Statnett

Fast Frequency Reserves

This brochure provides basic information to both new and established actors who are curious about the new Norwegian Fast Frequency Reserve (FFR) market. The new market gives opportunities to a whole new set of providers of balancing services. More detailed information, as well as bidding documents for participation in the 2022 FFR market, can be found at Statnett's FFR page.

The future is **electric**

Why is FFR needed and how does it work?

The Nordic power system rely on a stable grid frequency of 50 Hz. To achieve this, a constant balance must be kept in the system between produced and consumed electrical energy. Statnett, the Norwegian transmission system operator, is responsible for frequency balancing and operates balancing/ reserve markets to this end.

The Nordic power system faces a growing number of new challenges to its frequency quality. More renewable production (wind, solar) and cables to continental Europe and UK are coming online in addition to decommissioning of nuclear power plants. New balancing concepts are therefore required to meet the new challenges and keep 50 Hz stable.

While frequency imbalances are usually stabilized by the so-called primary reserves, activation of these reserves can be too slow when a certain power system property called inertia is low. Inertia is delivered from traditional hydropower and thermal power plants

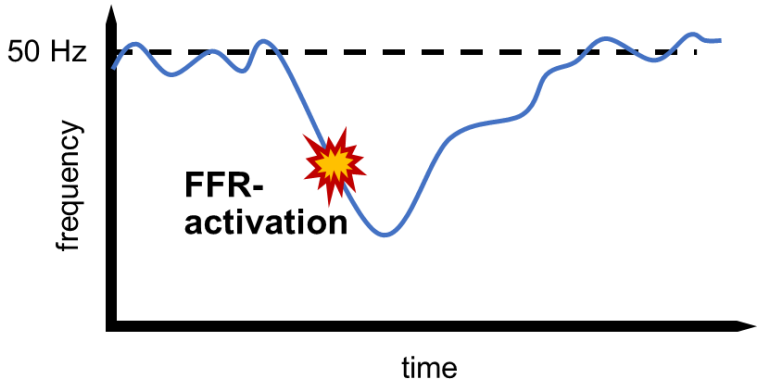
Inertia, also referred to as kinetic energy from mainly synchronous generators, act as a resistance to frequency changes. This initial response of synchronous machines decreases significantly when converter-based technologies like wind, solar plants or energy import on HVDC cables replace traditional energy generation in the Nordics.

Fast Frequency Reserves (FFR) are therefore reserves that will be activated to counter these rapid frequency drops. Activation of FFR is essential for security of supply and thus has a high value for society.

During summer, the Nordic power system is often below a critical inertia level due to low consumption, increased production of renewables and energy import on the cables. Under such conditions a sudden loss of power generation, for example disconnection of a nuclear power plant, will be particularly critical as it could lead to very rapid frequency drop.

When frequency drops below a certain limit, the FFR provider is contracted to increase active power production or decrease consumption within a second. Hence, FFR helps lower the imbalance between production and consumption until the primary reserves can act and the frequency is again stabilized.

To maintain stability in the Nordic power system, each of the Nordic system operators have agreed to procure a share of the FFR required. Statnett, as the Norwegian system operator, has committed to procure 150 MW of FFR in 2022.



Who can deliver FFR?

All actors who can either disconnect or quickly reduce their power demand at its facility are potential FFR providers. Industrial loads and data centres could potentially provide such response, but also other controllable demand side loads are possible suppliers, for example air-conditioning, electrical boilers or electrical vehicles. Also, batteries which can quickly feed in active power or reduce load could easily provide FFR.

An FFR pilot conducted in 2018 gave insights into which technologies handle FFR.

What's in it for me?

By being an FFR provider to Statnett, you guarantee the availability of a defined power capacity (MW) for a specified period of delivery time. For a power demand unit, this will mean that the provider guarantees a reduction of power consumption in case of activation of FFR.

Frequency drops in the scale that would trigger an FFR activation have historically happened rarely but are unpredictable. Historical records show that there might be none, one or two incidents per year. Because the FFR activation is quite short, it is unlikely to negatively influence the core businesses of most potential FFR providers.

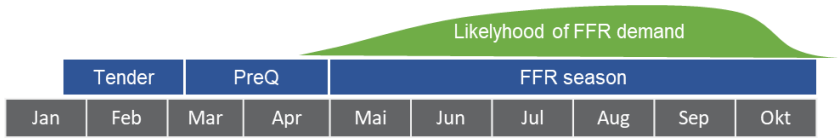
Delivery of FFR will most likely necessitate installation of some equipment for measurement and communication at your facility. It is expected that the FFR provider include these costs in his bidding price for FFR capacity.

The FFR capacity price will be set through competitive bidding (the highest accepted bid price will apply to all accepted bids). In case of activation, all costs incurred due to the consumption decrease/ increase of production will be reimbursed.

We have developed two FFR contracts with different specifications of when and how many hours the offered capacity must be available for activation in the contracting period. Potential providers with flexible power demand are encouraged to consider the opportunity to bid in the 2022 FFR market.

FFR contracts

In 2022, Statnett is going to procure FFR for a period lasting from May until October. FFR providers must deliver capacity during this period. The offer period opened on 31 January and will close on 28 February 2022.



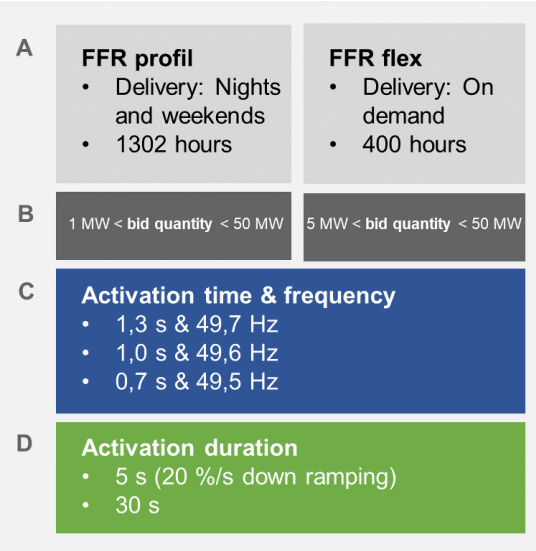
The market covers the time of the year when most FFR demand is expected.

Providers may choose to offer capacity through two specified FFR contracts:

FFR Profil is a fixed provision of FFR capacity for night-time hours and all hours during weekends.

FFR Flex guarantees FFR capacity upon request within a week, when needed.

You should consider the contract which best fits your technology and production/consumption pattern. The following figure provides an overview of the two contracts and their requirements.



Combine different parameters from A (contract type), B (FFR capacity), C (trigger settings) and D (duration).

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A short guideline to offer FFR in 2022

If you want to offer FFR services you need to do following steps:

1. **Read our terms and conditions** for providing FFR, which includes more detailed information on prequalification and technical requirements.

2. With regards to settlement, make sure you have an **agreement with or are registered as the balancing responsible party** (BRP) for the assets participating with FFR delivery.

3. **Send us an offer** on FFR provision, using our application form, by 28th of February. The application gives us important information what FFR product you choose, quantity, price for capacity and costs for activation.

4. **Prequalification** takes place after the tendering process, meaning that you can start implementing your technical solution, and test and document your activation and response time after your offer is accepted. .

If you need help or have further questions, we are happy to guide you through the process.

Contact

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