

FTI-CL Energy – Flexibility: The Need for a More Coordinated Approach

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Presented To:



Agenda and key messages

1 INTRODUCTION: THE NEED FOR A FLEXIBILITY OUTLOOK

2 TOWARD A DEFINITION OF “FLEXIBILITY NEEDS”

3 MEASURING AND QUANTIFYING FLEXIBILITY NEEDS: A WIDE VARIETY OF APPROACHES

4 MONETISING FLEXIBILITY: A WIDE VARIETY OF APPROACHES

5 CONCLUSION AND RECOMMENDATIONS

1. Introduction: the need for a flexibility outlook

1 INTRODUCTION: THE NEED FOR A FLEXIBILITY OUTLOOK

Flexibility is becoming just as essential as adequacy to ensure security of supply as the share of intermittent RES increases

- **In order to increase the European security of supply, considerable efforts were made in the past decades to implement a common adequacy assessment framework.**
 - **A consensual adequacy criteria:** The Loss of Load Expectation (LOLE)
 - **ENTSOE mid-term adequacy forecast (MAF):** Pan-European outlook of power system adequacy
 - **Clean Energy Package (CEP):** toward regional or EU-wide generation adequacy assessments, based on shared methodology and carried out in full transparency through ENTSO-E and ACER

- **As the share of intermittent RES increases, flexibility is becoming just as essential to balance expected and unexpected variations of injections and off-take at every point in time**
 - **Unexpected variations** (e.g. forced outages, renewable prediction errors, demand)
 - **Fast ramps** (e.g. solar eclipse, offshore wind power variations), or
 - **Minimum load** “incompressibility”

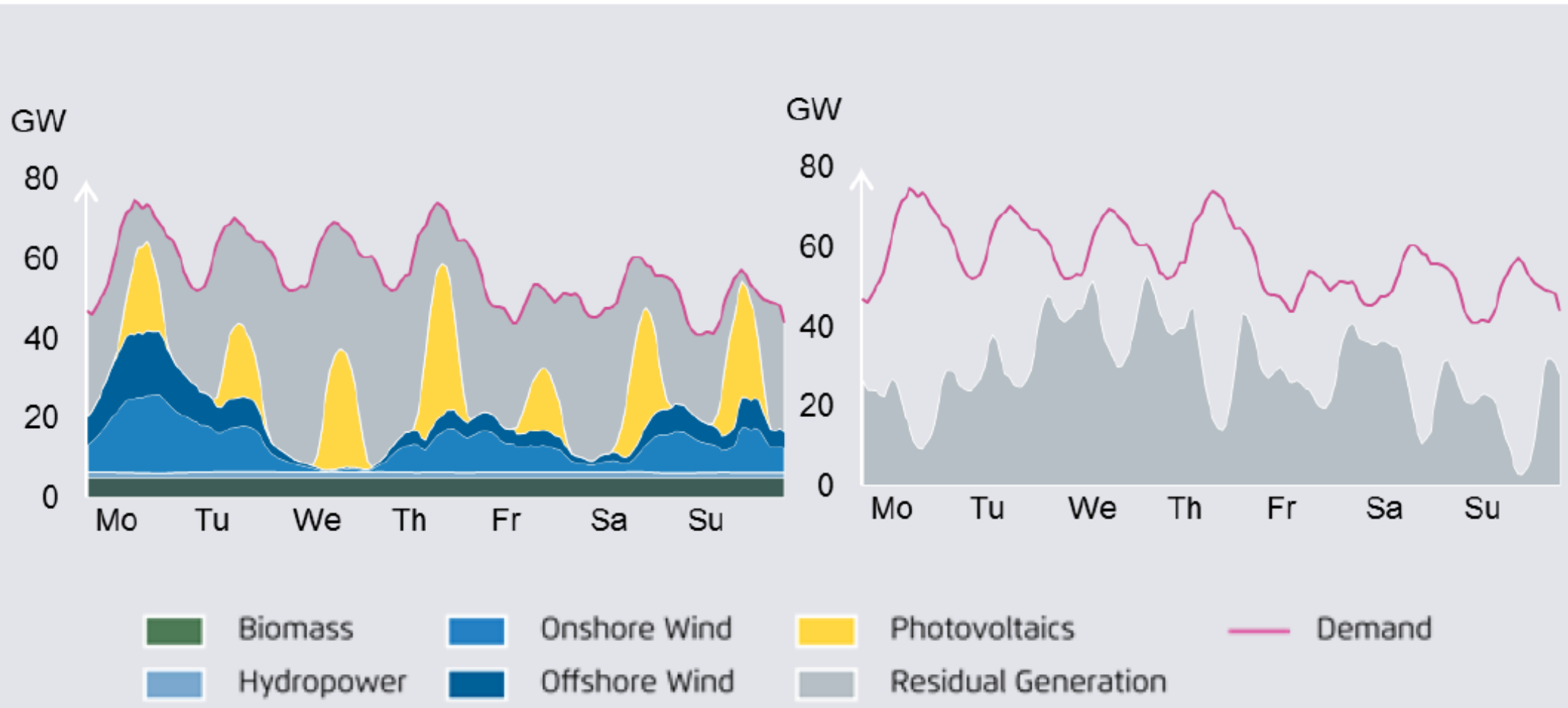
- **Despite the interest in developing the flexibility of the European power system, there is currently no structured or coordinated approach**
 - In most European countries, flexibility is currently not an issue as conventional power plants are still way flexible enough
 - A wide variety of approaches are used in Europe for the assessment of flexibility needs and the monetisation of flexibility sources
 - The CEP provides no clear guidelines for regional cooperation and coordination in this domain

2. Toward a definition of “flexibility needs”

2 TOWARD A DEFINITION OF "FLEXIBILITY NEEDS"

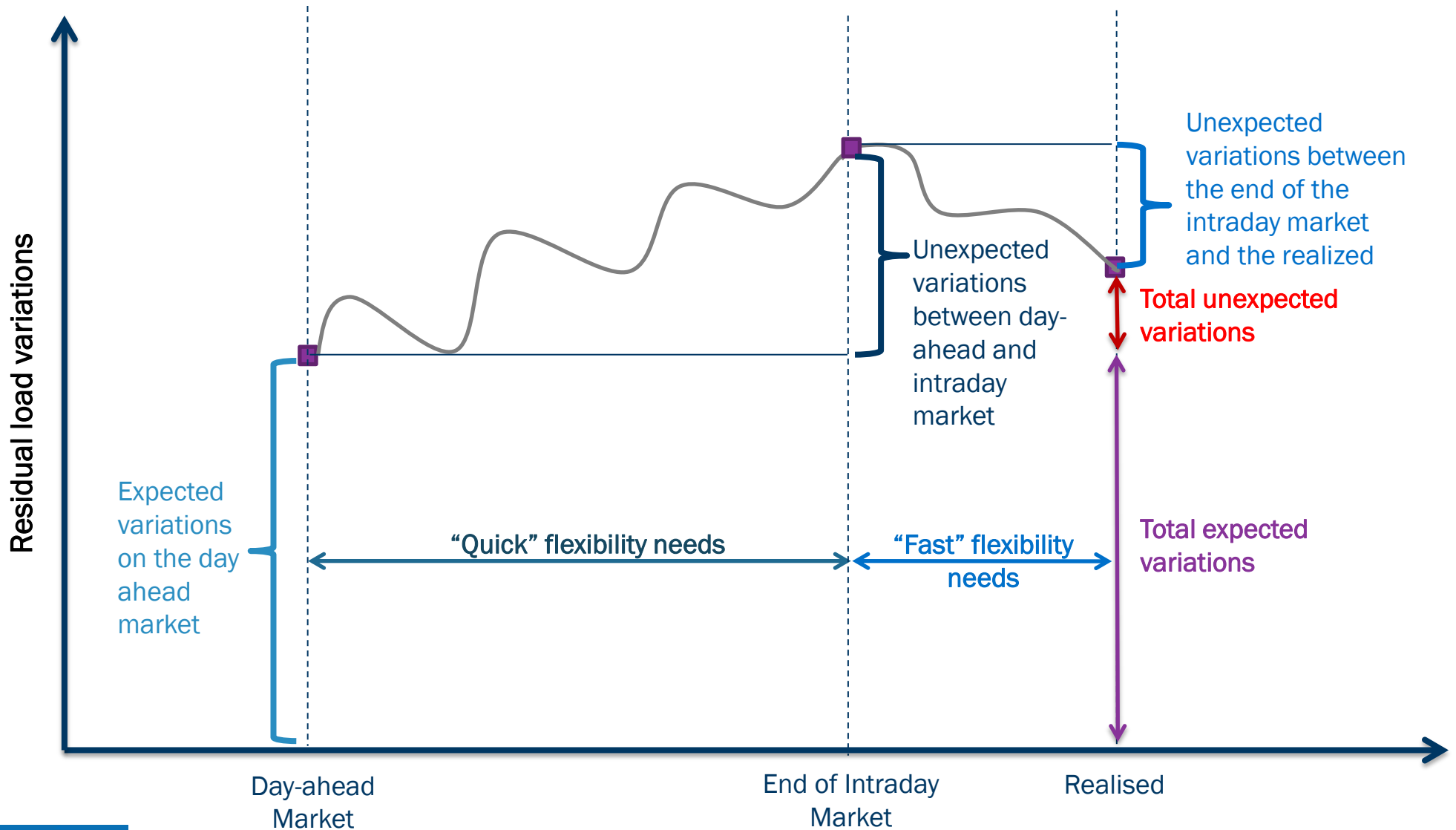
Flexibility needs may be represented by residual load variations across time

Electricity generation and consumption in a sample week with 50% RES share

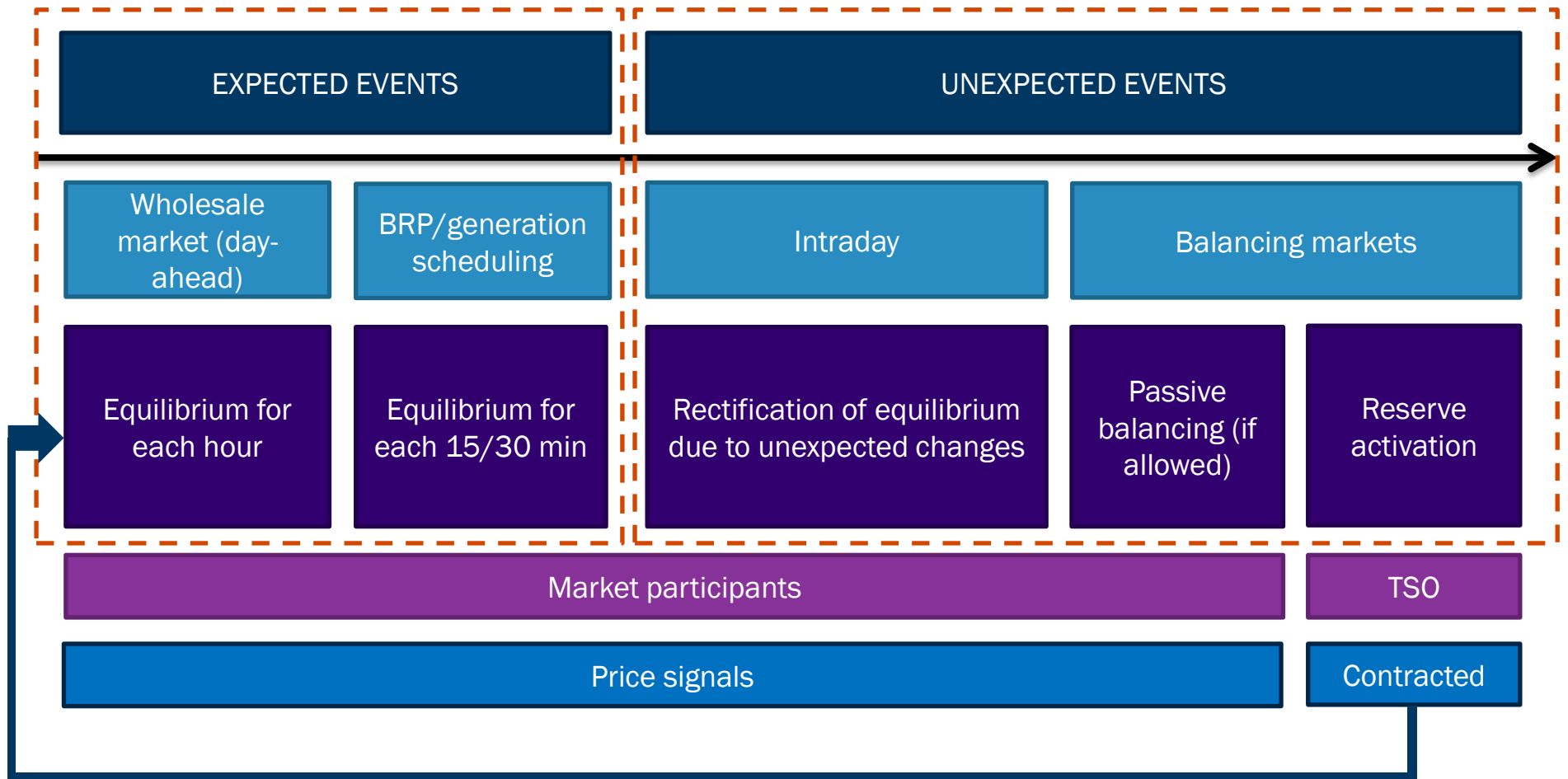


2 TOWARD A DEFINITION OF "FLEXIBILITY NEEDS"

Flexibility needs depend on the considered time horizon and whether they cover both expected and unexpected variations



Various flexibility needs and sources of flexibility



2. Measuring and quantifying flexibility needs: A wide variety of approaches

3 MEASURING AND QUANTIFYING FLEXIBILITY NEEDS: A WIDE VARIETY OF APPROACHES

In the literature, a wide variety of modelling methods and metrics are used to quantify flexibility needs

- **Several papers and publications were analysed from different sources: TSO, Energy Agency, Research institutes and academic papers and Utilities.**

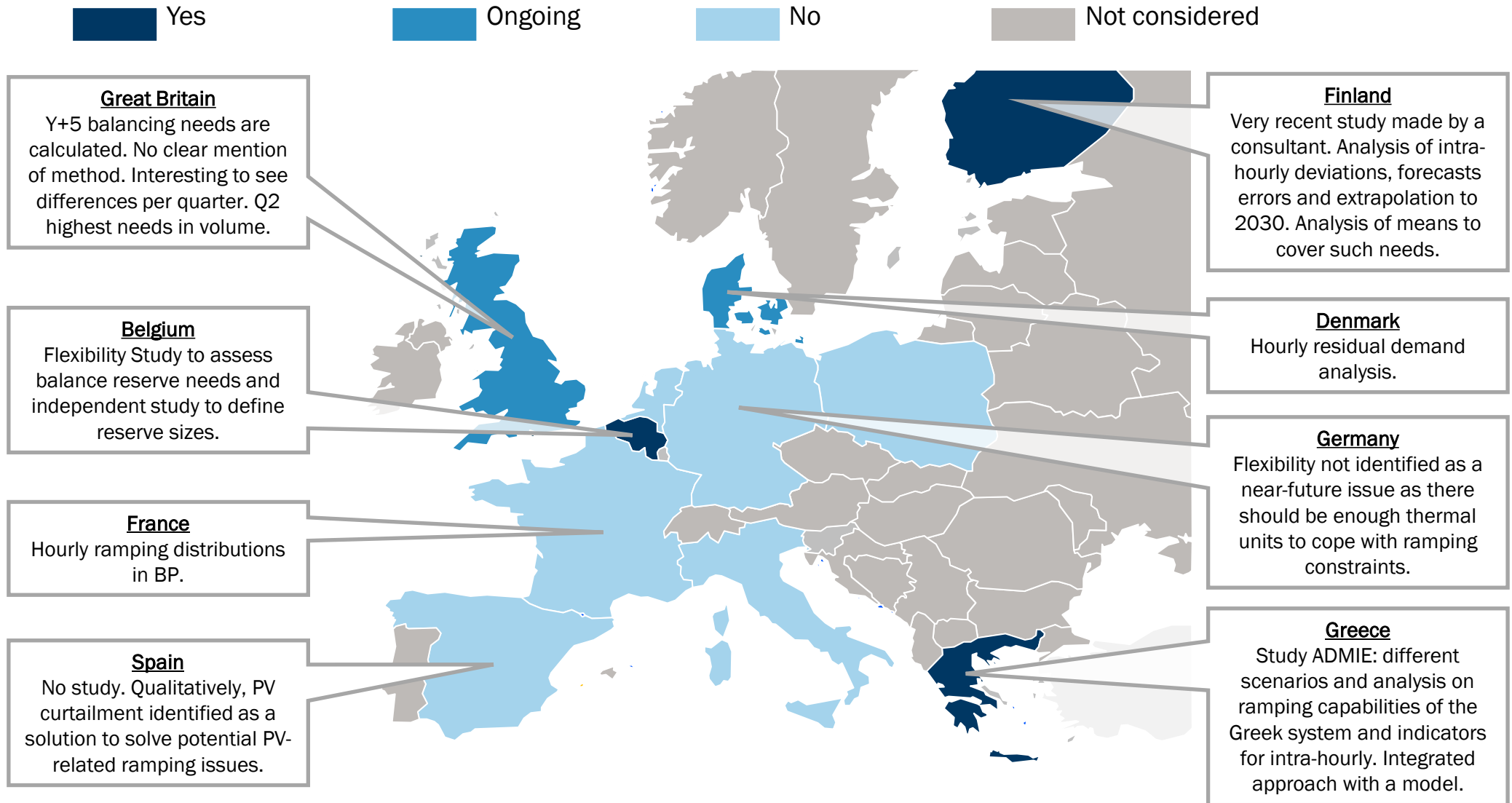
- **Only a small amount of publications quantifies flexibility needs. Most papers focus on flexibility means (storage, demand response etc.).**

- **We identified three main categories of approach to quantify flexibility needs:**
 - Flexibility needs described with **very simplistic methods**
 - Graphs showing the evolution of residual load without assessing exact flexibility needs (mainly from TSOs)
 - Flexibility needs estimated with **residual load analysis:**
 - METIS methodology: Flexibility needs is calculated as the sum of differences between average residual load and hourly residual load over the year.
 - Flexibility needs identified with a comparison of **means versus needs**
 - Means are defined with more or less complex methodologies (Dispatch or adequacy model versus simplified calculation based on plant parameters)

- **Many different criteria are used to characterise the lack of flexibility:** LOLE due to ramping, ramping margins, Insufficient Ramp Resource Expectation, Period of flexibility Deficit, Expected Unserved Ramping etc.

3 MEASURING AND QUANTIFYING FLEXIBILITY NEEDS: A WIDE VARIETY OF APPROACHES

A very limited number of TSOs are performing long term flexibility studies, and the methods used differ significantly



4. Monetising flexibility: A wide variety of approaches

Monetizing flexibility in electricity markets – 5 key sources of value

Capacity

- Load reduction & storage capacity is bid into capacity markets as a replacement for conventional generation
- Reducing the need for generation capacity requirements during peak demand hours

Reserves

- Providing modifications in electricity demand or supply to a TSO or energy supplier to provide additional ancillary services (e.g. frequency, voltage etc.)

Energy

- Wholesale market price compensation (Arbitrage)
- Providing/avoiding energy use at peak times

Network

- Active electricity management at the local level through demand adjustments or storage to
 - Limit capital investments in the network through peak avoidance
 - Reduced congestion and improve reliability

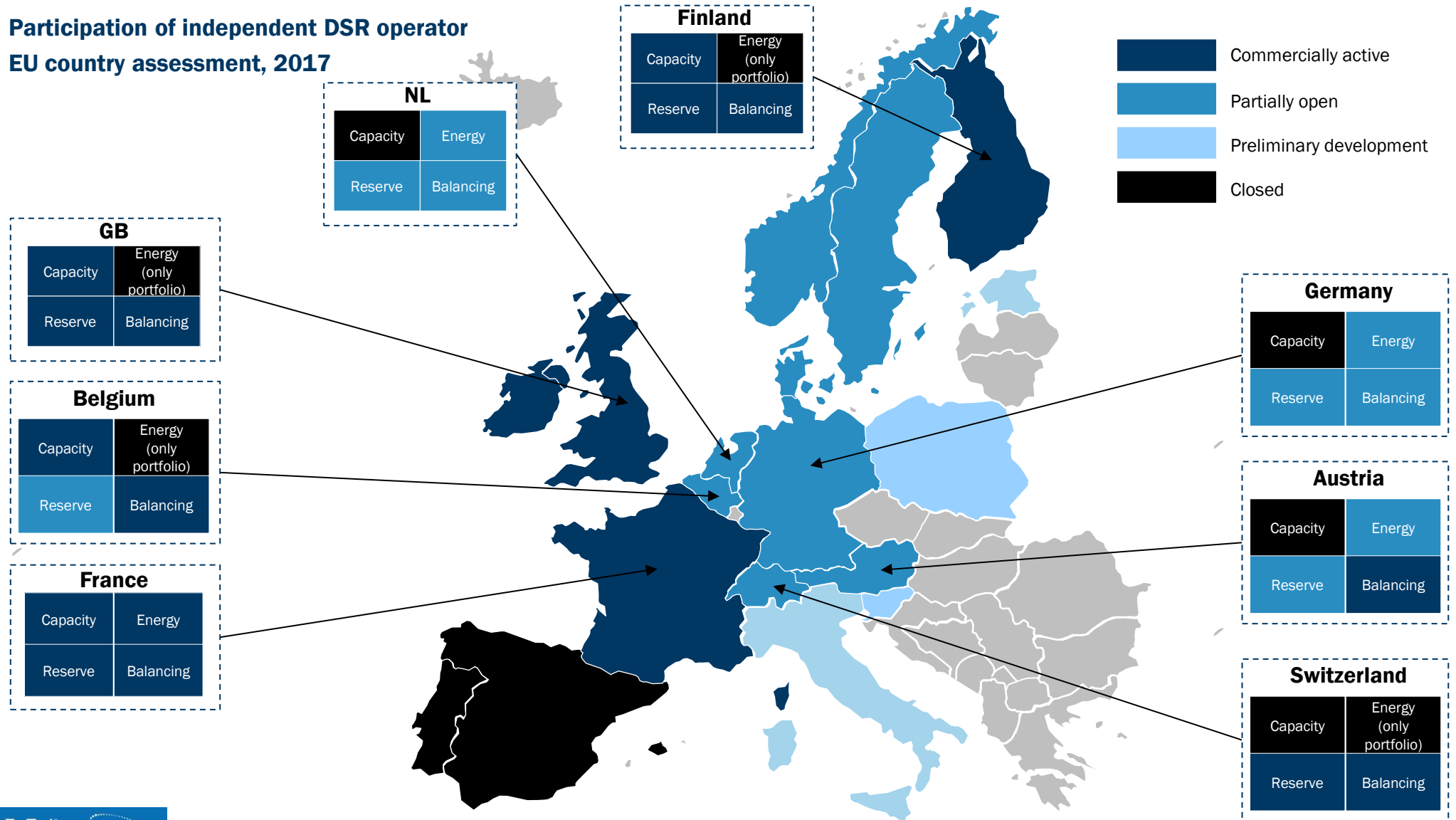
Environment

- Optimising energy mix to reduce CO2 intensive electricity generation at peak demand periods
- Ensuring maximal efficiency from new and existing conventional generating assets through consistent running

4 MONETISING FLEXIBILITY: A WIDE VARIETY OF APPROACHES

The absence of coordinated framework for flexibility monetisation in Europe: The example of demand response

Participation of independent DSR operator EU country assessment, 2017



Source: SEDC, FTI-CL Energy.

5. Conclusion and recommendations

The need for a more coordinated approach

- **The need for a flexibility outlook.** Flexibility is becoming just as essential as adequacy to ensure security of supply as the share of intermittent RES increases.
- **Defining “flexibility needs” may be ambiguous.** Flexibility needs may be represented by residual load variations across time. They depend on the considered time horizon, perspective and whether they cover both expected and unexpected variations.
- **Measuring and quantifying flexibility needs: A wide variety of approaches.** Few TSOs perform long term flexibility studies, and the methods and metrics used differ significantly.
- **Monetising flexibility: A wide variety of approaches.** Flexibility has 5 key sources of value in electricity markets (capacity, energy, environment, reserves, network). There is currently no coordinated framework for flexibility monetisation in Europe.
- **The need for a more coordinated approach on flexibility needs assessment and monetisation**
 - Perform a flexibility outlook based on harmonised definitions, metrics, and quantification methods, in particular at European level.
 - Further coordinate European approaches for flexibility monetisation in order to provide adequate incentives.

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