

BASIS

R&D-projects for Statnett 2021



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1. INTRODUCTION

1.1 About Statnett SF and R&D

Statnett SF is the owner and operator of the Norwegian main power distribution system. This implies construction and operation of high voltage power lines and substations.

Statnett SF is operating about 11 000 km of high voltage power lines, 150 substations, and the interconnections to Sweden, Finland, Russia, Denmark and the Netherlands.

Statnett SF has approximately 1,500 employees and has operations across Norway. The headquarter is located at Nydalen alle' 33, 0484 Oslo.

Statnett SF is a state-owned enterprise established under the Public Enterprises Act and owned by the Norwegian Ministry of Petroleum and Energy.

For more information about Statnett, see <https://www.statnett.no/en/>

For more information about R&D in Statnett, see <https://www.statnett.no/en/about-statnett/research-and-development/>

This procurement process will follow the Public Procurement Act no. 73 of June 17th 2016 (the Procurement Act), and the Procurement regulations for the utilities sector no. 975 of August 12th 2016 (the Utility Regulation) according to §2.5 for RnD projects.

For KPN/KSP og IPN projects, Statnett refers to contract templates issued by the Norwegian Council of Research (NCR).

Statnett refers to our RnD Contract template for other projects. The general terms and conditions are our basis for all contracts.

1.2 R&D financing options

Statnett is interested in proposals that might fall into financing options, such as:

- RCN – [The Research Council of Norway](#)
- Enova - https://www.enova.no/bedrift/?gclid=EAIaIQobChMIsp_9uOiX6AIVhsCyCh0elQ-aEAAYAiACEgKM1vD_BwE (only available in Norwegian)
- Pilot E - <https://www.enova.no/pilot-e/information-in-english/>
- Innovasjon Norge - <https://www.innovasjon norge.no/en/start-page/>

Your proposals shall be submitted via Statnetts homepage, see

[Do you have a project proposal? | Statnett](#)

1.3 Rights to project results and contract award

As a partner, Statnett shall have user rights to all project results. Please note that any background information is not included in the user rights.

The Contract shall be signed no later than three – 3 – months after all Parties have agreed that the project shall commence. No projects shall commence until the contract is signed by all Parties.

2 SECTORS FOR PROJECT IDEAS

In 2020 Statnett entered a new program-period for 2020 until 2023. The content of the new program-period is based on Statnett's strategy, the strategies of Energi21, ENTSO-E, the Nordic TSO-reports "Nordic Challenges" and "Nordic Solutions", and strategic guidelines from OED and NVE. The programs for the next period are:

- Co-operation in the energy system
- Digital, safe and cost-effective assets
- Real time control and effective markets

3 CO-OPERATION IN THE ENERGY SYSTEM

Introduction

We are facing a major and rapid restructuring of the power and energy system throughout Europe. Norway has committed itself to the EU's climate policy and, as such, has committed to ambitious emission reductions.

The goal of limiting climate change will affect all parts of the energy system. More than half of Norway's energy consumption currently comes from fossil fuels. Key measures to replace this will be electrification, energy efficiency and the construction of more renewable power generation. The power grid is therefore a necessary part of the climate solution. At the same time, Statnett's own business has a climate and environmental footprint, which we also want to minimise.

The power and energy system of the future will have much more intermittent renewable power generation, especially wind power – both onshore and offshore, be more closely connected to Europe, and we will see the electrification of the transport sector, heating and industrial processes. In addition, Norway will probably have more and new types of industry, such as data centres and hydrogen production. Parallel to this, consumers, often located in the distribution grid, will increasingly contribute flexibility to ensure balance in the power system.

The programme aims to facilitate the fully electric and renewable energy system of the future and promote:

- a forward-looking and efficient power system
- emission reductions and conservation of biodiversity
- smart grid development
- integrated solutions in the power system

In this year's announcement, we are looking for project proposals within three focus areas. We are seeing several mega trends, and there are already many initiatives and analyses underway in these areas of the industry, also at Statnett. Therefore, we are looking for specific proposals that will bring us further within topics that are currently little explored and that could provide added value for Statnett.

3.1 Electrification and collaboration

We want project proposals on what steps Statnett, as TSO and owner of the transmission grid, must take to most effectively help us achieve our national and European climate goals. We want to increase our knowledge of the areas in which Statnett can facilitate the electric future, and the areas where we need to adapt.

Examples of challenges that project proposals should address:

- How can energy-intensive sectors such as industry, transport and buildings (heating and cooling) be developed in cooperation with the power system in a way that provides good socio-economic benefits and a low impact on the climate and environment?
- What kind of role can energy storage play and how can this interact with incentive schemes in sector integration?
- How can Statnett develop its social dialogue and communication with various stakeholders towards 2050?
- What can Norway contribute with in the restructuring of the European energy system?
- The EU's strategy for the integration of energy systems (sector integration) calls for more holism

planning across energy carriers. How can this best be implemented in practice in Norway?

3.2 Smart and flexible grid development

Grid development takes place with a long-term perspective. The conversion to renewable power, more wind power, surplus areas, distributed production/flexibility and digitalisation place new demands and expectations on the power system. Among other things, we must explore alternatives to grid development to a greater extent. Reducing bottlenecks in the grid must be assessed against the willingness of stakeholders to use their resources more flexibly or their willingness to invest in new consumption or new production.

We are also looking for project proposals on how we can incorporate flexibility and options in our chosen solution to meet different future directions. Can we develop several different tools – for example, more active use of the market, new and flexible methods for connecting to the grid, agreements or collaborative solutions and possibly new methods for dealing with transfer restrictions within pricing areas. . We must also be able to understand how technology development will affect the future.

3.3 Climate and the environment

The transition to a low-emission society will entail major changes and set new requirements and expectations for the interaction in the power system. It is important that in this transition we find sustainable solutions that preserve biodiversity and reduce greenhouse gas emissions. Land degradation is the most important threat to biodiversity. Taking care of and increasing carbon stocks is one of the safest ways we can counteract extreme climate change. Functional, robust ecosystems are also central to counteract the extent of the damage to climate change.

Our facilities occupy a lot of space, and the construction of new facilities may lead to even larger temporary interventions. At the same time, there are areas in and around power lines and transformer stations that can be utilized better than today to strengthen and preserve landscape and nature values. We want project proposals addressing both the facilitation and use of natural environments in a better way, restoration of intervention areas and increased knowledge of species groups, ecosystems and other natural values we influence.

We experience that there are a number of barriers to using new, climate- and environment-friendly solutions. For example, emission-free construction sites or innovative and sustainable buildings and facilities. We want project proposals on how to implement the necessary changes in the power system at the same time as greenhouse gas emissions, biodiversity, landscape values and democratic principles are taken care of.

4 DIGITAL, SAFE AND COST-EFFECTIVE ASSETS

Introduction

Statnett is developing a smart and forward-looking power system, while at the same time safeguarding security of supply and high available grid capacity, as well as placing high demands on HSE and efficiency. Statnett's ambition is to pave the way for the electric future, and we also aim to level out consumption tariffs in 2023. These ambitions set important premises for Statnett's prioritisation of measures in our role as grid owner with responsibility for planning the transmission grid.

The programme will develop know-how, methods, solutions and technology that will facilitate digital, safe and cost-effective assets and asset management.

The programme has the following strategic goals:

Assets must be safe for our employees and the environment, and have the least possible environmental footprint by:

- reducing or eliminating dangerous tasks
- having a holistic focus on HSE

The design of the grid and the availability of the assets must be adapted to grid user needs by:

- having control over the criticality of the system and the risk to the assets
- efficiently planning, designing and building new assets
- having control over the condition of the assets

Cost-effective facility management will be achieved by:

- having control over lifecycle cost of the assets
- optimising maintenance and renovations based on costs, and the condition and criticality of the assets

To make good decisions, we need:

- easy access to relevant data, with the right quality
- good models and computer tools

4.1 Primary components and retrofitting solutions

A large proportion of Statnett' s assets is nearing the end of their planned lifecycle. We are therefore facing extensive re-investments and must have good knowledge of the condition of the assets and their remaining service life. Re-investments and extensions/renovations of existing assets may require different solutions, technologies and methods than those used for new construction. Increased digitalisation can also lead to the need for new renovation methods and retrofitting solutions.

New technical solutions and components could reduce the lifecycle cost of both new and existing assets.

Our focus will be on strengthening our expertise on primary components as well as their impact on the power system. Central to this is the contribution to extended service life and optimised maintenance and utilisation. Expertise and new technology that can improve the monitoring and estimation of the condition of components can provide a better lifecycle estimate, better insight into risk and more targeted maintenance.

Examples of relevant topics include:

- Condition assessments
- Reinvestment and retrofitting methods, and components
- Compact solutions due to lack of space
- Interoperability between suppliers and components
- New technology and solutions

4.2 Digital asset management

Statnett wants to take advantage of the opportunities provided by digitalisation of assets and asset management. One of the objects of digitalisation is to increase automated condition monitoring of components and systems. This can be achieved with everything from data collection and processing, to the use of digital twins and the improvement of system models. Access to data and better data quality will be important. Effective utilisation of data to make good decisions will be central to the effort.

We are undertaking extensive initiatives in the area of improvement and digitalisation of asset management through the internal initiatives LØFT and FRIDA, which occupy a large part of Statnett' s capacity to conduct development work within asset management. Consequently, during the first part of the programme period, most of the activity in the Digital Asset Management focus area will be related to the digitalisation of assets, with less focus on method development in terms of asset management.

4.3 HSE and safe new technology

Statnett has extensive activity throughout the country in both development and replacement projects as well as maintenance. With our zero-injury philosophy, we are therefore interested in technology, technical solutions and methods that can help make workplaces safer and reduce the environmental impact of our assets. New methods and digitalisation should help improve HSE and reduce costs.

Focusing on HSE, including technical safety and emergency preparedness, will set different or new requirements for our assets and working methods.

Examples of relevant topics include:

- Robots/drones (reducing helicopter use and work at height)
- Working methods that improve personal safety
- Securing our assets against external factors
- The environmental impact of our assets

Statnett is also looking for R&D related to the climate and environment through our Co-operation in the energy system programme.

5 REAL TIME CONTROL AND EFFECTIVE MARKETS

Introduction

The power system in the Nordics and Europe is rapidly changing and it is pointed out that challenges in the Nordic power system are related to frequency quality, capacity, flexibility and inertia. We expect these challenges to grow bigger in the future, and it will be important to have good control of system status and respond appropriately to changes and develop customized market mechanisms (models / structure / system).

Improved monitoring and control functions will be important to ensure a stable and reliable power system. Statnett wants to understand what it takes to organize data and data platforms, what functionality, analysis tools and applications one needs to have in order to provide the right decision support in future operating and market solutions.

- How can we use both our own and others' data to get real-time decision support within automatic system operation?
- How should we design markets that consider the physical characteristics of the power system in order to facilitate a fully electric society?
- How should the organization be set up to use emerging technology effectively
- How to safeguard security of supply when IT-systems fail?

5.1 Monitoring and control

It is necessary to investigate how we can develop our monitoring and control systems to capture events, visualize them and make operators aware of potential risks and how they can be addressed. In the long term, we foresee that the control systems will handle most incidents without manual intervention from the operators. Increased automation of central processes in system operation and market design will set requirements for data quality, amount of information with finer time resolution and use of real-time data. But at the same time, it will also lead to some questions about this topic.

Examples of challenges that project proposals should address:

- Contribution to the development of the intelligent and self-powered power system of the future
- Automated solutions for monitoring, control and correction
- Real-time communication and data exchange between companies and countries.
- Techniques / methods for early identification of errors and instability
- How fast is real time and how accurate must it be?
- What kind of solutions can help us to see operational challenges before they arise?

5.2 Operational challenges and market solutions

With a sharp increase in unregulated power generation, such as the connection to offshore wind farms, we expect, among other things, that it will be more demanding to forecast power generation and that zero-prices will occur more and more frequently. It may trigger the need for other market designs to secure continued efficient operation and development of the power system. Perhaps a greater number of bid areas will be needed and the interaction with the reserve markets may be quite different from today?

The need to exchange information between different players in the power system will increase, and we want to increase the knowledge of what kind of solutions are needed - at Statnett, other grid companies and those connected to the grid. It could for example be verification of deliveries or exchange of information between the players.

Statnett plays a bigger role and has more responsibilities towards regional distribution grids than in other European countries, so it is natural that we focus on national or Nordic projects. For example in conjunction to:

- The new Nordic balancing model where it will be useful to look at alternative solutions within forecasting, bottleneck control, automation and robustness / error handling as an example.
- Collaboration solutions between Statnett and the Distribution System Operators. For example, the need for and design of market solutions for buying and selling flexibility, and how these should interact with our balancing markets.

More Interconnectors internationally will lead to more frequent and bigger changes in the energy flow. We want to improve our knowledge of the consequences this has for our operations and markets, and what possible solutions may be needed.

Examples of challenges that project proposals should address:

- Technology and methods to meet the integration of more unregulated energy sources
- Increased automation of system operation and market solutions
- Increased efficiency and better utilization through data-driven decision support
- Design of engaging and effective market solutions

5.3 Smart Data and Cyber Security

The transformation towards a cyber-physical power system will lead to more automation and coordination of operations and will provide increased opportunities for interaction and integration in and between power grid companies.

Studies show that the major opportunities in digitalisation lies in a more cost-effective power system, better risk management, increased system security and sector coupling. Technologies such as artificial intelligence, machine learning, use of digital twins, IoT, sensors and 5G will be "game-changers" in research and development for the power grid of the future, but will also challenge the cybersecurity of the power system.

Increased use of sensor data will help improve analysis and forecasting, developing new tools that give operators a near-real-time view will help simplify the operation of an increasingly complex power system, and the use of artificial intelligence and machine learning are relevant contributions for increased automation of operations.

What is required of us with increasing use of emerging technologies? For example, monitoring of the applications?

Examples of challenges that project proposals should address:

- What kind of competence/expertise is required to operate and deliver services to a more automated control room?
- Which technologies are best suited to solve future operational challenges?
- How to automate testing without connecting to the physical system?

- How to embed cyber security into the digitalized power grid, including sensor data, sensors, communications and protocols, as well as artificial intelligence and machine learning-based decisions?
- How to build effective systems and data integrity solutions and ensure accessibility and confidentiality of systems and data?
- Which technologies are best suited for targeted and efficient prevention, detection, response and recovery of cyber threats and incidents?

6 DESCRIPTION OF THE PROCESS

For KPN-, IPN- and other relevant new R&D-projects with start in 2020, Statnett will have the following process:

The project ideas shall be submitted via Statnett internet pages, <https://www.statnett.no/en/rnd>

Statnett will evaluate project ideas according to the award criteria and the described process.

Please note that if there is any deviations between the Norwegian and English edition, the Norwegian edition has priority.

6.1 Deadlines and the process for evaluation proposals

Deadline

There is no definite deadline for RnD proposals, Statnett will evaluate the proposals currently and at least 2 – two – months before relevant deadlines for financial support.

The process after received proposals are as follows:

Phase 1

Statnett will evaluate the project proposals to determine whether the project idea is qualified for further evaluation. The evaluation will be done with reference to the described areas of interest and the award criteria in chapter 7.

Phase 2

Statnett will evaluate the project ideas further and in more detail according to the award criteria.

If necessary, Statnett will clarify with the tenderer and among other things consider if and how the project could fit better to Statnett' s R&D programs. Statnett will consider the following:

- Does the project have the best R&D partners, or could it be strengthened by inviting others?
- Could – or should there be revisions to make the project more relevant to fit in with Statnett priorities.
- Have important clarifications been done, such as immaterial property rights (IPR).
- May a good case strengthen the project, including the following implementation of the R&D results.
- Does the budget need to be revised? This could be both a downscaling to meet Statnett R&D budget or an increase to allow for more/other R&D partners.

Phase 3

The target for phase 3 is to finalize the contract documents, which includes:

- Get financial support from invited R&D partners outside Statnett, such as Norwegian Research Council.
- Create a more detailed project plan with work packages, milestones, routines for reports etc.
- Establish an agreement according to the different contract types given in 1.2, between Statnett R&D and the project partners
- Contract signature

Please note that even though your project proposal may be qualified for the finale, Statnett may choose to stop the project. Several issues may stop a project; budget, changes to Statnett' s scope or priorities etc., or issues outside our control that may influence the project.

All project proposals will receive feedback. Further explanation may be given by the contact for this Tender.

Please note that Statnett does not incur any commitments other than those described above for the tendered project ideas.

6.2 Tendering costs

Statnett SF will not reimburse any costs that the tenderer incurs in connection with preparation, delivery and follow-up of the tender.

6.3 Confidentiality

Both tenderers and Statnett SF have a duty to prevent others from gaining access to knowledge or information on technical devices and procedures or operations and business matters which will be of competitive significance secrecy regarding to the information concerned.

In accordance with Freedom of Information Act § 23, the procurement process is subject to public scrutiny. The tender, contract and procurement protocol are public documents after the award of the contract.

In the event of a demand for access being made, the Statnett SF shall make an independent appraisal of whether the information in question is such that Statnett SF is obliged to refuse access, cf. Freedom of Information Act § 29.

Upon such a request for access, tenders will be contacted to submit a censored version of the tender.

All confidential information will be kept confidential, including sensitive parts of the project idea. Statnett reserves the right to discuss the idea internally and with relevant parties for cooperation amongst the Nordic TSO, which are bound by confidentiality declarations. If we need to consult a third party or expert, the Tenderer will be consulted first.

Statnett has no other obligations other than these.

7 REQUIREMENTS AND EVALUATION CRITERIA

Statnett reserves the right to evaluate the Tenderers financial capacity

For projects that intends to qualify for support from NRC or other financial support, the tenderer must fulfill the requirements given by these.

For NRC:

<https://www.forskningsradet.no/en/apply-for-funding/who-can-apply-for-funding/research-organisations/approved-research-organisations/>

Statnett has the following additional requirements:

Qualification criteria	Documentation
The project proposal must be within Statnett's line of business	The project description shall show the relevance for Statnett
Legally established enterprise	Company certificate
Taxes etc. paid in full	Tax certificate, not older than 6 – six – months from deadline for this announcement.
Confidential information	A security agreement and confidentiality declarations are mandatory when confidential information is involved.

Statnett SF will award contracts to the tenderers that have supplied the best project ideas. Statnett will evaluate the suitability of the project idea according to the award criteria given below:

Award criteria	Documentation requirement
<p>1. The suitability of the project idea as documented in the project description</p> <p>Including, but not limited to:</p> <p>Does the project fit into the R&D programs project portfolio?</p>	<ul style="list-style-type: none"> - Project-/problem-description - Presentation of Consortium or cooperating parties - Present the benefit for Statnett, including cost benefit estimates
<p>2. Delivery plan and organization of project</p> <p>Including, but not limited to:</p> <p>Does the plan and organization for the project fit in with other activities?</p>	<ul style="list-style-type: none"> - Organization of project - Delivery plan - short CV for the planned and available resources for the project
<p>3. Cost and Terms&Conditions</p> <ul style="list-style-type: none"> • Is the budget realistic in relation to Statnett R&D? • Contract Terms&Conditions 	<ul style="list-style-type: none"> - Hourly rates for the relevant resource-categories including an estimated share for each of the categories. - Total cost estimate in given currency, including proposed Statnett part of the costs - Any deviations to terms and conditions