

‘Second Opinion’ on Statnett’s Green Bond Framework

January 31st, 2019

Summary

Overall, Statnett's green bond framework provides a progressive, clear and sound framework for investments into projects that well align with the Green Bond Principles. The green bond framework lists eligible project categories which promote the transition to low carbon, climate resilient growth and a sustainable development.

Statnett has adopted an ambitious climate and environment strategy and concrete plans on how to reduce emissions. We are encouraged to see that life cycle analysis will inform procurement decisions. It is further notable that the issuer aims to minimize its impact on natural carbon sinks, and that Statnett has piloted Norway's first low emissions construction site. According to the issuer, efforts to minimize its impact on biodiversity, landscapes and communities, as well as climate impacts, play a central role in planning, construction and operation of the grid.

The company reports greenhouse gas emissions according to the Greenhouse Gas Protocol standards. Pending improved data quality, Statnett intends to report emissions from construction works, some procured materials, and from impacts on natural carbon sinks from 2020.

Statnett has solid management and governance structures, as well as regular and transparent reporting about green bond project achievements to investors. We are encouraged that the issuer will follow the Nordic Public Issuers recommendations on impact reporting. In its annual Green Bond Investor Letter, Statnett will outline a list of financed projects, including a brief description and expected impacts where feasible. The letter will also provide information about the division of Green Bond proceeds between new projects and refinancing. The assessment of the governance structure gives it a rating of "Excellent". Nevertheless, we note that Statnett does not analyze or report its exposure to climate risk as recommended by the Task Force on Climate-Related Financial Disclosure. The issuer has stated that TCFD reporting will be considered for the future.

Eligible projects are transmission-grid investments to connect new renewable power generation; grid reinforcement or upgrades and interconnectors. Proceeds will likely be allocated to shares of 15%, 35%, and 50% across the three categories.

Based on the assessment of the project types that will be financed under this framework, the shading lies between dark and medium green. Based on an overall assessment of the project types and the governance score of "Excellent", we allocate a Dark Green Shading to the framework. Investors should be aware that investments in grid reinforcement and upgrades will to a considerable extent be activated due to increased demand for electrification from the offshore oil and gas sector. In order to pursue the goals of the Paris climate agreement, electrification of the oil and gas sector is necessary in the short to medium term. Lock-in effects should however be considered carefully for such investments. The issuer has assured that green bond proceeds will not be used to finance the direct links to offshore oil and gas platforms.



°CICERO
Dark Green

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1 Introduction and background

As an independent, not-for-profit, research institute, CICERO (Center for International Climate and Environmental Research - Oslo) provides Second Opinions on institutions' framework and guidance for assessing and selecting eligible projects for green bond investments and assesses the framework's robustness in meeting the institutions' environmental objectives. The Second Opinion is based on documentation of rules and frameworks provided by the institutions themselves (the client) and information gathered during meetings, teleconferences and e-mail correspondence with the client.

CICERO is independent of the entity issuing the bond, its directors, senior management and advisers, and is remunerated in a way that prevents any conflicts of interests arising as a result of the fee structure. CICERO has established the global Expert Network on Second Opinions (ENSO), a network of independent non-profit research institutions on climate change and other environmental issues, to broaden the technical expertise and regional experience for Second Opinions. CICERO works confidentially with other members in the network to enhance the links to climate and environmental science, building upon the CICERO model for Second Opinions. In addition to CICERO, ENSO members currently include Basque Center for Climate Change (BC3), International Institute for Sustainable Development (IISD), Stockholm Environment Institute (SEI), and Tsinghua University's Institute of Energy, Environment and Economy. A more detailed description of CICERO can be found at the end of this report. ENSO encourages the client to make this Second Opinion publicly available. If any part of the Second Opinion is quoted, the full report must be made available.

CICERO's Second Opinions are normally restricted to an evaluation of the mechanisms or framework for selecting eligible projects at a general level. CICERO does not validate or certify the climate effects of single projects, and thus, has no conflict of interest in regard to single projects. CICERO is neither responsible for how the framework or mechanisms are implemented and followed up by the institutions, nor the outcome of investments in eligible projects.

This note provides a Second Opinion of Statnett Green Bonds Framework and policies for considering the environmental impacts of their projects. The aim is to assess the Statnett Green Bonds Framework as to its ability to support Statnett's stated objective of promoting the transition to low-carbon and climate resilient growth.

This Second Opinion is based on the green bond framework presented to CICERO by the issuer. Any amendments or updates to the framework require that CICERO undertake a new assessment. CICERO takes a long-term view on activities that support a low-carbon climate resilient society. In some cases, activities or technologies that reduce near-term emissions result in net emissions or prolonged use of high-emitting infrastructure in the long-run. CICERO strives to avoid locking-in of emissions through careful infrastructure investments and moving towards low- or zero-emitting infrastructure in the long-run. Proceeds from green bonds may be used for financing, including refinancing, new or existing green projects as defined under the mechanisms or framework. CICERO assesses in this Second Opinion the likeliness that the issuer's categories of projects will meet expectations for a low carbon and climate resilient future.

Expressing concerns with 'shades of green'

CICERO/ENSO Second Opinions are graded dark green, medium green or light green, reflecting the climate and environmental ambitions of the bonds and the robustness of the governance structure of the Green Bond

Framework. The grading is based on a broad qualitative assessment of each project type, according to what extent it contributes to building a low-carbon and climate resilient society. The shading methodology also aims at providing transparency to investors when comparing green bond frameworks exposure to climate risks. A dark green project is less exposed to climate risks than a lighter green investment.

This Second Opinion will allocate a 'shade of green' to the green bond framework of Statnett:

- **Dark green** for projects and solutions that are realizations today of the long-term vision of a low carbon and climate resilient future. Typically, this will entail zero emission solutions and governance structures that integrate environmental concerns into all activities.
- **Medium green** for projects and solutions that represent steps towards the long-term vision but are not quite there yet.
- **Light green** for projects and solutions that are environmentally friendly but do not by themselves represent or is part of the long-term vision (e.g. energy efficiency in fossil-based processes).
- **Brown** for projects that are irrelevant or in opposition to the long-term vision of a low carbon and climate resilient future.

Assessing governance

In assessing the governance quality of the issuer, four aspects are studied: The policies and goals of relevance to the green bond framework; the selection process used to identify eligible projects under the framework, the management of proceeds and the reporting on the projects to investors. Based on these aspects, an overall grading is given on governance strength falling into one of three classes: Fair, Good or Excellent.

Overall shading

The project types that will be financed by the green bond primarily define the overall grading. However, governance and transparency considerations are also important because they give an indication whether the institution that issues the green bond will be able to fulfil the climate and environmental ambitions of the investment framework. Hence, the governance assessment plays a role in the overall shading of the framework. Investments in all shades of green projects are necessary in order to successfully implement the ambition of the Paris agreement. The overall shading reflects an ambition of having the majority of the project types well represented in the future portfolio, unless otherwise expressed by the issuer.

2 Brief Description of Statnett's Green Bond Framework and rules and procedures for climate-related activities

Statnett is the owner and operator (TSO) of the Norwegian electricity transmission system. The company develops, operates and maintains 12.000 kilometers of high-voltage electricity lines and 160 substations. Statnett is not responsible for the distribution grid, which uses a lower voltage and delivers electricity to most end consumers, e.g. private homes. Statnett is owned by the Norwegian state through the Ministry of Petroleum and Energy.

Statnett has three core functions: Securing grid stability at all times; Planning of the transmission grid; Owning the grid and the connections to other countries' grids. Statnett currently has ownership stakes in interconnectors to Sweden, Denmark, Finland, the Netherlands, and Russia.

According to the issuer, the Norwegian government requires Statnett to contribute to achieving Norway's climate targets and map its exposure to climate risks. Statnett is pursuing this mandate through an investment program in the period 2017-2021 with a volume of 35-45bn NOK. This program encompasses grid upgrades and new constructions to enable the addition of new renewable energy. The largest projects relating to renewable energy are the connection of new wind power to the grid. The program also includes the construction of interconnectors to Germany and the UK. Another part of the program consists of grid upgrades to enable and scale up the use of electricity in new segments (e.g. electric transport, data centers, metals production, oil and gas industry).

Statnett maps its direct exposure to climate risk, both in terms of physical and transition risk, to identify risk-mitigating measures, and to be aware of the benefits that come with early adaptation. According to the issuer, weather and climate impacts have always played an important role in the planning, construction and operation of the grid. For the next 10 years, the company expects increased urgency regarding physical risk impacts, posing greater challenges to assuring security of supply. A Statnett report from 2016 finds that more frequent extreme weather, landslides and flooding are to be expected. The company cooperates with experts in the fields of climate and geology and employs climate models in order to build resilience in existing and new facilities. As of now, the company does not report its exposure to climate risk as recommended by the Task Force on Climate-Related Financial Disclosure. The issuer has stated that TCFD reporting will be considered for future reporting.

Most of its office buildings have been certified "Miljøfyrtårn", a Norwegian environmental certification system. The issuer informed us that the Miljøfyrtårn certification will be replaced by ISO 14001 certification.

Use of proceeds:

According to the issuer, eligible projects cover three areas of transmission-grid infrastructure investments: Grid reinforcement to connect new renewable power production; grid reinforcement or upgrade to enable the efficient use of clean energy; and interconnectors between regions or countries to increase the market for renewable energy. Proceeds will likely be allocated to shares of 15%, 35%, and 50% across the three categories. Statnett's Green Bonds can be used to finance the acquisition and development of new eligible projects and to refinance existing eligible projects. Statnett's Green Bonds will not directly finance nuclear or fossil energy generation

projects, according to the framework. Statnett has also given assurance that it is fully committed not to fund with Green Bonds projects that directly connect or improve grid connection to fossil fuel or nuclear based power production. Statnett has the mandate to treat and serve all its customers equally and, as a TSO, does not have control over the energy mix in the electricity grid. However, it aims to promote the increased share of renewables in the energy mix through the development of its transmission networks.

Eligible projects will be added to a green portfolio. If, for any reason, a financed Eligible Project no longer meets the eligibility criteria, it will be removed from the Green Project Portfolio.

Only projects which meet the criteria of Statnett's Green Bond Framework, and have a high likelihood for positive, net long-term environmental impacts, will be approved. Records of all meetings will be kept.

Selection:

The selection process is a key governance factor in the Green Bond Principles. We typically look at how climate and environmental considerations are taken into account when evaluating whether projects can qualify for green bond funding. The broader the project categories, the more importance CICERO places on the governance process. Based on Statnett's long term project plan, projects will be evaluated by representatives from at least three of the four functions Grid Planning, Land Use and Environmental, Finance and Treasury, Environmental Social and Governance (ESG), according to the framework. If projects are found to meet the criteria stated in Statnett's green bond framework, they are selected as potential eligible projects. The representatives from the above-mentioned functions will be responsible for the final approval of potential projects as eligible projects. In this process, at least one of the functions of Finance and Treasury and ESG has to participate. The representative from the Land Use and Environment function must be present in all such decisions and will have veto power in the decision-making process, according to the issuer.

Management of proceeds:

The proposed management approach for Green Bond proceeds are in alignment with the Green Bond Principles. An amount equal to the net proceeds of the issue of the Green Bonds will be booked to a dedicated account that will support Statnett's funding of Eligible Projects. As long as the Green Bonds are outstanding and the dedicated account has a positive balance, at the end of every fiscal quarter, funds will be deducted from the dedicated account and added to Statnett's Green Project Portfolio in an amount equal to all disbursements made during such quarter in respect of financing and/or refinancing of Eligible Projects., for any reason, a financed Eligible Project no longer meets the eligibility criteria, it will be removed from the Green Project Portfolio.

Transparency and Accountability:

Transparency, reporting, and verification of impacts are key to enable investors to follow the implementation of green bond programs. Procedures for reporting and disclosure of green bond investments are also vital to build confidence that green bonds are contributing towards a sustainable and climate-friendly future, both among investors and in society.

Statnett will provide an annual Green Bond Investor Letter. This letter will outline to investors a list of the projects financed including a brief description and expected impact where feasible. Impact reporting will, depending on type of project, include grid-connected new renewable capacity (MW). Reporting will also include increased capacity of the transmission grid to supply increased demand, expected extension of operating life of affected assets, reduction in transmission energy losses (MWh), increased capacity between countries, regions or price areas. The issuer will follow the Nordic Public Issuers recommendations on impact reporting. Regarding the reporting of impacts from interconnectors, the issuer will use a methodology called the Ten Year Network

Development Plan (TYNDP) established by ENTSO-E (an association of European transmission system operators). This method has been approved and published by the European Commission and assesses transmission and storage projects using different future scenarios. The letter will also provide information about the division of the allocation of Green Bond proceeds between new projects and refinancing and a summary of Statnett's Green Bond developments.

According to the issuer, an independent and qualified auditor will, on an annual basis, assess Statnett's selection process and review whether the allocation of green bond proceeds was conducted in accordance with Statnett's green bond framework. The opinion of the assurance provider will be made publicly available on Statnett's webpage, according to the issuer.

Statnett will publish this second opinion on the company's website.

The table below lists the documents that formed the basis for this Second Opinion:

Document Number	Document Name	Description
01	Statnett Green Bond Framework DRAFT Juli 2018	Green Bond framework and company information
02	Statnett Årsrapport 2017 – annual report 2017	Annual report 2017 including sustainability report
03	Konsernstrategi 2017-2021 – corporate strategy 2017-2021	Outlining focus areas for activities up to 2021
04	Funksjonspolicy HMS – Policy document for HSE	Outlining main principles for company-wide health, security and environment policy
05	Sertifikat Statnett 2018 – Management System Certificate	Certification of NS-EN ISO 14001:2015
06	Styringspolicy for samfunnsansvar – CSR policy	Guiding policies for CSR work
07	Strategy, decision making and reporting	Outlining socioeconomic criteria for investment decisions and impact reporting indicators

08	Rutiner klimarisiko	Outlining the process to evaluate physical risk exposure in new projects
09	Miljø- og klimastrategi 2018-2021	Strategy to reduce emissions and impact on biodiversity and landscapes
10	Kontraktskrav samfunnsansvar og HMS	Standard agreement for suppliers on CSR and HSE
11	Kontraktsvedlegg spesielle HMS krav	Standard agreement for contractors on HSE
12	Kvalifikasjonskrav og dokumentasjonskrav til entreprenør	Standard agreement for contractors on required qualifications and documentation
13	MTA plan Kobbvatnet	Environment, transport and construction plan (mandatory under energy legislation) for the Kobbvatnet project
14	MTA-plan Lyse-Fagrafjell	Environment, transport and construction plan (mandatory under energy legislation) for the Lyse-Fagrafjell project
15	LT power market outlook	

Table 1. Documents reviewed

3 Assessment of Statnett’s Green bond framework and environmental policies

Overall, Statnett’s Green Bond framework provides a detailed and sound framework for climate-friendly investments.

The framework and procedures for Statnett’s Green Bond transactions are assessed and their strengths and weaknesses are discussed in this section. The strengths of an investment framework with respect to environmental impact are areas where it clearly supports low-carbon projects, whereas the weaknesses are typically areas that are unclear or too general. Pitfalls are also raised in this section to note areas where issuers should be aware of potential macro-level impacts of investment projects.

Overall shading

Based on the assessment of the project types that will be financed under this framework, the shading lies between dark and medium green. This is due to the types of investments and their relative weight in the allocation of green bond proceeds. Based on an overall assessment of the project types and the governance score of “Excellent”, we allocate a **Dark Green Shading** to the framework.

Eligible projects under the Green finance framework

At the basic level, the selection of eligible project categories is the primary mechanism to ensure that projects deliver environmental benefits. Through selection of project categories with clear environmental benefits, green bonds aim to provide certainty to investors that their investments deliver environmental returns as well as financial returns. The Green Bonds Principles state that the “overall environmental profile” of a project should be assessed and that the selection process should be “well defined”.

Category	Eligible project types	Green Shading and some concerns
Connecting renewable power production 	<ul style="list-style-type: none"> Projects directly associated with connecting new renewable power production to the grid 	<p>Dark Green</p> <ul style="list-style-type: none"> ✓ Be aware of impacts on biodiversity and communities ✓ Be aware of landscape issues

Enabling efficient use of clean energy



- Projects directly associated with serving demand for electricity. The projects in this category will typically be initiated due to:
- Increased demand for electricity, due to transition from fossil fuels to electric solutions (i.e. electric cars, electric heating, electrification of industrial processes instead of fossil fuel usage)
- Poor conditions of existing network components that are important for serving existing and future demand for electricity. Typical projects would be an upgrade of existing lines and substations, due to old age and/or new technical requirements.

Medium Green

- ✓ Be aware of impacts on biodiversity and communities
- ✓ Industrial demand is led by electrification of petroleum and metals production
- ✓ Electrification of petroleum production processes represents only a short- to medium-term improvement as petroleum production is not compatible with a low carbon world
- ✓ No direct links to oil and gas installations, or other industrial customers, will be financed with green bond proceeds
- ✓ Data centers carry the risk of increasing the need for imports of electricity from systems with higher grid emission factors in cases of energy intensive mining of crypto currencies

Increasing the market for renewable energy



- Projects directly associated with the construction of connections between regional markets in Norway or interconnectors between Norway and other countries with a clear goal of a renewable power system.

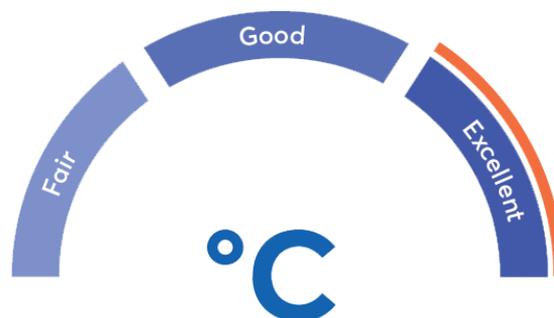
Dark to medium Green

- ✓ Be aware of impacts on marine biodiversity
- ✓ Interconnectors can increase the flow of foreign electricity with a higher emission grid factor and a nuclear share into Norway in the short term
- ✓ Currently, interconnectors to Germany and the UK are under construction
- ✓ Cable laying follows national regulation and International Maritime Organisation's conventions; construction of related infrastructure in Norway follows national laws and Statnett's routines and policies

Table 2. Eligible project categories

Governance assessment

In assessing the governance quality of the issuer, four aspects are studied: The policies and goals of relevance to the green bond framework (1), the selection process used to identify eligible projects under the framework (2), the management of proceeds (3) and the reporting on the projects to investors (4). Based on these aspects, an overall grading is given on governance strength falling into one of three classes: Fair, Good or Excellent.



The overall assessment of the governance structure of Statnett gives it a rating of **Excellent**. Statnett has updated its climate and environment strategy and defined ways for how to reduce emissions. The quantification of these goals for all business units has been announced for 2019. Policies for minimizing the impact on biodiversity, landscapes, carbon sinks and communities are well established and receive positive feedback from the regulatory authorities. The framework outlines a sound selection process and comprehensive and transparent reporting. The issuer will follow the Nordic Public Issuers recommendations on impact reporting. Nevertheless, we note that Statnett does not analyze or report its exposure to climate risk as recommended by the Task Force on Climate-Related Financial Disclosure. The issuer has stated that TCFD reporting will be considered for future reporting.

Strengths

Governance

Statnett has comprehensive governance and strategies to support the framework. The issuer has a strong focus on the resilience of its assets and has procedures and routines in place in order to minimize the footprint of its activities on the local environment and affected communities. Statnett is tracking greenhouse gas emissions from a wide range of its activities. Even though not quantified yet, Statnett aims to cut its greenhouse gas emissions and can point to data tracking, changes to decision making and already enacted measures which serve this goal.

The Environment and Climate Strategy for the period 2018-2021, which was updated mid-2018, sets out Statnett's plan to reduce climate gas emissions from procurement, construction works and projects in natural carbon sinks, among other targets. These targets are the result of a recently concluded mapping of hitherto unreported emissions. Since Statnett is lacking historic data on these emissions, the targets have not yet been quantified. Once data sets have been built up, Statnett aims to define indicators and procedures for recording and reducing emissions and operationalize those for all business units. These indicators and procedures will be fed into so-called carbon budgets and taken into decisions on project design, procurement and technology qualification, according to the strategy. Statnett aims to include these emissions in its overall emissions reporting, which follows the Greenhouse Gas Protocol standard, starting in 2020, pending improved emissions data quality.

One aspect of this strategy aims to reduce the number of substation construction projects in bogs. This is positive. Around 35 % of a forest's carbon storing capacity lies in bogs, according to the Bjerknes Center for Climate Research. Statnett will identify such carbon sinks in the project development phase and aim to find alternative solutions.

Another part of the strategy aims to reduce emissions from construction. This is positive since construction works stand for ca. 1% of Norway's total CO₂ emissions (Zero, 2015). In its pilot project between Smestad and Sogn substations in Oslo, many of the machines used in tunnel works run on electricity, as do close to all light

duty vehicles. Trucks and machinery that have not been electrified run on renewable diesel free of palm oil. This fuel has been certified under a scheme approved by the European Commission (ISCC EU) and achieves a reduction of climate gasses of 89.5 %, according to third party documentation provided by Statnett. According to the issuer, overall emissions at the construction site have been cut by 78 %. The issuer informs that two new fossil free projects are under development.

The third prong of Statnett's ambition to cut emissions is through increased use of life-cycle analysis (LCA) in procurement and, to a less stringent extent, in technology qualification. LCA will be part of the decision making for choosing suppliers of steel towers and power lines. The issuer has informed us that the qualification of new technologies or materials within Statnett will have to take LCA into consideration as well.

The Environment and Climate Strategy also sets out the goal to minimize the impact of construction works on biodiversity and landscapes. The issuer informed us that this goal has received increased attention in the past years and that organizational changes have been taken to that end. In order to minimize impacts the issuer involves environmental competence from early on and throughout the project development. This informs the choice between alternative project solutions, avoiding when possible projects in vulnerable areas. It also supports the process of obtaining a license, which is mandatory for projects in the high-voltage grid. Environmental concerns are also taken into the internal socioeconomic valuation of projects when possible. This affects the prioritization of projects. Statnett reports that it has longstanding good working relationships with the licensing and supervisory authority NVE (*Norges vassdrags- og energidirektorat* = the Norwegian Water Resources and Energy Directorate) and receives positive feedback when NVE performs project completion assessments.

The issuer informed us that they take a proactive approach also towards affected communities. This encompasses early dialogue, transparency, and practical measures such as camouflaging and noise barriers. The issuer informed us that green bond proceeds may be used to fund projects with potentially controversial social and environmental aspects. Statnett reports that its proactive approach to social and environmental impacts has been successful in identifying and managing the potential for protest.

Most of Statnett's physical assets have a long life-time. In order to strengthen resilience of its physical infrastructure against climate change impacts, the company cooperates with experts in the fields of climate and geology and employs climate models.

Project categories

Statnett's investments contribute to meeting Norway's target of cutting climate gas emissions. Energy system models require increased electrification in sectors such as industry and transport, and a rise in the share of renewable energy generation in order to limit the rise in global temperatures. As an example, Statnett will use green bond proceeds to prepare the transmission system for a further increase in the number of electric vehicles in Oslo and Stavanger.

Weaknesses

There are no apparent weaknesses in the framework.

Pitfalls

Governance

Impact reporting will include grid-connected new renewable capacity (MW). CICERO would like to point out that, since Statnett is not responsible for the construction of new capacity itself, newly connected capacity may also be reported by the actual owner of that capacity.

Project categories

The category «Enabling the efficient use of clean energy» is allocated a Medium Green Shading. Under this category, the issuer intends to invest in the upgrading of existing lines and substations. This will respond to poor conditions of existing network components, which are important for serving existing and future demand for electricity. The expected increase in demand stems from the sectors industry, transport and data-centres. According to the issuer's analysis, the industry sector stands for the largest increase (14TWh) until 2025. Thereafter, demand from industry will fall slightly (6 TWh) until 2040, adding up to a net increase of 8 TWh. According to the issuer, the types of industries behind this increase are the metallurgical industry and the electrification of offshore oil and gas installations. The issuer assured us that green bond proceeds will not be used to finance the direct links to offshore oil and gas platforms. Investments will focus on strengthening the central transmission grid. However, we note that investments in this category will to a considerable extent be activated due to increased demand from the oil and gas sector, and that investments will serve the electrification of this sector. The electrification of oil and gas installation in itself is necessary for pursuing the goals of the Paris agreement, but it does not represent a solution for achieving a low emissions climate resilient society. The electrification may even prolong the lifetime of oil and gas installations, thereby locking in the use of fossil energy. Investments connected to this demand cannot be seen as dark green under our methodology.

The construction of new interconnectors between Norway and Germany and the UK has the capacity to provide a net flow of largely renewable electricity from Norway to Germany and the UK, thus increasing the renewable share in these countries. Around 96 % of power production in Norway is based on hydropower. Norway's electricity export balance has been positive between 2008-2018, according to Statistics Norway and Statnett. This is likely to continue to be the case as an expected increase in demand goes along with an increase in new renewable capacity in Norway. The interconnectors also have the capacity to support the transition to a more renewable electricity mix in the connected countries. Germany, for example, is expected to more than double its capacity of intermittent generation, putting increased strain on a transmission grid constructed around large, centralized generation. Interconnectors offer ad hoc flexibility which helps to smoothen out demand and price curves, supporting the continued increase of intermittent renewables. However, the reason for shading this category Dark to Medium Green is that the interconnectors to Germany and the UK will in the short term allow for increased import into Norway of electricity from systems which currently have a significantly higher grid emissions factor, and which contain a share of nuclear power. Over the past 10 years (since January 2008), the export/import split of Norway's exchange with connected countries has been 71% / 29% (Statnett website). The imports amounted to ca. 79 TWh over these 10 years, over half of Norway's total production in 2017 (149 TWh, Statistics Norway). Even though the net balance of electricity exchange between Norway and connected countries is likely to remain positive for Norway, the interconnectors enable an absolute increase of imports of electricity with a higher grid emissions factor and nuclear shares until connected countries achieve a lower emissions grid factor. We take note of the TYNDP analysis provided by the issuer, which assesses the future impact in terms of CO₂ of both interconnectors. The analysis shows that emissions in the short term, until 2025 are expected to rise moderately due to the interconnectors under a "best estimate" scenario. Other scenarios presented, assuming the achievements of European climate and energy targets, and two different future pathways for the transition to a greener European electricity system, expect strong cuts in CO₂ emissions due to the interconnectors in 2030.

Impacts beyond the project boundary

Norway's electricity supply depends to a large degree on precipitation. Periods of high electricity demand, e.g. during unusual cold long winters, or low precipitation, e.g. during unusual dry summers, as experienced during the winter and summer of 2018, will increase the need for temporary imports from systems with a higher grid emissions factor and a share of nuclear power.

Rebound effects

Efficiency improvements may lead to rebound effects. When the cost of an activity is reduced there will be incentives to do more of the same activity. From the project categories in Table 2, an example is the upgrade of the transmission grid to supply data centers. If data centers' main activity is the mining of crypto currencies, the electricity demand is going to increase starkly. This may lead to an increased need for imports of electricity in order to balance the grid, with the negative aspects outlined above.

Appendix: About CICERO

CICERO Center for International Climate Research is Norway's foremost institute for interdisciplinary climate research. We deliver new insight that helps solve the climate challenge and strengthen international climate cooperation. We collaborate with top researchers from around the world and publish in recognized international journals, reports, books and periodicals. CICERO has garnered particular attention for its work on the effects of manmade emissions on the climate and the formulation of international agreements and has played an active role in the UN's IPCC since 1995.

CICERO is internationally recognized as a leading provider of independent reviews of green bonds, since the market's inception in 2008. CICERO received a Green Bond Award from Climate Bonds Initiative for being the biggest second opinion provider in 2016 and from Environmental Finance for being the best external review provider (2017).

CICERO Second Opinions are graded dark green, medium green and light green to offer investors better insight in the environmental quality of green bonds. The shading, introduced in spring 2015, reflects the climate and environmental ambitions of the bonds in the light of the transition to a low-carbon society.

CICERO works with both international and domestic issuers, drawing on the global expertise of the Expert Network on Second Opinions. Led by CICERO, ENSO is comprised of trusted research institutions and reputable experts on climate change and other environmental issues, including the Basque Center for Climate Change (BC3), the Stockholm Environment Institute, the Institute of Energy, Environment and Economy at Tsinghua University and the International Institute for Sustainable Development (IISD). ENSO operates independently from the financial sector and other stakeholders to preserve the unbiased nature and high quality of second opinions.

cicero.oslo.no/greenbonds

