

Connection codes: modernization of the connection point – first insights

Belgian Grid 21/04

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Agenda

- 1) Legal context – connection codes

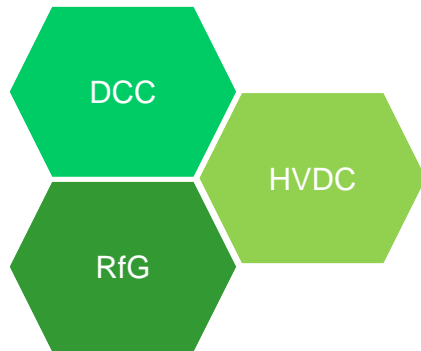
- 2) Zoom in on the articles
 - A) Requirements for generators
 - B) Demand Connection
 - C) HVDC

- 3) Link to existing processes

- 4) High level principles and examples

1) Legal context – connection codes

Legal context - Connection Codes



3 Connection Codes

- Requirements for generators
- Demand Connection Code
- HVDC

Apply only for new 'systems'

Not apply to existing 'systems'
Except in case of:

Retro-active effect
with CBA (Cost-
Benefit Analysis)

Or in case of substantial
modernisation or
replacement of equipment
impacting the technical
capabilities of the systems

Extract of Article 4 – DCC:

- (i) demand facility owners, DSOs, or CDSOs who intend to undertake the modernisation of a plant or replacement of equipment impacting the technical capabilities of the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit shall notify their plans to the relevant system operator in advance;
- (ii) if the relevant system operator considers that the extent of the modernisation or replacement of equipment is such that a new connection agreement is required, the system operator shall notify the relevant regulatory authority or, where applicable, the Member State; and
- (iii) the relevant regulatory authority or, where applicable, the Member State shall decide if the existing connection agreement needs to be revised or a new connection agreement is required and which requirements of this Regulation shall apply; or

2) Zoom in on the articles

Zoom in the articles

A) Requirements for generators

A) Requirements for Generators – concerned articles

Article 4 – Application to existing power-generating modules

1. Existing power-generating modules are not subject to the requirements of this Regulation, **except** where:

(a) a type C or type D power-generating module has been modified to such an extent that its connection agreement must be substantially revised in accordance with the following procedure:

(i) power-generating facility owners who intend to undertake the modernisation of a plant or replacement of equipment impacting the technical capabilities of the power-generating module shall notify their plans to the relevant system operator in advance;

(ii) if the relevant system operator considers that the extent of the modernisation or replacement of equipment is such that a new connection agreement is required, the system operator shall notify the relevant regulatory authority or, where applicable, the Member State; and

(iii) the relevant regulatory authority or, where applicable, the Member State shall decide if the existing connection agreement needs to be revised or a new connection agreement is required and which requirements of this Regulation shall apply; or

(b) a regulatory authority or, where applicable, a Member State decides to make an existing power-generating module subject to all or some of the requirements of this Regulation, following a proposal from the relevant TSO in accordance with paragraphs 3, 4 and 5.

2. For the purposes of this Regulation, a power-generating module shall be considered existing if

....

3. Following a public consultation in accordance with Article 10 and in order to address significant factual changes in circumstances, such as the evolution of system requirements including penetration of renewable energy sources, smart grids, distributed generation or demand response, the relevant TSO may propose to the regulatory authority concerned, or where applicable, to the Member State to extend the application of this Regulation to existing power-generating modules.

For that purpose a sound and transparent quantitative cost-benefit analysis shall be carried out, in accordance with Articles 38 and 39.

The analysis shall indicate:

....

Requirements for Generators – concerned articles

Article 4 – Application to existing power-generating modules

1. Existing power-generating modules are not subject to the requirements of this Regulation, **except** where:
- (a) a **type C or type D power-generating module** has been modified to such an extent that its connection agreement must be substantially revised in accordance with the following procedure:
 - (i) power-generating facility owners who intend to undertake the **modernisation of a plant** or **replacement of equipment impacting the technical capabilities** of the power-generating module shall notify their plans to the **relevant system operator*** in advance;
 - (ii) if the relevant system operator considers that the extent of the modernisation or replacement of equipment is such that a new connection agreement is required, the system operator shall notify the relevant regulatory authority or, where applicable, the Member State; and
 - (iii) the relevant regulatory authority or, where applicable, the Member State shall decide if the existing connection agreement needs to be revised or a new connection agreement is required and which requirements of this Regulation shall apply; or

Definitions:

‘synchronous power-generating module’ means an **indivisible set of installations** which can generate electrical energy such that the frequency of the generated voltage, the generator speed and the frequency of network voltage are in a constant ratio and thus in synchronism.

‘power park module’ means a unit or ensemble of units generating electricity, which is either **non-synchronously connected** to the network or **connected through power electronics**, and that also has a single connection point to a transmission system, distribution system including closed distribution system or HVDC system;

* TSO/DSO/CDSO – responsibilities and flow of information to be discussed

Zoom in on the articles
B) Demand connection

Zoom in on the articles – Demand Connection

Article 4 – Application to existing transmission connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units used to provide demand response services

1. Existing transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems and existing demand units that are or can be used by a demand facility or a closed distribution system to provide demand response services to a relevant system operator or relevant TSO, are not subject to the requirements of this Regulation, except where:

(a) an existing transmission-connected demand facility, an existing transmission-connected distribution facility, an existing distribution system, or an existing demand unit within a demand facility at a voltage level above 1 000 V or a closed distribution system connected at a voltage level above 1 000 V, has been modified to such an extent that its connection agreement must be substantially revised in accordance with the following procedure:

(i) demand facility owners, DSOs, or CDSOs who intend to undertake the modernisation of a plant or replacement of equipment impacting the technical capabilities of the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit shall notify their plans to the relevant system operator in advance;

(ii) if the relevant system operator considers that the extent of the modernisation or replacement of equipment is such that a new connection agreement is required, the system operator shall notify the relevant regulatory authority or, where applicable, the Member State; and

(iii) the relevant regulatory authority or, where applicable, the Member State shall decide if the existing connection agreement needs to be revised or a new connection agreement is required and which requirements of this Regulation shall apply; or

(b) a regulatory authority or, where applicable, a Member State decides to make an existing transmission-connected demand facility, an existing transmission-connected distribution facility, an existing distribution system, or an existing demand unit subject to all or some of the requirements of this Regulation, following a proposal from the relevant TSO in accordance with paragraphs 3, 4 and 5.

2. For the purposes of this Regulation, a transmission-connected demand facility, a transmission-connected distribution facility, a distribution system, or a demand unit that is, or can be, used by a demand facility or a closed distribution system to provide demand response services to a relevant system operator or relevant TSO, shall be considered as existing if:

3. Following a public consultation in accordance with Article 9 and in order to address significant factual changes in circumstances, such as the evolution of system requirements including penetration of renewable energy sources, smart grids, distributed generation or demand response, the relevant TSO may propose to the regulatory authority concerned, or where applicable, to the Member State to extend the application of this Regulation...

Zoom in on the articles – Demand Connection

Article 4 – Application to existing transmission connected demand facilities¹, existing transmission-connected distribution facilities², existing distribution systems and existing demand units used to provide demand response services³

1. Existing **transmission-connected demand facilities, existing transmission-connected distribution facilities, existing distribution systems** and existing **demand units that are or can be used** by a demand facility or a closed distribution system **to provide demand response services** to a relevant system operator or relevant TSO, are not subject to the requirements of this Regulation, except where:

(a) an existing transmission-connected demand facility, an existing transmission-connected distribution facility, an existing distribution system, or an existing demand unit within a demand facility at a voltage level above 1 000 V or a closed distribution system connected at a voltage level above 1 000 V, **has been modified to such an extent that its connection agreement must be substantially revised** in accordance with the following procedure:

- (i) demand facility owners, DSOs, or CDSOs who intend to undertake **the modernisation of a plant or replacement of equipment impacting the technical capabilities** of the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit shall notify their plans to the **relevant system operator** in advance;
- (ii) if the relevant system operator considers that the extent of the modernisation or replacement of equipment is such that a new connection agreement is required, the system operator shall notify the relevant regulatory authority or, where applicable, the Member State; and
- (iii) the relevant regulatory authority or, where applicable, the Member State shall decide if the existing connection agreement needs to be revised or a new connection agreement is required and which requirements of this Regulation shall apply;

Definitions

¹'transmission connected demand facility' means a facility which consumes electrical energy and is connected at to the transmission system. A distribution system and/or auxiliary supplies of a power generating module do not constitute a demand facility

²'transmission-connected distribution facility' means a distribution system connection or the electrical plant and equipment used at the connection to the transmission system

³'demand unit' means an indivisible set of installations containing equipment which can be actively controlled by a demand facility owner or by a CDSO, either individually or commonly as part of demand aggregation through a third party;

3) Link to existing processes

Link to current processes – Federal Grid Code

Base case: TSO is the relevant system operator

Notion “substantial modernization” not used

Hoofdstuk III – Geringe wijziging

Art. 91. Bij een beoogde wijziging van een aansluitingsinstallatie, een installatie van een netgebruiker en/of van hun respectievelijke exploitatiewijzen brengt de netgebruiker de voorgenomen wijzigingen aan de netbeheerder ter kennis.

Art. 92. De netbeheerder onderzoekt de kennisgeving bedoeld in het artikel 91, beoordeelt en motiveert de geringe aard van de wijziging.

Art. 93. § 1. Volgend op het onderzoek, bedoeld in artikel 92 kan de netbeheerder :

1° de voorgenomen wijzigingen zonder andere formaliteiten goedkeuren;

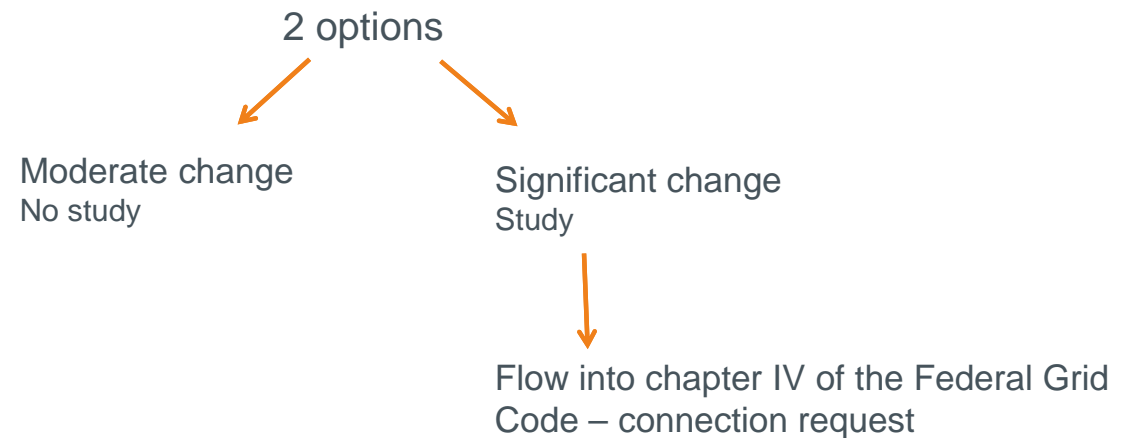
2° het afsluiten van een addendum bij het aansluitingscontract voorstellen;

3° voorstellen dat hij de wijziging niet als gering beschouwt en de wijziging met inachtneming van de procedure voorzien in Hoofdstuk IV van deze Titel dient te gebeuren.

§ 2. Het sluiten van een addendum zoals bedoeld in § 1, 2° stelt de aansluitingsaanvrager niet vrij van het verkrijgen van een kennisgeving van conformiteit met de aansluiting overeenkomstig Hoofdstuk V van deze Titel.

GU notification of planned changes of the installation to the TSO

TSO analyses the request



Link to current processes – flow modernisation in European Code

Extract of Article 4 – DCC

an existing transmission-connected demand facility, an existing transmission-connected distribution facility, an existing distribution system, or an existing demand unit within a demand facility at a voltage level above 1000V or a closed distribution system connected at a voltage level above 1000V, has been modified to such an extent that its connection agreement must be substantially revised in accordance with the following procedure:

- (i) **demand facility owners, DSOs, or CDSOs** who intend to undertake the modernisation of a plant or replacement of equipment impacting the technical capabilities of the transmission-connected demand facility, the transmission-connected distribution facility, the distribution system, or the demand unit **shall notify their plans to the relevant system operator** in advance;
- (ii) if the relevant system operator considers that the extent of the modernisation or replacement of equipment is such that a new connection agreement is required, **the system operator shall notify the relevant regulatory authority** or, where applicable, the Member State; and
- (iii) ~~the relevant regulatory authority or, where applicable, the Member State~~ **shall decide** if the existing connection agreement needs to be revised or a new connection agreement is required and which requirements of this Regulation shall apply;

Modernization/replacement



Notification to the TSO



Notification to the NRA (if considered that new connection agreement is required)



Decision by the NRA

GU/DSO/CDSO

TSO

NRA

Link to current processes – Proposed integration in Federal Grid Code

Incorporate substantial modernization into chapter III of the FGC

Hoofdstuk III – Geringe wijziging

Art. 91. Bij een beoogde wijziging van een aansluitingsinstallatie, een installatie van een netgebruiker en/of van hun respectievelijke exploitatiewijzen brengt de netgebruiker de voorgenomen wijzigingen aan de netbeheerder ter kennis.

Art. 92. De netbeheerder onderzoekt de kennisgeving bedoeld in het artikel 91, beoordeelt en motiveert de geringe aard van de wijziging.

Art. 93. § 1. Volgend op het onderzoek, bedoeld in artikel 92 kan de netbeheerder :

- 1° de voorgenomen wijzigingen zonder andere formaliteiten goedkeuren;
 - 2° het afsluiten van een addendum bij het aansluitingscontract voorstellen;
 - 3° voorstellen dat hij de wijziging niet als gering beschouwt en de wijziging met inachtneming van de procedure voorzien in Hoofdstuk IV van deze Titel dient te gebeuren.
- § 2. Het sluiten van een addendum zoals bedoeld in § 1, 2° stelt de aansluitingsaanvrager niet vrij van het verkrijgen van een kennisgeving van conformiteit met de aansluiting overeenkomstig Hoofdstuk V van deze Titel.

Notification of planned changes of the installation to the TSO

TSO analyses the request

2 options

Moderate change
No study

Significant change
Study

Enter into the flow of chapter IV of the Federal Grid Code – connection agreement

Substantial modernization

link to current processes - proposal Federal Grid Code

Notification of planned changes of the installation to
the TSO

TSO analyses the request

Moderate change
No study

Significant change
Study

“normal” study

Study modernisation

link to current processes - proposal Federal Grid Code

Notification of planned changes of the installation to the TSO

TSO analyses the request

Moderate change
No study

Significant change
Study

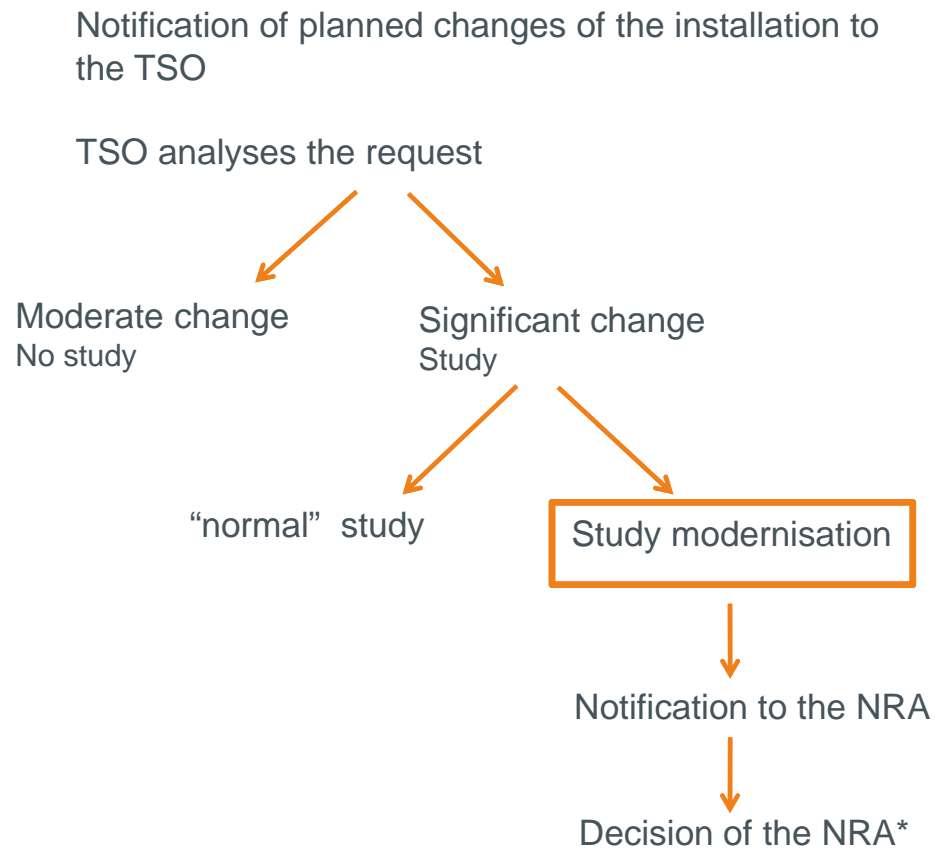
“normal” study

Study modernisation

Decision based on:

- Functional blocks
- Nominal Power (x% increase)
- Age of the assets

link to current processes - proposal Federal Grid Code



Decision based on:

- Functional blocks
- Nominal Power (x% increase)
- Age of the assets

* To be clarified

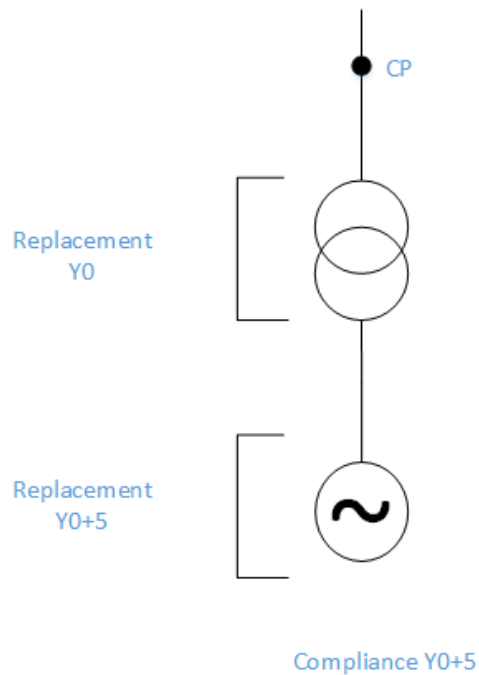
4) High level principles and examples

High level examples – general principles

- Implementation of modernisation:
 - General principles in the Federal Grid Code
 - A list, available in a guidance document, will be gradually complemented as the number of cases increases
- Units going from type B to type C will be considered modernised and need to be compliant
- Compliance is measured at the connection point (including for CDS)
- Shift from demand unit to CDS is not a modernisation
- New elements in an installation have to be able to comply with the new regulations
- Modifications can not result in worse technical capabilities at the CP
- Goal is to define pragmatic principles that allow us to have compliant installations in a reasonable timeframe (a few decades not years).

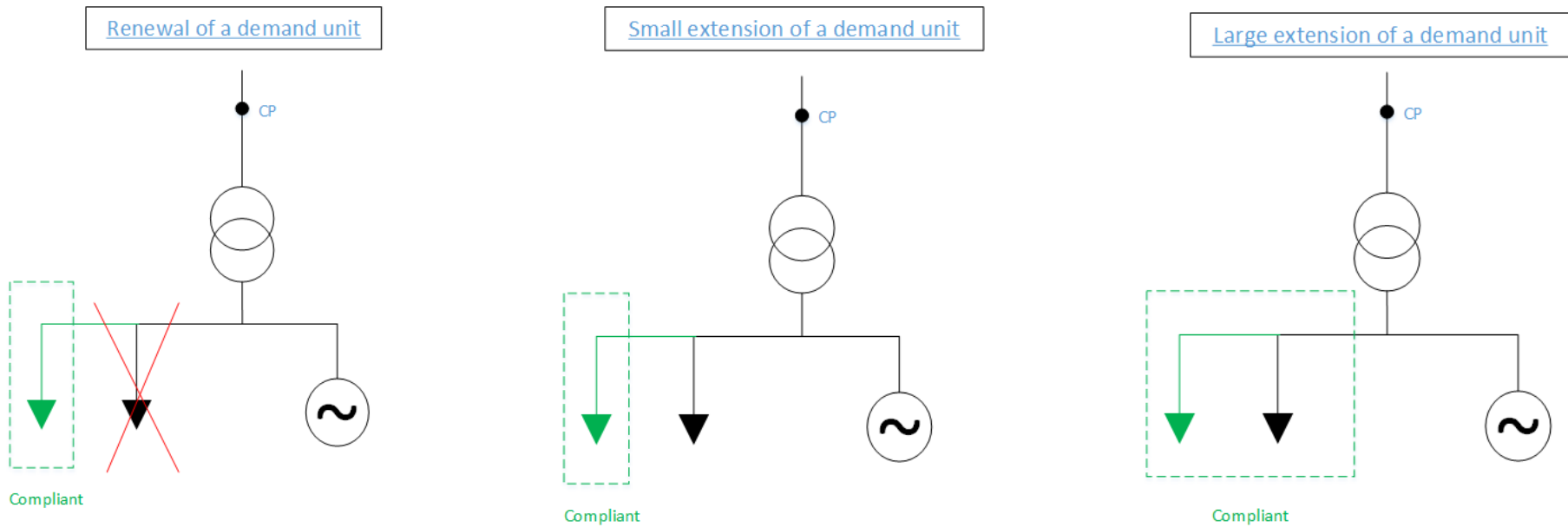
High level examples – general examples

Replacement of equipments

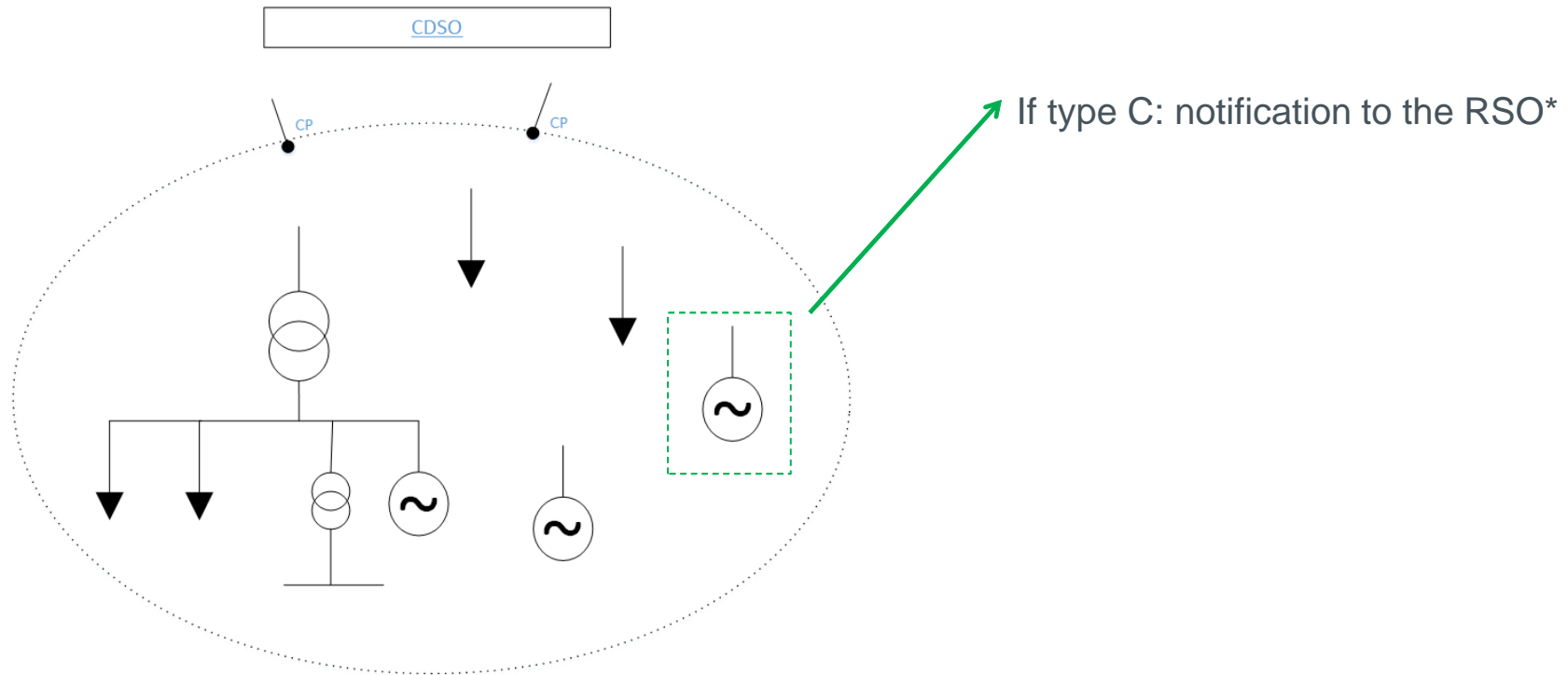


Timeline	Before replacement Equip 1	After replacement Equip 1	After replacement Equip 2
Equipment's contributing to the functional list of requirement A	Existing Equip 1 limiting application of requirement A	Opt1: Spare part of Equip 1 limiting application of requirement A Opt2: New Equip 1 not limiting the application of requirement A	New Equip 1 not limiting the application of requirement A
	Existing Equip 2 limiting application of requirement A	Existing Equip 2 limiting application of requirement A	New Equip 1 not limiting the application of requirement A
Conclusions	=> Requirement A does not apply	=> Requirement A does not apply	=> Requirement A applies

High level examples – general examples

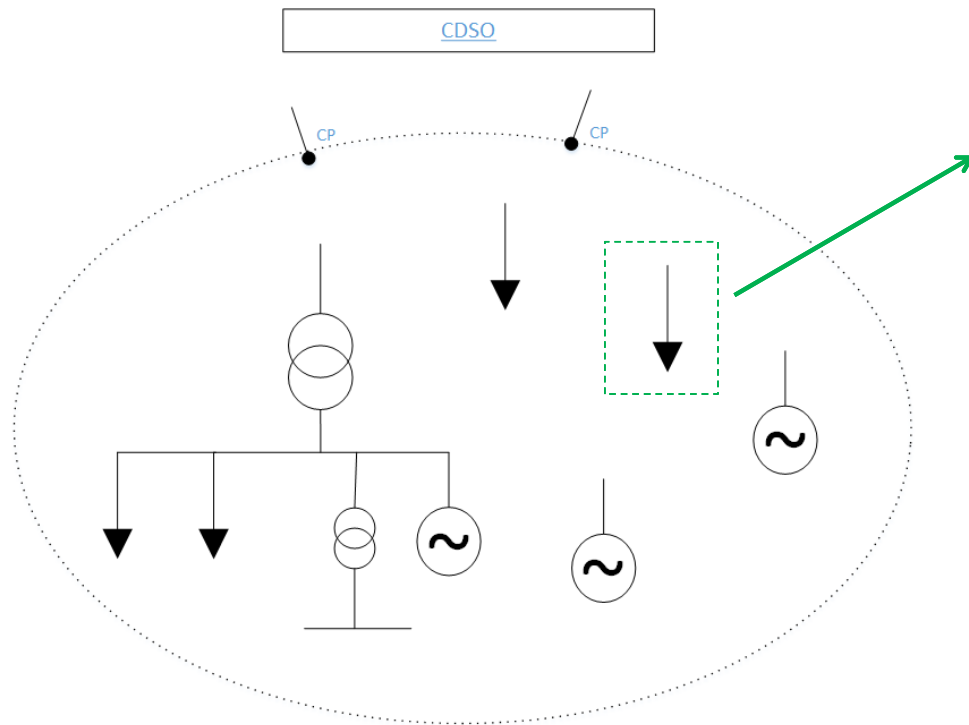


High level examples – general examples



* TSO needs to be implemented in the notification/decision process concerning modernisation. Possibly via article 4 of DC

High level examples – general examples



No notification to the RSO* needed unless:

- wanting to provide/providing demand response services
- impact on the connection point

* Interaction RSO – TSO to be defined



Many thanks for your attention!

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