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# **Cover note describing publication of Nordic System Operation Agreement on ENTSO-E homepage**

## **Nordic Operations Group (SG NOG)**

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## Introduction

The subsystems of Norway, Sweden, Finland and Eastern Denmark are synchronously interconnected, forming the Nordic synchronous system. The subsystem of Western Denmark is connected to Norway, Sweden and Eastern Denmark using DC interconnectors. The synchronous system and the subsystem of Western Denmark jointly constitute the interconnected Nordic power system.

The background of entering into the Nordic System Operation Agreement (hereafter SOA) is that operation of the interconnected Nordic power system entails operational collaboration and co-ordination taking place between the system operators. Effective collaboration between these will provide the technical prerequisites for trading in power on an open electricity market.

The Agreement and its Appendices regulate the operational collaboration between the Parties.

## Official versions and translations

The official version of the SOA is the Swedish version, which was signed by the CEOs of the Nordic Transmission System Operators in 2006. It has not been revised or altered, and is still valid as the legal official version of the main agreement. To ease communication and cooperation between interested parties an English translation is made available, but this is not the official version.

The SOA has a number of Appendices, which are regularly evaluated and updated if necessary. The Nordic Operations Group (NOG), a subgroup of Regional Group Nordic (RGN), performs this responsibility. The updates are then approved by RGN plenary, and are thereafter considered the official version of the Appendices.

Previously, both a Swedish and an English version were available and official, but in 2015, RGN approved that only the English version of the Appendices will be kept updated and official.

## 2018 updates in the Appendices

The updates were approved by RGN 20<sup>th</sup> June 2018. Below is a summary of the changes made in this revision.

| <b>Appendix</b>                                      | <b>Chapter</b>  | <b>Summary of changes</b>  |
|--|---|--|
| <b><i>App.2 - Operational security standards</i></b> | 4.1.2 Frequency controlled disturbance reserve  | Introduced a gate closure at 16:00 D-1 for changes of dimensioning fault, since the changes could affect the requirement of frequency controlled disturbance reserve for other TSOs. |
| <b><i>App.4 - Exchanging information</i></b>         | 1. Outage planning  | Stated that Nordic RSC is responsible for coordinating the outage planning.  |
| <b><i>App. 5 - System protection</i></b>             | 4. System protection activated by one or more relay signals from the facilities' protective equipment | Update of Figure 5: System protection for load shedding or network division.   |
|  | 4.10 Norway: System protection in the Nordland constraint (PFK)                                       | Update on system protection due to voltage upgrade.  |
|  | 4.15 Norway: System protection <del>Run-back</del> NorNed   | Updated information. System protection on NorNed changed from Run-back to EPC.   |

## 2017 updates in the Appendices

The updates were approved by RGN 20<sup>th</sup> September 2017. Below is a summary of the changes made in this revision.

| <b>Appendix</b>   | <b>Chapter</b>   | <b>Summary of changes</b>  |
|---|--|--|
| <b><i>App. 3 – Electrical safety for facilities under 2.1</i></b>   | 3.3 Switching responsible operator   | Sunnalsöra changed to Alta in table.   |
| <b><i>App. 5 - System protection</i></b>  | 2.2 Frequency controlled start-up of production  | In table 1 under “Sweden”, 700 MW has been increased to 800 MW.                        |
|   | 4.2 Sweden: System protection with production shedding for limiting overloads on lines in Sweden | Text about Järpströmmen and Midskog updated.   |
|   | 4.4 Sweden: System protection Forsmark   | Corrections  |
|   | 4.5 Sweden: System protection Långbjörn (PFK)  | New system protection  |
|   | 4.20 Finland: System protection to protect Finland in island operation                           | Paragraph about system protection on 220 kV line Ossauskoski - Kalix has been deleted. |
| <b><i>App. 7.6 - Joint operation between the Eastern Danish and Swedish subsystems on the AC links across Öresund and to Bornholm</i></b> | 5.3 Co-ordination of fast active disturbance reserve south of constraint 4                       | Small update.  |

## 2016 updates in the Appendices

The updates were approved by RGN 16<sup>th</sup> June 2016. Below is a summary of the changes made in this revision.

| Appendix   | Chapter  | Summary of changes   |
|--|--|--|
| <b>App. 1 - Definitions</b>  |  | cross-border link updated to harmonize AC and DC, and avoid confusion regarding DC faults.                     |
| <b>App. 5 - System protection</b>  | 2.5 Frequency controlled stop ramping  | New paragraph  |
|  | 3.1 System protection in Sweden constraint 2   | 3.1 removed  |
|  | Fig. 4 System protection for production shedding or control of HVDC                              | PFK Nea-Järpströmmen added.  |
|  | 4.2 Sweden: System protection with production shedding for limiting overloads on lines in Sweden | PFK Nea-Järpströmmen added.  |
|  | 4.6 Sweden: System protection Sege   | Text corrected.  |
|  | 4.8 Sweden: System protection NordBalt   | New paragraph  |
| <b>App. 6 System services</b>  | Black start services   | Black start via NordBalt added.  |
| <b>App. 7.2 Joint operation between the Finnish and Swedish subsystems on the AC links and Fenno-Skan</b>                        | 2.1 Transmission facilities which are owned/held by system operators                             | New substation Djuptjärn. 220 kV line Kalix-Ossauskoski taken out of service. Reduced voltage on Fenno-Skan 1. |
|  | 3.3 Switching responsible operator   | New substation Djuptjärn.  |
|  | 4.1.2 Fenno-Skan   | Reduced voltage and capacity on Fenno-Skan 1.  |
|  | 4.3 Trading capacity (NTC)   | Reduced capacity on Fenno-Skan 1.  |
|  | 4.5.1 Voltage regulation on the Swedish side   | New substation Djuptjärn.  |
|  | 4.5.3 Co-ordination of voltage regulation  | New substation Djuptjärn.  |
|  | 4.7 Disturbance management   | Updated agreement between Fingrid and Svenska kraftnät about losses.   |
| <b>App. 7.6 Joint operation between the Eastern Danish and Swedish subsystems on the AC links across Öresund and to Bornholm</b> | 5.3 Co-ordination of fast active disturbance reserve south of constraint 4                       | NordBalt added as an example of dimensioning fault.  |

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| <b><i>App. 10 The interconnected Nordic power system's joint operation with other systems</i></b> | 5 The synchronous system's joint operation with Lithuania | New paragraph |
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## 2015 updates in the Appendices

The Appendices of SOA were updated and approved by RGN in the autumn. Below is a summary of the changes made in this revision.

| Appendix  | Chapter   | Summary of changes  |
|---|---|---|
| <b>App. 5 - System protection</b>                               | <i>2.2 - Frequency controlled start-up of production</i>  | Changes to Denmark's setup for frequency controlled start-up of production (Table 1).   |
|   | <i>2.3 - Frequency controlled load shedding</i>   | New values for Denmark's frequency controlled load shedding (Table 2).  |
|   | <i>3 - System protection in Finland</i>   | Change to - not in service and changes in Figures 3, 4 and 5.   |
|   | <i>4 - System protection activated by one or more relay signals from the facilities' protective equipment</i> | Figure 4 shows an overview of system protection for <b>production shedding</b> , not load shedding. Update of information on system protection in figure 4 and 5. |
|   | <i>4.1 - Eastern Denmark: System protection for stability in Eastern Denmark</i>                              | Changes to the system protection in Eastern Denmark, including system protection at Ishøj east, Hovegård North, Hovegård South and Bjæverskov West.               |
|   | <i>4.3 - Sweden: System protection in the West Coast constraint</i>   | Changes to the settings of the system protection in the West Coast constraint in Sweden, related to downward regulation of import to DK2 from SB1.                |
|   | <i>4.5 - Sweden: System protection Långbjörn (PFK)</i>  | Changes to the settings of the system protection at Långbjörn.  |
|   | <i>4.7 - Sweden: Sweden: System protection in Loviseholm for the Hasle constraint</i>                         | New chapter   |
|   | <i>4.8 - Norway: System protection in the Hasle and Flesaker constraint (PFK)</i>                             | Changes to the settings of the system protection in the Hasle and Flesaker constraints, including production shedding at more sites.                              |
|   | <i>4.9 - Norway: System protection in the Nordland constraint (PFK)</i>                                       | Norra Røssåga corrected to Nedre Røssåga  |
| <i>4.10 - Norway: Local system protection av Kvilldal (PFK)</i> | Changes to the settings of the local system protection at Kvilldal.   |   |

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|  | <i>4.11 - Norway: Network division in southern Norway</i>                                  | Specifying the links where simultaneous stoppages will trigger network division in southern Norway.  |
|  | <i>4.12 - Norway: System protection for load shedding</i>                                  | Specifying the settings of the system protection for load shedding in Norway.  |
|  | <i>4.13 - Norway: System protection at Sørlandsnittet</i>                                  | Changes to the settings of the system protection at Sørlandssnittet.   |
|  | <i>4.14 - Norway: System protection Run-back NorNed</i>                                    | Changes to the settings of the system protection Run-back NorNed.  |
|  | <i>old 4.14 - Western Denmark: Konti-Skan 2</i>  | The system protection on Konti-Skan 2 is not active.   |
|  | <i>4.15 - Western Denmark: SB1</i>   | This section now describes system protection relating to <b>SB1</b> , not Skagerrak.   |
|  | <i>old 4.16 - Western Denmark: the German link</i>   | The system protection on the link to Germany is not active.  |
|  | <i>4.18 - Fenno-Skan power modulation</i>  | Not in service.  |
|  | <i>4.12 - System protection during island operation of Finland</i>                         | Deletion of 220 kV Ossauskoski-Kalix connection.   |
| <b>App. 7.1 - Joint operation between Norway - Sweden</b>          | <i>2.1 - Transmission facilities which are owned/held by system operators at both ends</i> | For settlement points between the subsystems of Sweden-Norway, see Settlement agreement concerning balancing power, system services and transmission losses, 2014-01-01. |
| <b>App. 7.4 - Joint operation between Norway - Western Denmark</b> | <i>2 - Transmission facilities linking the subsystems of Norway-Western Denmark</i>        | The settlement points between the subsystems Norway-Western Denmark is changed to the receiving end. The Skagerrak link is now made up of SK1, SK2, SK3 and SK4.         |
|  | <i>3.2 - Responsibility for electrical operation/Operational management</i>                | Removed paragraph on power operation responsibility.   |
|  | <i>4.1 - Transmission capacity</i>   | Specifying the transmission capacity of SK4.   |
|  | <i>4.3 - Trading capacity</i>  | New normal trading capacity (NTC) between the subsystems Norway-Western Denmark.   |
|  | <i>4.4.1 - The power flow and distribution between the DC links</i>                        | Description of the distribution of power flow between the DC links   |



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|   |  | between the subsystems Norway-Western Denmark is referred to the agreement for SK1-4.   |
|   | <i>4.4.2 - Regulating the link</i>                               | Changes to the regulation of the DC link, alternating between Statnett and Energinet.dk.  |
|   | <i>5.1 - Ancillary services</i>                                  | Subchapter regarding ancillary services included.   |
|   | <i>5.3 - Settlement</i>  | Changes to the settlement routine between Energinet.dk and Statnett.  |
| <b>App. 10 - The Nordel system's joint operation with other systems</b> | <i>3.1 - System operation collaboration with Russian parties</i> | Changes to the synchronous system's operation collaboration with Russian parties. The System Service Agreement covering ancillary services is concluded, and there is a new agreement on electricity metering and accounting between Fingrid and the Russian parties. |
|   | <i>3.2 - Commercial conditions</i>                               | Changes to the commercial conditions of the link between Finland and Russia.  |
|   | <i>4.1 - System operation collaboration with Elering</i>         | Defining <b>manual regulation</b> to signify supportive power exchange.   |

In addition to the changes above, there has been minor updates in spelling, updates of names (Halden - Skogssäter => Halden - Loviseholm, Svenska Kraftnät => Svenska kraftnät), renumbering of chapters following new additions and some linguistic improvements.