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1 Introduction

This document has been issued in order to provide interested parties concerning provision of reserves with information, guidance and answers to questions that may arise.

Svenska kraftnät is the system operator for electricity in Sweden, which entails responsibility for ensuring that the Swedish electricity supply is reliable and that there is a constant balance between power input and output, which entails that the frequency is 50 Hz.

Figure 1: The electricity balance of the power system

Svenska kraftnät purchases reserves from balance responsible parties in order to be able to fulfil the commission concerning maintaining a balance in the electricity system. Additional information on the balance responsibility can be found here.¹

Reserves may for instance consist of production units or units that can adapt their electricity consumption. Svenska kraftnät wants to increase the competition in the reserve markets and new kinds of resources are thereby welcome, such as demand response². The concept demand response includes many different kinds of resources, where the consumption of electricity changes and/or is transferred over time, due to some kind of external signal. This may refer to the (individual or aggregated) electricity consumption in households or industries.

² Svenska kraftnät’s ambition is that the reserve markets shall be technically neutral. However, today it is not possible to provide aFRR from consumption.
2 What different kinds of reserves are available?

There are different kinds of reserves with various requirements on for instance endurance and speed. The automatic reserves are the ones with the most rapid response, and are therefore the ones first activated in the event of a frequency deviation. The manual reserves are used in order to restore the automatic reserves, so that these are always ready for re-activation.

The function of FCR (Frequency Containment Reserve) is to stabilize the frequency in the event of a frequency deviation and is the fundamental element required to maintain the balance. FCR is divided into two different kinds of reserves:

- FCR-N (Frequency Containment Reserve – Normal)
- FCR-D (Frequency Containment Reserve – Disturbance)

FCR is procured in advance for every minute of the day. The reserves are automatically activated if the frequency changes within the frequency range they are to support.

aFRR (automatic Frequency Restoration Reserve) is also procured in advance and automatically activated. The function of aFRR is to automatically restore the frequency to 50.00 Hz in the event of a deviation from 50.00 Hz.

mFRR (manual Frequency Restoration Reserve) is a manual reserve intended to relieve the automatic reserves and restore the frequency to 50.00 Hz. This kind of reserve is activated at the request of Svenska kraftnät.

mFRR is included in a Nordic regulating power market, shortened to RKM, where energy is sold and bought every hour in order to maintain the frequency in the Nordic power system within the range 49.90 – 50.10 Hz. Manual regulations are performed by Svenska kraftnät’s balance service.
Table 1: Overview of the different kinds of reserves

<table>
<thead>
<tr>
<th>Reserve</th>
<th>Function</th>
<th>Activation</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCR-N</td>
<td>Automatic reserve that stabilizes the frequency in the event of minor changes in consumption or production</td>
<td>Automatically if the frequency changes within the range 49.90 – 50.10 Hz</td>
</tr>
<tr>
<td>FCR-D</td>
<td>Automatic reserve that stabilizes the frequency in the event of operational disturbances</td>
<td>Automatically if the frequency drops below 49.90 Hz</td>
</tr>
<tr>
<td>aFRR</td>
<td>Automatic reserve that restores the frequency to 50 Hz</td>
<td>Automatically through a control signal if the frequency deviates from 50.00 Hz</td>
</tr>
<tr>
<td>mFRR</td>
<td>Manual reserve that relieves the automatic reserves and restores the frequency to 50 Hz</td>
<td>Manually at the request of Svenska kraftnät if the frequency deviates from 50.00 Hz</td>
</tr>
</tbody>
</table>

3 Provision of reserves - requirements

In order to become a provider of reserves, the requirements stipulated in the Balance Responsibility Agreement including appendices and regulatory documents, must be met. The Balance Responsibility Agreement including appendices and regulatory documents are found on this page. Potential providers of reserves should particularly look into the following appendices included in “Balansansvarsavtalet” (the Balance Responsibility Agreement):

- Bilaga 3 – Handel med Frequency Containment Reserve (FCR)
- Bilaga 4 – Handel med Frequency Restoration Reserve – Automatisk (aFRR)
- Bilaga 5 – Handel med Frequency Restoration Reserve – Manuell (mFRR)

Plans and bids are reported to Svenska kraftnät in accordance with the Ediel standard in force. The Ediel directions are found on this page. Some Ediel directions can be found in English but the majority can only be found in Swedish at the moment.

A brief overview of the different reserve markets is given in the document “Reserve Markets”, found on this page, where you also find the document “Questions & Answers on Reserves”.

3.1 Prequalification

In order to gain permission to participate in the respective markets, the provider of FCR and FRR must be able to demonstrate that the technical requirements on the reserve are met, by completing a prequalification with approved results.

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1 The Balance Responsible Agreement and included appendices are only available in Swedish at the moment.
2 https://www.svk.se/aktorsportalen/elmarknad/balansansvar/
3 https://www.ediel.se/Info/edielanvisningar
4 Some Ediel directions can be found in English but the majority can only be found in Swedish at the moment.
5 https://www.svk.se/en/stakeholder-portal/Electricity-market/information-about-reserves/
3.1.1 Reassessment of prequalification
The prequalification of FCR or FRR providing units or groups shall be re-assessed:

- at least once every 5 years,
- in case the technical requirements, endurance requirements or the equipment have changed

In addition, FCR providing units or groups shall be re-assessed:

- in case of modernisation of equipment related to FCR activation

Documents linked to prequalification of FCR-N, FCR-D, aFRR and mFRR are found on this page.  

4 Which market may the unit or group participate in?

If there are any uncertainty regarding the market that the unit or group may participate in, it is possible to submit an optional application of interest. A filled-out application of interest will make it easier for Svenska kraftnät to perform a preliminary assessment regarding the reserve markets in which the unit or group may participate. Subsequently, the standard prequalification process may commence for the respective reserves (FCR-N, FCR-D, aFRR or mFRR).

The web form used for submitting an application of interest is found on this page.

Please note that an application of interest does not imply submitting a formal application on the provision of reserves. The formal application process is described below in the section named “Application Process”.

5 Application process

The application process including lead times in order to begin the provision of FCR-N, FCR-D, aFRR or mFRR to Svenska kraftnät is described first in text and items, followed by an illustration in Figure 2 below:

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* [https://www.svk.se/aktorsportalen/elmarknad/information-om-reserver/](https://www.svk.se/aktorsportalen/elmarknad/information-om-reserver/)
* The web form used for submitting an application of interest can only be found in Swedish at the moment.
**Application process**

1. The operator in question notifies Svenska kraftnät about the scheduled date for the tests required in order to prequalify the unit/group, to ensure that Svenska kraftnät is able to attend during the tests.

2. If required, Svenska kraftnät may request a change of the date of the tests.

3. Tests are performed in accordance with the “Test Program Template”.

4. A formal application is submitted to Svenska kraftnät. All the documentation associated with the application shall be submitted through Svenska kraftnät’s service Deaddrop. The applying operator is given a temporary account once the operator has notified Svenska kraftnät that the application is complete and ready to be submitted. The application shall include the following documents:
   a. Application Document Template, and
   b. Test Report Template (the results of the completed test)

5. Svenska kraftnät makes an assessment of the application.
   a. Svenska kraftnät may request additional information during the assessment.

6. The application is rejected or approved.
   a. If the application is rejected, the operator is informed about the decision including information on any measures required in order for the unit or group to be approved.
   b. If the application is approved, set-up and tests of real time measurements and data logging are performed.

**Lead times**

Within eight weeks after Svenska kraftnät has received the formal application, Svenska kraftnät shall inform the applicant about whether or not the application is complete. If Svenska kraftnät requests additional information from the operator, this supplementary information shall be submitted to Svenska kraftnät within four weeks after having received the request.

Svenska kraftnät shall within three months after having confirmed that the application is complete, decide on whether the unit or group meets the criteria of the prequalification.
Figure 2: Application process including lead times for the provision of reserves
6 Remuneration for provision of reserves

Additional information about the remuneration in the respective markets is given in the document "Trade and Pricing" found on this page\textsuperscript{11}.

7 Contact information regarding application for provision of reserves

Please, use the e-mail concerned in order to commence a prequalification of FCR or FRR:

<table>
<thead>
<tr>
<th>Reserve market</th>
<th>E-mail</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCR-N and FCR-D:</td>
<td><a href="mailto:fcr@svk.se">fcr@svk.se</a></td>
</tr>
<tr>
<td>aFRR:</td>
<td><a href="mailto:afr@svk.se">afr@svk.se</a></td>
</tr>
<tr>
<td>mFRR:</td>
<td><a href="mailto:mfr@svk.se">mfr@svk.se</a></td>
</tr>
</tbody>
</table>

\textsuperscript{11} https://www.svk.se/en/stakeholder-portal/Electricity-market/information-about-reserves/