# *Demand side Response*

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**Irish ENTSO-E public consultation workshop**

**on Demand Connection Code (DCC)**

***Dundalk 2nd August***



entsoe

Reliable Sustainable Connected

# New European Requirements

The new requirements identified for DSR by ENTSO-E is divided into the following:

1. **Demand Side Response delivering Reserve Services**
2. Demand Side Response delivering System Frequency Control

# DSR delivering Reserve Services - Introduction

**Reserve capability is required due to uncertainty ahead**

- Demand and unscheduled position for generation
- Increasing forecasting errors due to high penetration of RES

⇒a bigger volume of reserve will be needed to ensure system security.

**Reserves are typically required when an incident occurs until replacement power can be produced defined as reserve ancillary services**

- During high RES production, synchronous generation could be displaced, the most economic service for providing reserves

⇒ Risk of a lack of services during high RES production periods

# DSR delivering Reserve Services - Introduction

Three service can be envisaged that are cross border:

I. Active Power Control
II. Reactive Power Control
III. Transmission Constraint Management

Other services excluded as not cross border

# DSR delivering Reserve Services – Requirements

## Significance test

- Devices which are considered significant will be mandatorily fitted with DSR capabilities
- Significance test will be by proposed by TSOs to NRAs after 6 mth consultation
- NRAs respond in 2mths with decision
- Minimum 3 year review period

## Applicability of requirements

- Voluntary entry into market to provide service by user
- Once volunteered users DSR must comply with requirements
- Eligibility (scale and location) will be defined by TSO

## Technical requirements

- Frequency and voltage ranges shall be met by DSR (later presentation)
- LVDD and LFDD will be provided by DSR as required
  - Methods of LVDD/LFDD, by command or pre-alert signal
- Commands should be responded to in less than 1 sec
- Response ramping times shall be specified by RNO
- ROCOF capability will be specified by Rel. TSO
- Very fast frequency control can be required by RNO with TSO, scheme defined nationally

# DSR delivering Reserve Services – Requirements

## Information exchange

- Maximum of yearly updates to RNO
- Any changes to be informed as soon as reasonably practical

# New European Requirements

The new requirements identified for DSR by ENTSO-E is divided into the following:

1. Demand Side Response delivering Reserve Services
2. **Demand Side Response delivering System Frequency Control**

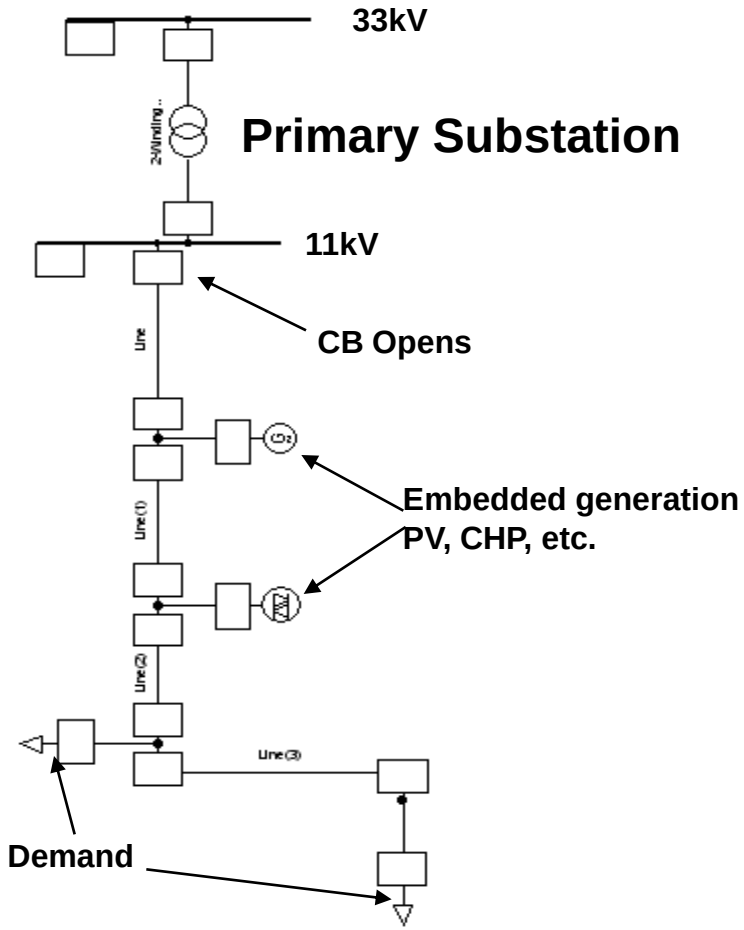
# DSR SFC – The need

**In the context of severe frequency events, introduction of large scale RES introduces two major new challenges.**

1. RES delivered via power electronic converters severely reduces system inertia (ability to slow down frequency change).

2. The second challenge arises from the need for a means to cope with extreme events via defence plan measures, most notably Low Frequency Demand Disconnection (LFDD).

# DSR SFC – The need




**Problems in future deploying LFDD**

LFDD disconnects demand to restore frequency from low levels

Embedded Generation means that demand stations can sometimes produce power

Therefore effectiveness of LFDD reduced or counter productive

# DSR SFC - Overview

Temperature controlled devices offer an inherent store of energy, for example:

- Fridges
- Freezers
- Heat pumps
- Immersion heaters
- Etc

Device regulates between two sets points - stored energy between the points can be used to increase or reduce these devices effective demand

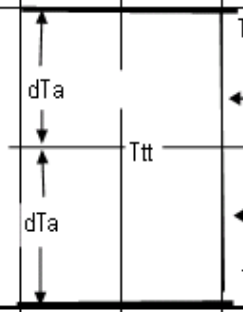
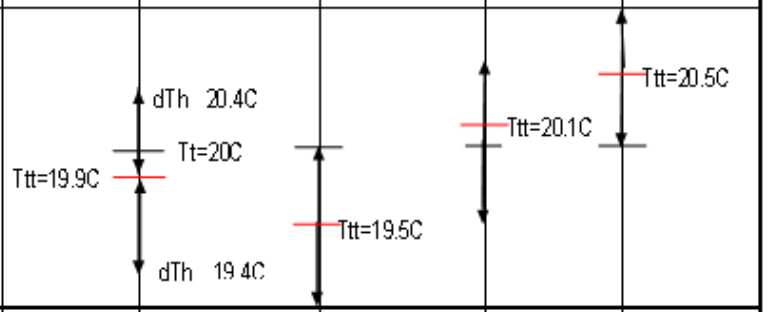
DSR SFC will not be noticeable to consumer and therefore is classed as ‘Non-essential’ demand

Benefits consumer avoids disconnecting essential and non-essential demand simultaneously

DSR SFC can be major component of need for demand disconnection based on analysis of the team for their respective countries

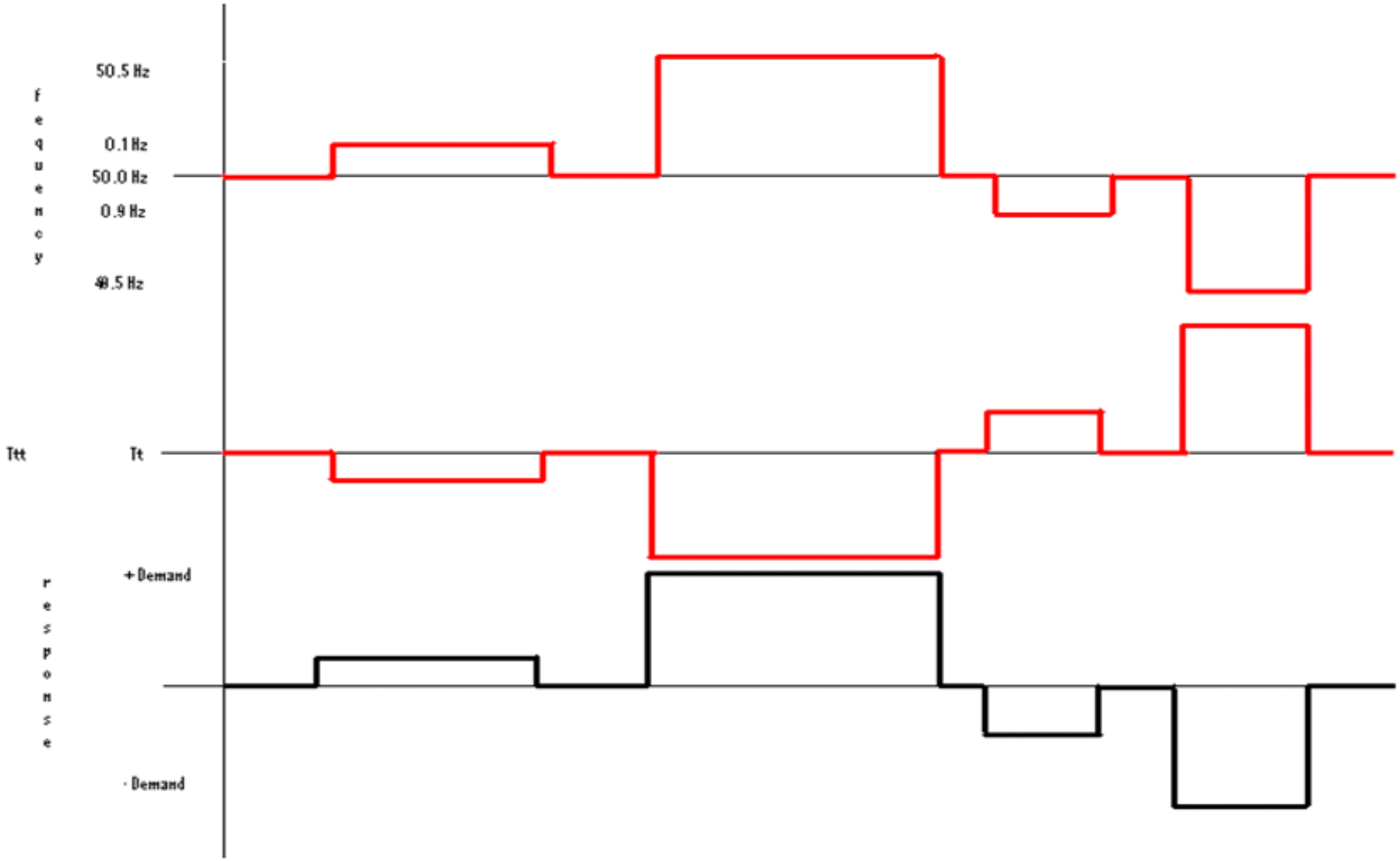
# DSR SFC - Example

Example:

| DSR SFC Heating Version | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Temperature Values** |  | | |  | | | |
| **FREQUENCY** | | | **50.00Hz** | | **50.10Hz** | **50.50Hz** | **49.90Hz** | **49.50Hz** |
| | | | dTcfc = 0 = dTcfc max *df(50-50)/df max (0.5) | | | | | |
| | | | Ttt = Tt = 20C | **dTcfc =** | -0.5C x 0.1Hz/0.5Hz = - **0.1C** | -0.5C x 0.5Hz/0.5Hz = - **0.5C** | +0.5C x 0.1Hz/0.5Hz = **+0.1C** | +0.5C x 0.5Hz/0.5Hz = **+ 0.5C** |
| | | | dTcfc max= Tt + dTa - (Tt + dTh)<br>20+1C - (20+0.5C) = +/- 0.5C | | | | | |
| | | | Ttt = Tt - dTcfc | | **19.9** | **19.5** | **20.1** | **20.5** |
| **Consequences for Demand** | | | All demand Kept between T-dTh and T+dTh Normal operation | | A few devices at 19.4-19.5C turn on | A lot of devices 19.0- 19.5C turn on | A few devices 19.5 - 19.6C turn off | A lot of devices 19.5 - 20.0C turn off |
| **Response Provided** | | | No response | | + 20% available response | + 100% available response | - 20% available response | - 100% available response |

# DSR SFC – Response example

Response:



# DSR System Frequency Control – Requirements

## Significance test

- Devices which are considered significant will be mandatorily fitted with DSR SFC capabilities
- Significance test will be by proposed by TSOs to NRAs after 6 mth consultation
- NRAs respond in 2mths with decision

## Applicability of requirements

- Derogation temporarily to assist move to new products possible

## Technical requirements

- Deadband specified by TSO
- On/Off temperature ranges will be respected – primary function assured
- Maximum range setting set by Rel.TSO in co-ordination with synchronous system TSOs
- Polling time of 0.2secs
- Random delay timer of 5 minutes on return to normal operation
- 0.01Hz detection sensitivity, 0.05Hz error in real frequency

Thanks for your attention

Any questions