

## New needs for reserves and flexibility

**Febeliec DSM workshop, 10/06/2013**

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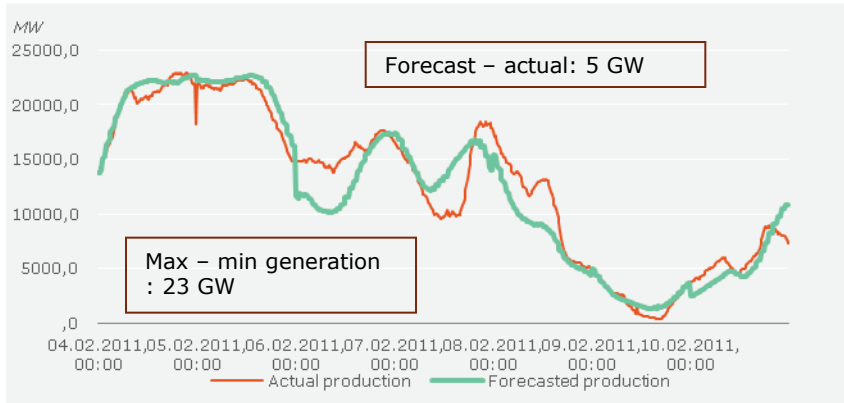


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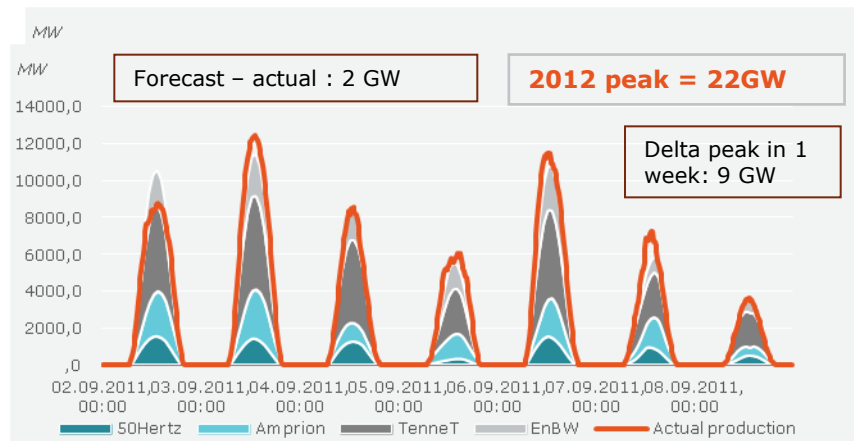
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# TSOs: in search of flexibility (1/2)

## 1 week wind generation in Germany



## 1 week solar generation in Germany

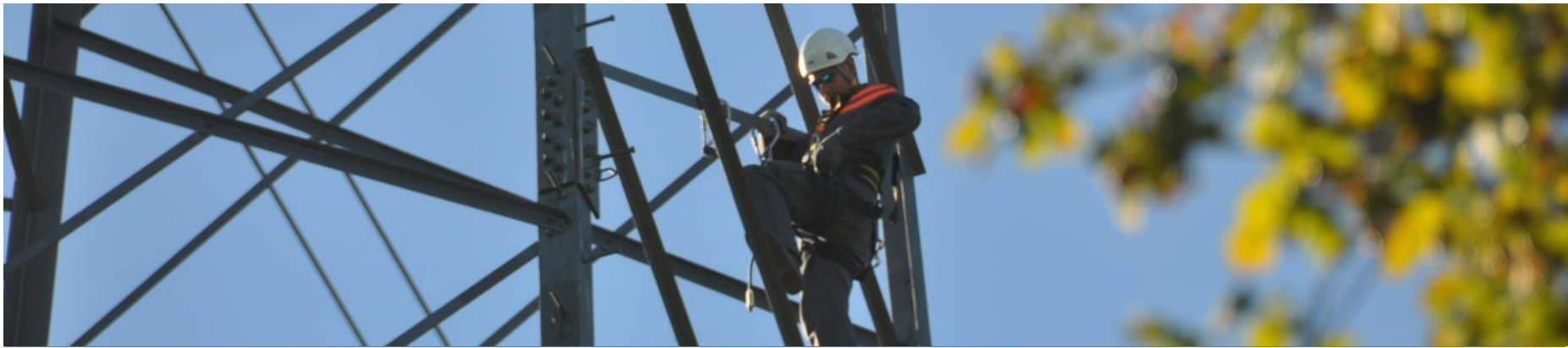


**Example of Germany: Important differences between minimal and maximal generation from intermittent sources**

- ➔ TSOs need flexibility to keep the balance between supply and demand, by mobilizing all potential sources of flexibility within the TSO, generation and the demand domain!
- ➔ In the realtime balancing market
- ➔ In the Intraday market
- ➔ Outside the balancing market, but in timeframes between DAH and realtime: Potential for strategic reserves

# TSOs: in search of flexibility (2/2)

- **Balancing** flexibility – TSO side
  - Cross border balancing products and bid ladders: under study
  - Cross border integrated secondary control BE-NL-DE-CZ has started
- **Balancing** flexibility – generation side
  - Often, “out of merit order” gas plant is running for balance control, which is uneconomic and unsustainable;
  - Instead, other options are perfectly feasible:
    - Storable biomass
    - CHP equipped with heat storage or backup boilers
    - Downward regulation on wind and PV as last resort
    - Use of pumped storage hydro plant for balancing
  - **But: RES support mechanisms** and regulatory framework for ancillaries are often inflexible and give strong **economic counterincentives** for adequate generation flexibility: ongoing debates!
- **Balancing** flexibility – demand side
  - TSO-net: rather mature mechanisms in cooperation with Balance Resp Party/supplier
  - DSO-net: Role of DSO, BRP/suppliers and/or Aggregators?? Emerging models!



## Balancing products - Realtime

### **Demand Side Management in the realtime balancing market**



# Demand side management



## Overview

Product	Product	Sourcing	Supplied by	Load connected to
<b>FCR - R1 Load</b>	Load modulation in case of large Frequency dips (as from Freq <49,900Hz)	Yearly Contracted Capacity	BSP, open for aggregation	Transmission Grid only
<b>FRR – ICH</b>	Decrease of Off-take to a predefined off-take level, within 3 minutes	Yearly Contracted Capacity	BSP, open for aggregation	Transmission Grid
<b>FRR – APP</b>	Increase/Decrease of Off-take/generation within 15minutes.	Day ahead, free bids at free price per 15min	BRP	Transmission & distribution Grid
<b>FRR – R3 Dynamic Profile (from 2014)</b>	Decrease of Off-take with a predefined volume. within 15minutes	Yearly Contracted Capacity	BSP, open for aggregation	Transmission & distribution Grid

FCR: Frequency Containment Reserves: modulation of generation/load in order to stabilize frequency deviations, locally activated based on frequency measurements

FRR: Frequency Restoration Reserves: increase/decrease generation/load in order to restore frequency deviations, activated by the Elia National Control Center

BSP: Balance Supplier Party: anyone who can offer a FCR an/or FRR product to Elia

BRP: Balance Responsible Party: Party who has signed an ARP contract and thus is responsible for the balance of a portfolio of generation/load

# Demand side management



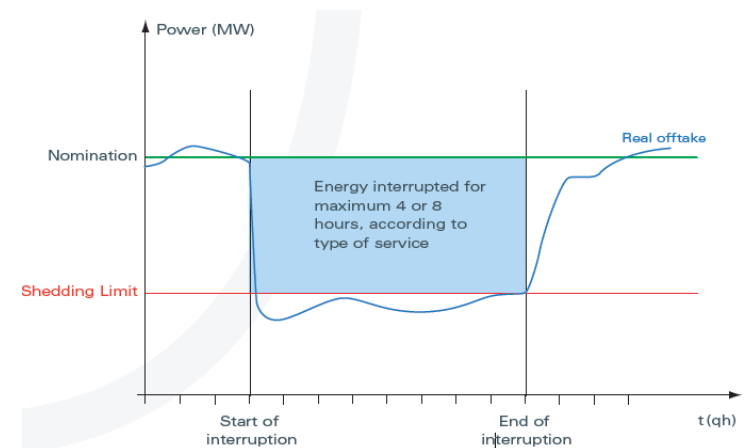
## R1 load: FCR through load on TSO grid

- Elia developed a combination of asymmetric and symmetric FCR products in order to allow a demand side participation. Currently Elia has contracted 30,5MW of R1 load.
- R1load = tailored to industrial consumers + compliant with Entso-e requirements
  - Activated for only deviations  $> 100\text{mHz}$  leads to a limited number of activations per year = limited impact on the Industrial Processes
  - Linear modulation of the off-take on the frequency with a max activation time of 30seconds for the entire volume
- Grid users or a pool of grid users (aggregator) connected to the transmission grid can participate in the yearly tendering
- The Supplier is remunerated for the capacity he makes available.
  - No remuneration for the activation

# Demand side management

## FRR through Interruptible load on TSO Grid - ICH

- Elia is procuring currently 261MW of R3 reserves from Industrial Customers connected to the Transmission Grid (ICH)
- Highly flexible product to deal with outages
  - Elia activates this reserve by remote control
  - Grid user's offtake must drop below shedding limit within 3 minutes
- Product is adapted to load constraints:
  - Limited number of activations per year (2-4)
  - At least 24 hours between 2 interruptions
  - Duration of the activation between 15 minutes and 2-8hours (depending on the contract)
- Grid users or a pool of grid users (aggregator) connected to the transmission grid can participate in the yearly tendering
- The Supplier is remunerated for the capacity he makes available and for the activated energy





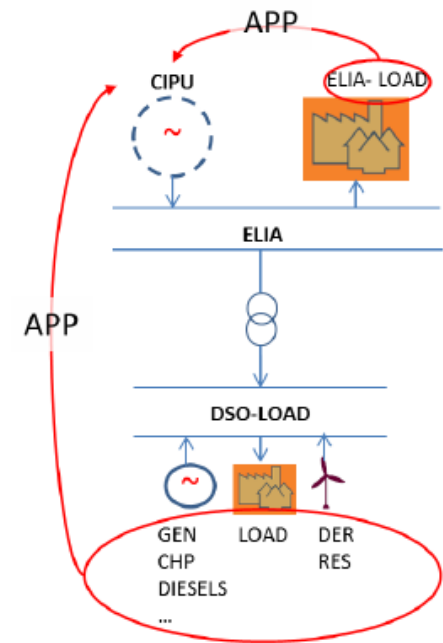
## R3 Dynamic Profile: FRR on DSO Grid

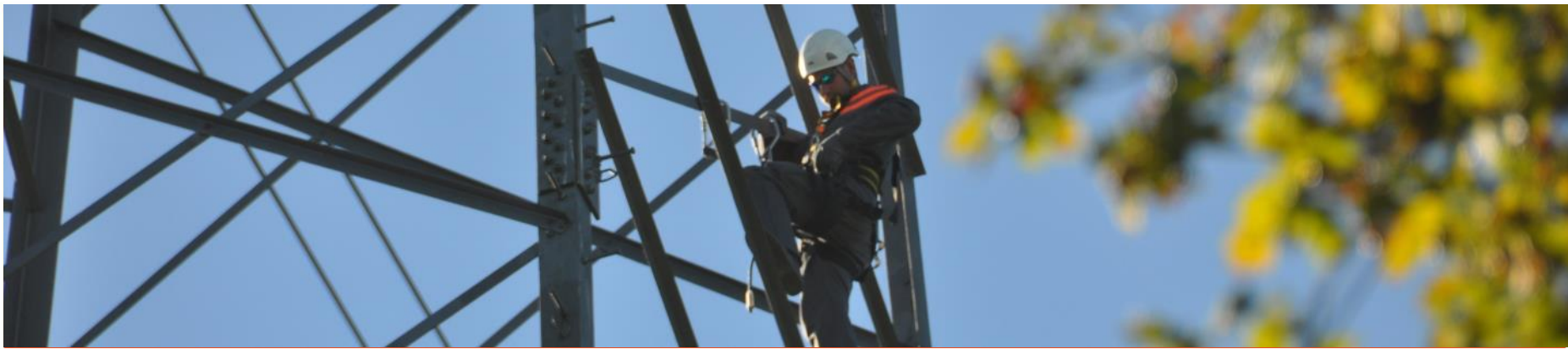
- In the framework of an experimentation, Elia is procuring currently 10MW of R3 reserves sourced from large DSO consumers. Based on this experimentation Elia is developing a new product “R3 Dynamic Profile” for 2014.
- Product competing with R3 Production (FRR)
  - .
- Product allows DSO connected flexibility to participate
- This ancillary service can be provided by non-BRP aggregators; aggregation is allowed over different DSOs and different BRPs/suppliers
- Capacity-only product: the Supplier is remunerated for the capacity he makes available.

# Demand side management

## APP: aggregated power plant

- Until the new “bid ladder” balancing platform is developed, Elia can use the current CIPU framework to allow generation and load to offer their flexibility to Elia, by means of an aggregation into an “virtual power plant”
- Elia can activate extra flexibility within this existing framework
- A Pool can offer flexibility to Elia:
- Only to be offered by parties who have signed an ARP Contract by Elia for load/production that is a part of their BRP portfolio.
- Pre-requisite: connection to the CIPU IT applications
- The provider is remunerated for the activation at the offered price.
  - Free (if necessary negative) prices, which allows Green energy to recuperate the loss of GSC





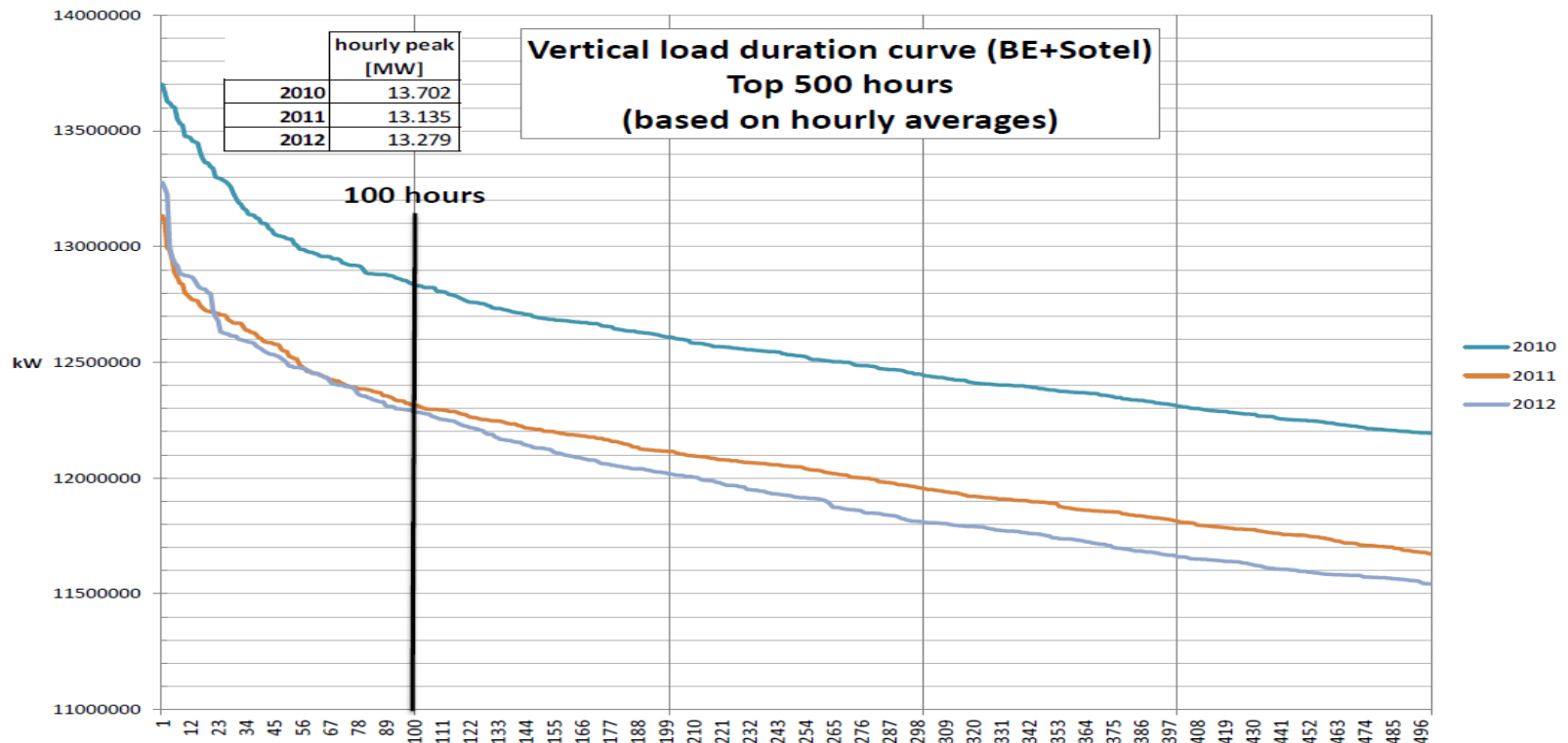
## Strategic Demand Response Products (SDR) Between Day Ahead and Realtime

**How to make use of existing demand flexibility with industrial users not yet mobilized in existing products?**



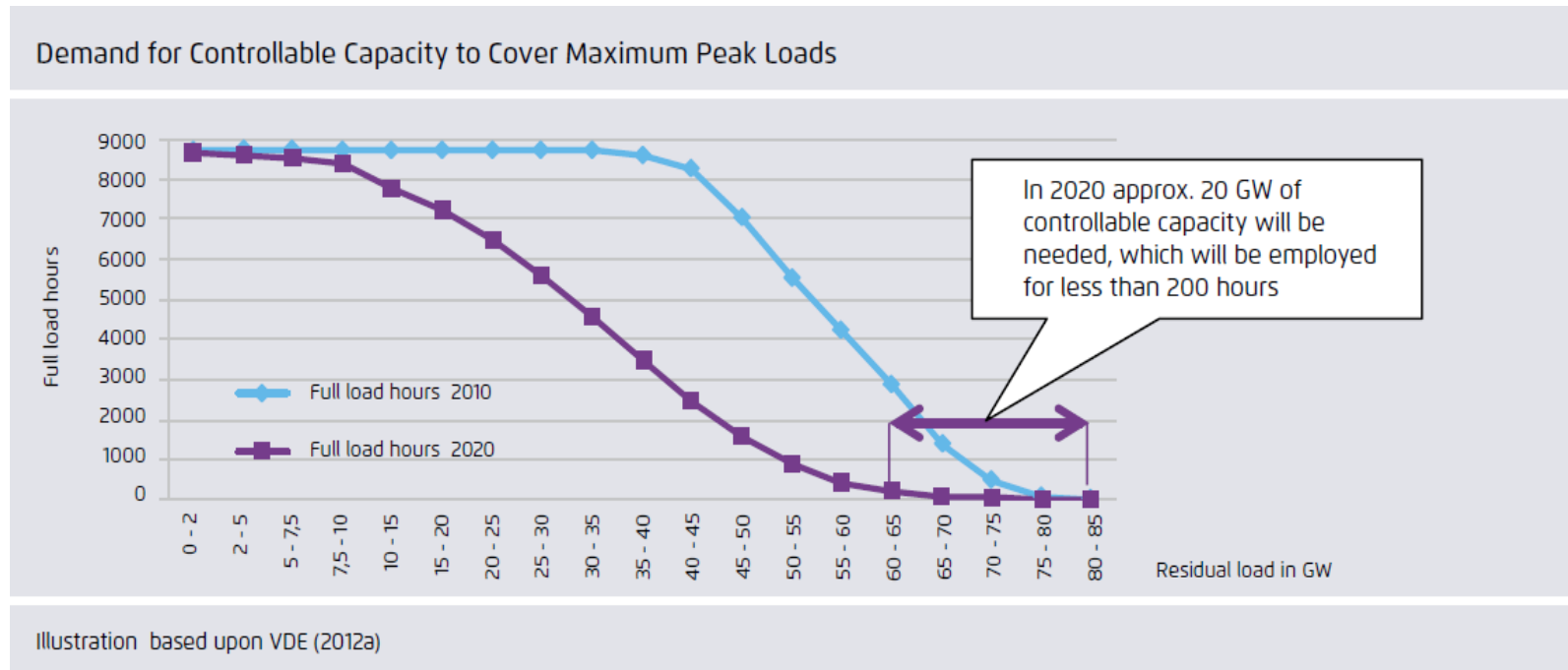
# Context of Strategic Demand Response

- Studies & operational experience with power system in context of highly decentralized generation mix:
  - ➔ Yearly load duration of top slice of residual load as measured by TSO is strongly decreasing
    - In Belgian context: Top 500-1000 MW of residual load has annual load duration lower than 100 hours.



# Context of Strategic Demand Response

➔ **Yearly load duration** A recent German study for 2020 [Agora] mentions a residual load slice of 20 GW with a duration of less than 200 hours.



- ➔ **this load slice is a candidate for Demand Response.**
  - As a basic assumption for the SDR timeframe, the project would consider Demand Response actions with a yearly duration below 100 hours.

# Demand Side Response and Strategic Reserves

## “Plan Wathelet”: Strategic Reserves with participation of the demand side

### → Activation of demand side

- Different contribution to SoS
- Crucial to acknowledge differences in product characteristics between demand side and generation

### The need for SDR will depend on several factors:

- Future of the existing gas fired plant
- Intended tender for new capacity (at the earliest 2017)
- International context
- Offered prices compared to maintaining old gas fired plant online

# Joint Febeliec – Elia Project for potential assessment and SDR development

## Scope of the joint Febeliec-Elia SDR Project:

- Estimate potential for Demand Response in Belgian Industry in 3 different timeframes: day ahead, balancing and the timeframe with notice period starting at day ahead closure and ending before balancing → SDR!
- Define business model and service characteristics for the Strategic Demand Reserves.

**Aimed conclusion of this phase: November 2013**

**If result of joint project phase considered positive by Febeliec & Elia  
→ Elia shall formally apply with a proposal to Energy Minister and to CREG.**

During these next project phases a bilateral consultation structure between Febeliec and Elia for follow-up shall be kept in place  
(beside general consultation via the Elia Users' Group)

**Thank you for your attention!**