maximum budget
1-5. Participation in Research Consortium	500 000
7-8. Analytical Work Package (A or B)	400 000
<b>Total (NOK)</b>	<b>900 000</b>

### Combination C

Work Package	Maximum budget
1-5. Participation in Research Consortium	500 000
6. Analytical Project Leadership	500 000
<b>Total (NOK)</b>	<b>1 000 000</b>

### Combination D

Work Package	Maximum budget
1-5. Participation in Research Consortium	500 000
6. Analytical Project Leadership	500 000
7-8. Analytical Work Package (A or B)	400 000
<b>Total (NOK)</b>	<b>1 400 000</b>

### Combination E

Work Package	Maximum budget
1-5. Participation in Research Consortium	500 000
9. Liaison Researcher A	600 000
<b>Total (NOK)</b>	<b>1 100 000</b>

### Combination F

Work Package	Maximum budget
1-5. Participation in Research Consortium	500 000
10. Liaison Researcher B	600 000
<b>Total (NOK)</b>	<b>1 100 000</b>

### Combination G

Work Package	Maximum budget
1-5. Participation in Research Consortium	500 000
6. Analytical Project Leadership	500 000
10. Liaison Researcher (A or B)	600 000
<b>Total (NOK)</b>	<b>1 600 000</b>





norden

Nordic Energy Research

## PROJECT DESCRIPTION

# NORDIC ENERGY TECHNOLOGY PERSPECTIVES 2016

Stensberggata 25  
NO-0170 Oslo  
Tel: +47 4761 4400  
[www.nordicenergy.org](http://www.nordicenergy.org)

25 April 2014

Attachment: Concise NETP2  
workshops summary.pdf

## Background

Nordic Energy Technology Perspectives 2016 (NETP2016) is a research project that builds on the Nordic Energy Technology Perspectives 2013 project (NETP2013). NETP2013 was a research collaboration between the IEA, research institutions from the Nordic countries and Nordic Energy Research. One of its outputs was a report published in January 2013 that presented technology pathways towards a carbon-neutral Nordic energy system in 2050.

NETP2013 achieved significant traction both in building Nordic research competencies and in informing energy technology policy development. NETP2016 will develop Nordic research competencies further and will offer a second edition of the report, providing insight on a range of topics including in-depth analysis on how the challenges identified in NETP2013 can be met.

This project description is based on input gathered from a wide range of stakeholders, specifically via a survey in the spring of 2013 and a series of five workshops held in each of the Nordic countries in the autumn of 2013.

## Challenge

NETP2013 gave researchers from 14 institutions across five countries the opportunity to learn from each other and the IEA, and produced a Nordic energy system model based on the IEA's global Energy Technology Perspectives (ETP) model. Researchers have underlined the importance of further support for Nordic research cooperation in this field and in maximising the value of the model and network established in NETP2013.

Secondly, Nordic decision-makers within energy technology policy now have a common reference document in NETP2013. Its technology pathways showed that it is economically and technically feasible for the Nordic countries to reach their ambitious targets in 2050. However, decision-makers have expressed a need for more in-depth analysis of certain issues and challenges highlighted in NETP2013, as well as more insight into the how to bridge the long-term scenarios of the NETP2013 with energy technology policy and investment decisions of today.

Thirdly, there is a challenge in increasing the relevance for decision-makers outside the region, allowing the Nordic case to support decisions on decarbonisation in other countries. NETP2013 showed the level of ambition in the Nordic countries and offered various cases, but further distillation of these Nordic solutions is necessary in order to increase the relevance for an international audience of IEA member countries and beyond.

# Aims and Objectives

## Aim 1. Develop Nordic research competencies and cooperation

Objectives      Establish a Nordic research consortium, consisting of leading Nordic researchers within energy system analysis. Cooperate to conduct strategic analysis of key Nordic issues based on the analysis and modelling developed in NETP2013.

## Aim 2. Provide research-based analysis to inform Nordic decision-makers

Objectives      Conduct in-depth analysis of issues critical in realising the opportunities identified in NETP2013, present a set of updated scenarios towards 2050, identify necessary short-term implementation actions, and develop indicators as to how the energy system is progressing relative to the scenarios. Provide forums for decision-makers to discuss and absorb the implications of the analysis.

## Aim 3. Share knowledge to inform decisions on decarbonisation outside the Nordic region

Objectives      Deliver analysis to the IEA for use in the global ETP publication, distilling solutions from the Nordic energy system relevant for decision-makers outside the region.

# Activities

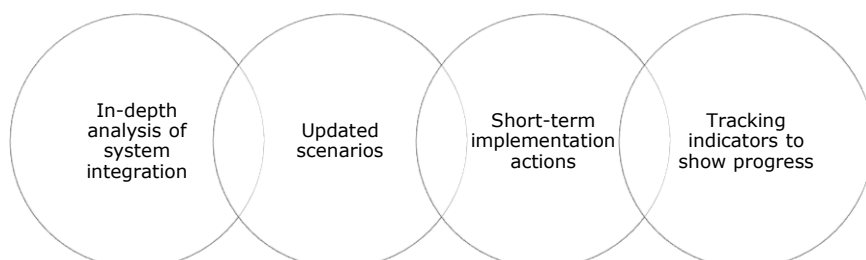
In addition to the development of research competencies, the main deliverable of the project is a final report entitled "Nordic Energy Technology Perspectives 2016" (NETP2016). The report will be co-published between the IEA, Nordic Energy Research (NER) and participating research institutions in May 2016, and will be distributed at no charge by NER.

The secondary concrete deliverable is input to the IEA's global ETP publication for 2016, and the third deliverable is input to the Nordic Council of Ministers' Energy Minister meeting in 2015. The three deliverables are elaborated below.

## NETP2016 report

NETP2016 will provide in-depth analysis of issues critical in realising the opportunities identified in NETP2013, present a set of updated scenarios towards 2050, identify necessary short-term implementation actions, and develop indicators as to how the energy system is progressing relative to the scenarios.

### Main elements of the NETP2016 report



The sections below detail each of the four main elements of the NETP2016 report. They are based on input gathered from key stakeholders across the Nordic region in a series of five national workshops. A concise summary of these workshops is included at the end of this document as an attachment.

The specific research topics outlined below will be reduced in scope and specified in detail through two key events later in the project. Firstly, the Research Consortium will submit a Research Plan explaining which topics they will address within the scope outlined in this document, and how they will address them. For more details see the *Call Process* section below. Secondly, the methodology will be further refined in meetings between the IEA and the Research Consortium. Detailed documentation from the stakeholder workshops conducted in 2013 will provide a foundation for the work in focussing and elaborating the research topics.

### **In-depth analysis of system integration**

NETP2016 will have a focus on in-depth analysis of system integration issues critical to realising the scenarios. These issues cut across multiple sectors and were not sufficiently addressed in the sector-based analysis of NETP2013.

IEA's global ETP2012 covered system integration issues in chapters on heating and cooling, flexible electricity systems and on hydrogen. This analysis provided an overview of the potential of greater system integration, with analysis down to the level of OECD Europe. NETP2016 will build on the ETP2012 analysis and that of Nordic research projects to give much more detailed insight into the specific challenges and opportunities for further system integration in the Nordic countries.

System integration issues will be addressed at both the urban level, and the wider international level. The analysis will quantify the potential of these technologies and strategies in the Nordic countries, and identify necessary short-term measures to realise the potential.

Urban System Integration - Analysing the interplay between different sectors at the city level, potentially including:

- Balancing variable and distributed renewable electricity production with heating and cooling, demand response, electric mobility, and other means.
- Integration of sustainable mobility, and transport energy demand mitigation through urban planning and modal shifts.
- System-level energy efficiency improvements and utilisation of waste energy streams in urban areas.
- The role of new breakthrough technologies in facilitating system integration and transition

International System Integration – Analysing the role of the Nordic region in the broader European energy system transition, specifically on:

- The potential to provide balancing services to Continental electricity grids and to export a potential surplus of Nordic electricity production.
- The interplay between future Continental and Nordic electricity markets and price structures, Nordic electricity production and resulting infrastructure requirements.

An in-depth analysis of system integration issues will allow a more thorough discussion of factors outside the model, such as the distribution of costs, institutional obstacles, and broader socioeconomic effects such as societal acceptance and behaviour change.

Where relevant, existing Nordic models will be used to further improve the quality of the results from the ETP model. The number and extent of these side-analyses will be determined during the project.

An integral part of the in-depth analysis will be a series of cases that distil and present the findings most relevant for stakeholders outside the Nordic region.

### **Updated scenarios**

The scenarios present the core sector-based results of the analysis. These will be updated from those presented in NETP2013 to represent the Nordic countries more accurately and will include a more relevant range of variant scenarios to address important uncertainties in the future of the Nordic energy system.

As in NETP2013, NETP2016 will likely feature a central Carbon-Neutral Scenario, with the Nordic region achieving an 85% cut from 1990 by 2050 in a world achieving the IEA's 2-degree scenario. The main scenarios will be re-run using updated Nordic data and the latest global data and assumptions from the IEA's ongoing ETP project. These new results will reflect recent changes in technology prospects (such as CCS or PV), energy prices (gas) and policies (EU 2030 framework). Aggregations and modelling issues that have been identified in NETP2013 will be addressed, where necessary by supplementing the analysis with existing Nordic models.

Two variant scenarios were presented in NETP2013 (high electricity and high biomass) as well as two sensitivity analyses. These will likely be replaced with a range of variant scenarios covering issues that are more relevant to stakeholders. The variants will not be as detailed as the in-depth analysis areas, and will directly address the more controversial results in NETP2013. They may include:

- A low biomass variant, assuming no net imports. Here the analysis will address the different options for biomass utilisation, as a transport fuel, an industry raw material or as a stationary energy fuel.
- A low nuclear variant, where no existing reactors are replaced and no new reactors are built. It will analyse the challenges in replacing the base load, as well as grid and demand-side implications. The eventual interpretation of *low nuclear* would be taken during the project with the assistance of the Steering Group.
- A low electricity export variant, looking at the interplay with Nordic industrial activity, and tying into the in-depth analysis.
- A low industrial activity variant, where energy-intensive industry largely moves outside of the Nordic region. An Icelandic interconnector could also be assessed in this variant.
- A low CCS variant, where CCS implementation is delayed.

The number and focus of the variant scenarios will be determined during the project. The variant scenarios can also be used to explore the impact of the faster introduction of new breakthrough technologies. Importantly, politically sensitive variants such as nuclear phase-out will not be presented as target scenarios in the report, but rather as variants to add value and context to the main scenarios.

The results from the scenarios will likely be presented by sector as in NETP2013 (Power & Heat, Transport, Industry and Buildings), but will adhere to the IEA's plan to streamline the ETP's presentation of scenario results compared to previous editions. The report will also look to present more national-level results than in NETP2013, a more systematic overview of the costs and benefits of the scenarios, and a more transparent overview of the assumptions behind the results.

### **Short-term implementation actions**

NETP2016 will put a significant focus on the short-term implementation needs in order to realise the scenarios. These necessary actions will focus on the next 5 to 15 years and will relate to mid-term targets from the scenarios as well as the tracking indicators.

The actions will link the optimised results from the energy system models with more empirical 'real-world' framework conditions such as markets, financing, policies, and consumer behaviour. Where feasible, actions will be ranked. Examples of rankings include how urgent they are to implement, the cost of



<b>Key Milestones</b>	<b>Date</b>
Call for Research Consortium released	April 2014
Written hearing with NER Board and Nordic Committee of Senior Officials for Energy regarding Steering Group mandate and composition	May 2014
Call evaluation approved by Steering Group. Research Plan requested from Research Consortium	June 2014
Research Plan approved by Steering Group	September 2014
Research Consortium contracted	September 2014
Kick-off meeting conducted	September 2014
Week-long workshop for Research Consortium at the IEA	October 2014
Analysis begun	November 2014
Input to Nordic Council of Ministers' meeting	September 2015
Seminars to discuss preliminary results complete	October 2015
External review process complete	December 2015
Layout and printing complete	March 2016
Launch events complete	May 2016

The timing of key milestones may change during the project depending on the IEA's plans for ETP2016.

## Organisation

### NER (Project coordinator)

NER will coordinate the administrative aspects of the project, cooperation between the project groups, and external communication and stakeholder management. The leader of the project coordination for NER will be Benjamin Donald Smith, with assistance from Filip Ehrle Elveling. See work package table below for more details.

### Research Consortium (Analytical project leader)

The Research Consortium will manage the analytical aspects of the project and have responsibility for consolidating the final report. One institution will act as project leader for the analysis and will lead the other members of the consortium, a role that the IEA had in NETP2013. See work package table below for more details.

The Research Consortium will also include two Liaison Researchers seconded to the IEA for approximately 6 months. See work package table below for details.

The Research Consortium should cover the broad of competencies needed to conduct the analysis, while involving a manageable number of research institutes.

Members of the Research Consortium become joint owners of the IPR produced during the project upon entering a standard IPR agreement with the IEA and NER.

### IEA (Cooperation partner)

The IEA will work together with the Research Consortium and NER, however, where possible the core modelling and analytical activities will be conducted by the Research Consortium. The IEA will be eventual co-publishers of the report and will provide overall approval of the finished report. See work package table below for details.

## **Steering Group**

The strategic Steering Group will steer the analysis and provide input as representatives of the end-users of the publication, namely Nordic governments and institutions (representing both energy technology policy-making and research financing), industry and potentially the European Commission. The group will have around 10 members with a maximum of two per country, appointed by the NER Board and the Nordic Committee of Senior Officials for Energy.

The role of the Steering Group will be stronger than in NETP2013, as the members will be central in facilitating the review and promotion of the eventual report. They will also be tasked with approving the evaluation of proposals for Research Consortium participation. The Research Consortium, who will be represented by their project leader in all Steering Group meetings, will take the directions given by the Steering Group into account in their analysis.

The Steering Group is expected to meet between 5 and 6 times over the course of the project. A detailed Steering Group mandate will be developed during the project.

## **NER Board (Financier and Project owner)**

The NER Board are the financiers of the project and will also approve key aspects of the project at regular Board meetings, such as the Project Description and Steering Group mandate. Decisions relating to the output of the analysis will be under the mandate of the Steering Group. The NER Board will be updated at regular Board meetings.

## **Nordic Committee of Senior Officials for Energy**

The Committee will be updated regarding progress in the project at their regular meetings, and will be consulted in the appointment of the Steering Group. The Committee will also be invited to attend all seminars and launch events.

## Work Packages

Work package	Selected tasks	Leader
<b>Five Work Packages for Analysis of National Energy Systems / Participation in Research Consortium</b>	Develop a methodological framework in cooperation with IEA, develop scenarios and assumptions, gather data, model energy systems, develop indicators, analyse technology implementation needs and actions, analyse technology policy needs, formulate content for NETP2016 report in adherence to IEA standards, lead eventual Sub Work Packages, participate in project events and promote project externally.	<b>Research Consortium</b>
<b>Analytical Project Leadership</b>	Lead and manage analysis and outputs of the Research Consortium, lead development of Research Plan outlining a detailed division of work within the Research Consortium and thematic focus of analysis, lead development of methodological approach in cooperation with IEA, lead consolidation of content for NETP2016 report, coordinate with IEA, NER and the Liaison researchers.	<b>Research Consortium</b>
<b>Analytical Work Packages</b>	The Research Consortium will define its own Analytical Work Packages for the analysis in the Research Plan they submit to the Steering Group. Tasks in these Work Packages will resemble those in the first work package in this table, but will entail more detailed contribution to a specific part of the analysis, such as side analyses of international system integration based on existing models, analysing specific cases of urban system integration, or analysing technology implementation needs and actions.	<b>Research Consortium</b>
<b>Liaison Researchers</b>	Two Nordic researchers will be seconded to the IEA for approximately 6 months each. In addition to responsibility for additional Analytical Work Packages to those above (to be determined in Research Plan), the Liaison Researcher's tasks include supporting the Analytical Project Leader by liaising between the IEA and Research Consortium, and conducting analysis common to both ETP2016 and NETP2016 projects.	<b>Research Consortium</b>
<b>Project coordination</b>	Prepare evaluation of, contract and coordinate Research Consortium, assemble and coordinate Steering Group, manage reporting (to Steering Group, NER Board and Committee of Senior Officials), facilitate project workshops and seminars, administer funding, manage external review process, manage external print services, coordinate distribution, manage launch events and communication activities.	<b>NER</b>
<b>IEA involvement</b>	Develop methodological approach with Research Consortium, provide updated models and data, collaborate with Research Consortium in analysis, assist in report formulation, ensure graphic and language adherence to IEA standards, overall approval of report, consolidate Nordic input to global ETP, participate in project events and promote project externally.	<b>IEA</b>



## Call process

The Research Consortium will be established through a call and the approval of a Research Plan.

The call will determine the participating institutions in the Research Consortium. Relevant institutions will apply to cover the analysis of one of the five Nordic countries in the Consortium, based on the applicability of their competencies to the focus areas of the project. One application (including one or more research institutions) will be selected to join the Research Consortium to analyse each of the five countries. There will therefore be five successful applications. The Steering Group will approve the evaluation, which will be prepared by NER and the IEA. In addition to applying for participation, research institutes will apply for responsibility for Analytical Project Leadership, additional analytical work packages and for the Liaison Researcher positions.

The Research Plan will determine the division of sub work package leadership between the participants in the Research Consortium, which focus areas will be addressed and which research methodology will be used. The Research Consortium will submit the Research Plan which will answer these questions. The plan will be approved by the Steering Group before the Research Consortium is contracted.

## Communication

The communication targets two audiences in order of priority:

- Nordic decision-makers in the energy technology sector from ministries, authorities and industry
- International decision-makers in the energy technology sector from ministries and authorities

### Publication

Like NETP2013, NER will distribute the publication free of charge. An initial print run of 2000 copies is expected. Synergies will be explored with the IEA's coming combined print and online publication format for the ETP project.

### Seminars

Various meetings with stakeholders from for example local government will be conducted early in the project to ensure support an eventual use of the results.

A series of five seminars will be held during September-October 2015 to discuss preliminary results with stakeholders. This will help to quality assure the results and to secure acceptance of the results from stakeholders.

A series of five launch events will be conducted in May 2016 to present the final report, in a similar style to NETP2013.

The possibility of a webinar will be explored as a means to present the results to international audiences after the launch roadshow.

Members of the Research Consortium and Steering Group will be equipped with a multimedia package in order to best present the results at relevant external seminars after the launch.

### Communication materials

In addition to being available on the IEA website, a NER project website will be created where the report can be pre-ordered, explored and downloaded. Synergies between the IEA's digital promotion of the global ETP and NETP2016 will be explored.

Print and/or online materials will be produced to promote the publication, with details being determined during the project.

The project will seek to produce a short deliverable of preliminary results in autumn 2015. These will feed into the seminars discussing preliminary results, and also allow the use of the results at the Nordic Council of Ministers' Energy Minister meeting, the IEA's Clean Energy Ministerial meeting, and potentially also COP21.

# Concise NETP2 workshops summary

This document briefly summarises the input gathered from five national workshops on a potential second edition of Nordic Energy Technology Perspectives (Iceland 27.08.13, Finland 17.09.13, Sweden 18.09.13, Norway 08.11.13, Denmark 13.11.13). To the extent possible, points common to all five countries have been included in the document. This masks differences between the countries, which can be explored in the full summaries from each of the national workshops.

## Aims of project

- Provide research-based analysis to inform Nordic decision-makers.
- Share knowledge to inform decisions on decarbonisation outside the Nordic region.
- Develop Nordic research competencies and cooperation.

## Focus of report

Consisting of: In-depth analysis of central issues from NETP1, a broader scenario picture than in NETP1, short-term recommendations on how to achieve emission targets, and indicators to measure development related to emission targets.

### Focus: In-depth analysis

- In-depth analysis should capture issues of particular importance in realising the opportunities outlined in the scenarios, which are not adequately covered by sector-based results.
- Define methodological framework together with IEA – use parallel runs from national models to improve representation in IEA models.
- **System Integration** as overarching in-depth topic, split into two:
  - Urban/local system integration
    - Exploring the potential of synergies between technologies, for example:
      - Danish example balancing wind with district heating and natural gas.
      - Buildings, smart grids and distributed renewable energy production.
      - Industrial symbiosis and waste heat use in district heating + cooling.
    - Energy efficient renovation acceleration in buildings
    - Transport integration
      - More details on how to achieve the transition.
      - Exploration of challenging assumptions based on avoidance through urban planning and modal shifts.
      - How to integrate transport energy use, including vehicle to grid, smart charging, etc
      - More on infrastructure needs for transport
  - National/international system integration
    - Interplay between expansion of variable renewables, increased electricity trade with continent, and greater demand-side management
    - Potential for hydro-based balancing of variable renewables on continent
    - More detailed assessment of price and supply variation in Europe and corresponding infrastructure needs
    - More details on electricity infrastructure investment pathways domestically and between countries
    - Role of energy markets, including capacity markets
- Important to set clear boundaries for the analysis to ensure issues are covered adequately with the project resources.

- Nordic cases (specifically within the topic of urban system integration) can contribute to the global ETP for 2016. Cases will be selected to explore scalable, transferable solutions despite scale and wealth differences between small Nordic cities and international mega-cities.

### **Focus: Scenarios**

- The scenarios present the core sector-based results of the analysis. Need to update the NETP1 scenarios using latest IEA models to reflect recent changes in for example technology (CCS), prices (gas) and policies (EU framework).
- Utilise national models to improve the representation of Nordic issues in the IEA model, through parallel analyses.
- Iron out simplifications and aggregations that detract from validity – determine the appropriate aggregation level for results.
- Include more national-level results and recommendations to make it more useful and relevant to stakeholders.
- Replace the two variant scenarios and two sensitivity analyses in NETP1 with a wider range of variants or sensitivity analyses. These would not be as detailed as the in-depth analysis areas, and would directly address the five controversial results in NETP1 (el export, nuclear, CCS, biomass import, steady industrial activity).
  - Power options
    - Nuclear phase-out or ‘no replacement or new build’ variant and how to replace the base load, grid and demand-side implications
    - Interplay between electricity import/export and industrial activity
    - Low electricity export variant, use other models to improve electricity trade representation in IEA model.
    - Effect of different European development pathways on electricity export
    - Icelandic interconnector
  - Different industrial futures
    - Impact of energy prices and competitiveness of Nordic industry
    - More details on required efficiency improvements and CCS implementation.
    - Give process emissions more attention, late/no-CCS variant
    - Climate benefits of Nordic-based energy intensive industry, carbon-leakage
  - Role of biomass
    - More details on how biomass can be supplied, distributed and what the optimal usage is (transport fuel vs industry raw material vs energy)
    - No (or low) import variant
    - Reflect on sustainability, but focus on sustainable biomass (or biofuel) supply, and not in depth analysis as is covered by other studies
- The analysis should not take the import/export of embedded emission issues into account, but may allude to this factor in discussion,
- The scenarios should reflect the in depth analysis topics in order to tie the project together
- Better represent sectors relevant for island and coastal economies, such as fishing fleets.
- Potentially assess a CNS Norden in 4DS world.

### **Focus: Recommendations**

- Strong focus on implementation, providing concrete near-term recommendations on how to achieve the scenarios.
- Address needs in next 5-15 years, relate to mid-term targets and tracking indicators.
- Measures ranked by how urgent they are to implement, cost-effectiveness, and by cost of delay, building on the no-regret options in NETP1 and utilising marginal abatement cost curves.

- Need balance between optimised technology based energy system models showing interesting potential interactions, and more empirical assessments of “real-world” framework conditions such as financing, markets, policies, consumer behaviour, etc.
- In addition to techno-economic aspects, recommendations should cover broader aspects such as institutional obstacles, GDP impacts and cost distribution, societal acceptability and behaviour change

### **Focus: Indicators**

- Tracking indicators to compare implementation progress against mid-term targets
- National-level comparative indicators, but avoiding ‘beauty contests’
- Better overview of European and other international policy scene

### **Organisation of project**

- Longer time schedule than first edition
- Responsibility for and leadership of analysis by Nordic researchers, with IEA involvement
- Better cooperation and clearer mandates between researchers, and between research team and steering group.
- Involvement of a wider range of stakeholders, including industry, TSOs and local governments.
- Improve integration with related projects (NEPP) and national programmes.
- A more multidisciplinary approach to the research team, including expertise from outside energy system analysis, while keeping project size manageable.

### **Communication of results**

- Seminars during the project to present preliminary findings to increase quality of results and stakeholder engagement.
- Better engagement of policy-makers through established communication channels
- Consideration of political nature of variant scenarios / sensitivity analyses.
- Greater transparency in the report and appendix to help the reader see how the results were achieved.
- Clear presentation of scenarios as back-casting not forecasting
- More systematic presentation of costs associated with scenarios and measures.
- Analysis can point to opportunities for further research