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EXPLANATORY DOCUMENT FOR TECHNICAL REGULATION 3.4.2

# Manual load-shedding of transmission-connected demand facilities:

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## Purpose of this explanatory document

This explanatory document elaborates on the rules in Technical regulation 3.4.2 Manual load-shedding of transmission-connected demand facilities (hereinafter TR 3.4.2).

The document comprises chapters with specific explanations of the corresponding parts in the regulation.

An overview of definitions is available in TR 3.4.2 in Appendix 1.

In case of any discrepancy between the regulation and this document, the regulation will be applicable.

### 1. Scope and definitions

This document concerns new transmission-connected demand facilities in categories 3, 4, 5 and 6, cf. document 'DCC – Appendix 1 – Requirements'. The categories have been specified by Energinet with legal basis in Commission Regulation (EU) 2016/1388 of 17 August 2016 establishing a Network Code on Demand Connection (hereinafter the DCC). The rules are available on Energinet's website here:

<https://en.energinet.dk/Electricity/Rules-and-Regulations/Regulations-for-new-facilities#Generationfacilities>

The explanatory document is also directed at existing transmission-connected demand facilities in the categories mentioned above, where the Danish Utility Regulator has made decisions under Article 4 (1) (b) of the DCC. In this context, it should be noted that, irrespective of whether the Danish Utility Regulator has decided that the overall transmission-connected demand facility should only be covered by parts of the DCC, the present TR 3.4.2 will apply to the entire facility.

The regulation stipulates requirements for manual load-shedding of transmission-connected demand facilities in the event of:

- imminent risk of power shortage, and/or
- prevention or mitigation of critical overloads, and/or
- undervoltage in the grid.

The purpose is for Energinet to be able to manually initiate load-shedding in an expedient way in order to prevent a strained supply situation from evolving into a breakdown in the transmission system.

Manual load-shedding of transmission-connected demand facilities is the last tool that Energinet's Control Centre Electricity has to use in the above-mentioned situations when all measures in the various markets have been activated but are not sufficient to solve the strained supply situation. An overview of the various ancillary services/measures can be found in 'Introduktion til systemydelse' (Introduction to ancillary services) on Energinet's website here (Danish only): <https://energinet.dk/El/Systemydelser/Hvad-er-Systemydelser>

Activation of manual load-shedding of transmission-connected demand facilities will only take place when the system is in emergency state, cf. Commission Regulation (EU) 2017/1485 of 2 August 2017 establishing a guideline on electricity transmission system operation (SO GL), Arti-

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cle 18 (3) (c), as manual load-shedding is one of the tools in the system defence plan, cf. Commission Regulation (EU) 2017/2196 of 24 November 2017 establishing a network code on electricity emergency and restoration (NC ER), Article 22.

Section 27 (c) (3) of the Danish Electricity Supply Act<sup>1</sup> clearly states that in the event of an imminent risk of grid breakdown as well as during grid breakdowns and restoration of the grid, Energinet can demand any necessary changes to generation, trade and consumption without compensatory payment.

Therefore, there will be no compensation for manual load-shedding activated in accordance with this regulation, cf. section 27 (c) (3) of the Danish Electricity Supply Act.

<sup>1</sup>Consolidated order no. 119 of 6 April 2020 of the Danish Electricity Supply Act

## 2. Manual load-shedding

This part describes the requirements applicable to transmission-connected facilities.

A transmission-connected demand facility can choose between two different methods for manual load-shedding.

### 2.1 Responsible parties

Energinet

- sends a message to the operator in charge of the activation of manual load-shedding.

### 2.2 Parties affected

Operator in charge of the transmission-connected demand facility

- responsible for shedding load according to the chosen method within the required period of time.

### 2.3 Load-shedding methods

#### 2.3.1 Load-shedding in steps

If the owner of a transmission-connected demand facility has chosen this method, the facility must be able to divide its electricity use into the following steps:

#### **Transmission-connected demand facilities connected in synchronous area CE:<sup>2</sup>**

- must have 10 manual load-shedding steps of 8%

#### **Transmission-connected demand facilities connected in synchronous area N:<sup>3</sup>**

- must have 16 manual load-shedding steps of 5%

Using this method, load-shedding must be implemented as net demand effect, which means that load must be shed in relation to the actual electricity use at the time when the first notification about activation of load-shedding is received.

#### 2.3.2 Full disconnection

If the owner of a transmission-connected demand facility has chosen this method, the facility must be able to fully shed load in a single step.

Transmission-connected demand facilities with an allocated maximum power draw of 500 MW or more, which choose the full disconnection method for manual load-shedding, must make an agreement with Energinet on the specific options as this solution may pose a threat to system stability due to local circumstances.

If the owner of the transmission-connected facility does not want to install the required equipment on the facility side of the point of connection, it may be agreed with Energinet that the equipment for full disconnection can be placed on Energinet's side of the point of connection.

However, this means that load-shedding will be implemented as soon as possible and without prior notice when Energinet's Control Centre Electricity activate manual load-shedding.

<sup>2</sup> Central Europe, west of the Great Belt

<sup>3</sup> Nordic, east of the Great Belt

## 2.4 Response time for manual load-shedding

Regardless of the load-shedding method chosen, cf. above, it applies that load-shedding is implemented as soon as possible, however no later than 15 minutes after Energinet's Control Centre Electricity has activated manual load-shedding. With a maximum response time of 15 minutes, the operator in charge of the transmission-connected demand facility has the option to move demand to another location where there is no strained situation in the transmission system, or to perform a 'secure' shutdown of the facility with as little negative effect as possible.

A 15-minute response time is the same time limit as specified in Technical regulation 2.1.2 for automatic and manual load-shedding, which describes, among other things, manual load-shedding for distribution system operators.

The procedure described gives Energinet's Control Centre Electricity an operatively good and uniform (in relation to the manual load-shedding solution for distribution systems) approach to handling the situation in question.

## 2.5 Agreement on postponed time limit

Energinet's Control Centre Electricity can choose to agree on a postponed time limit for load-shedding than the default maximum 15 minutes if the specific situation allows for this.

Notification about a postponed time limit for manual load-shedding will be sent via secure communication, cf. Technical regulation 5.3.4.1 Grid telegraph (Nettelegrafen, available in Danish only).

## 2.6 Load-shedding issues

If activated load-shedding cannot be completed within 15 minutes or any other agreed time limit, load-shedding must be stopped, and the operator in charge must immediately notify Energinet's Control Centre Electricity. This will enable Energinet's Control Centre Electricity to implement other/additional measures to solve the ongoing emergency situation.

Any notification about load-shedding issues must be sent via secure communication, cf. Technical regulation 5.3.4.1 Grid telegraph (Nettelegrafen, available in Danish only).

At Energinet's request, the owner of the transmission-connected demand facility must document the reason for the lack of load-shedding.

## 2.7 Full disconnection

Energinet's Control Centre Electricity can disconnect a transmission-connected demand facility completely if the situation so requires. Disconnection will be done directly from Energinet's Control Centre Electricity without involvement of the transmission-connected demand facility.

## 2.8 Selecting transmission-connected demand for load-shedding

In the given situation, Energinet's Control Centre Electricity will decide whether it would be most expedient to load-shed all or only some of the transmission-connected demand which is covered by manual load-shedding.

If the situation permits, Energinet's Control Centre Electricity must attempt to shed load equally between both the transmission-connected demand under Technical regulation 3.4.2



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and the distribution system operators' manual load-shedding solution, cf. Technical regulation 2.1.2, which is comparable with this regulation.

## 2.9 References

- Technical regulation 3.4.2 – Manual load-shedding of transmission-connected demand facilities – Part 2, Manual load-shedding, section 2
- Technical regulation 5.3.4.1 – Grid telegraph (Nettelegrafen, available in Danish only)
- Technical regulation 2.1.2 – Automatic and manual load-shedding

### 3. Build-up of load after manual load-shedding

This part describes the requirements for build-up of load after manual load-shedding. The transmission-connected demand facility can choose between two different methods to build up load after manual load-shedding.

#### 3.1 Responsible parties

Energinet

- notifies operator in charge when there is a need for build-up of load after activation of manual load-shedding.

#### 3.2 Parties affected

Operator in charge of the transmission-connected demand facility

- responsible for build-up of load as per the instructions from Energinet.

#### 3.3 Methods of build-up of load after manual load-shedding

##### 3.3.1 Build-up of load in steps

If a transmission-connected demand facility has chosen this method, the facility must be able to build up load by gradually reconnecting the steps which were disconnected during load-shedding. If planned demand deviates significantly from the demand level before load-shedding, Energinet's Control Centre Electricity must be notified.

##### 3.3.2 Full disconnection

If a transmission-connected demand facility has chosen this method, the facility must be able to reconnect the full load in a single step. If planned demand deviates significantly from the demand level before load-shedding, Energinet's Control Centre Electricity must be notified.

#### 3.4 Response time for manual build-up of load

Regardless of the load build-up method chosen, cf. above, it applies that load build-up is implemented as soon as possible, however no later than 15 minutes after Energinet's Control Centre Electricity has activated manual load build-up.

A 15-minute response time is the same procedure as that used in Technical regulation 2.1.2 for automatic and manual load-shedding, which describes, among other things, manual load-shedding for distribution system operators. This procedure allows Energinet's Control Centre Electricity to handle the situation in question appropriately.

#### 3.5 Agreement on postponed time limit

Energinet's Control Centre Electricity can choose to agree on a postponed time limit for load build-up than the default maximum 15 minutes if the specific situation allows for this. Notification about a postponed time limit for manual load build-up will be sent via secure communication, cf. Technical regulation 5.3.4.1 Grid telegraph (Nettelegrafen, available in Danish only).

#### 3.6 Load build-up issues

If activated load build-up cannot be completed within 15 minutes or any other agreed time limit, load build-up must be stopped, and the operator in charge must immediately notify Energinet's Control Centre Electricity. This will give Energinet's Control Centre Electricity the option to choose other consumers to build up load instead. Any notification about load build-up issues

must be sent via secure communication, cf. Technical regulation 5.3.4.1 Grid telegraph (Nettelegrafen, available in Danish only).

The reason must be new technical faults in connection with load build-up if the issues are not to be regarded as non-compliance with technical regulation 3.4.2.

### 3.7 Decision on which transmission-connected consumers to select for load build-up

On the basis of the given situation, Energinet's Control Centre Electricity will decide whether it is most expedient to build up load with all or only some of the transmission-connected consumers that are subject to manual load-shedding. Facilities that have opted for single-step load-shedding and load build-up must be prepared for the return to full load to take longer as extensive reconnection of load may be undesirable in certain challenging situations.

If the situation permits, Energinet's Control Centre Electricity must attempt to build up load equally with both transmission-connected demand under Technical regulation 3.4.2 and the distribution system operators' manual load-shedding solution, cf. Technical regulation 2.1.2, which is comparable with this regulation.

### 3.8 References

- Technical regulation 3.4.2 – Manual load-shedding of transmission-connected demand facilities – Part 3, Load build-up following manual load-shedding, section 3
- Technical regulation 5.3.4.1 – Grid telegraph (Nettelegrafen, available in Danish only)
- Technical regulation 2.1.2 – Automatic and manual load-shedding

## 4. Communication

This part describes how communication between Energinet and the transmission-connected demand facility must take place.

### 4.1 Responsible parties

Energinet

- responsible for sending out signals to activate manual load-shedding via the grid telegraph.
- responsible for sending out signals that activate manual load build-up following manual load-shedding via the grid telegraph.

### 4.2 Parties affected

Operator in charge of the transmission-connected demand facility

- responsible for receiving signals from Energinet via the grid telegraph to activate manual load-shedding or load build-up.

### 4.3 Communication tool

Communication between Energinet's Control Centre Electricity and the operator in charge must be done via secure communication, cf. Energinet's Technical regulation 5.3.4.1 Grid telegraph (Nettelegrafen, available in Danish only).

### 4.4 References

- Technical regulation 3.4.2 – Manual load-shedding of transmission-connected demand facilities – Part 4, Communication, section 4
- Technical regulation 5.3.4.1 Grid telegraph (Nettelegrafen, available in Danish only)

## 5. Conformity testing

This part describes, in general terms, how and under what circumstances conformity testing must be done.

### 5.1 Responsible parties

Energinet

- responsible for determining whether the facility complies with the requirements of the regulation
- responsible for cooperating and not delaying the completion of tests unnecessarily.

### 5.2 Parties affected

Operator in charge of the transmission-connected demand facility

- responsible for submitting relevant documentation demonstrating that the facility can comply with the requirements of the regulation.

### 5.3 Demonstration of manual load-shedding

Whether manual load-shedding is done as load-shedding in steps or as a full disconnection, the following must be complied with:

- The manual load-shedding test must be approved by Energinet to obtain a final operational notification (FON).
- Facilities that are required to submit dynamic simulation models, cf. document 'DCC – APPENDIX 1D – SIMULATION MODEL' specified by Energinet with legal basis in the DCC, must also submit a dynamic simulation model demonstrating compliance with the requirements of the regulation to obtain an interim operational notification (ION).

### 5.4 Compliance with requirements throughout the service life of the facility

In order to ensure that the facility complies with the requirements of this regulation, Energinet can ask the facility owner to demonstrate that the requirements are still met throughout the service life of the facility. Energinet can also test the facility's ability to receive signals from Control Centre Electricity in connection with emergency preparedness exercises or similar.

### 5.5 Where to send conformity test results

Conformity test results must be sent to Energinet's contact for the connection of transmission-connected demand facilities, Jens Ammitzbo, [JAM@energinet.dk](mailto:JAM@energinet.dk), along with the other documentation required to obtain a limited or final operational notification, cf. TR 3.4.2, section 7.

### 5.6 References

- Technical regulation 3.4.2 – Manual load-shedding of transmission-connected demand facilities – Part 5, Conformity testing, sections 5-8
- DCC – APPENDIX 1D – SIMULATION MODEL

## 6. Limited operational notification

This part describes, in general terms, how and under what circumstances the process regarding limited operational notification takes place.

### 6.1 Responsible parties

Energinet

- responsible for determining whether the facility will be issued a limited operational notification
- responsible for determining whether the facility will be granted an extension of its limited operational notification
- responsible for refusing operation of the transmission-connected demand facility, if necessary.

### 6.2 Parties affected

The owner of the transmission-connected demand facility

- responsible for notifying about and submitting relevant documentation in connection with the limited operational notification, cf. TR 3.4.2, Part 6, sections 9-15.

### 6.3 Notifying Energinet

The owner of a transmission-connected demand facility that has been granted a final operational notification shall immediately, and no later than 24 hours after, notify Energinet if:

- a) the transmission-connected demand facility is being significantly modified, which influences the fulfilment of one or more requirements in this regulation, or
- b) equipment faults lead to non-compliance with one or more requirements in this regulation.

The notification must be sent to Energinet's contact for the connection of transmission-connected demand facilities, Jens Ammitzbo, [JAM@energinet.dk](mailto:JAM@energinet.dk).

### 6.4 Application for limited operational notification

The owner of the transmission-connected demand facility applies to Energinet for a limited operational notification if the owner of the transmission-connected demand facility can reasonably expect the circumstances described in TR 3.4.2, section 9, to last longer than three months.

The application must be sent to Energinet's contact for the connection of transmission-connected demand facilities, Jens Ammitzbo, [JAM@energinet.dk](mailto:JAM@energinet.dk).

### 6.5 Issue of limited operational notification

A limited operational notification is issued by the Energinet and includes the following information which must be clearly identifiable:

- a) The unresolved issues which have triggered a limited operational notification.
- b) Division of responsibilities and time limits for expected resolution of the issues, and
- c) The maximum validity period which must not exceed 12 months. Initially, it is possible to set a shorter period, which can be extended if documentation is submitted, demonstrating to Energinet's satisfaction clear progress towards full compliance.

## 6.6 Regarding final operational notification

The final operational notification will be suspended during the validity period of the limited operational notification as regards the issues to which the limited operational notification applies.

## 6.7 Extension of limited operational notification validity period

The validity period of the limited operational notification can be further extended if a request for derogation is submitted to Energinet before the expiry of the period, cf. the derogation procedure in Title V, Part 2 of the DCC.

The request for derogation must be sent to Energinet's contact for the connection of transmission-connected demand facilities, Jens Ammitzbo, [JAM@energinet.dk](mailto:JAM@energinet.dk).

## 6.8 Refusal of permission to operate the transmission-connected demand facility

Energinet is entitled to refuse to allow further operation of the transmission-connected demand facility when the limited operational notification expires. In such case, the limited operational notification is automatically rendered void.

## 6.9 References

- Technical regulation 3.4.2 – Manual load-shedding of transmission-connected demand facilities – Part 6, Limited operational notification
- DCC, Title V, Chapter 2, Derogations

## 7. Derogation

This part describes, in general terms, to whom and under which conditions a derogation may be granted.

### 7.1 Responsible parties

Energinet

- shall inform the affected party of the decision on the derogation application and state a reason for the chosen decision.

### 7.2 Parties affected

Operator in charge of the transmission-connected demand facility

- responsible for submitting the relevant information/justifications for the derogation.

### 7.3 Conditions for derogation

All conditions mentioned in section 15 (2) (a)-(e) of the regulation must be met to obtain a derogation. However, the granting of a derogation is based on a specific assessment of each individual case.

The application must state which provisions the derogation concerns and the reason for the derogation.

### 7.4 Where to send a derogation application

Derogation applications must be sent to Energinet's Regulatory Affairs department at this e-mail address: [myndighed@energinet.dk](mailto:myndighed@energinet.dk)

### 7.5 References

Technical regulation 3.4.2 – Manual load-shedding of transmission-connected demand facilities  
– Part 7, Derogation, section 15