

# ENTSO-E WGAS

## Survey on Ancillary services procurement, Balancing market design 2014

January 2015



Reliable Sustainable Connected

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# Introduction (1)



## **ENTSO-E Survey on Ancillary services procurement, Balancing market design 2014**

The purpose of this survey is to provide an overview of the different market arrangements in place throughout Europe regarding to Ancillary services procurement and Balancing market design.

The maps illustrate how different approaches have been taken to the design elements across Europe.

The Ancillary Services Working Group members who responded to the questionnaire are as follows:

Austria, Belgium, Bosnia & Herzegovina, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland & NI, Italy, Latvia, Lithuania, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, The Netherlands, United Kingdom.

# Introduction (2)

**This document is expected to help the introduction of the Network Code Balancing. It is meant as a quite comprehensive, but user-friendly set of information on the existing arrangements.**

## Caveats:

- This is a relatively high-level exercise (not all details are captured).
- Developing a single set of definitions for the purpose of this survey, we experienced the difficulty to match the various concepts used in different countries. As a consequence, in some specific cases, the position of a country in a certain group might be debatable.
- This is based on information updated in November 2014 and describes the mechanisms in place in 2014, irrespective of any updates which might already be foreseen for the future.
- Elaborating the data we decided not to appear all the questions from the survey in this document, because majority of the given answers were „Not applicable” or „Missing data”.
- Visualizing the answers we distinguished the TSO who responded the questionnaire, but doesn't have answer to the certain question (marked with „N/A”) from the TSO who did not response the questionnaire (marked with”Missing data”).

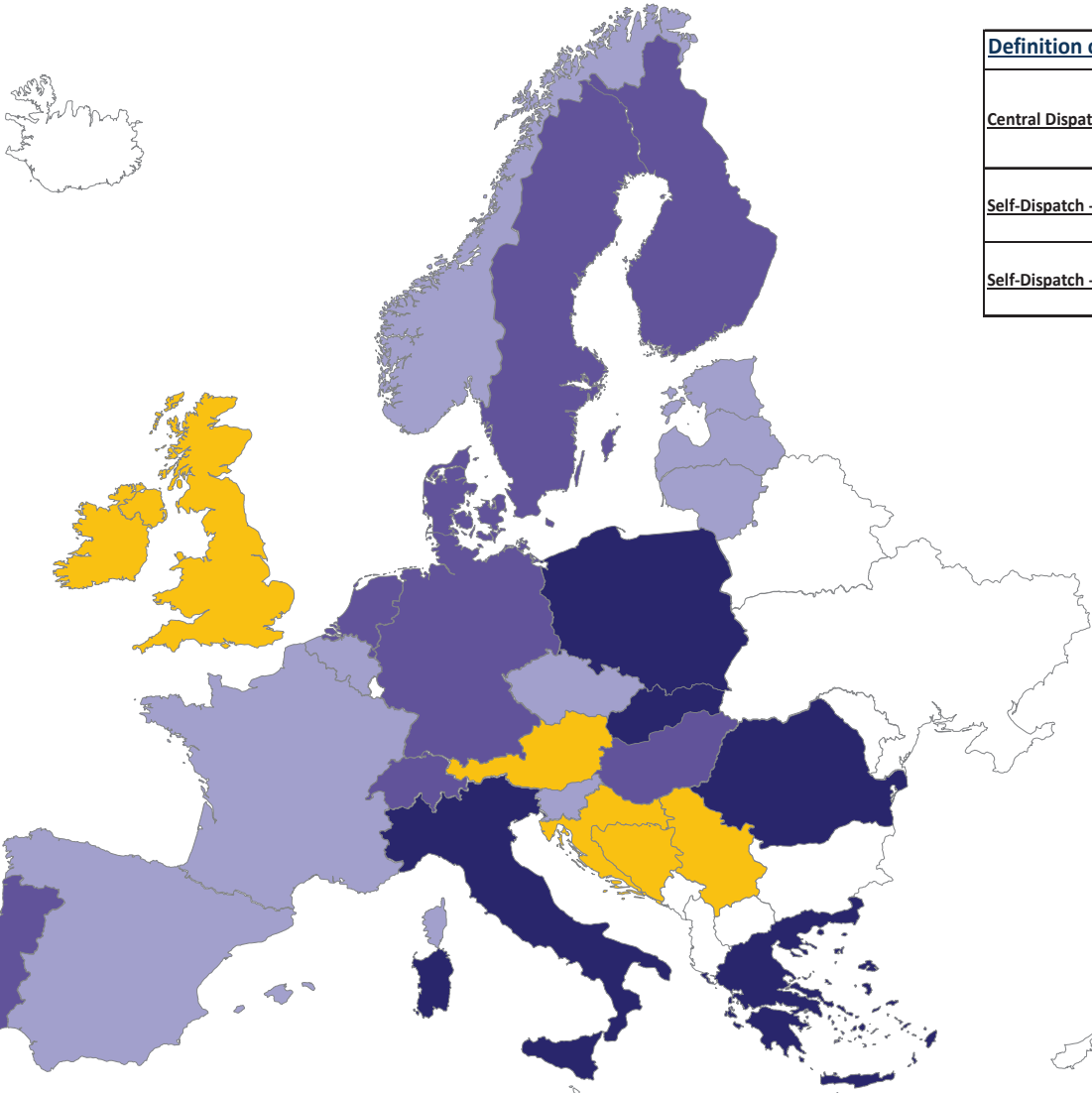
*Note: please print in colour for distinction between answers!*



# Ancillary Services






(Referring to questions of AS survey from AS1.0 to AS14.2)

# What is the balancing process in place?

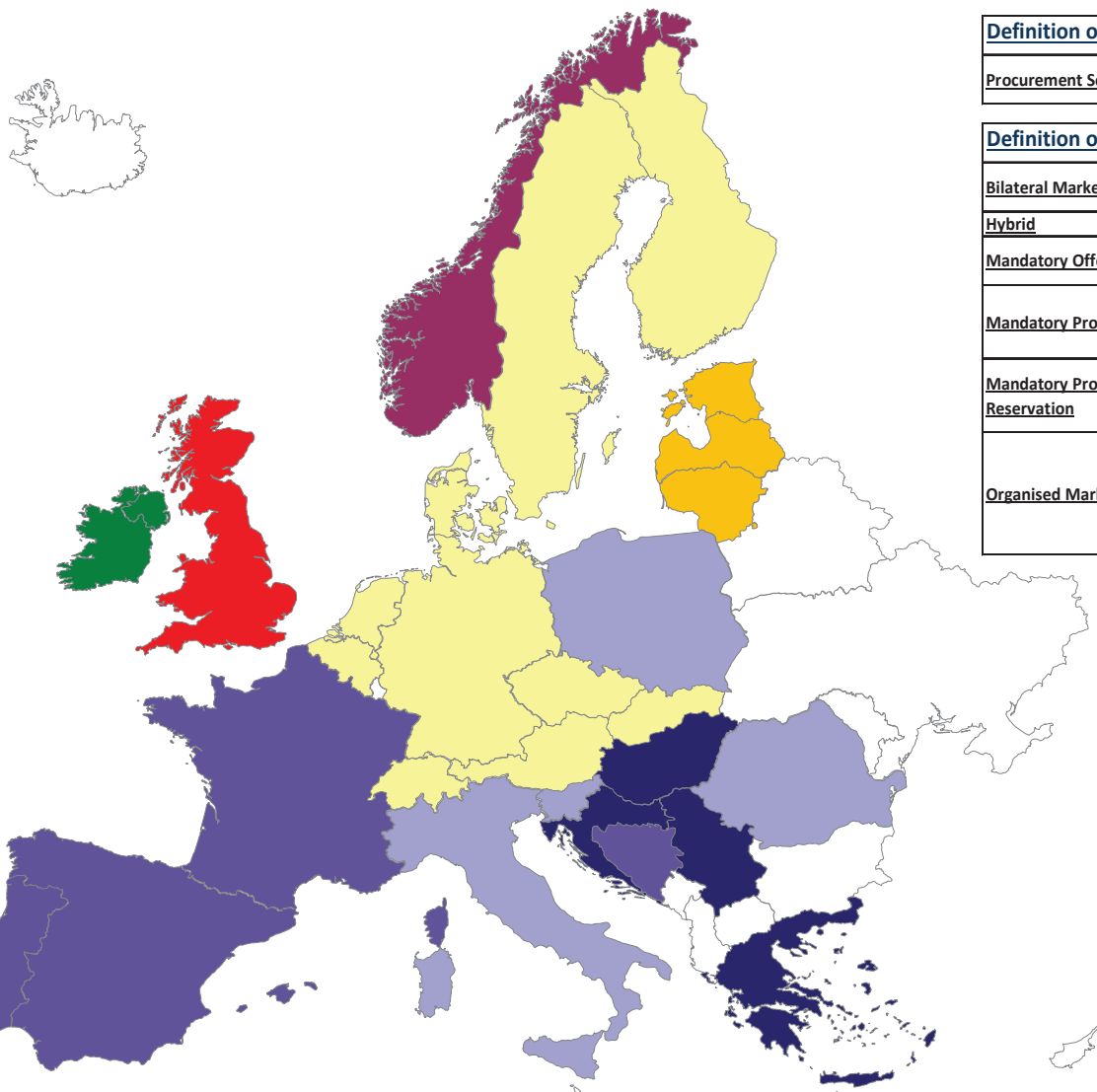


<u>Definition of answer</u>	
<u>Central Dispatch</u>	Central dispatch means a dispatch arrangement in a Relevant Area where the Transmission System Operator determines the commitment and output of a majority of generation or demand and issues dispatch instructions directly to them.
<u>Self-Dispatch - Portfolio Based</u>	A portfolio of units/generators (or other plant types) follow an aggregated schedule of actions to start/stop/increase output/decrease output in real time.
<u>Self-Dispatch - Unit Based</u>	Generators (or other plant types) following their own schedules of actions to start/stop/increase output/decrease output in real time.

**Key:**













	Missing data
	N/A
	Central Dispatch
	Self-Dispatch - Portfolio Based
	Self-Dispatch - Unit Based

## Frequency Containment Reserve - Capacity - Procurement Scheme



<u>Definition of question</u>	
<u>Procurement Scheme</u>	Background of the offer, which is closest to the real operation time.
<u>Definition of answer</u>	
<u>Bilateral Market</u>	A grid user and TSO negotiate a contract regarding the offered service and price/price system.
<u>Hybrid</u>	Combination.
<u>Mandatory Offers</u>	Generators connected to the grid are obligated to offer the remaining capacity/available capacity.
<u>Mandatory Provision</u>	Generators connected to the grid are obligated to reserve a certain amount of capacity in order to meet TSO requirements, for a fixed price set by TSO, NRA or for free.
<u>Mandatory Provision without Reservation</u>	It is mandatory for dispatchable units to be able to provide frequency containment reserve, but these units are not required to reserve capacity to provide this service.
<u>Organised Market</u>	There is no contract or obligation for a grid user to offer the reserve (before the offer). The grid user can voluntary participate in the market (e.g. tender, auction, market platform (like PX)) and bid a price or customize his offer (e.g. the volume, timeframe). The market result may lead to a bilateral contract.

**Key:**

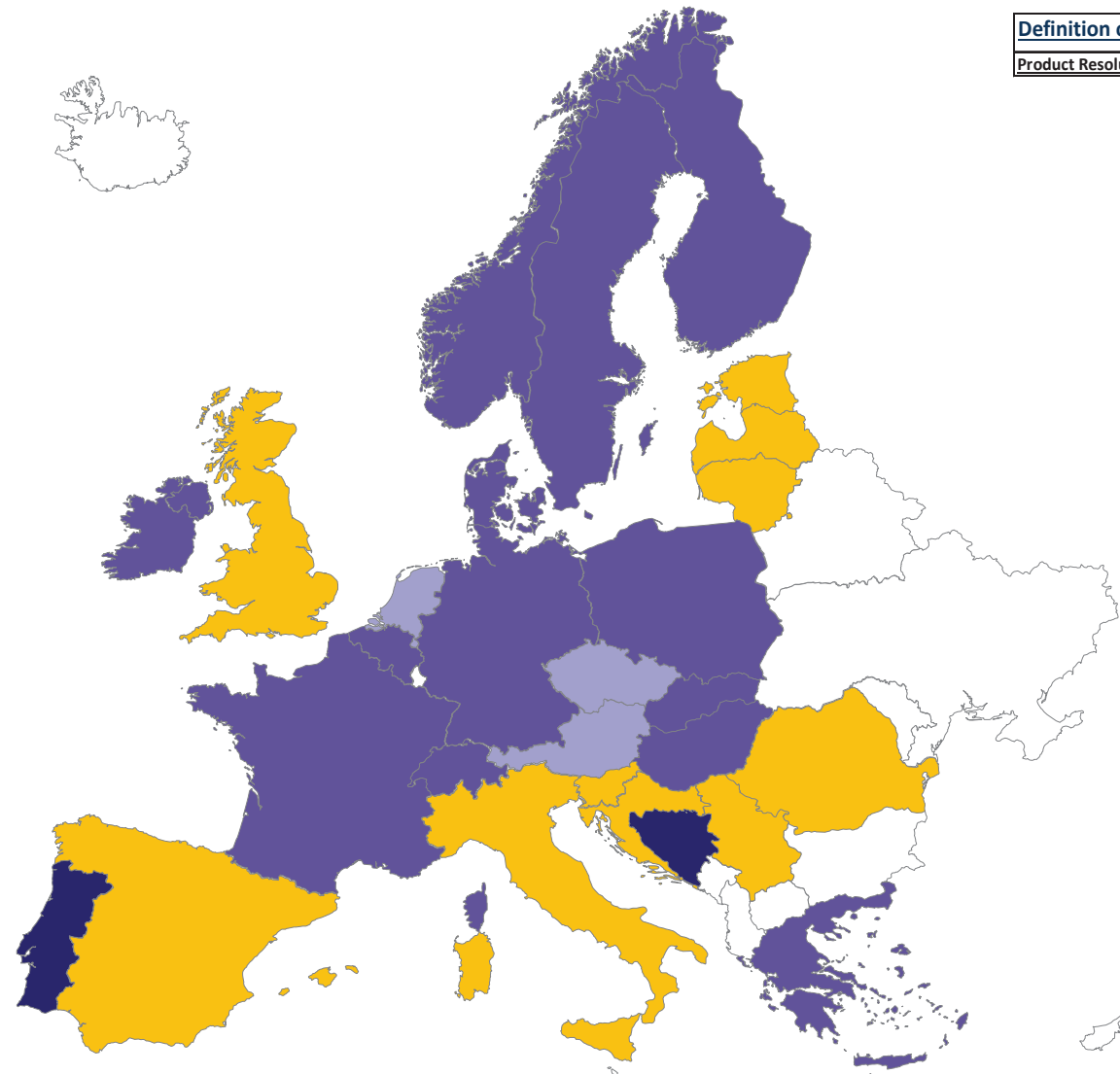
	Missing data
	N/A
	Mandatory Offers
	Mandatory Provision
	Mandatory Provision without Reservation
	Bilateral Market
	Organised Market
	Hybrid
	Other
	Pre-contracted Offers only
	Pre-contracted and Mandatory Offers
	Pre-contracted and Free Offers

# Frequency Containment Reserve - Capacity - Product Resolution (in MW)

## Definition of question

Product Resolution (in MW)

The minimum bid size into the balancing market.



## Key:



Missing data

N/A

No minimum bid size

$x \leq 1$  MW

$1 \text{ MW} < x \leq 5$  MW

$5 \text{ MW} < x \leq 10$  MW

$x > 10$  MW

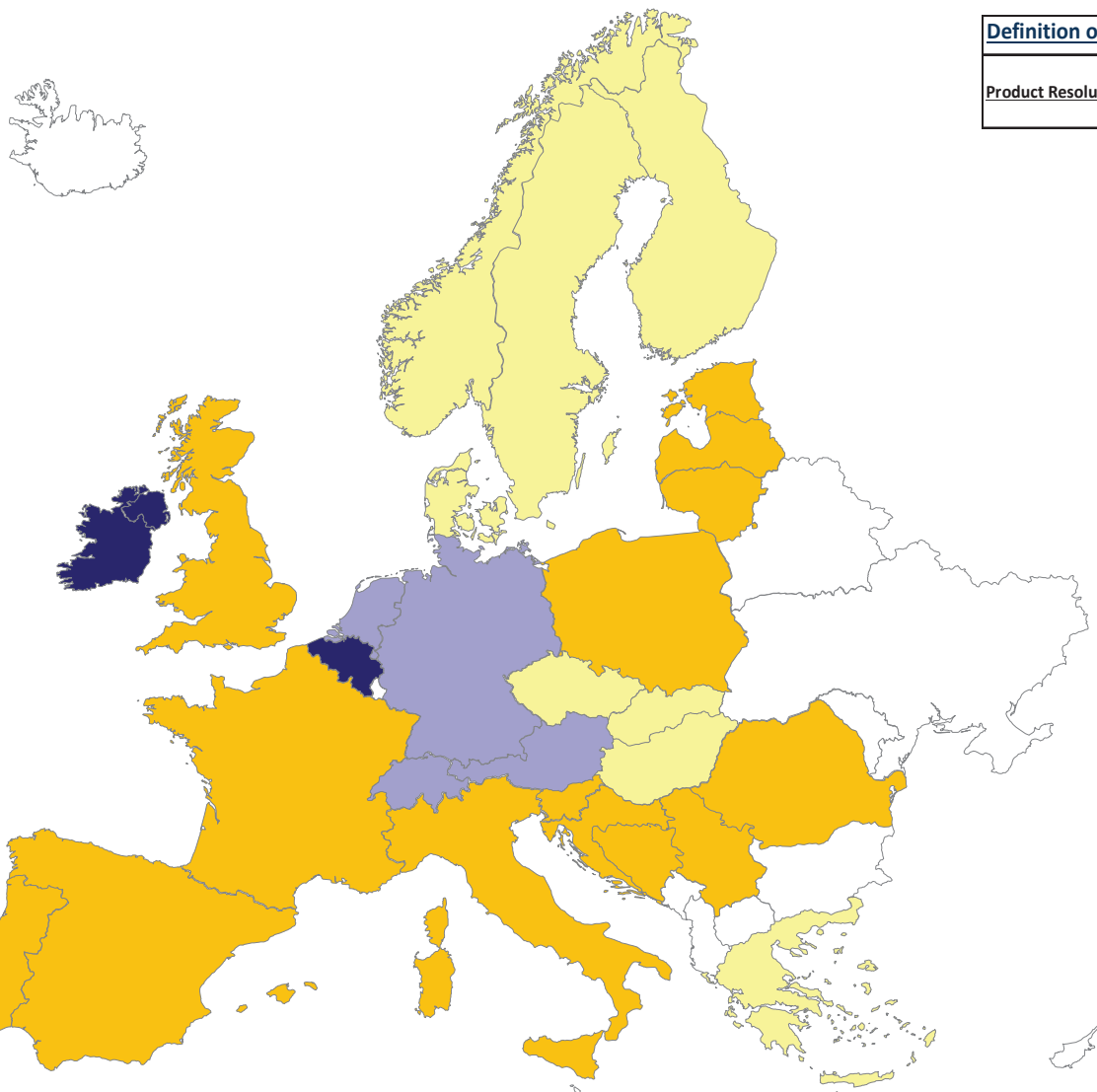


## Frequency Containment Reserve - Capacity - Product Resolution (in time)

### Definition of question

### Product Resolution (in time)

The maximum resolution for which the product can be bid into the market (for instance =1 hour in the case of a 24 auctions day ahead market for reserve provision).



### Key:

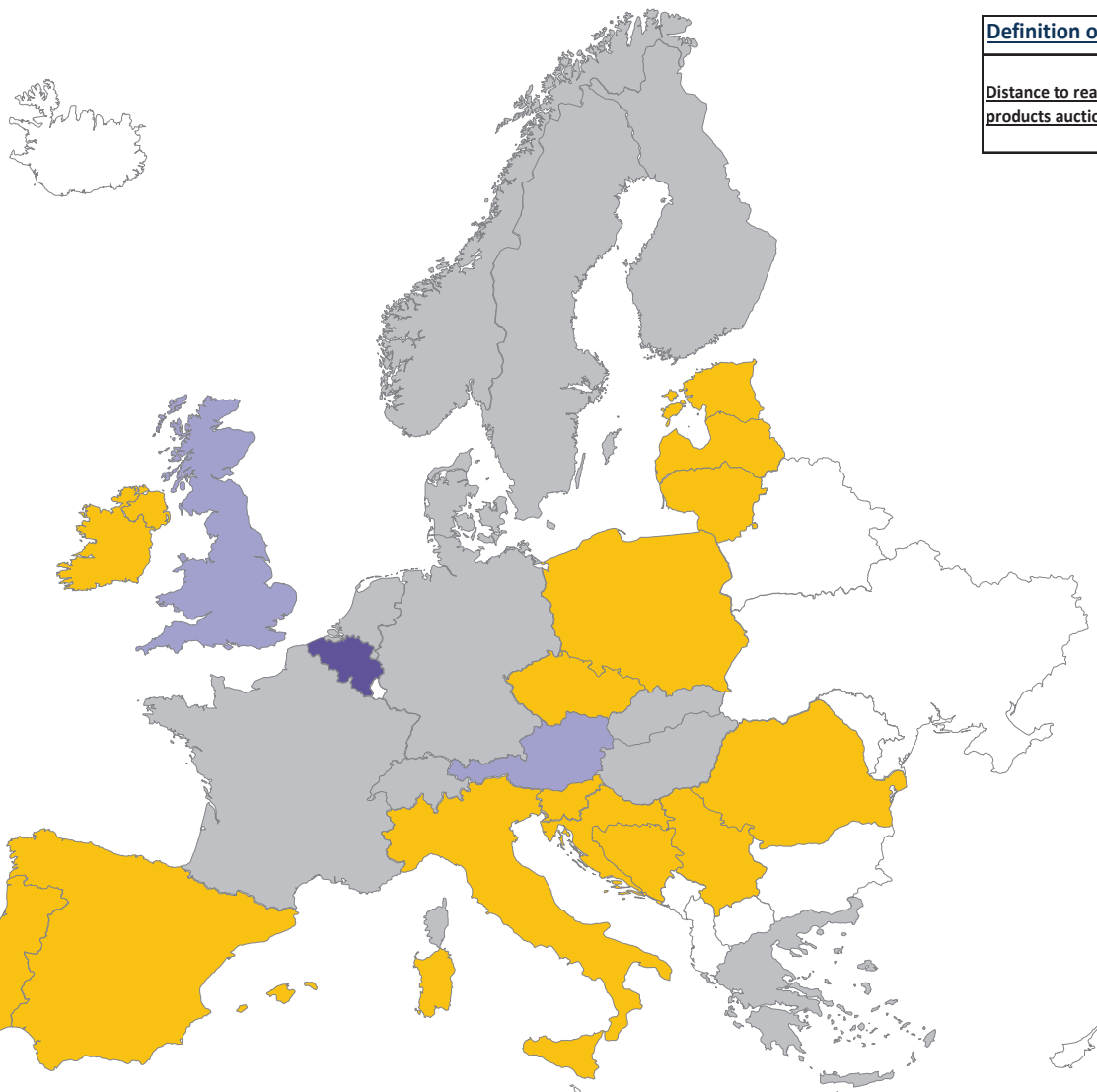
White	Missing data
Orange	N/A
Dark Blue	Year or more
Purple	Month(s)
Light Purple	Week(s)
Grey	Day(s)
Yellow	Hour(s)

# Frequency Containment Reserve - Capacity - Distance to real time of reserve products auctions

## Definition of question

### Distance to real time of reserve products auctions

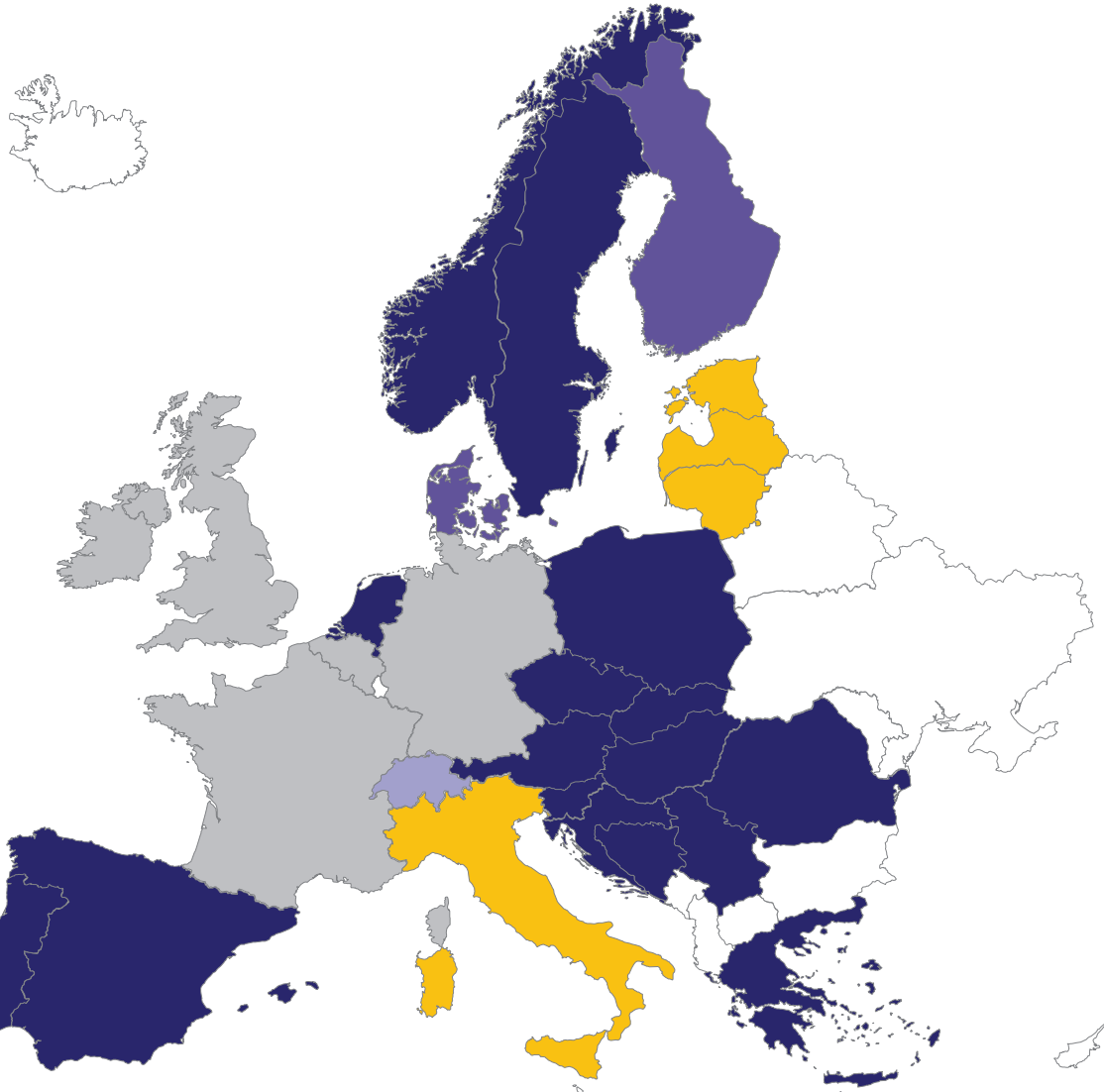
The time ahead from real time when auction/agreement for a specific balancing product takes place (for instance = 1 year in the case of a reserve agreement signed 1 year ahead of real time).



### Key:

White	Missing data
Yellow	N/A
Dark Blue	Year or more
Medium Blue	Month(s)
Light Blue	Week(s)
Grey	Day(s)

# Frequency Containment Reserve - Capacity - Provider



**Key:**

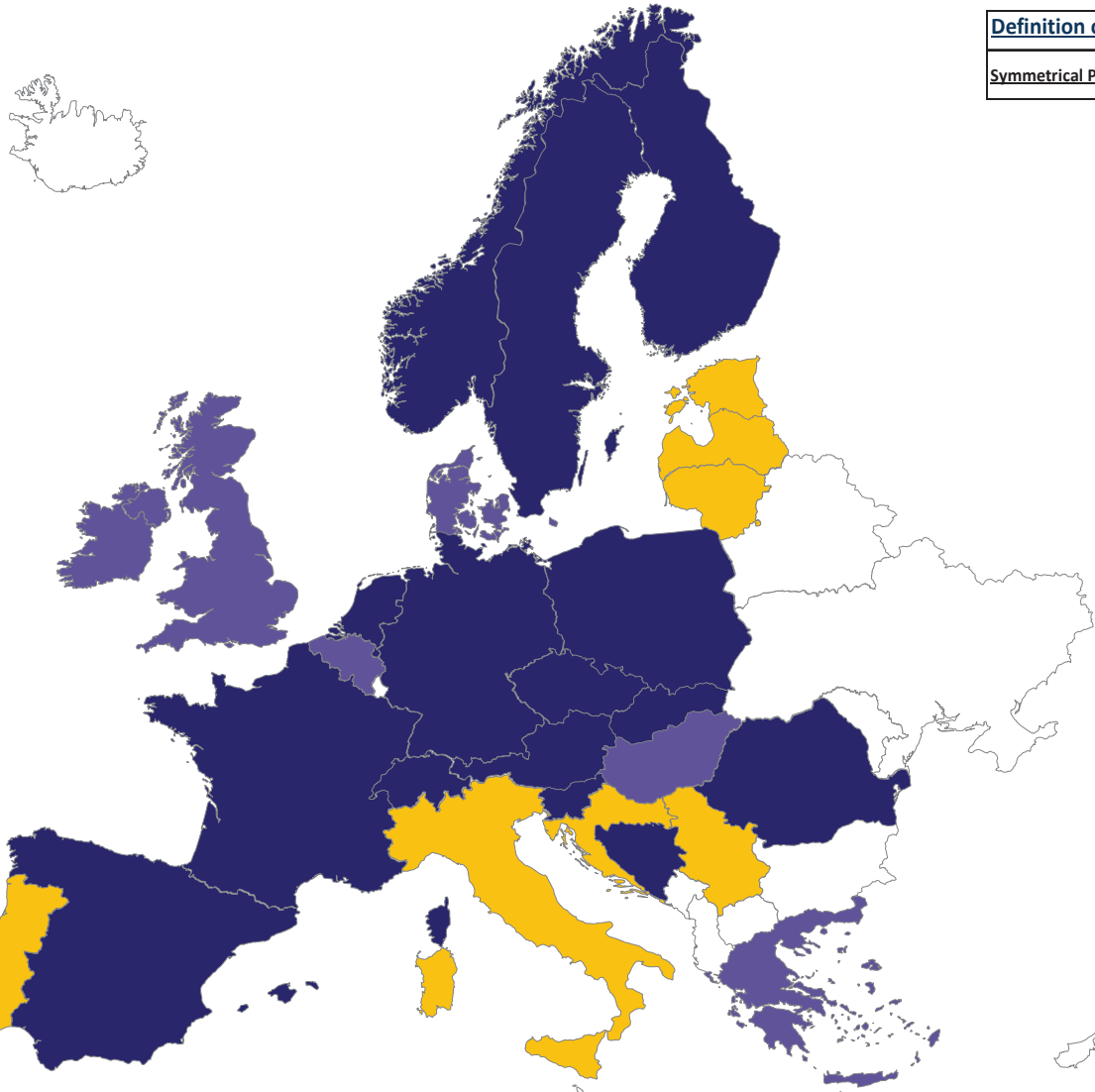
White	Missing data
Yellow	N/A
Dark Blue	Generators Only
Purple	Generators + Load
Light Blue	Generators + Pump Storage units pumping
Grey	Generators + Pump Storage units pumping + Load

# Frequency Containment Reserve - Capacity - Symmetrical Product

## Definition of question

**Symmetrical Product**

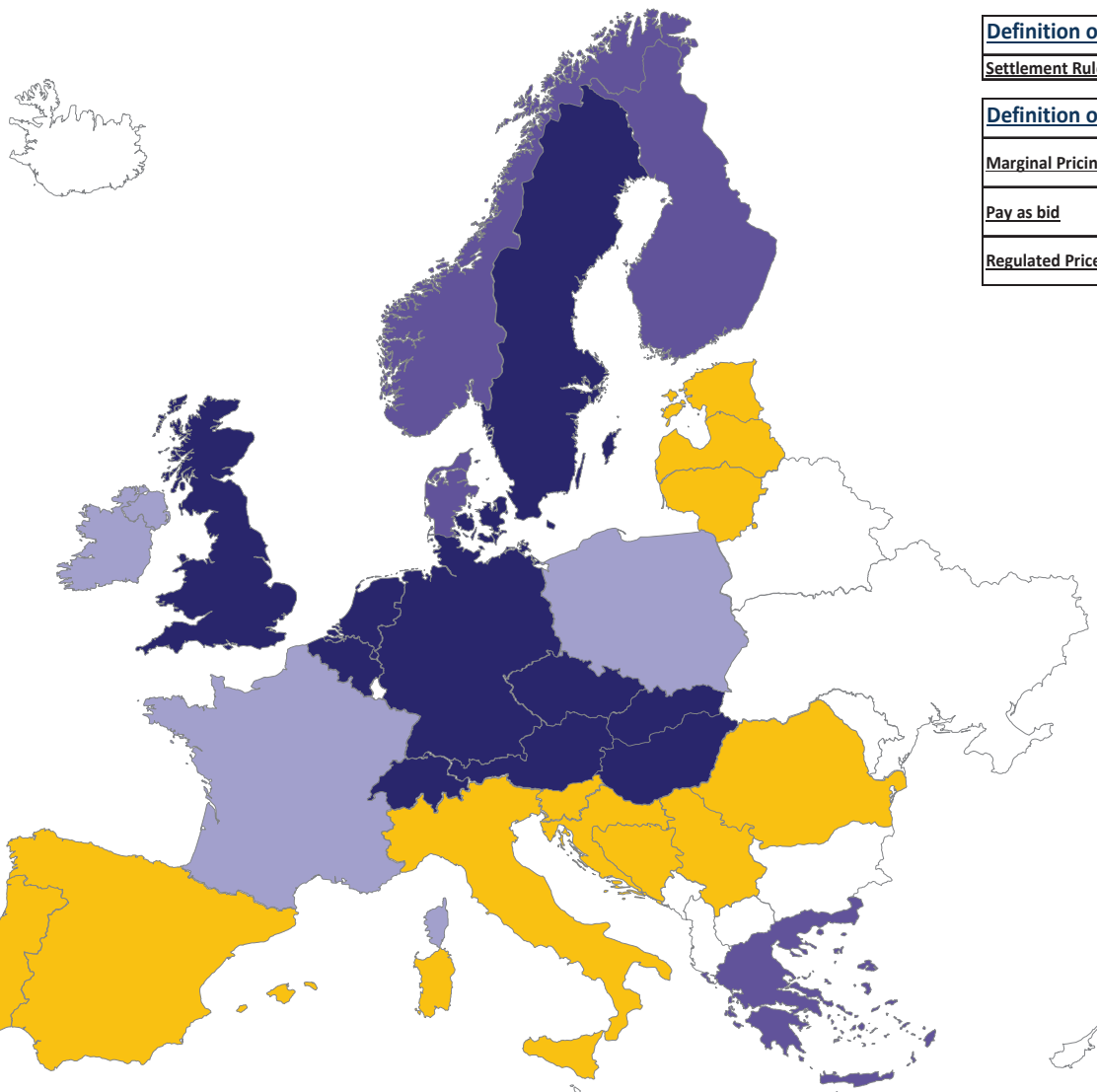
Upward regulation volume and for downward regulation volume has be equal.



### Key:

- Missing data
- N/A
- Has to be symmetrical
- Don't need to be symmetrical

## Frequency Containment Reserve - Capacity - Settlement Rule



### Definition of question

<b>Settlement Rule</b>	The pricing rules for settlement.
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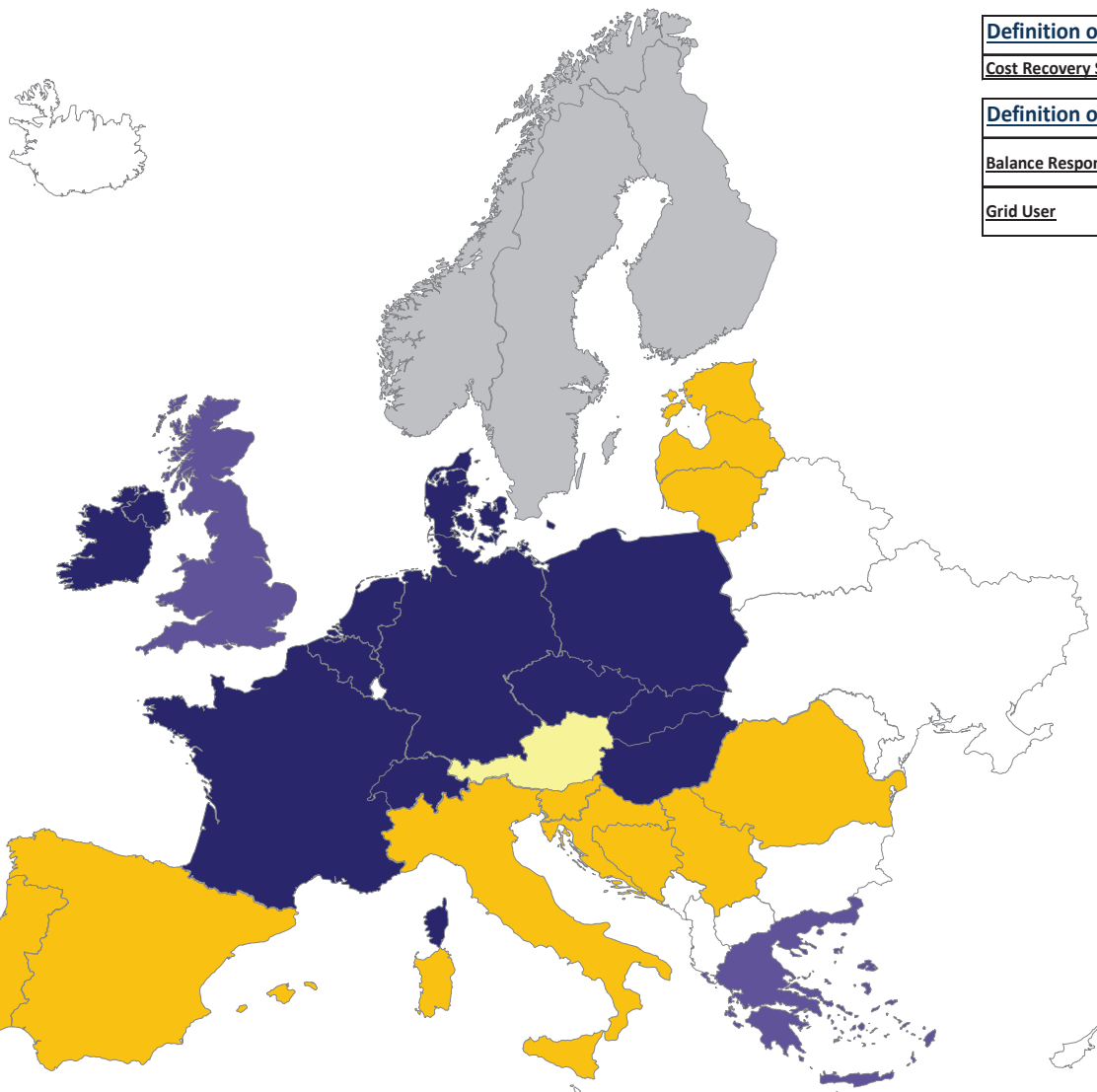
### Definition of answer

<b>Marginal Pricing</b>	Marginal pricing is the change in total cost that arises when the quantity produced changes by one unit.
<b>Pay as bid</b>	Contracted parties who provide a service are paid based on their offer price.
<b>Regulated Price</b>	Price for this service is based on a price that is set by the relevant regulatory authority.

### Key:

	Missing data
	N/A
	Pay as bid
	Marginal Pricing
	Regulated Price

## Frequency Containment Reserve - Capacity - Cost Recovery Scheme

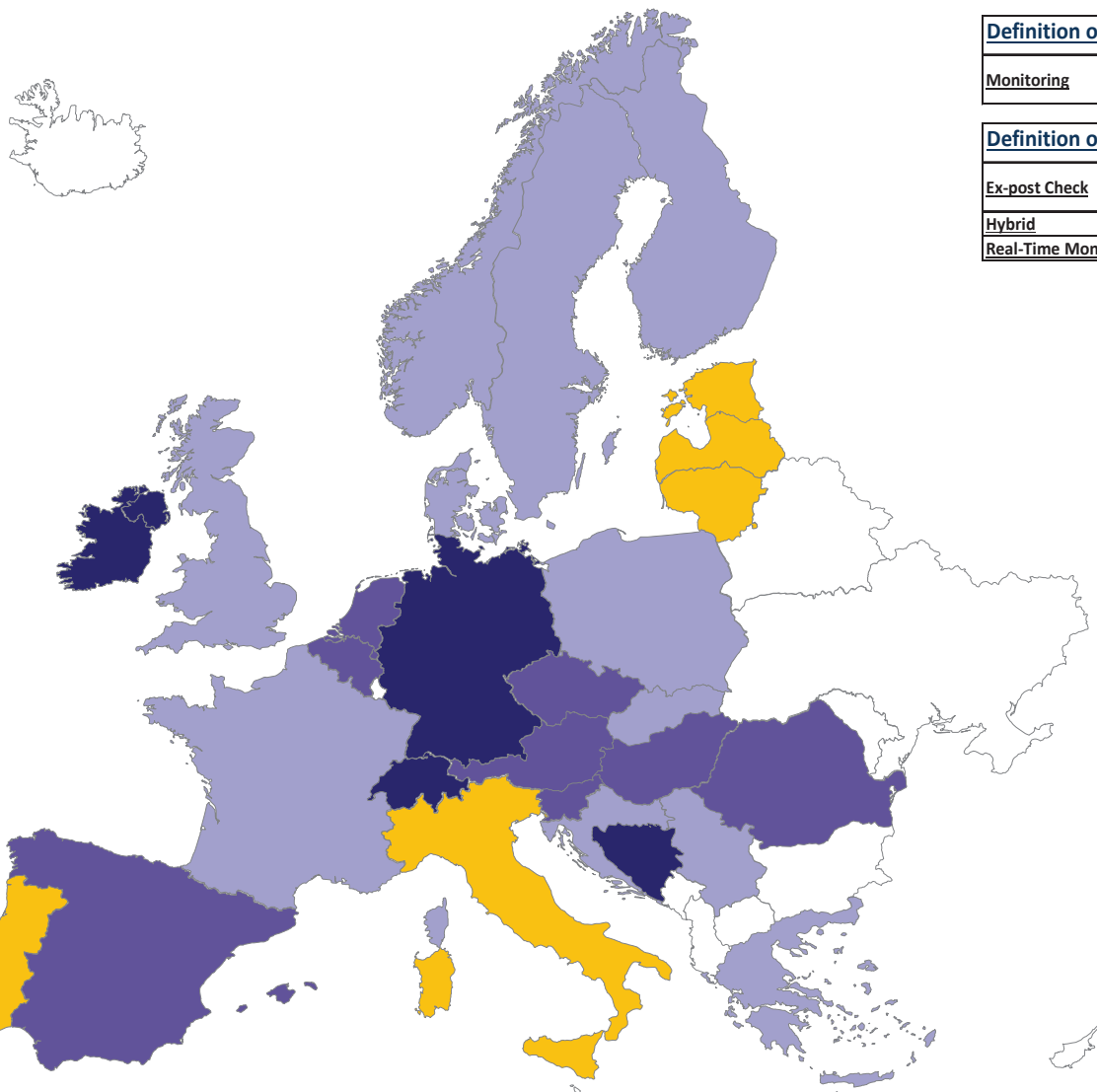


Definition of question	
<b>Cost Recovery Scheme</b>	From whom are the costs recovered.
Definition of answer	
<b>Balance Responsible Party (BRP)</b>	Balancing Responsible Party means a market participant or its chosen representative responsible for its Imbalances.
<b>Grid User</b>	The natural or legal person supplying to, or being supplied with active and/or reactive power by a TSO or DSO.

**Key:**

	Missing data
	N/A
	100% Grid Users
	100% BRP
	100% end consumers
	Mix of Grid Users and BRP
	Generators
	Consumers

## Frequency Containment Reserve - Capacity - Monitoring



### Definition of question

#### Monitoring

Refers to the type of monitoring in place by the system operator to ensure performance of plant.

### Definition of answer

#### Ex-post Check

When the monitoring of performance of plant carried out after the event.

#### Hybrid

Combination.

#### Real-Time Monitoring

Monitoring of delivery of ancillary services in real time.

### Key:



Missing data

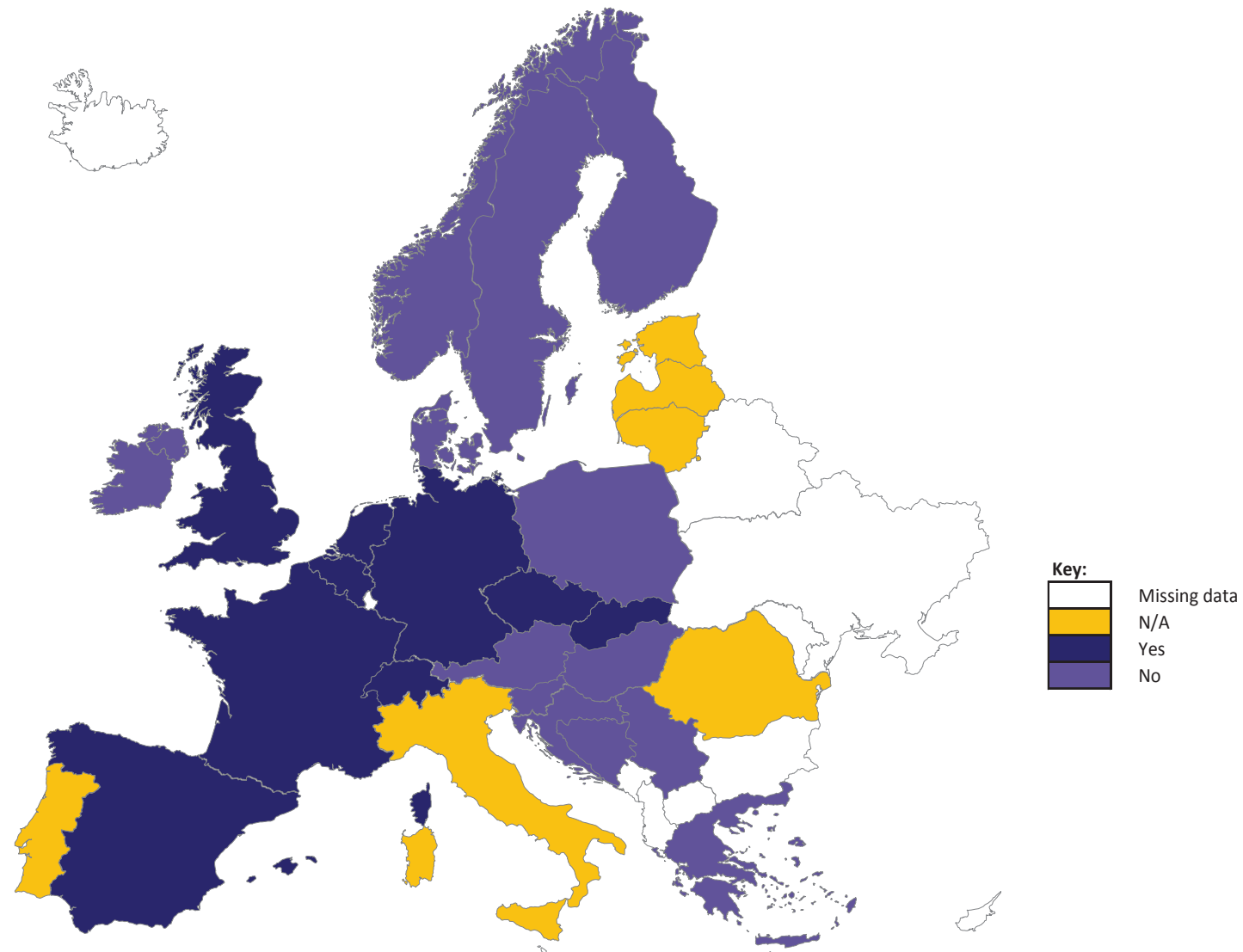
N/A

Real-Time Monitoring

Ex-Post Check

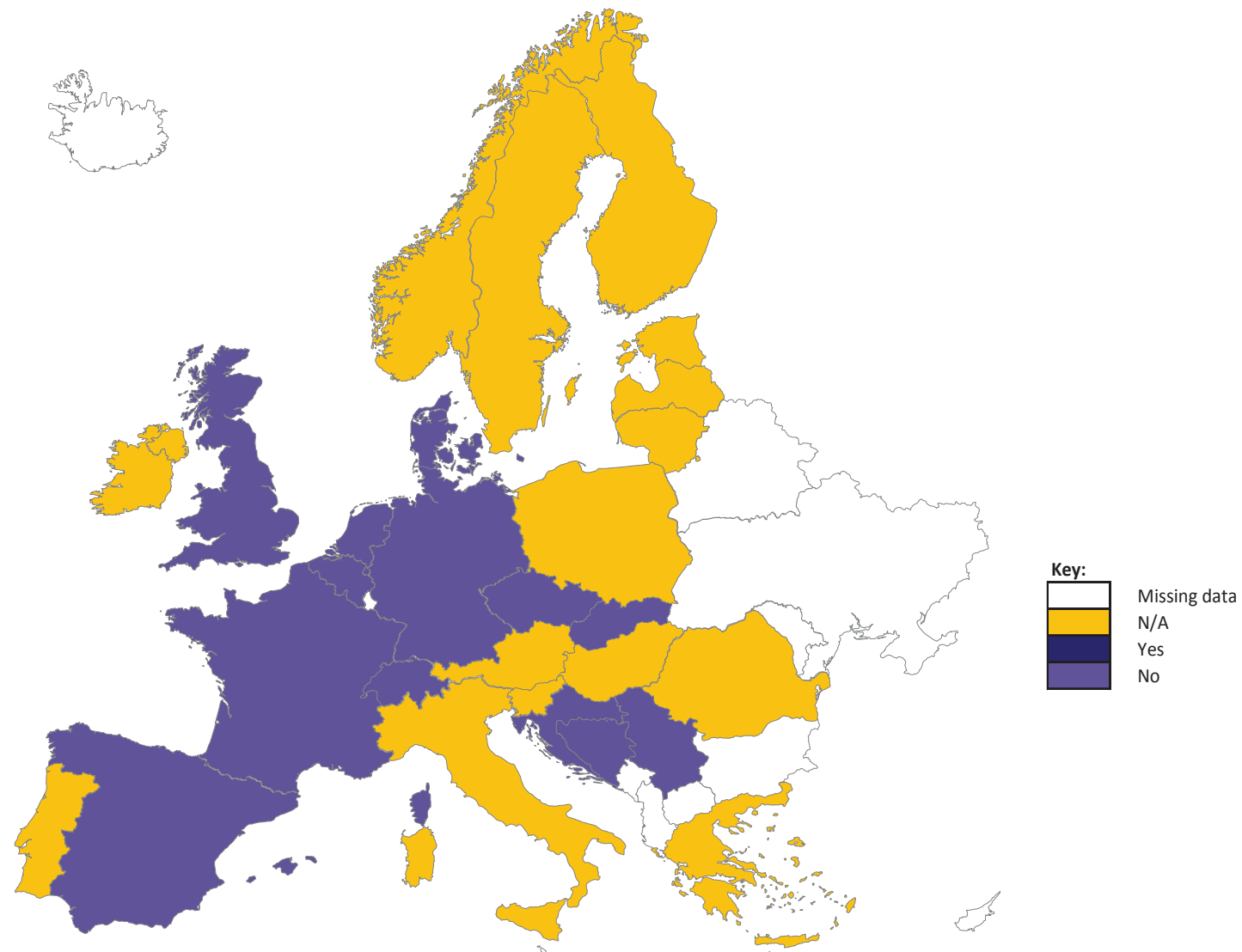
Hybrid

# Frequency Containment Reserve - Capacity - Transfer of obligation allowed

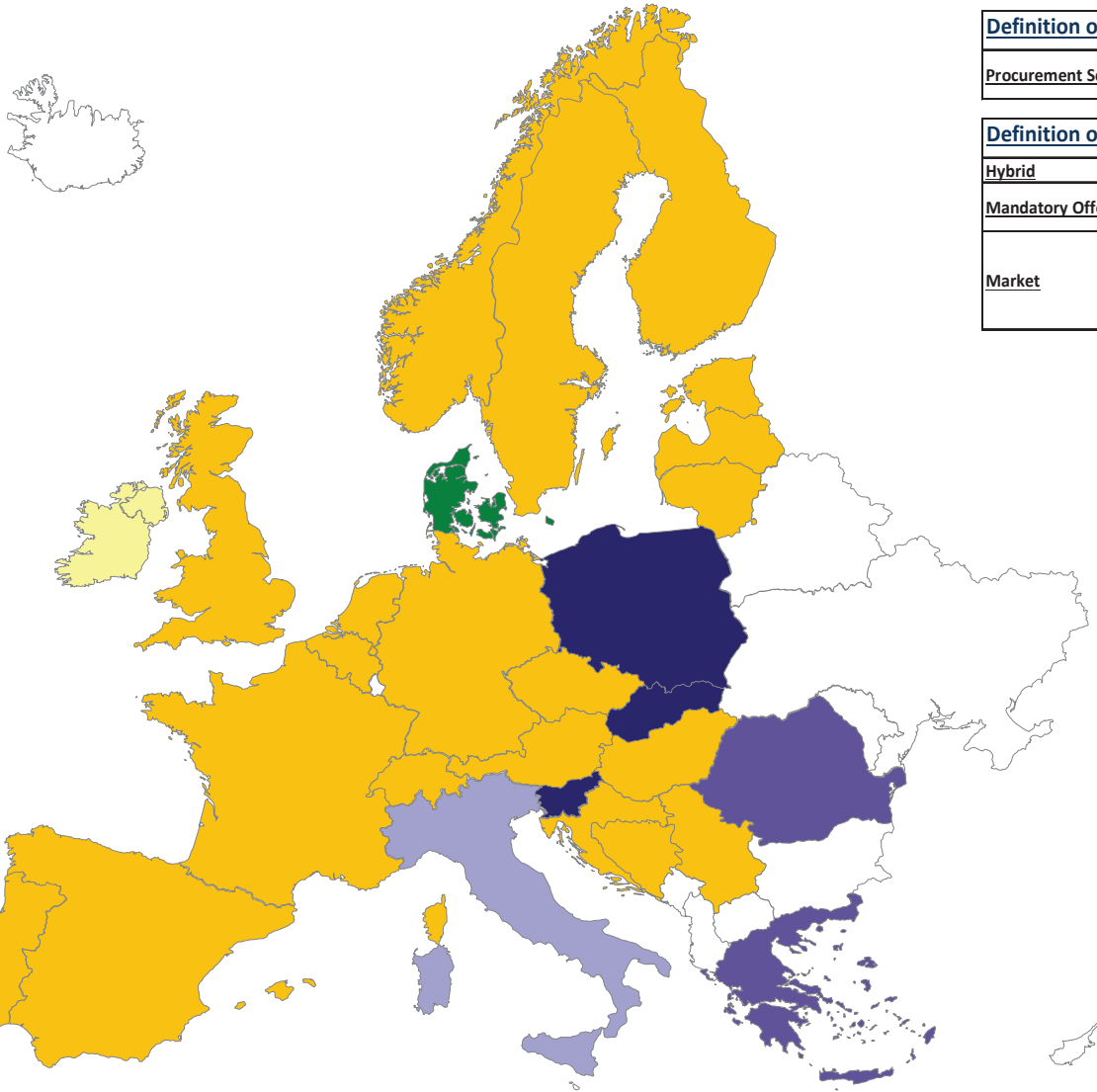




# Frequency Containment Reserve - Capacity - Obl. allowed, organised secondary market exists



## Frequency Containment Reserve - Energy - Procurement Scheme



<u>Definition of question</u>	
<u>Procurement Scheme</u>	Background of the offer, which is closest to the real operation time.
<u>Definition of answer</u>	
<u>Hybrid</u>	Combination.
<u>Mandatory Offers</u>	Generators connected to the grid are obligated to offer the remaining capacity/available capacity.
<u>Market</u>	There is no contract or obligation for a grid user to offer the energy (before the offer). The grid user can voluntary participate in the real-time energy market and bid a price or customize his offer (e.g. the volume, timeframe).

**Key:**

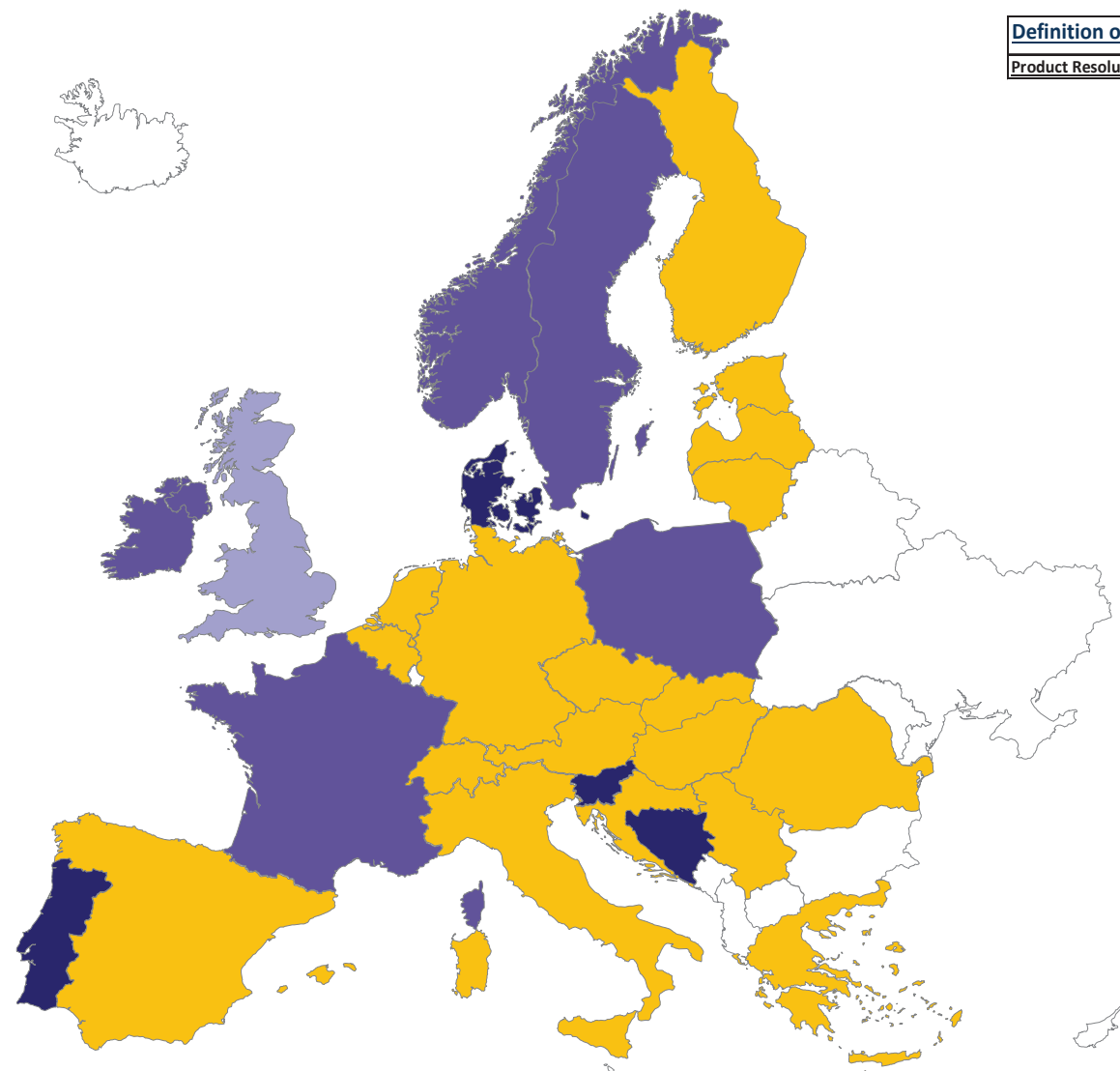
	Missing data
	N/A
	Mandatory Offers
	Mandatory Provision
	Mandatory Provision without Reservation
	Bilateral Market
	Organised Market
	Hybrid
	Other
	Pre-contracted Offers only
	Pre-contracted and Mandatory Offers
	Pre-contracted and Free Offers

## Frequency Containment Reserve - Energy - Product Resolution (in MW)

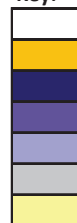
### Definition of question

#### Product Resolution (in MW)

The minimum bid size into the balancing market.



### Key:



Missing data

N/A

No minimum bid size

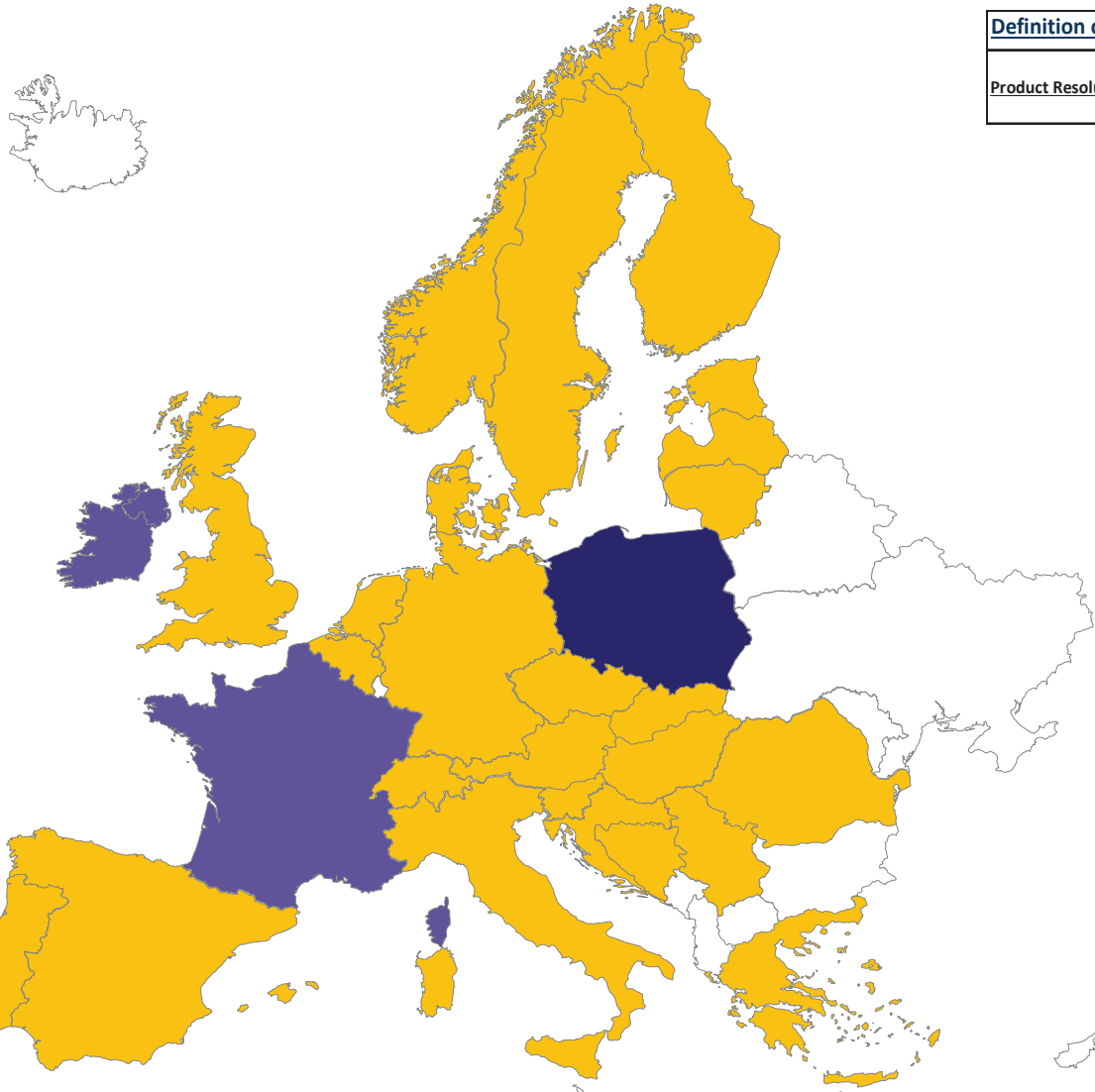
$x \leq 1$  MW

$1 \text{ MW} < x \leq 5$  MW

$5 \text{ MW} < x \leq 10$  MW

$x > 10$  MW

## Frequency Containment Reserve - Energy - Product Resolution (in time)



### Definition of question

#### Product Resolution (in time)

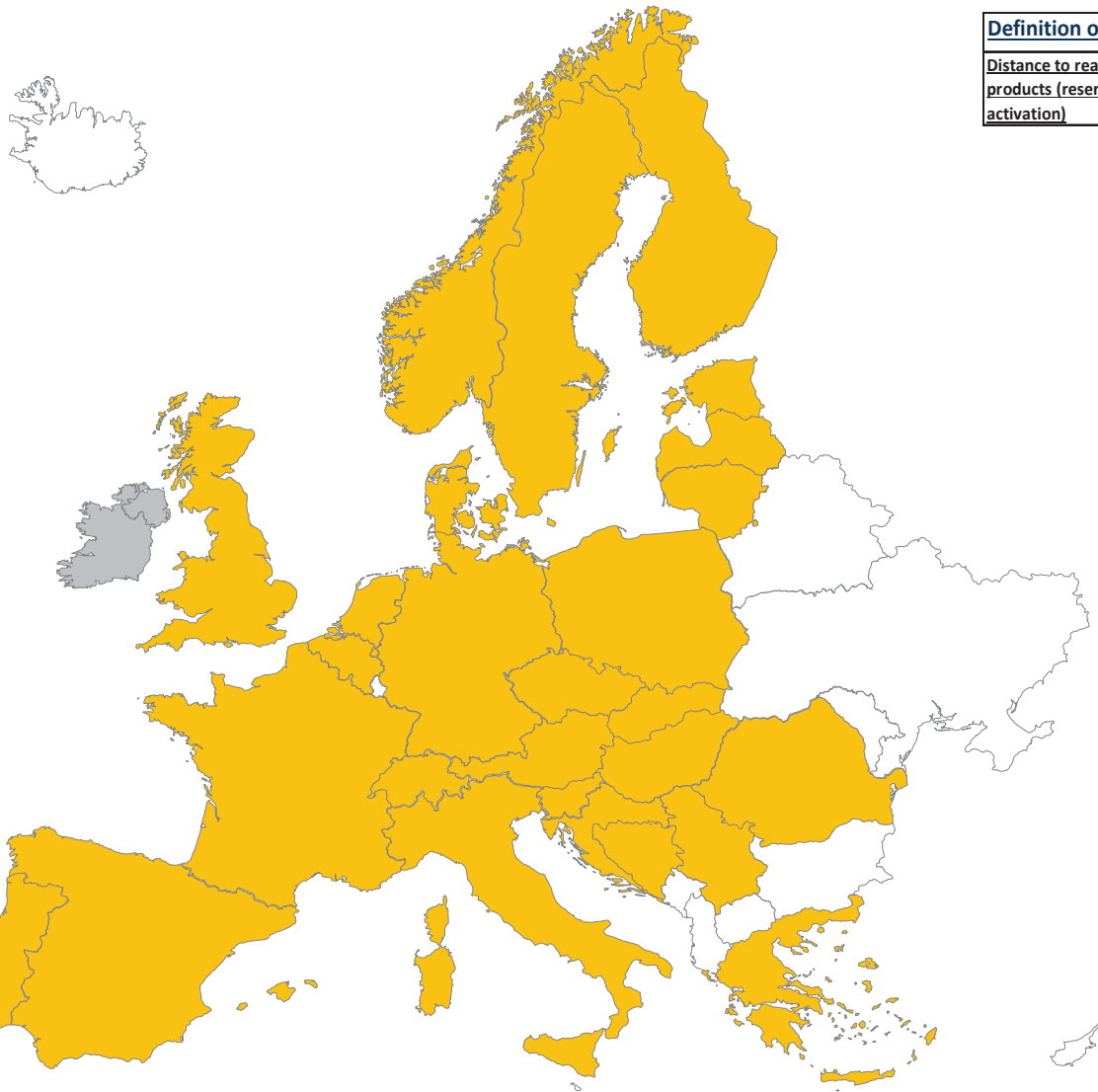
The maximum resolution for which the product can be bid into the market (for instance =1 hour in the case of a 24 auctions day ahead market for reserve provision).

#### Key:



Missing data  
N/A  
Hour (or blocks)  
30 minutes  
15 minutes

## Frequency Containment Reserve - Energy - Distance to real time of energy products



### Definition of question

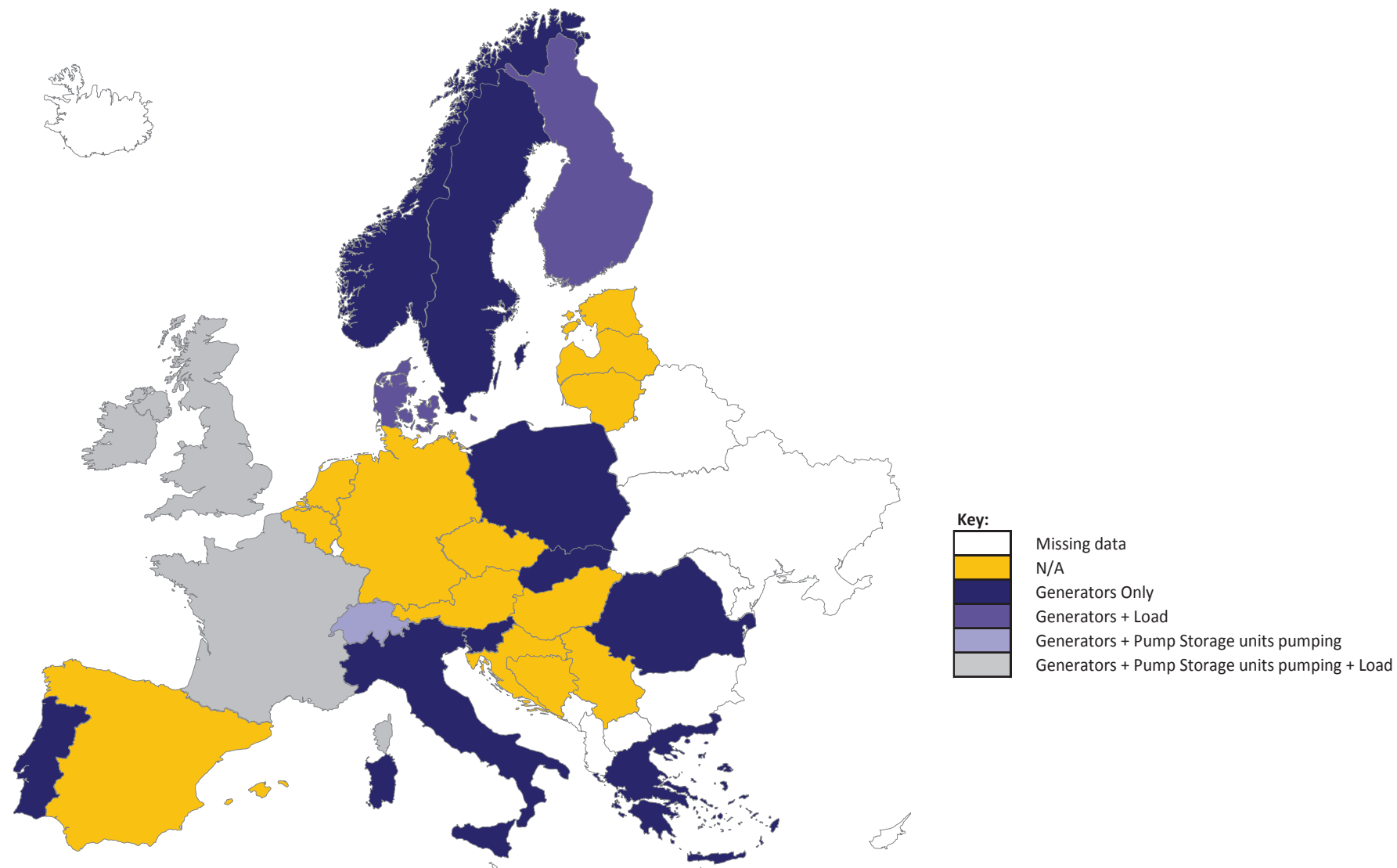
Distance to real time of energy products (reserve products activation)

The time ahead from real time when TSO activates a given product (for instance 15 minutes in the case of mFRR/tertiary energy).

### Key:

Missing data
N/A
$x > D-1$
D-1
$x > H-1$
$x \leq H-1$

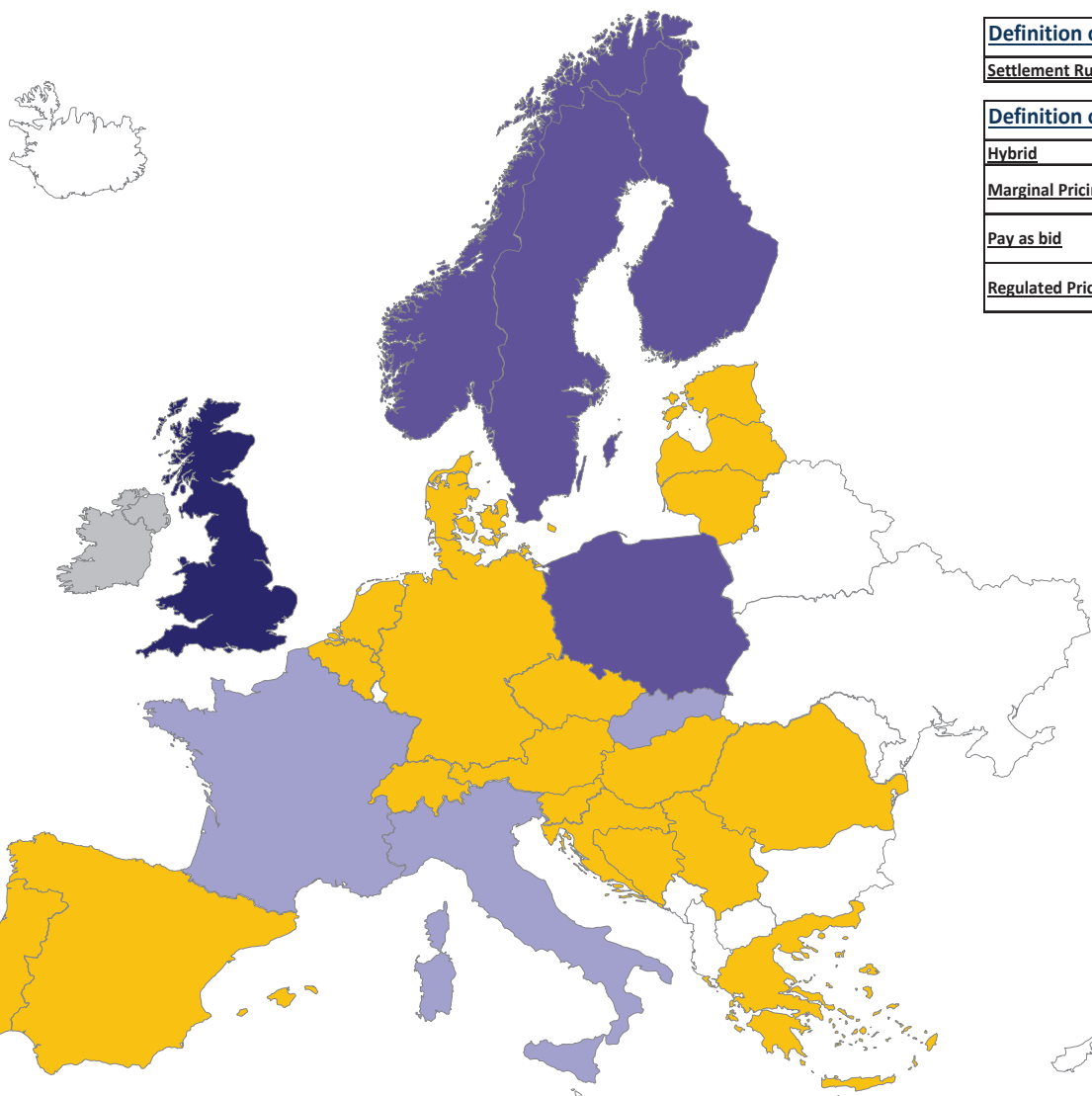
# Frequency Containment Reserve - Energy - Provider



**Key:**

- Missing data
- N/A
- Generators Only
- Generators + Load
- Generators + Pump Storage units pumping
- Generators + Pump Storage units pumping + Load

# Frequency Containment Reserve - Energy - Settlement Rule



<b>Definition of question</b>	
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<b>Settlement Rule</b>	The pricing rules for settlement.
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<b>Definition of answer</b>	
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
<b>Hybrid</b>	Combination.
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<b>Marginal Pricing</b>	Marginal pricing is the change in total cost that arises when the quantity produced changes by one unit.
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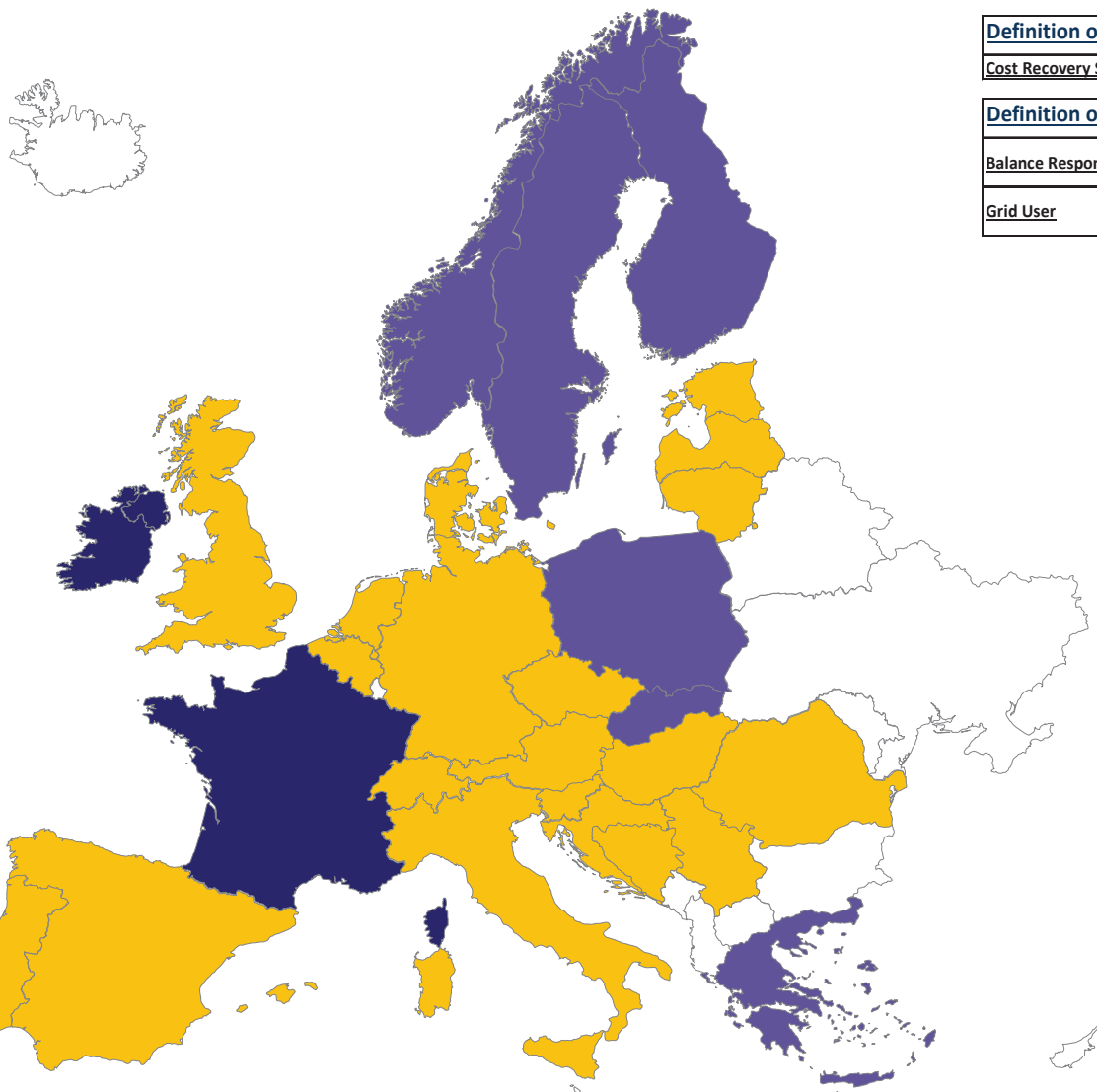
<b>Pay as bid</b>	Contracted parties who provide a service are paid based on their offer price.
-------------------	-------------------------------------------------------------------------------

<b>Regulated Price</b>	Price for this service is based on a price that is set by the relevant regulatory authority.
------------------------	----------------------------------------------------------------------------------------------

**Key:**

-  Missing data
-  N/A
-  Pay as bid
-  Marginal Pricing
-  Regulated Price
-  Hybrid

## Frequency Containment Reserve - Energy - Cost Recovery Scheme



### Definition of question

#### Cost Recovery Scheme

From whom are the costs recovered.

### Definition of answer

#### Balance Responsible Party (BRP)

Balancing Responsible Party means a market participant or its chosen representative responsible for its Imbalances.

#### Grid User

The natural or legal person supplying to, or being supplied with active and/or reactive power by a TSO or DSO.

### Key:



Missing data

N/A

100% Grid Users

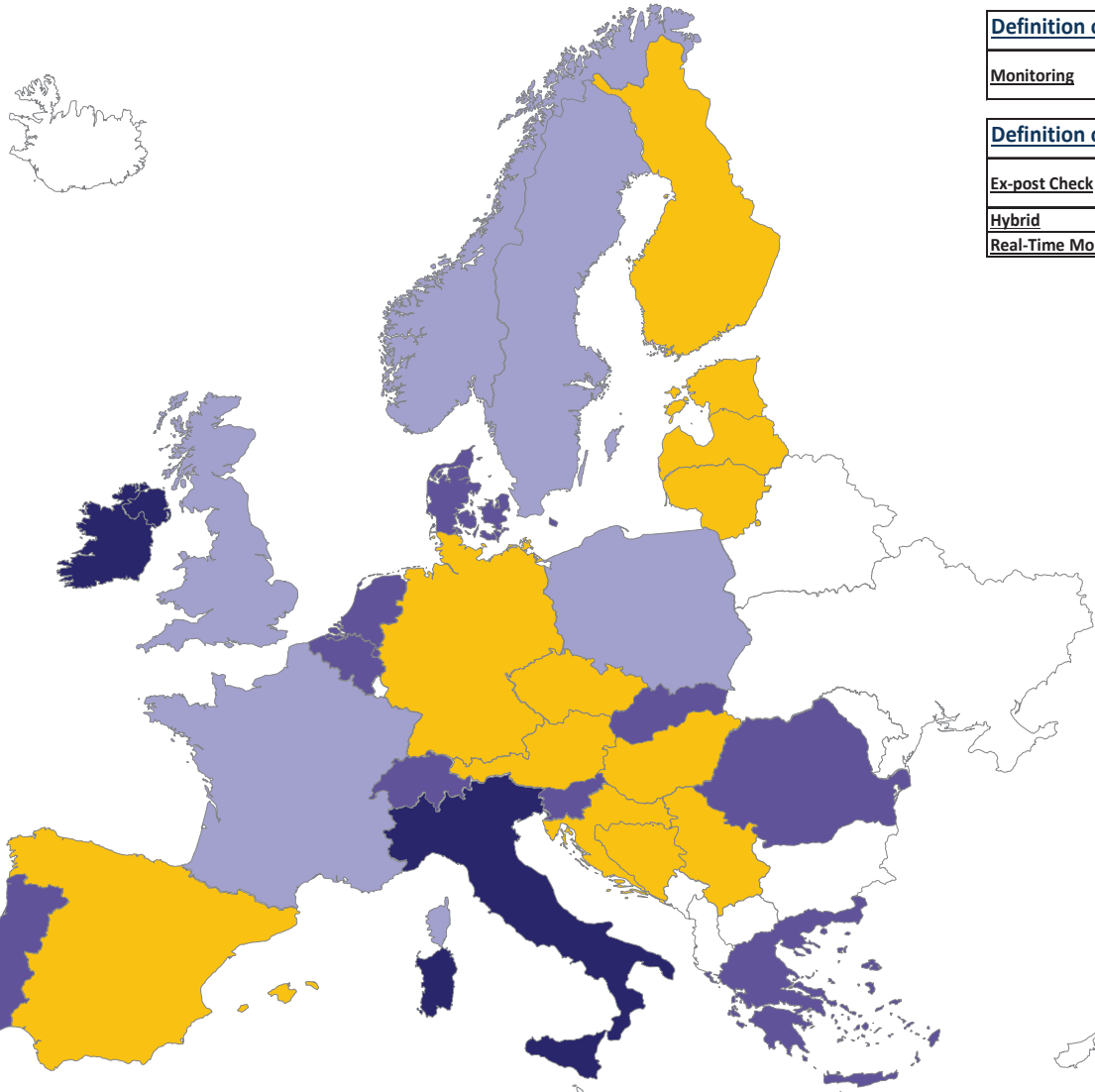
100% BRP

100% end consumers

Mix of Grid Users and BRP








## Frequency Containment Reserve - Energy - Monitoring



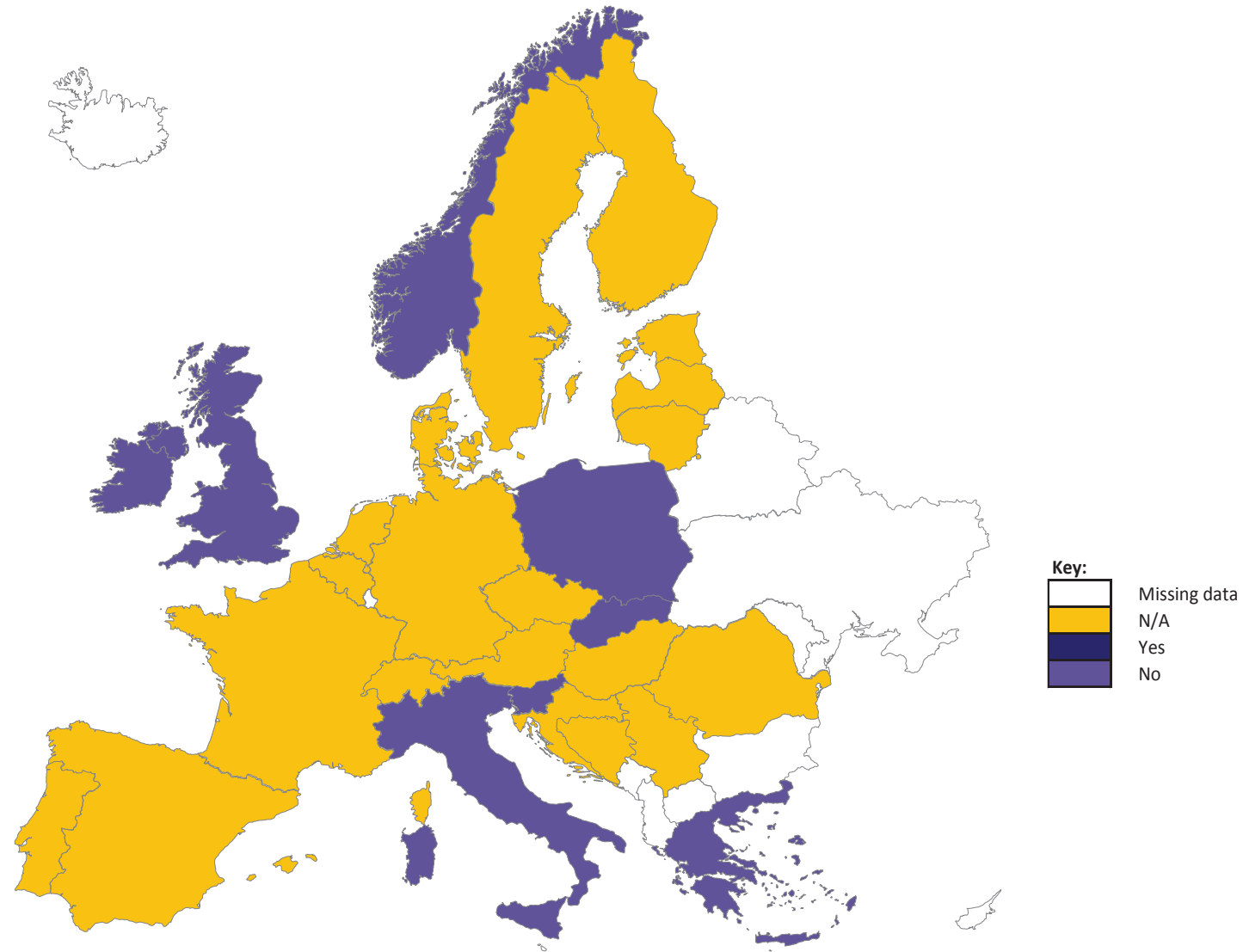
<u>Definition of question</u>	
<b>Monitoring</b>	Refers to the type of monitoring in place by the system operator to ensure performance of plant.

<u>Definition of answer</u>	
<b>Ex-post Check</b>	When the monitoring of performance of plant carried out after the event.
<b>Hybrid</b>	Combination.
<b>Real-Time Monitoring</b>	Monitoring of delivery of ancillary services in real time.

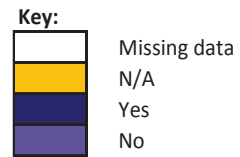
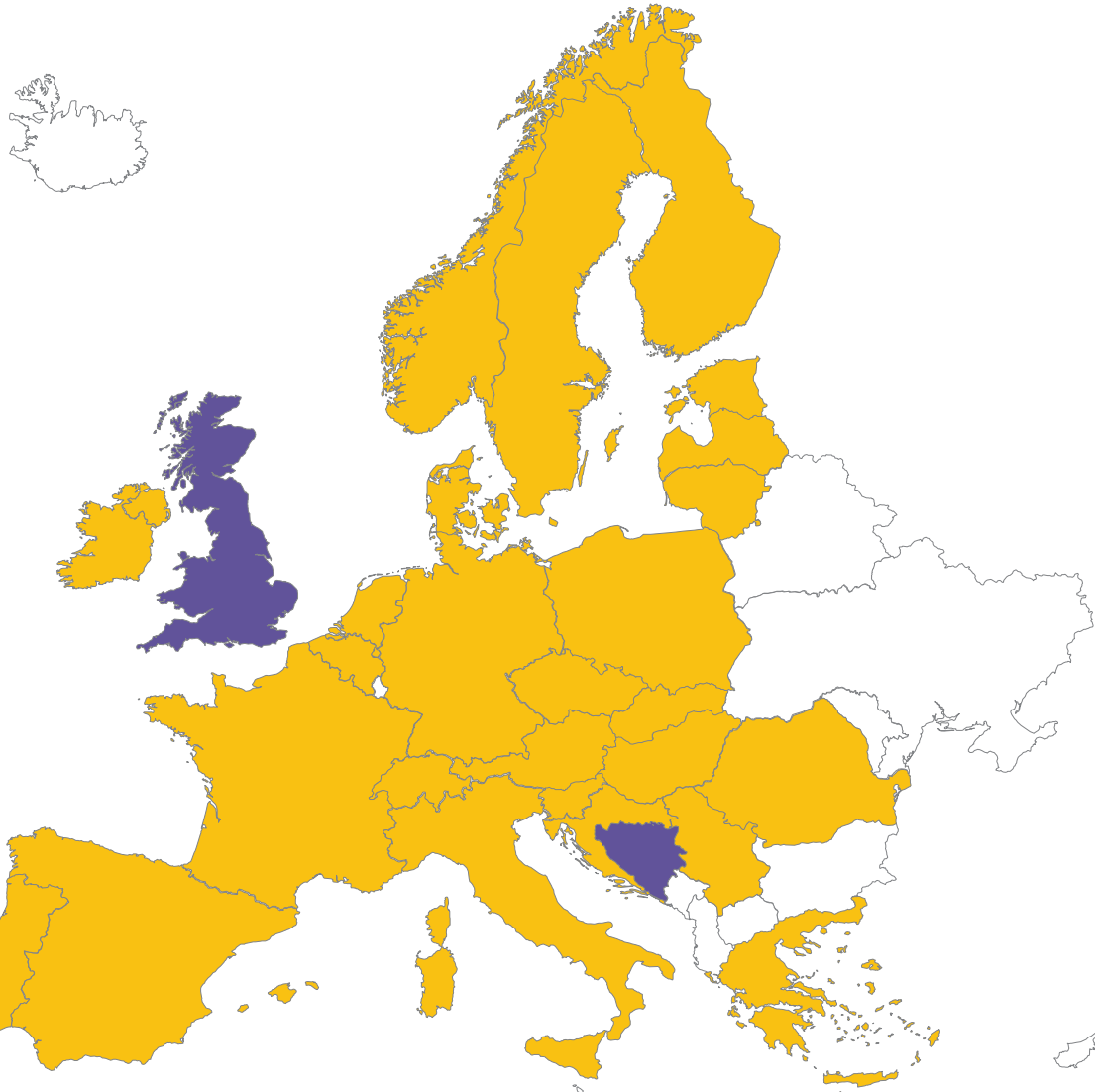
**Key:**

	Missing data
	N/A
	Real-Time Monitoring
	Ex-Post Check
	Hybrid

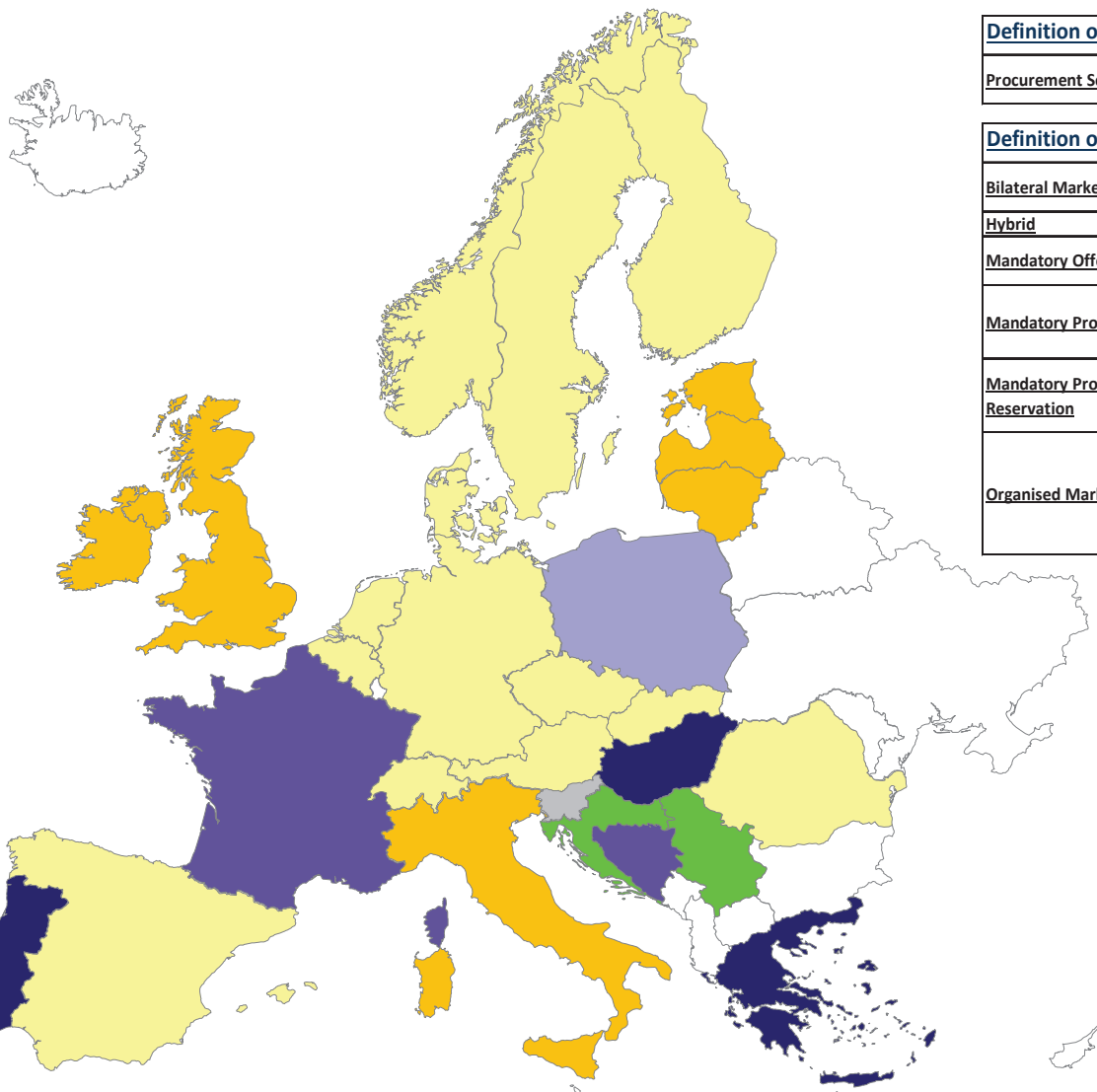
## Frequency Containment Reserve - Energy - Transfer of obligation allowed



# Frequency Containment Reserve - Energy - Obl. allowed, organised secondary market exists



## Frequency Restoration Reserve (Automatic) - Capacity - Procurement Scheme



<u>Definition of question</u>	
<u>Procurement Scheme</u>	Background of the offer, which is closest to the real operation time.
<u>Definition of answer</u>	
<u>Bilateral Market</u>	A grid user and TSO negotiate a contract regarding the offered service and price/price system.
<u>Hybrid</u>	Combination.
<u>Mandatory Offers</u>	Generators connected to the grid are obligated to offer the remaining capacity/available capacity.
<u>Mandatory Provision</u>	Generators connected to the grid are obligated to reserve a certain amount of capacity in order to meet TSO requirements, for a fixed price set by TSO, NRA or for free.
<u>Mandatory Provision without Reservation</u>	It is mandatory for dispatchable units to be able to provide frequency containment reserve, but these units are not required to reserve capacity to provide this service.
<u>Organised Market</u>	There is no contract or obligation for a grid user to offer the reserve (before the offer). The grid user can voluntary participate in the market (e.g. tender, auction, market platform (like PX)) and bid a price or customize his offer (e.g. the volume, timeframe). The market result may lead to a bilateral contract.

### Key:

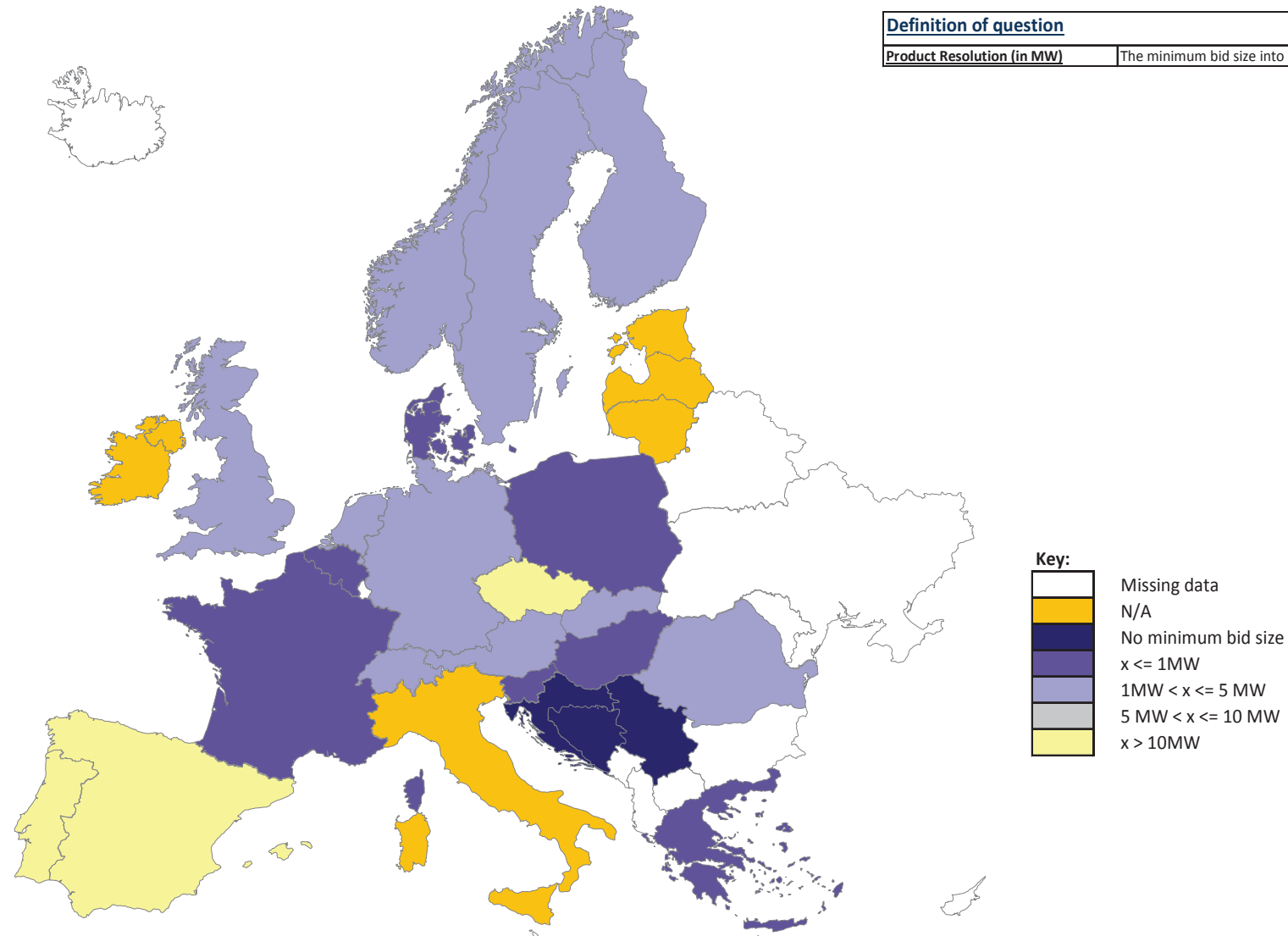
	Missing data
	N/A
	Mandatory Offers
	Mandatory Provision
	Mandatory Provision without Reservation
	Bilateral Market
	Organised Market
	Hybrid
	Other
	Pre-contracted Offers only
	Pre-contracted and Mandatory Offers
	Pre-contracted and Free Offers

## Frequency Restoration Reserve (Automatic) - Capacity - Product Resolution (in MW)

### Definition of question

**Product Resolution (in MW)**

The minimum bid size into the balancing market.



### Key:



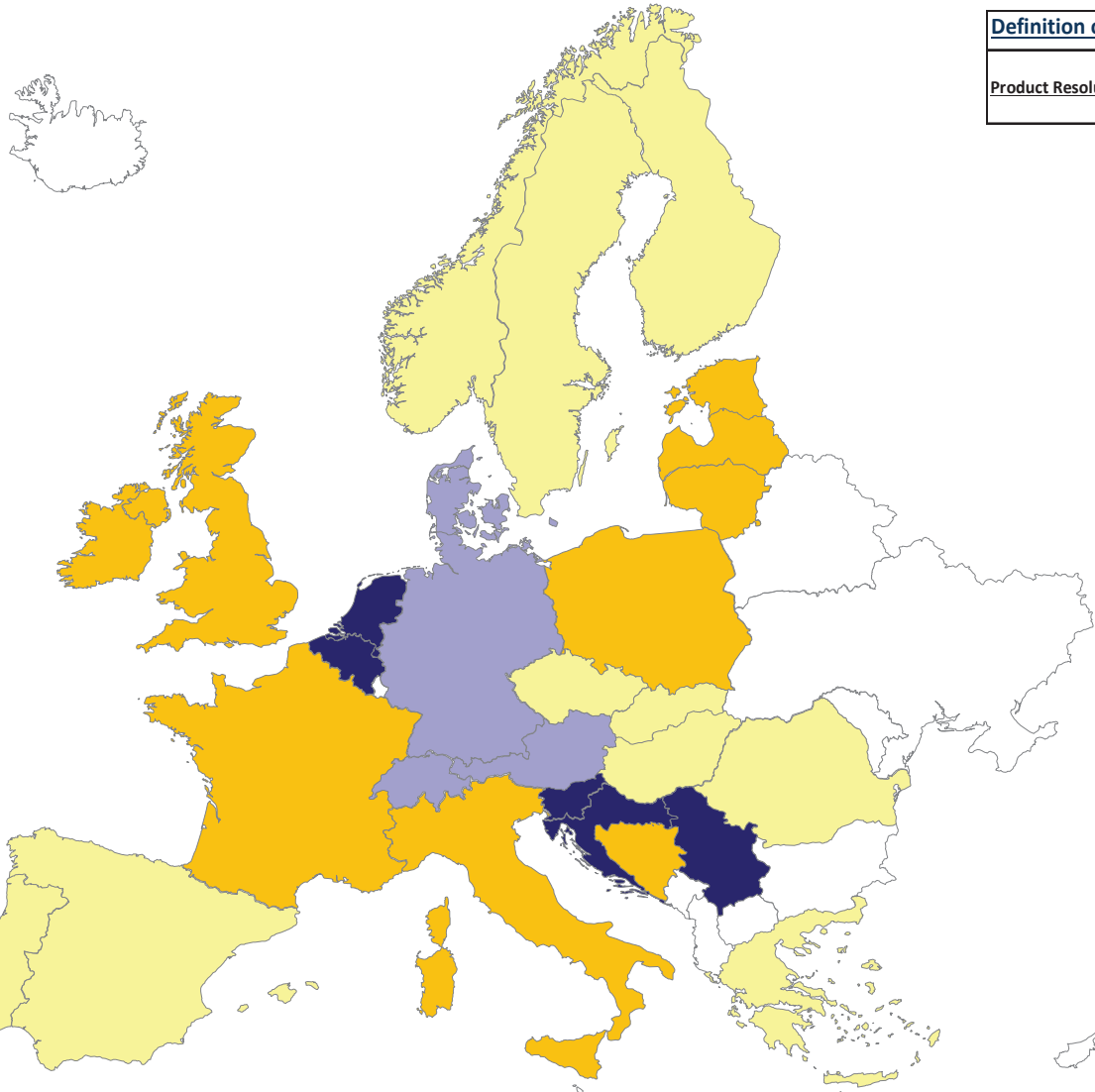
- Missing data
- N/A
- No minimum bid size
- $x \leq 1\text{MW}$
- $1\text{MW} < x \leq 5\text{MW}$
- $5\text{MW} < x \leq 10\text{MW}$
- $x > 10\text{MW}$

## Frequency Restoration Reserve (Automatic) - Capacity - Product Resolution (in time)

### Definition of question

### Product Resolution (in time)

The maximum resolution for which the product can be bid into the market (for instance =1 hour in the case of a 24 auctions day ahead market for reserve provision).



### Key:

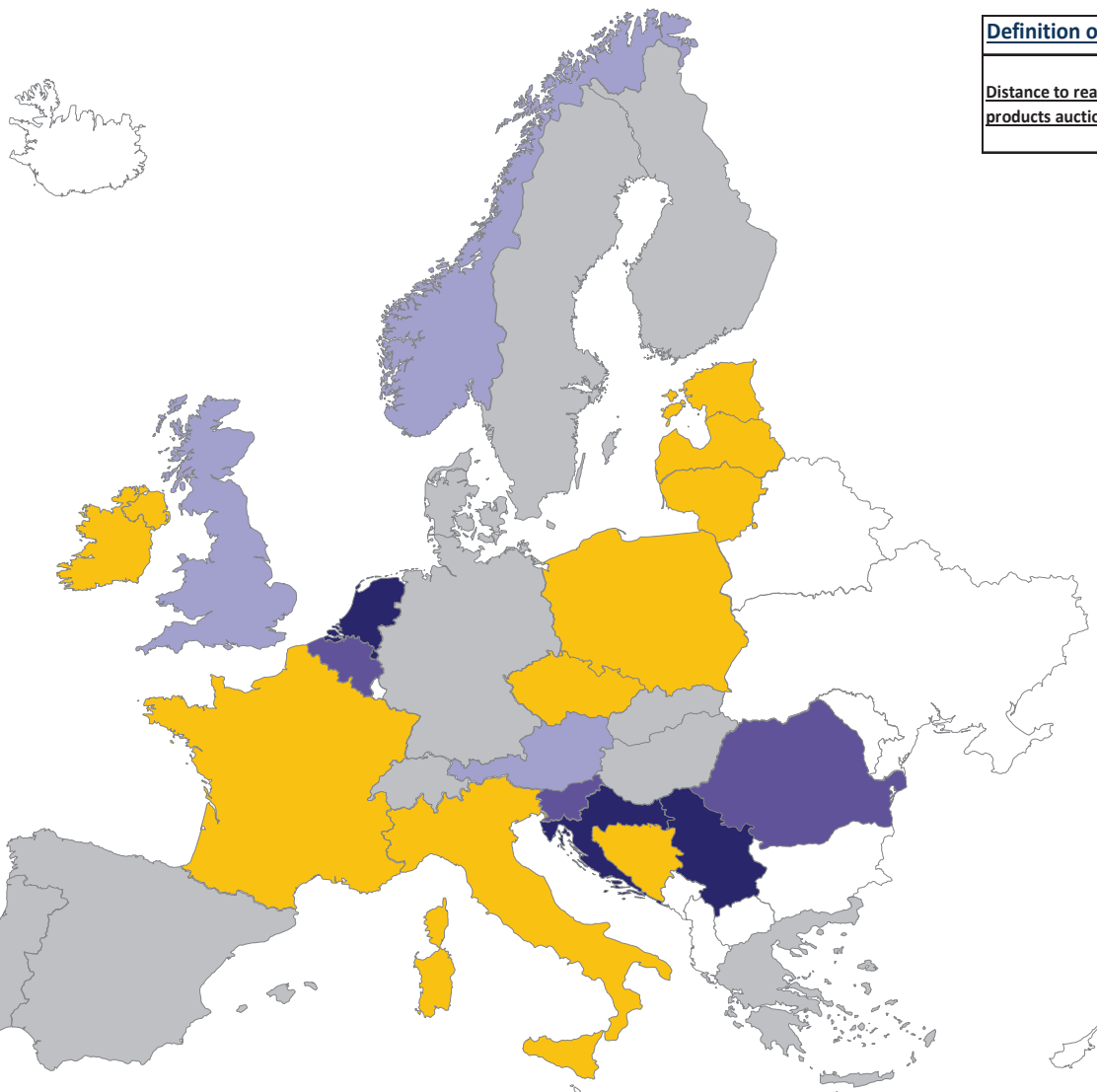
	Missing data
	N/A
	Year or more
	Month(s)
	Week(s)
	Day(s)
	Hour(s)

# Frequency Restoration Reserve (Automatic) - Capacity - Distance to real time of reserve products auctions

## Definition of question

### Distance to real time of reserve products auctions

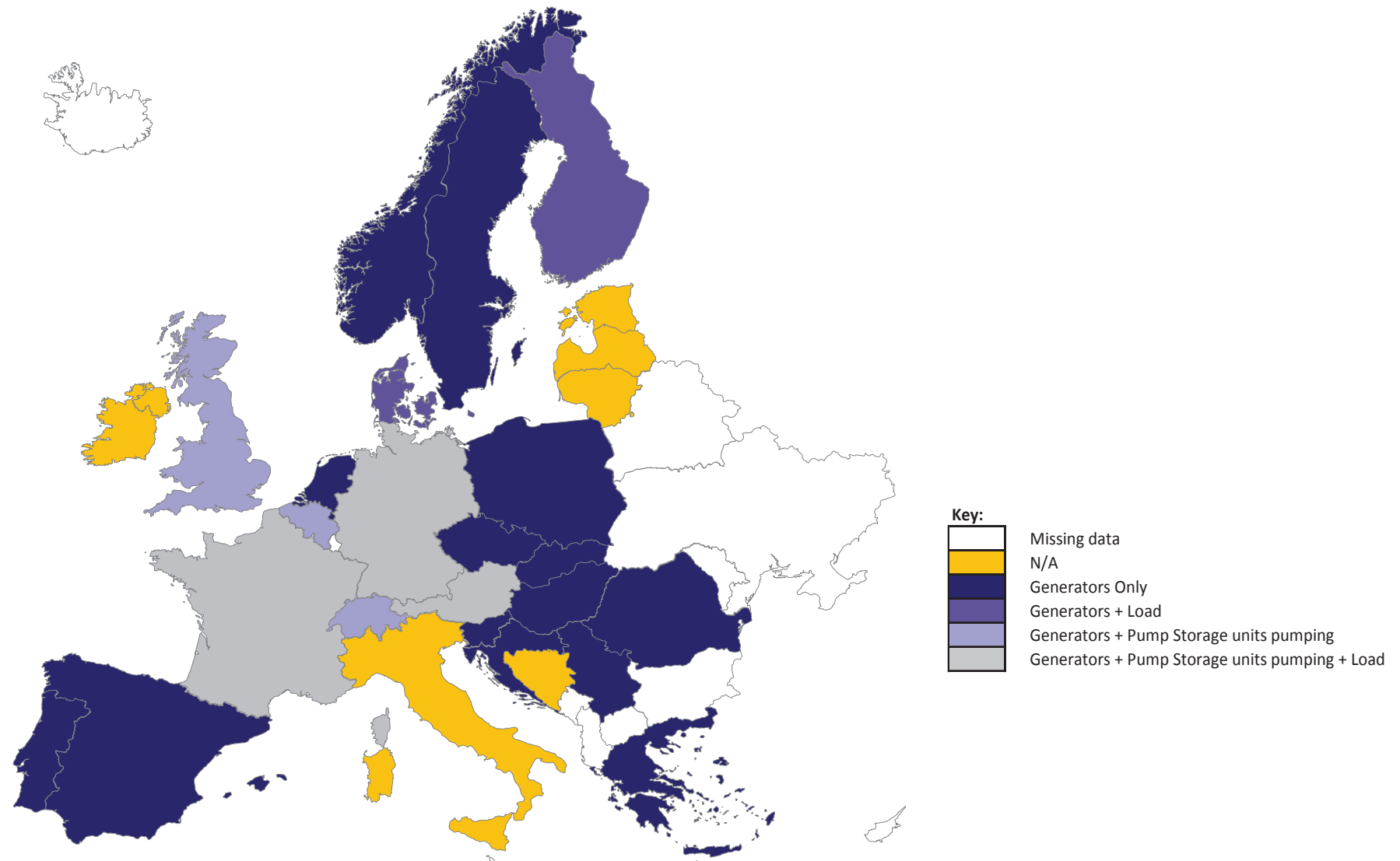
The time ahead from real time when auction/agreement for a specific balancing product takes place (for instance = 1 year in the case of a reserve agreement signed 1 year ahead of real time).



### Key:

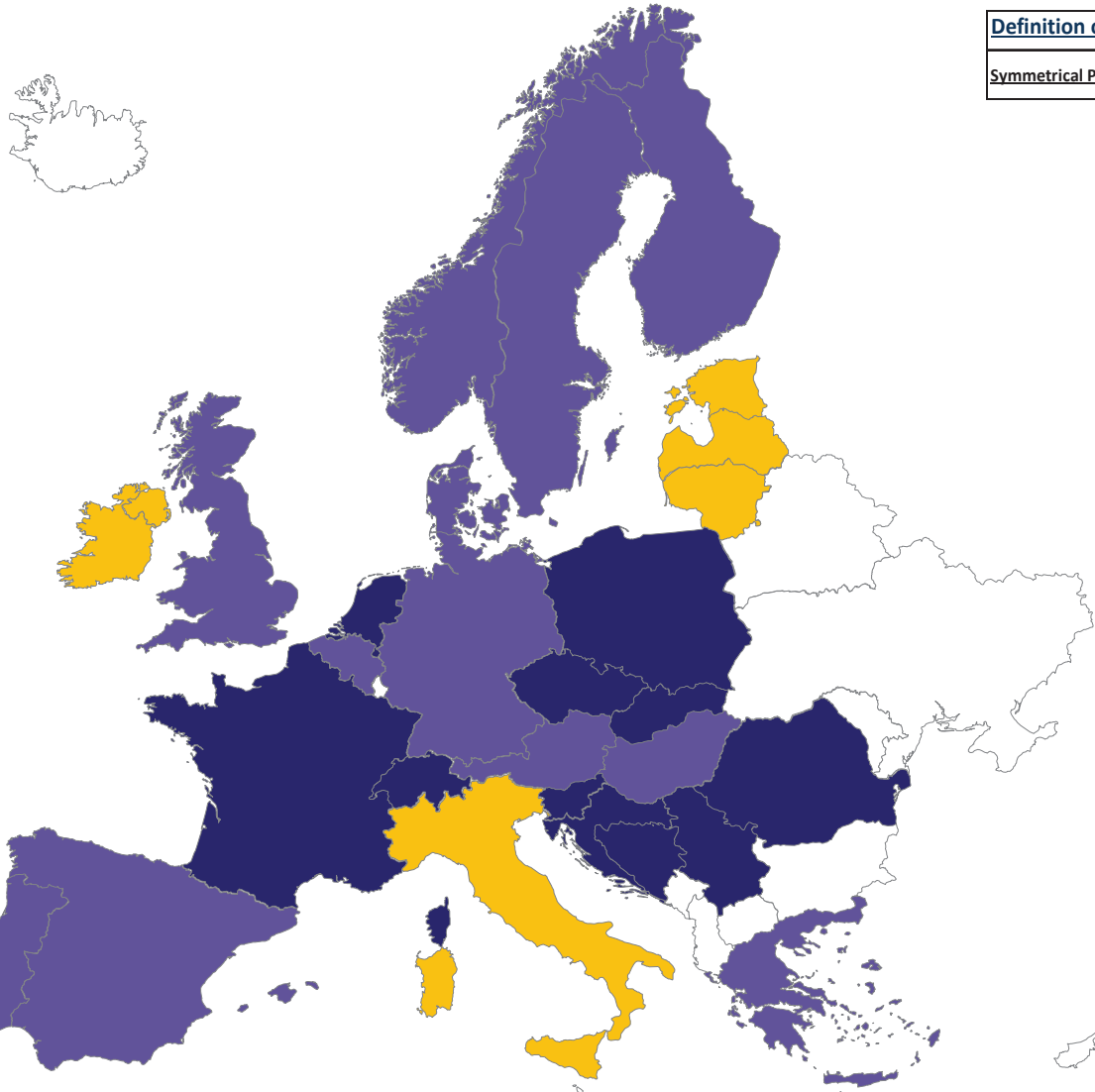
	Missing data
	N/A
	Year or more
	Month(s)
	Week(s)
	Day(s)

## Frequency Restoration Reserve (Automatic) - Capacity - Provider





## Frequency Restoration Reserve (Automatic) - Capacity - Symmetrical Product



### Definition of question

**Symmetrical Product**

Upward regulation volume and for downward regulation volume has be equal.

### Key:



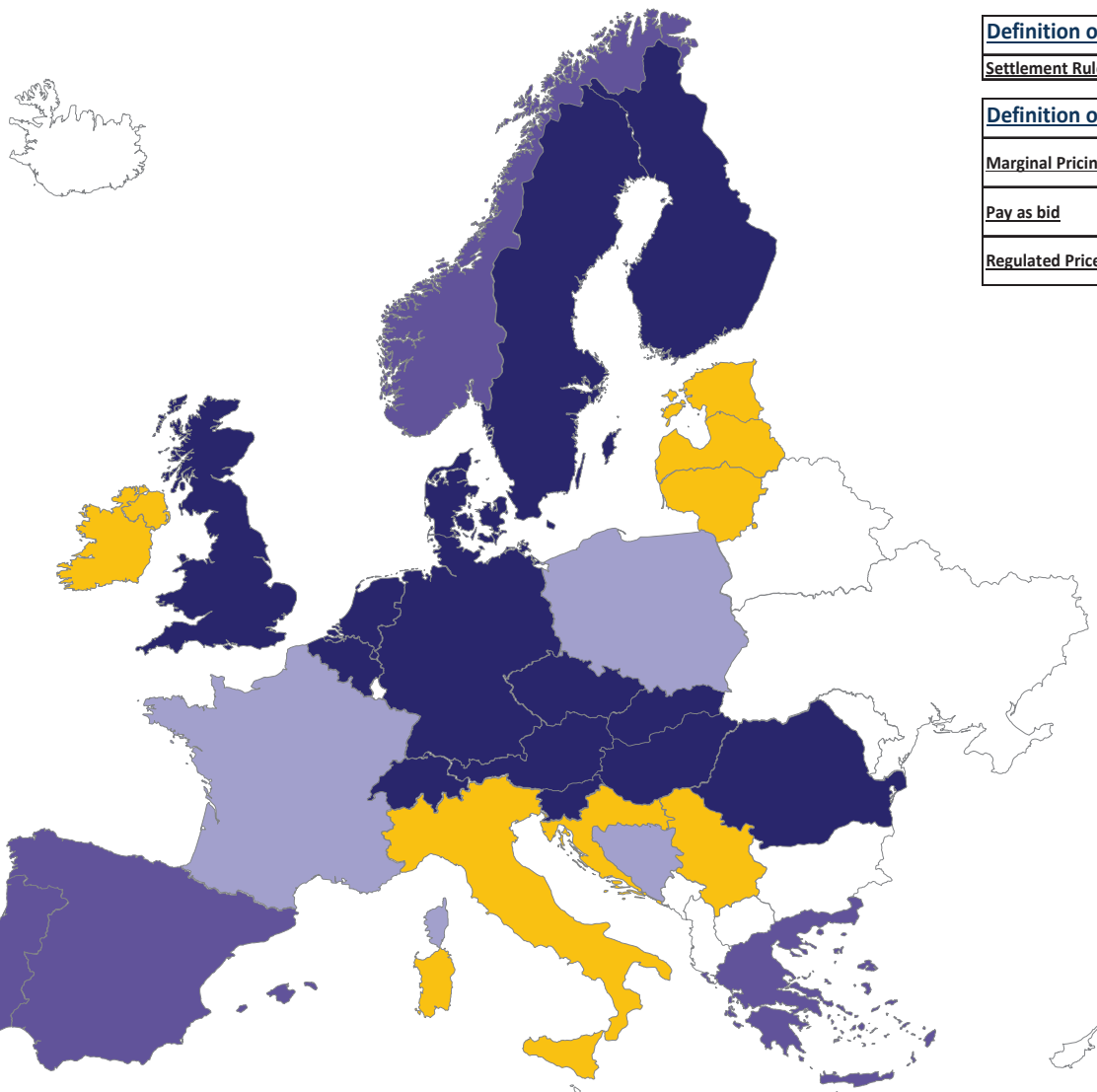
Missing data

N/A

Has to be symmetrical

Don't need to be symmetrical

## Frequency Restoration Reserve (Automatic) - Capacity - Settlement Rule








### Definition of question

<b>Settlement Rule</b>	The pricing rules for settlement.
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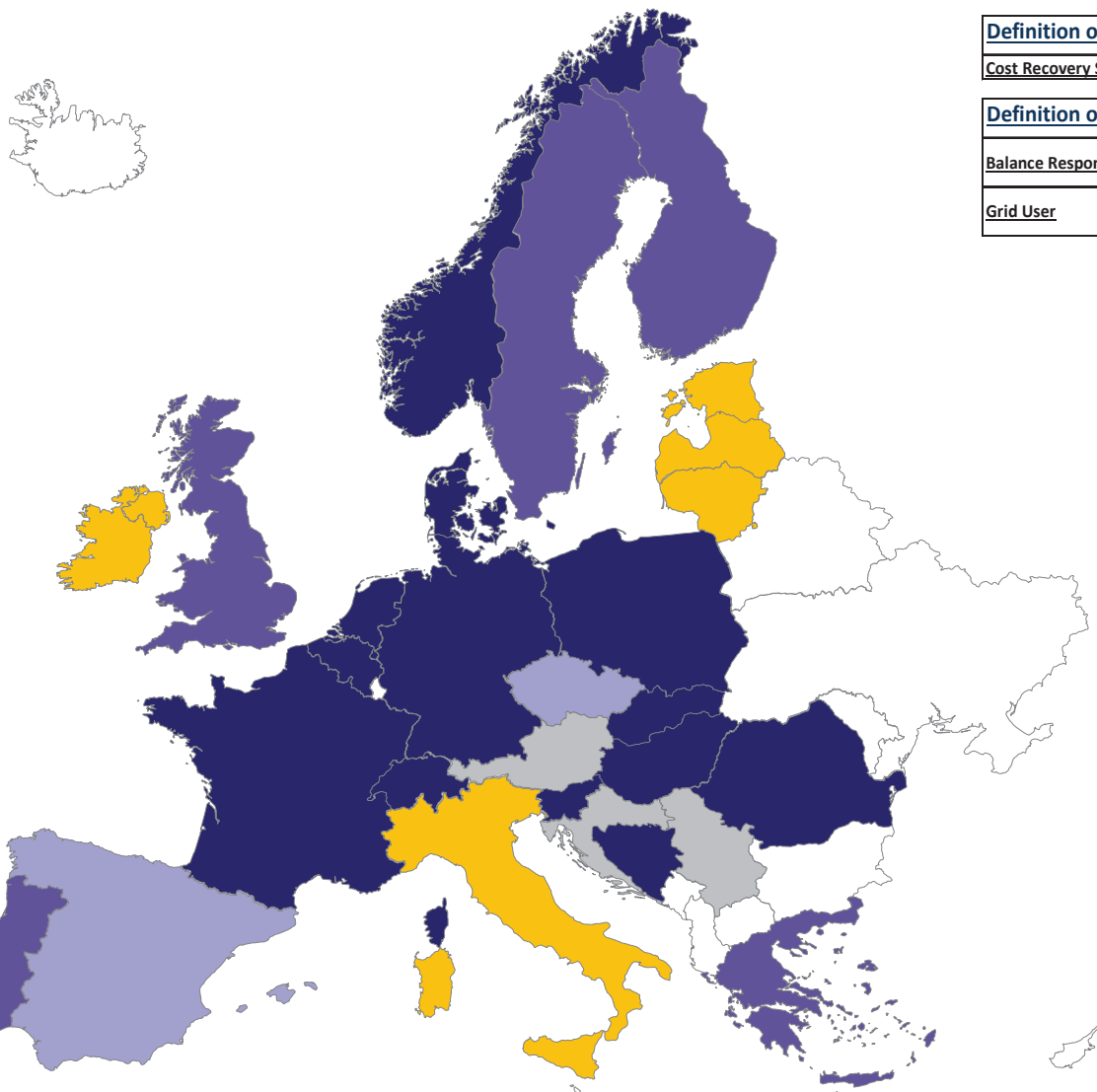
### Definition of answer

<b>Marginal Pricing</b>	Marginal pricing is the change in total cost that arises when the quantity produced changes by one unit.
<b>Pay as bid</b>	Contracted parties who provide a service are paid based on their offer price.
<b>Regulated Price</b>	Price for this service is based on a price that is set by the relevant regulatory authority.

### Key:

	Missing data
	N/A
	Pay as bid
	Marginal Pricing
	Regulated Price

## Frequency Restoration Reserve (Automatic) - Capacity - Cost Recovery Scheme



### Definition of question

#### Cost Recovery Scheme

From whom are the costs recovered.

### Definition of answer

#### Balance Responsible Party (BRP)

Balancing Responsible Party means a market participant or its chosen representative responsible for its Imbalances.

#### Grid User

The natural or legal person supplying to, or being supplied with active and/or reactive power by a TSO or DSO.

### Key:



Missing data

N/A

100% Grid Users

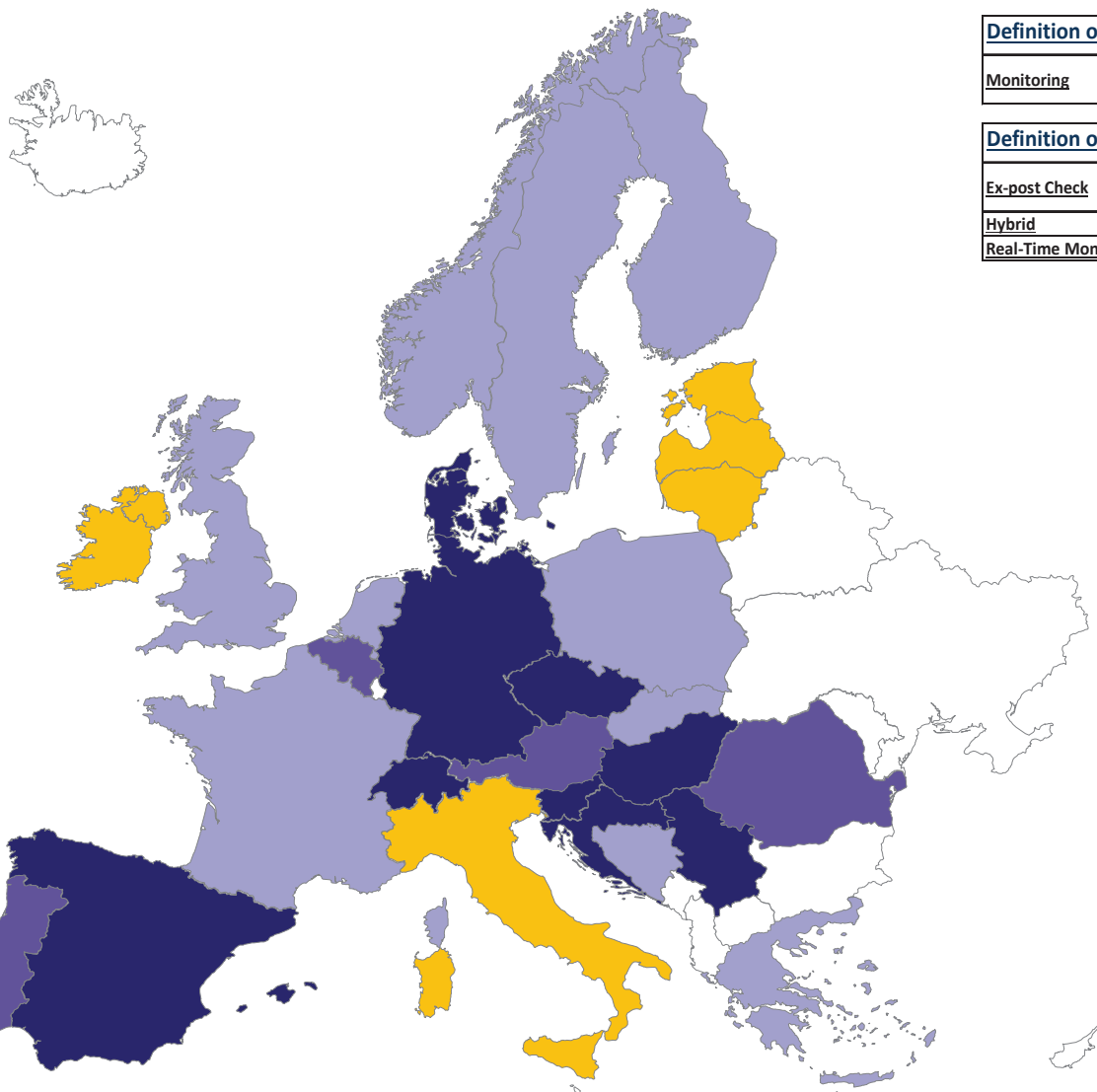
100% BRP

100% end consumers

Mix of Grid Users and BRP

Mix of generators and BRPs

## Frequency Restoration Reserve (Automatic) - Capacity - Monitoring








### Definition of question

<b>Monitoring</b>	Refers to the type of monitoring in place by the system operator to ensure performance of plant.
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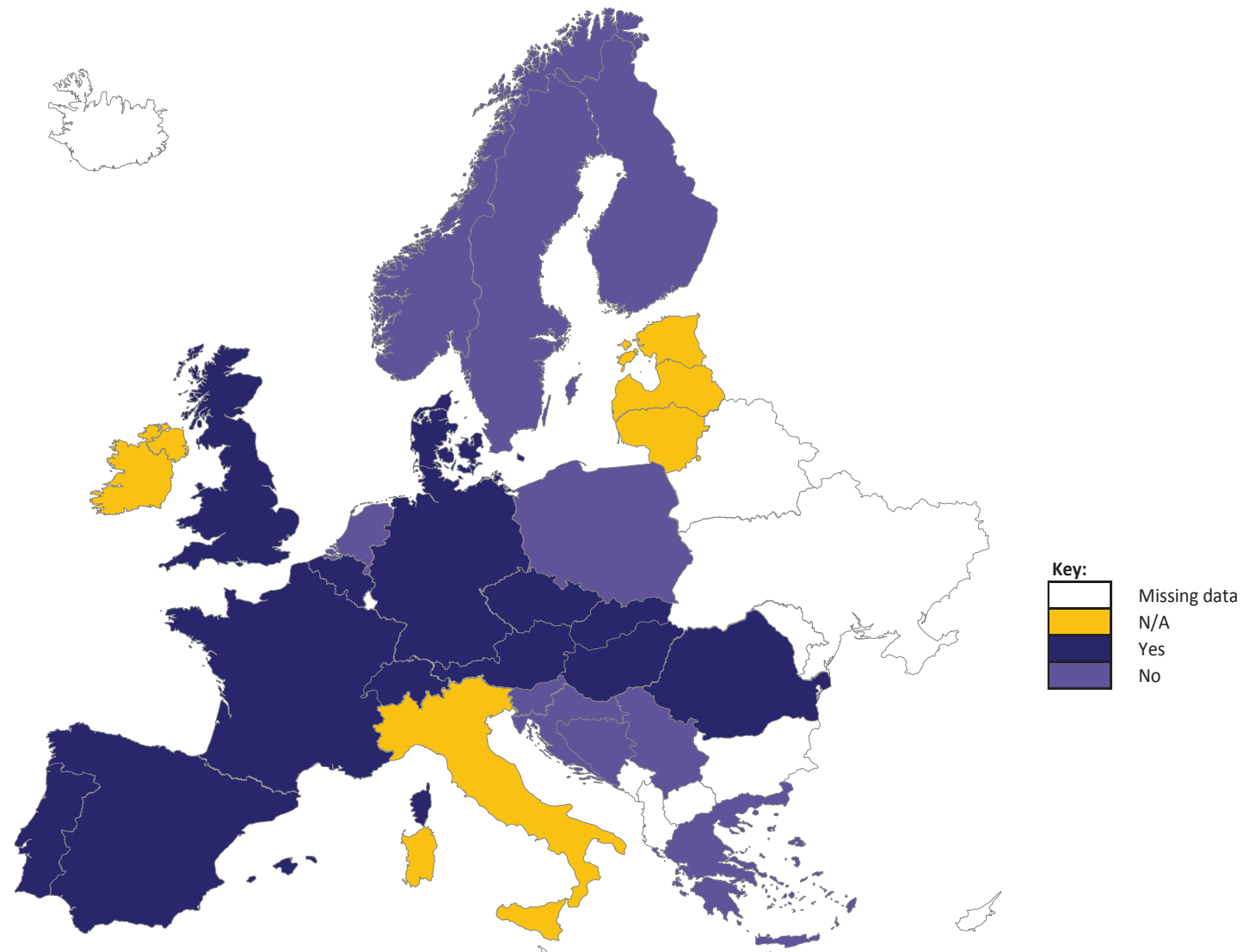
### Definition of answer

<b>Ex-post Check</b>	When the monitoring of performance of plant carried out after the event.
<b>Hybrid</b>	Combination.
<b>Real-Time Monitoring</b>	Monitoring of delivery of ancillary services in real time.

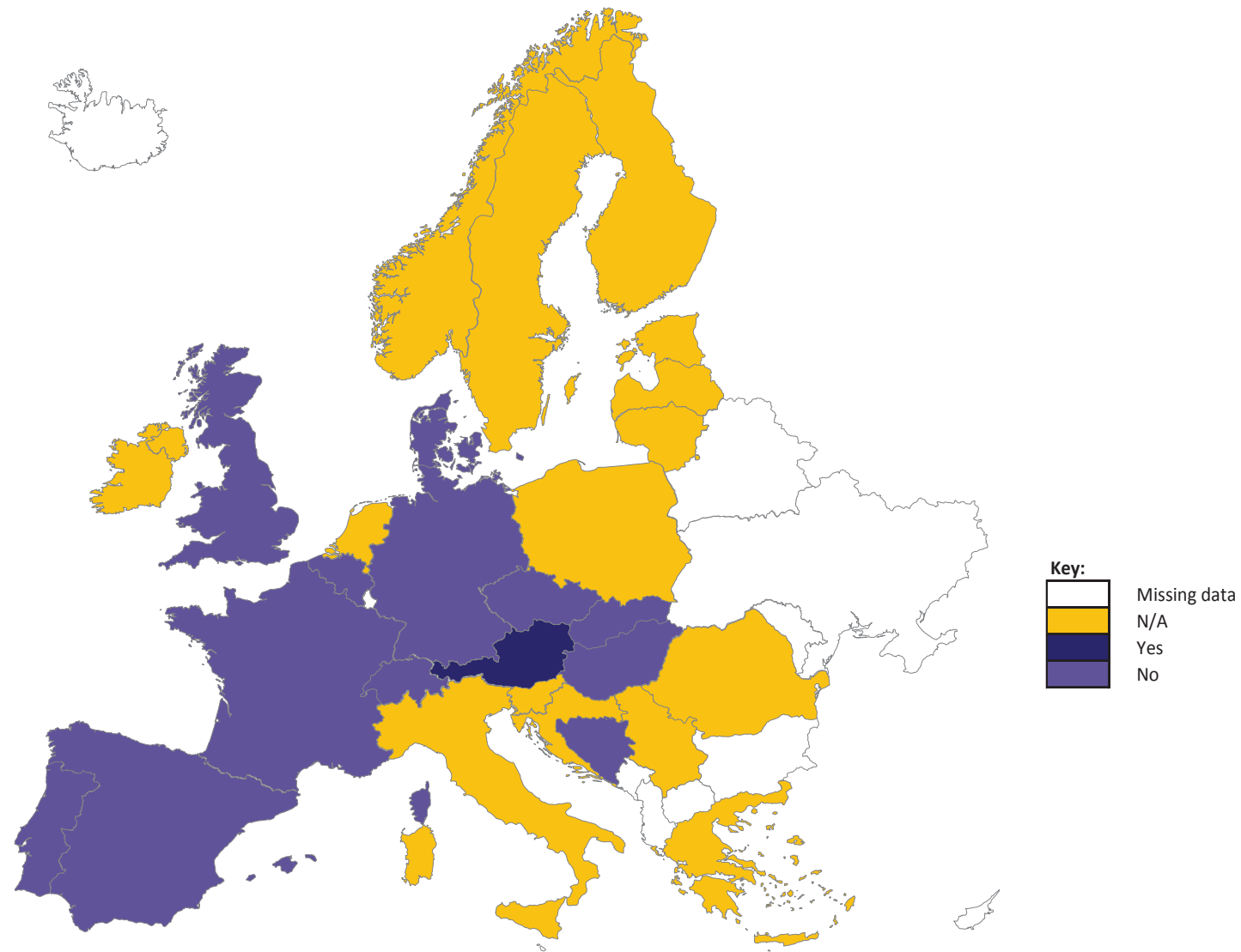
### Key:

	Missing data
	N/A
	Real-Time Monitoring
	Ex-Post Check
	Hybrid

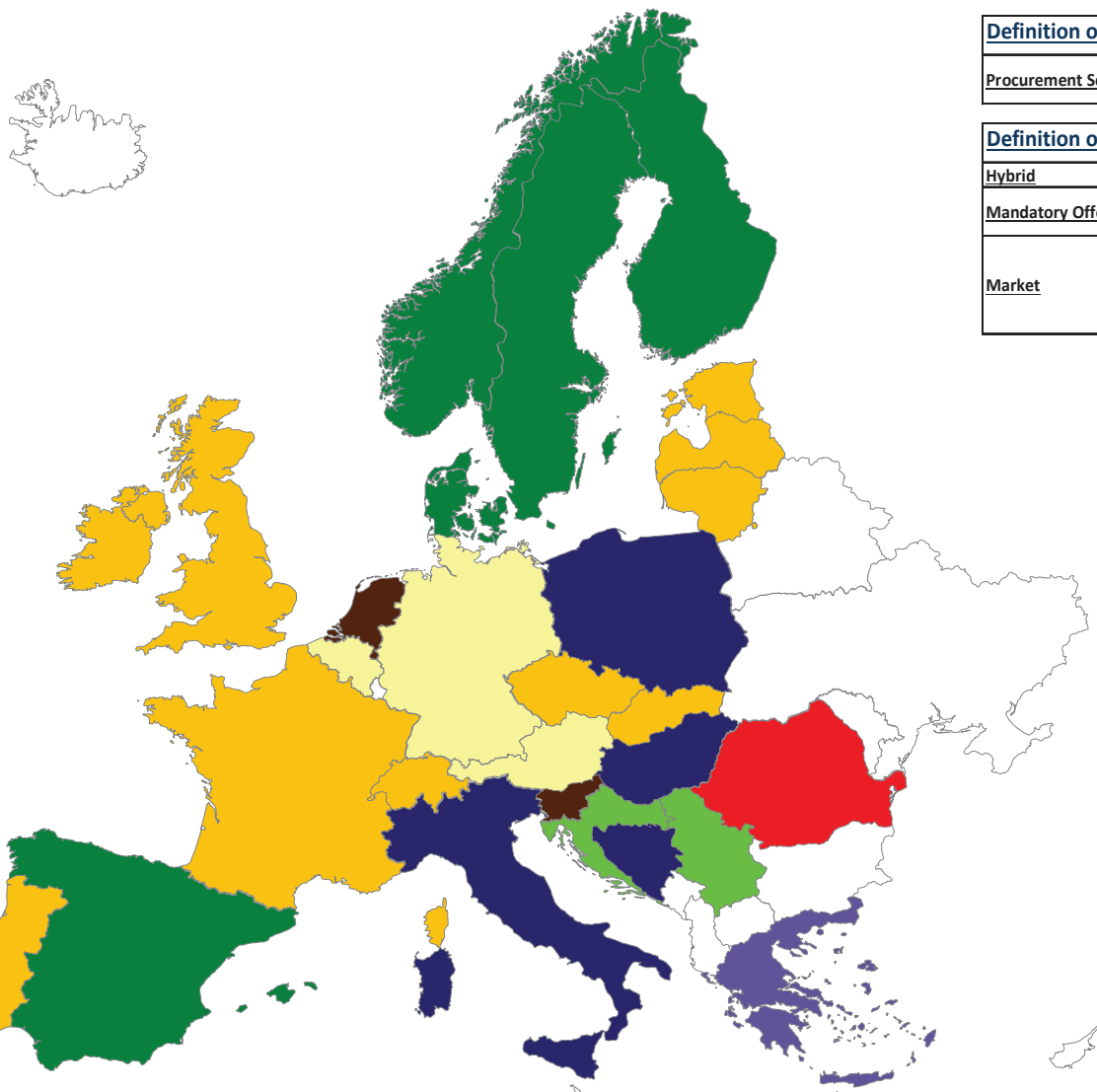
# Frequency Restoration Reserve (Automatic) - Capacity - Transfer of obligation allowed



# Frequency Restoration Reserve (Automatic) - Capacity - Obl. allowed, organised secondary market exists



## Frequency Restoration Reserve (Automatic) - Energy - Procurement Scheme

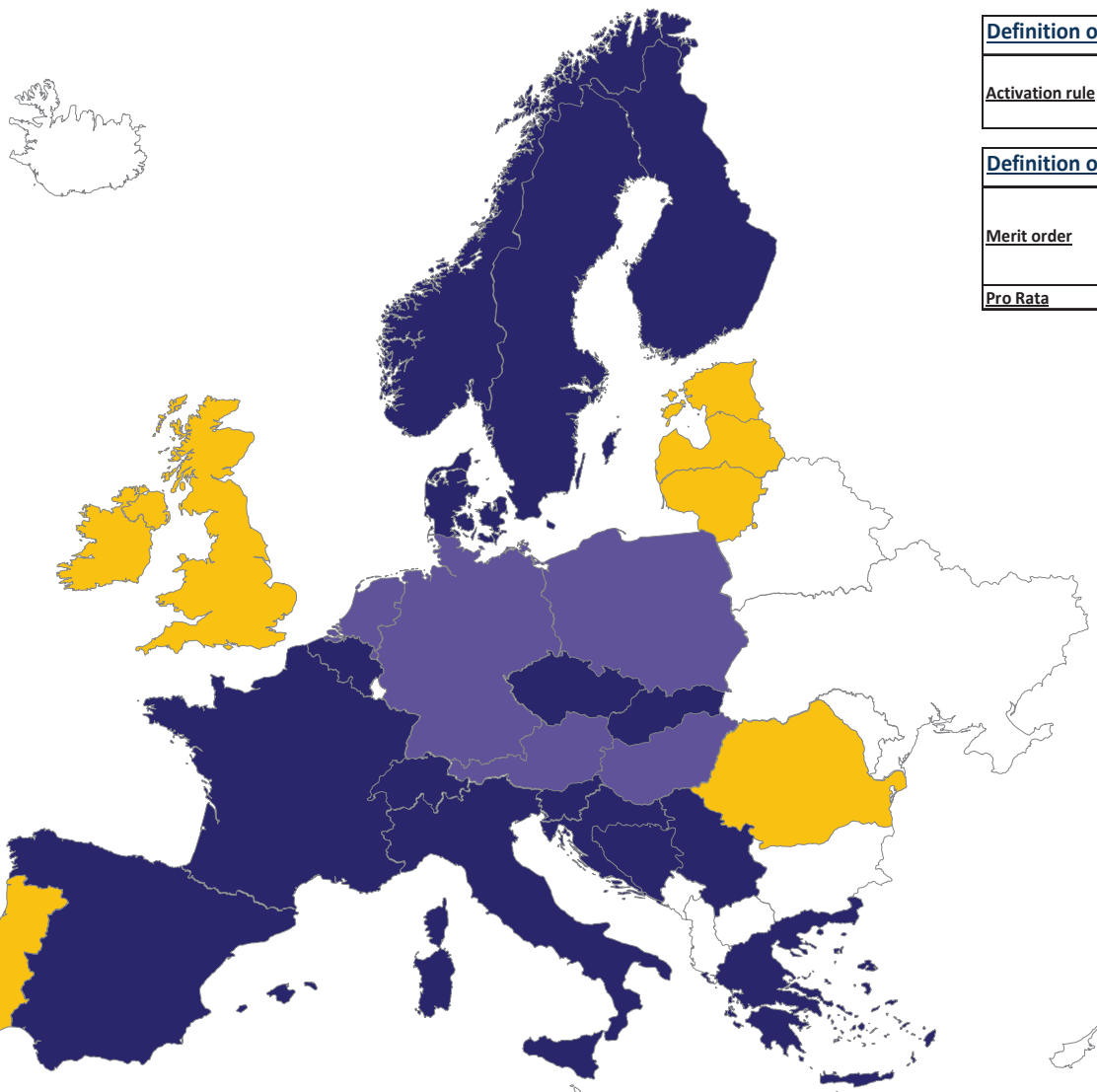


<u>Definition of question</u>	
<u>Procurement Scheme</u>	Background of the offer, which is closest to the real operation time.
<u>Definition of answer</u>	
<u>Hybrid</u>	Combination.
<u>Mandatory Offers</u>	Generators connected to the grid are obligated to offer the remaining capacity/available capacity.
<u>Market</u>	There is no contract or obligation for a grid user to offer the energy (before the offer). The grid user can voluntary participate in the real-time energy market and bid a price or customize his offer (e.g. the volume, timeframe).

**Key:**

	Missing data
	N/A
	Mandatory Offers
	Mandatory Provision
	Mandatory Provision without Reservation
	Bilateral Market
	Organised Market
	Hybrid
	Other
	Pre-contracted Offers only
	Pre-contracted and Mandatory Offers
	Pre-contracted and Free Offers

## Frequency Restoration Reserve (Automatic) - Energy - Activation Rule



### Definition of question

#### Activation rule

How the frequency restoration reserves are activated i.e. by a Pro-Rata system or on the basis of a Merit Order (cheapest being activated first).

### Definition of answer

#### Merit order

A merit order is a way of ranking available sources of energy in ascending order of their short run marginal costs of production, so that those with the lowest marginal costs are the first ones to be brought online to meet demand.

#### Pro Rata

In Proportion (Parallel Activation).

#### Key:



Missing data

N/A

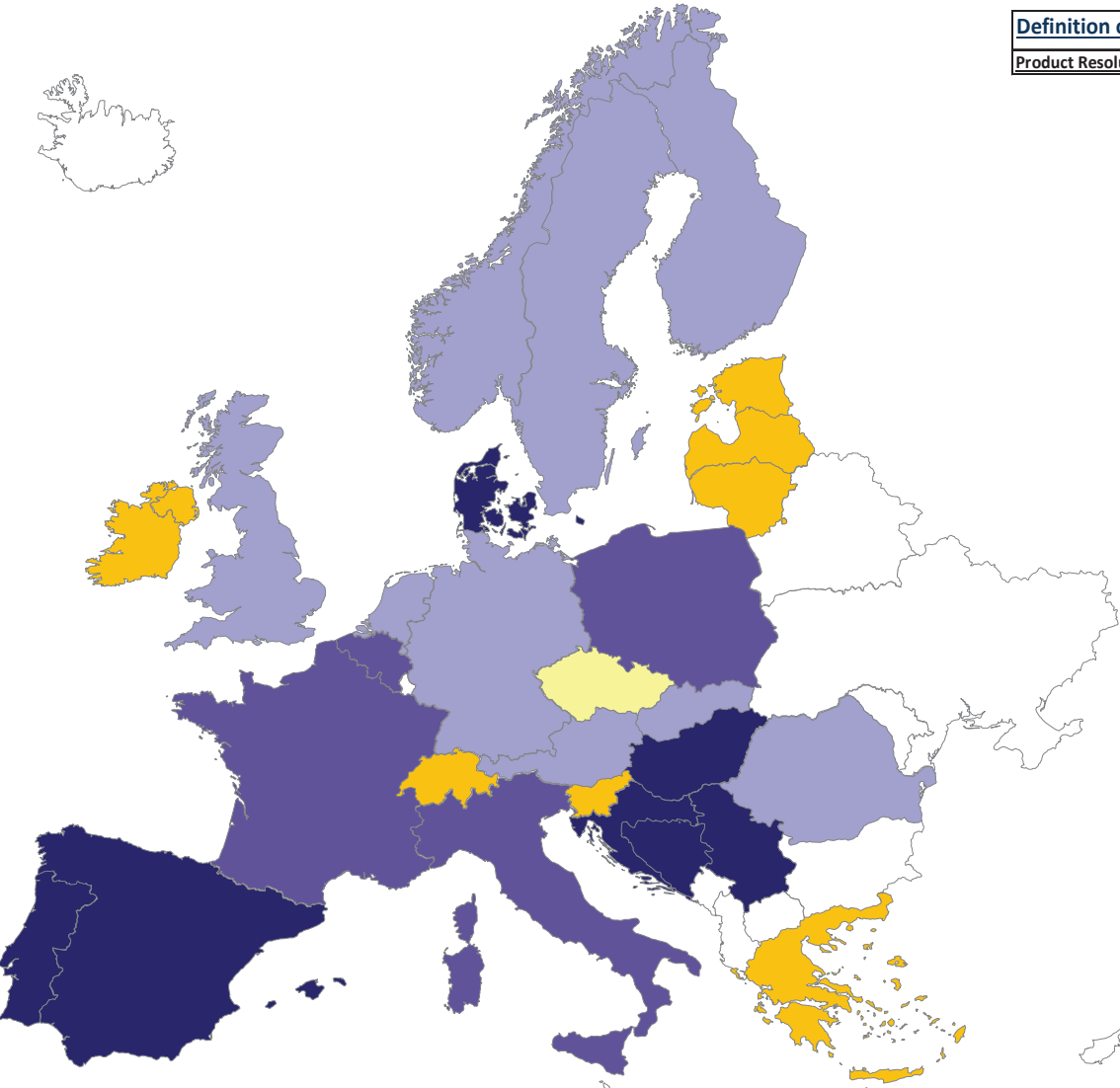
Pro Rata (Parallel Activation)

Merit order



# Frequency Restoration Reserve (Automatic) - Energy - Product Resolution (in MW)

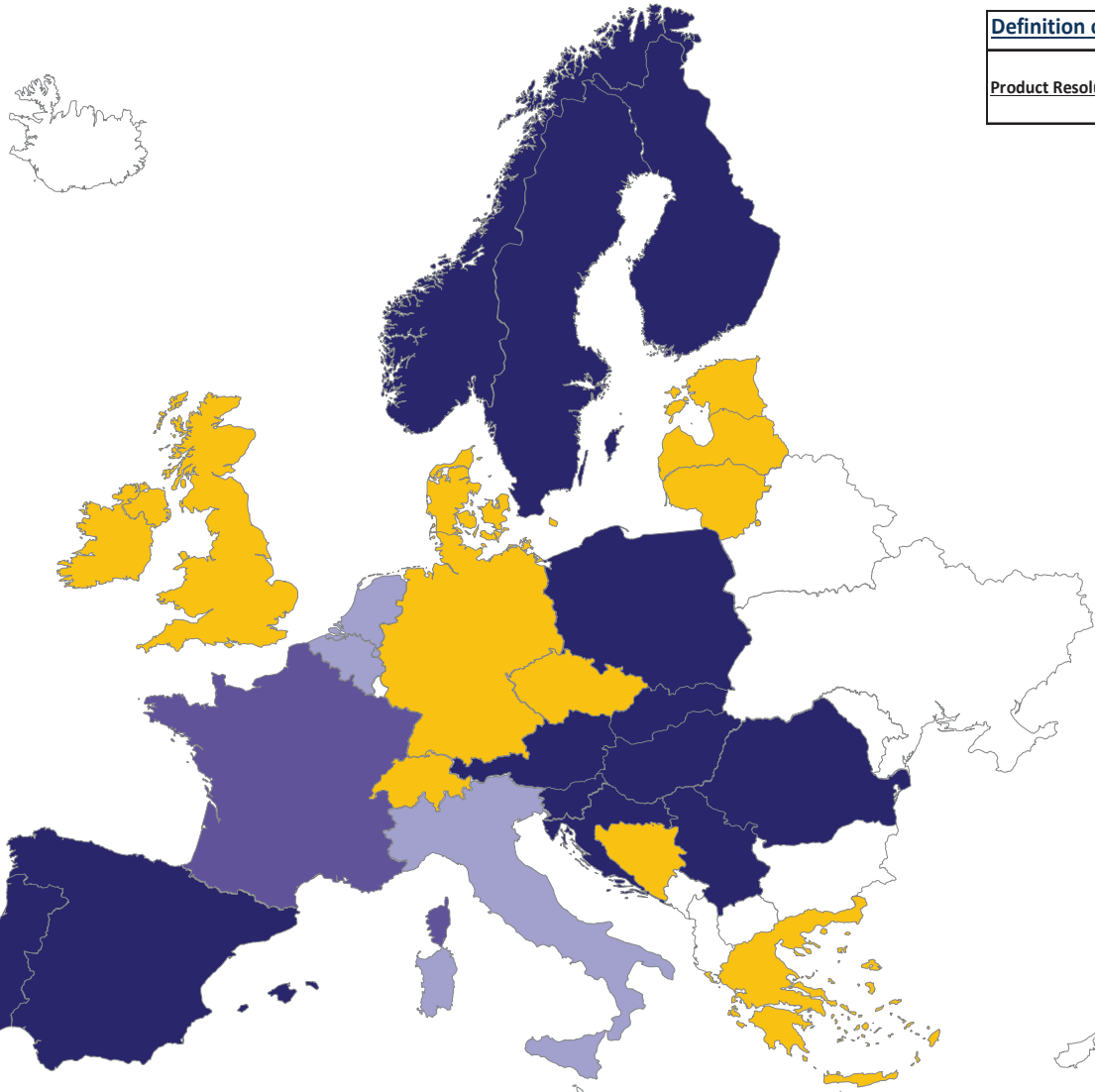
Definition of question	
Product Resolution (in MW)	The minimum bid size into the balancing market.



**Key:**

White	Missing data
Yellow	N/A
Dark Blue	No minimum bid size
Purple	$x \leq 1\text{MW}$
Light Blue	$1\text{MW} < x \leq 5\text{MW}$
Grey	$5\text{MW} < x \leq 10\text{MW}$
Light Yellow	$x > 10\text{MW}$

# Frequency Restoration Reserve (Automatic) - Energy - Product Resolution (in time)



<b>Definition of question</b>	
<b>Product Resolution (in time)</b>	The maximum resolution for which the product can be bid into the market (for instance =1 hour in the case of a 24 auctions day ahead market for reserve provision).

**Key:**

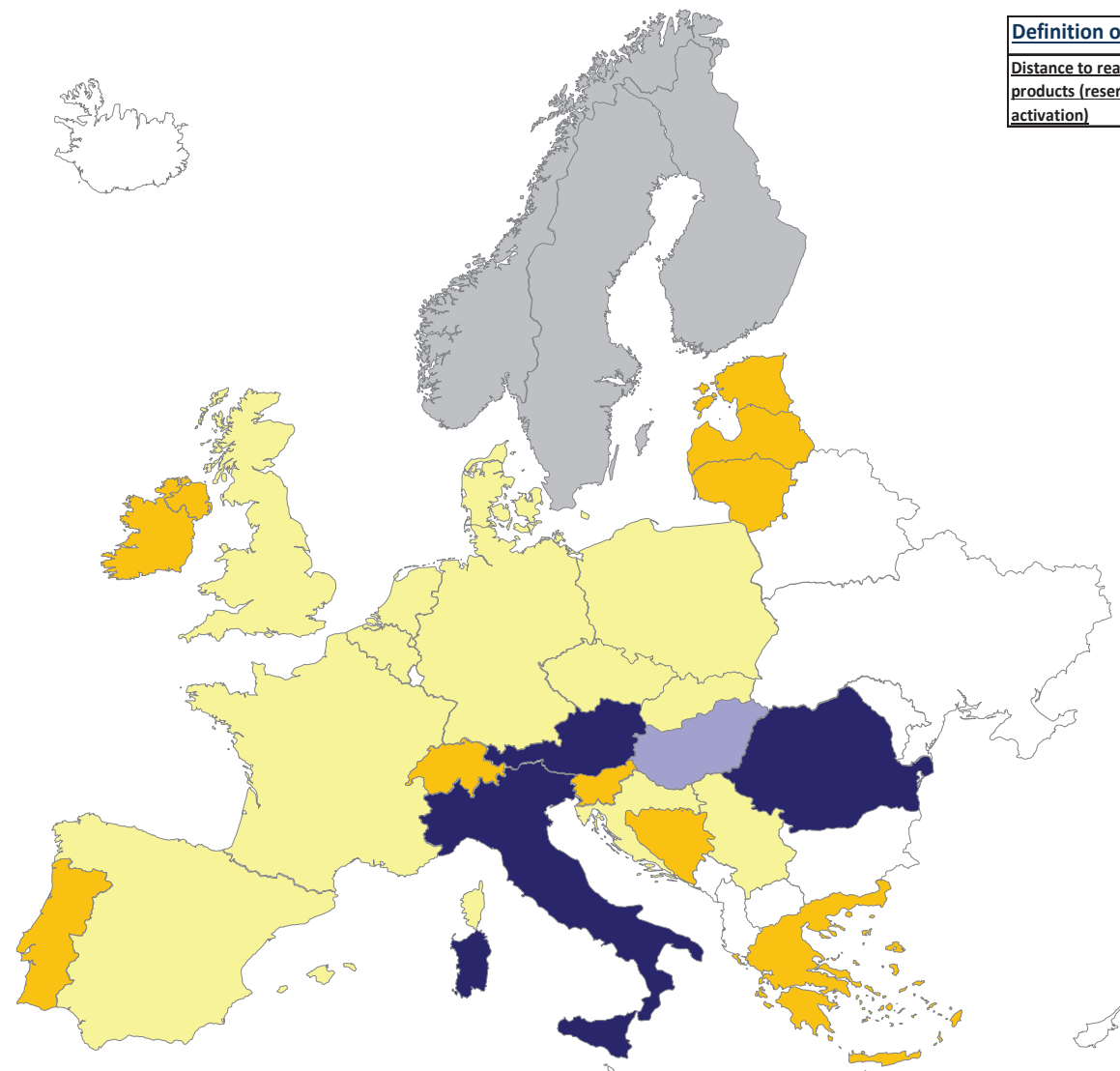
White	Missing data
Yellow	N/A
Dark Blue	Hour (or blocks)
Medium Blue	30 minutes
Light Blue	15 minutes

# Frequency Restoration Reserve (Automatic) - Energy - Distance to real time of energy products








## Definition of question

Distance to real time of energy products (reserve products activation)

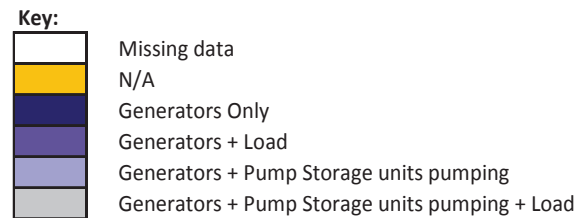
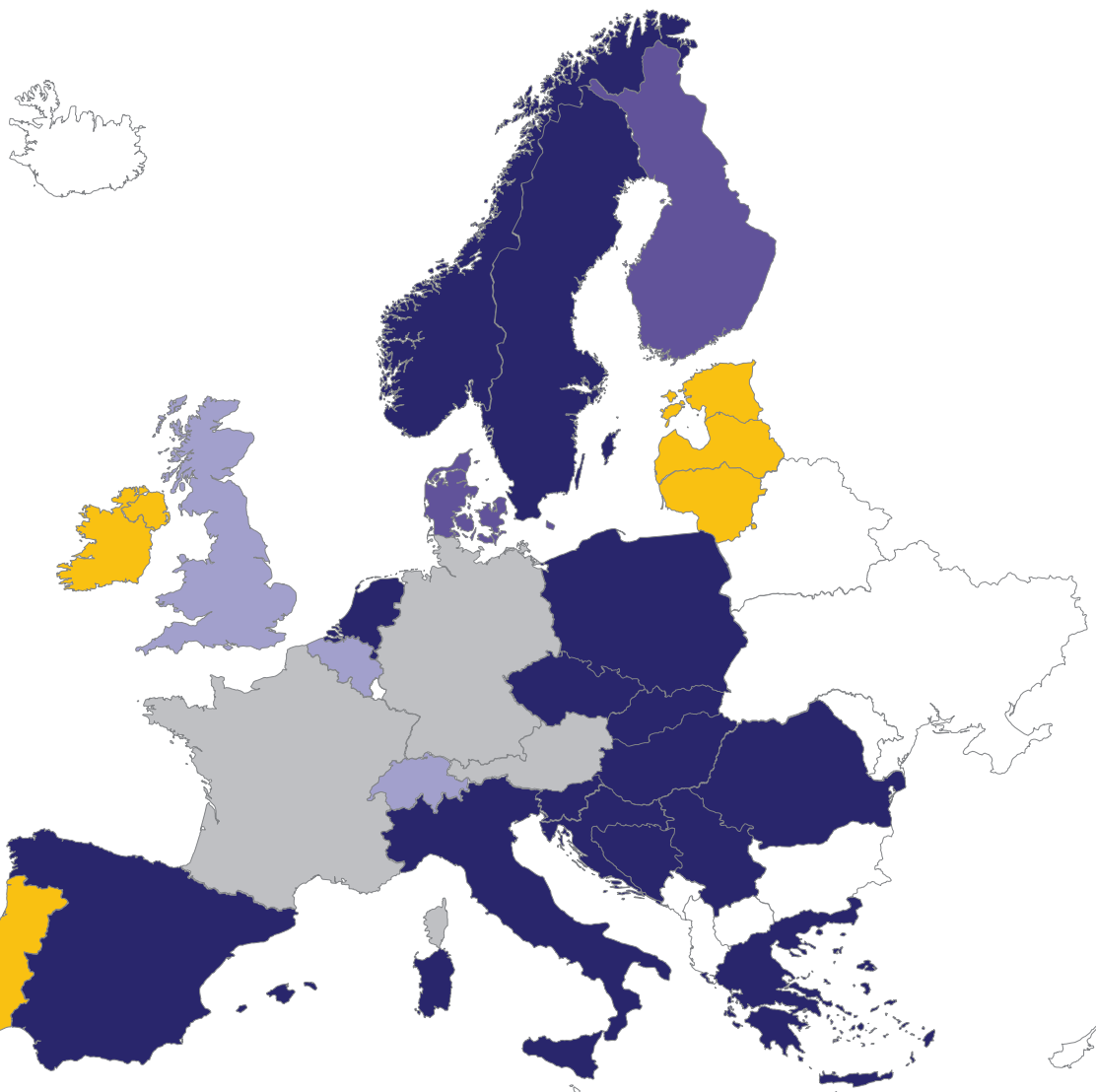
The time ahead from real time when TSO activates a given product (for instance 15 minutes in the case of mFRR/tertiary energy).



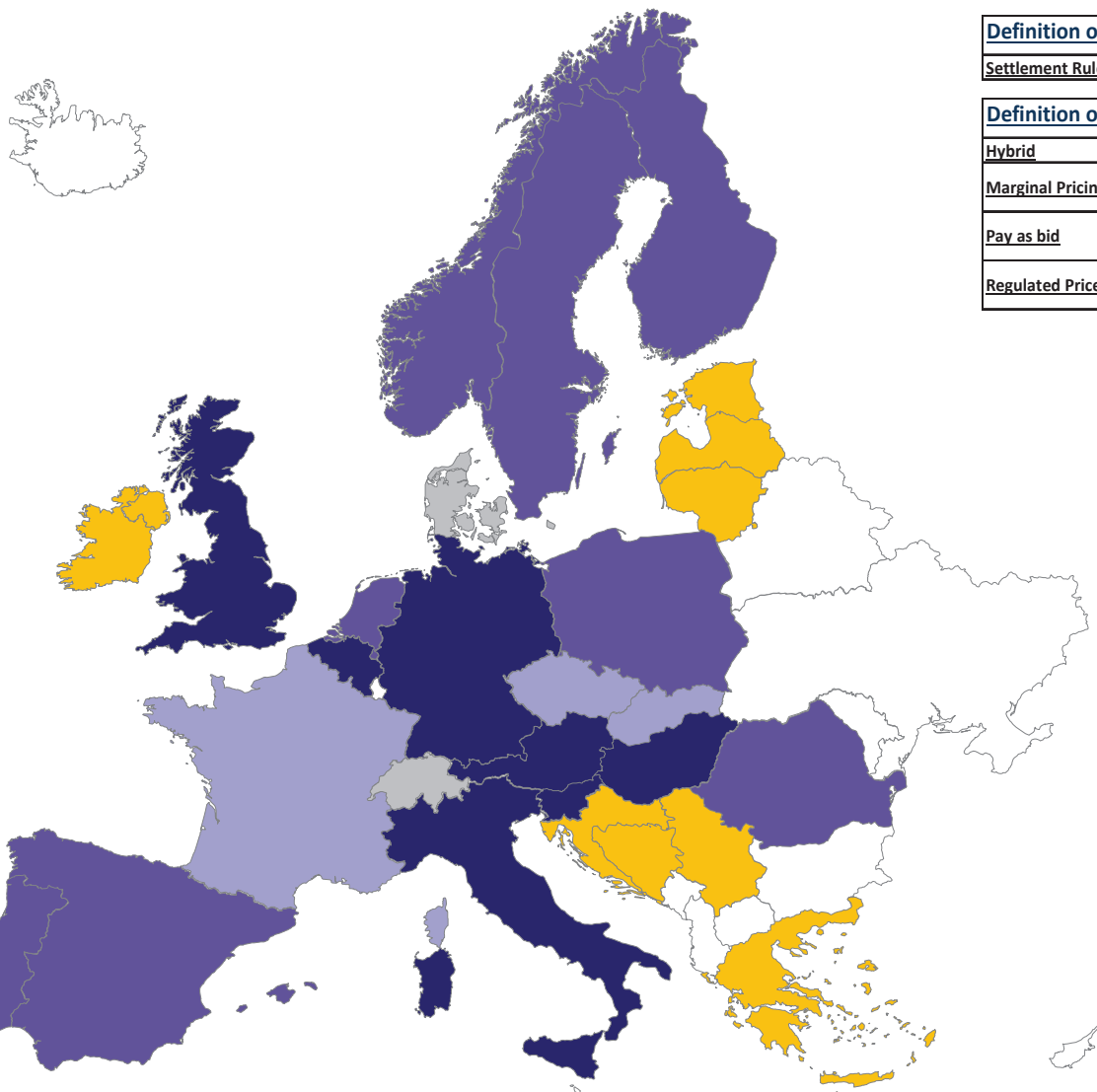
### Key:

	Missing data
	N/A
	$x > H-1$
	$15 \text{ minutes} < x \leq H-1$
	$5 \text{ minutes} < x \leq 15 \text{ minutes}$
	$1 \text{ minute} < x \leq 5 \text{ minutes}$
	$x \leq 1 \text{ minute}$

## Frequency Restoration Reserve (Automatic) - Energy - Provider



## Frequency Restoration Reserve (Automatic) - Energy - Settlement Rule



### Definition of question

<b>Settlement Rule</b>	The pricing rules for settlement.
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### Definition of answer







<b>Hybrid</b>	Combination.
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<b>Marginal Pricing</b>	Marginal pricing is the change in total cost that arises when the quantity produced changes by one unit.
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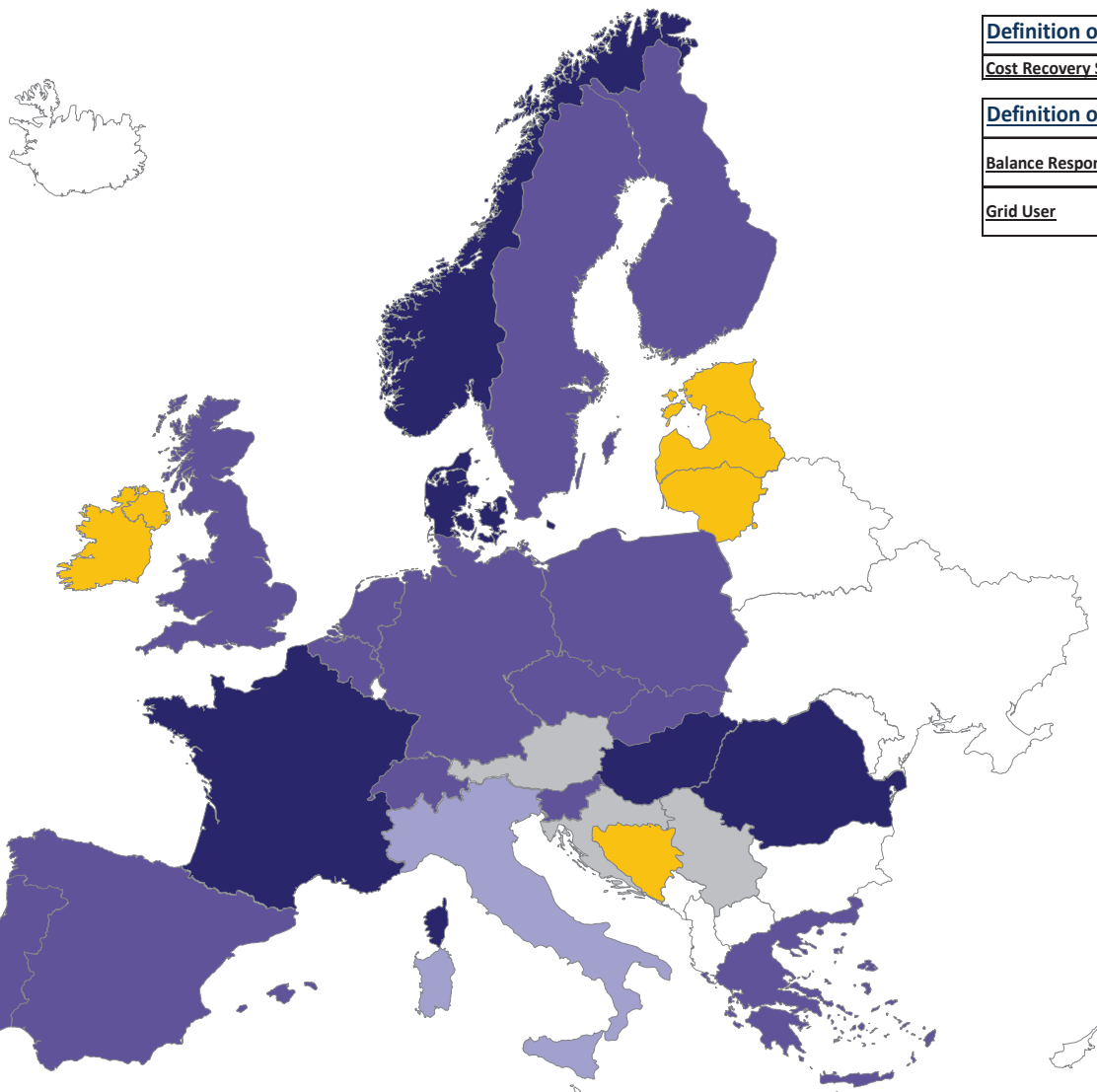
<b>Pay as bid</b>	Contracted parties who provide a service are paid based on their offer price.
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<b>Regulated Price</b>	Price for this service is based on a price that is set by the relevant regulatory authority.
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### Key:

	Missing data
	N/A
	Pay as bid
	Marginal Pricing
	Regulated Price
	Hybrid

## Frequency Restoration Reserve (Automatic) - Energy - Cost Recovery Scheme



### Definition of question

#### Cost Recovery Scheme

From whom are the costs recovered.

### Definition of answer

#### Balance Responsible Party (BRP)

Balancing Responsible Party means a market participant or its chosen representative responsible for its Imbalances.

#### Grid User

The natural or legal person supplying to, or being supplied with active and/or reactive power by a TSO or DSO.

### Key:



Missing data

N/A

100% Grid Users

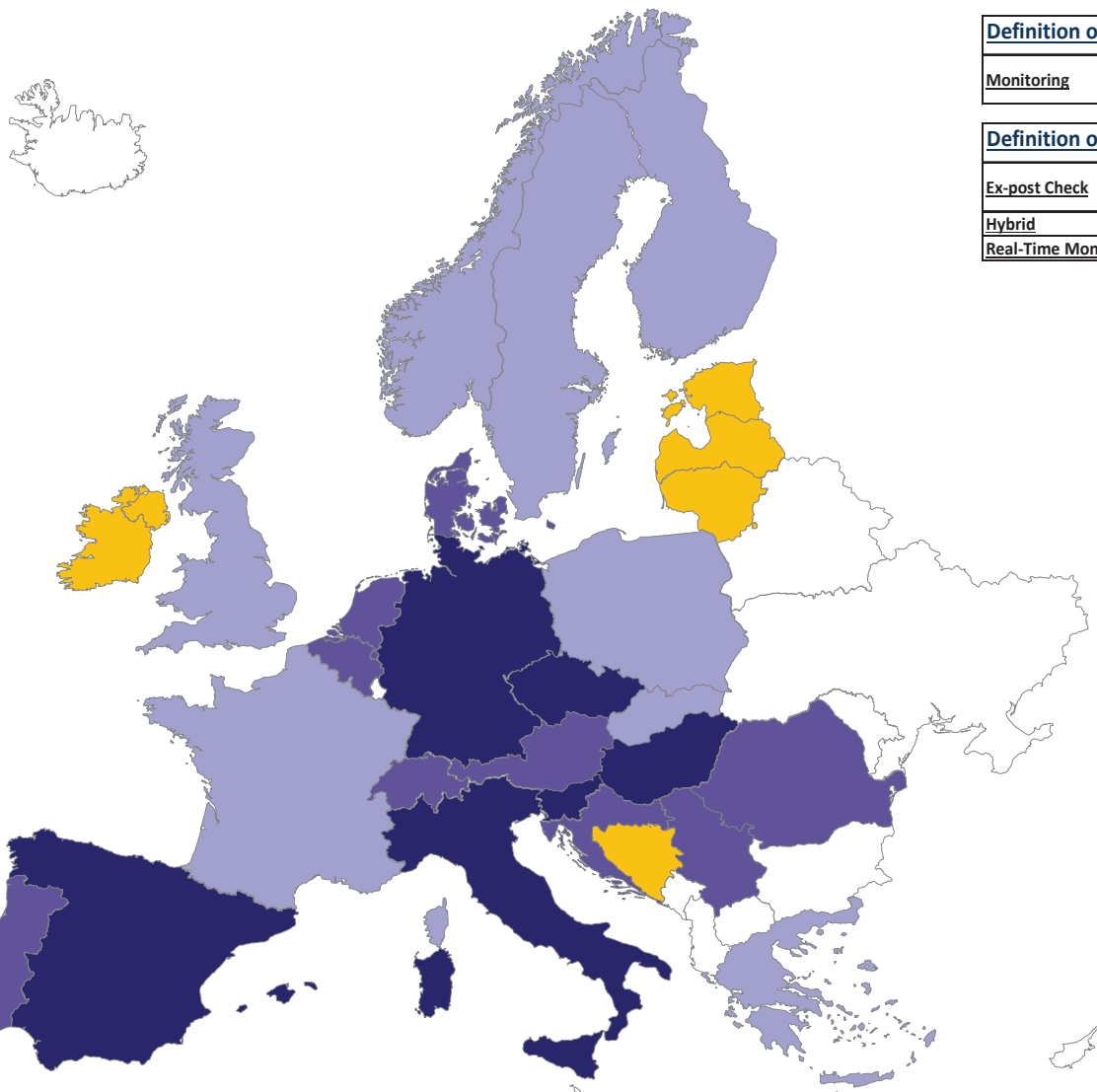
100% BRP

100% end consumers

Mix of Grid Users and BRP

Mix of generators and BRPs

## Frequency Restoration Reserve (Automatic) - Energy - Monitoring



### Definition of question

#### Monitoring

Refers to the type of monitoring in place by the system operator to ensure performance of plant.

### Definition of answer

#### Ex-post Check

When the monitoring of performance of plant carried out after the event.

#### Hybrid

Combination.

#### Real-Time Monitoring

Monitoring of delivery of ancillary services in real time.

### Key:



Missing data

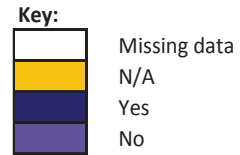
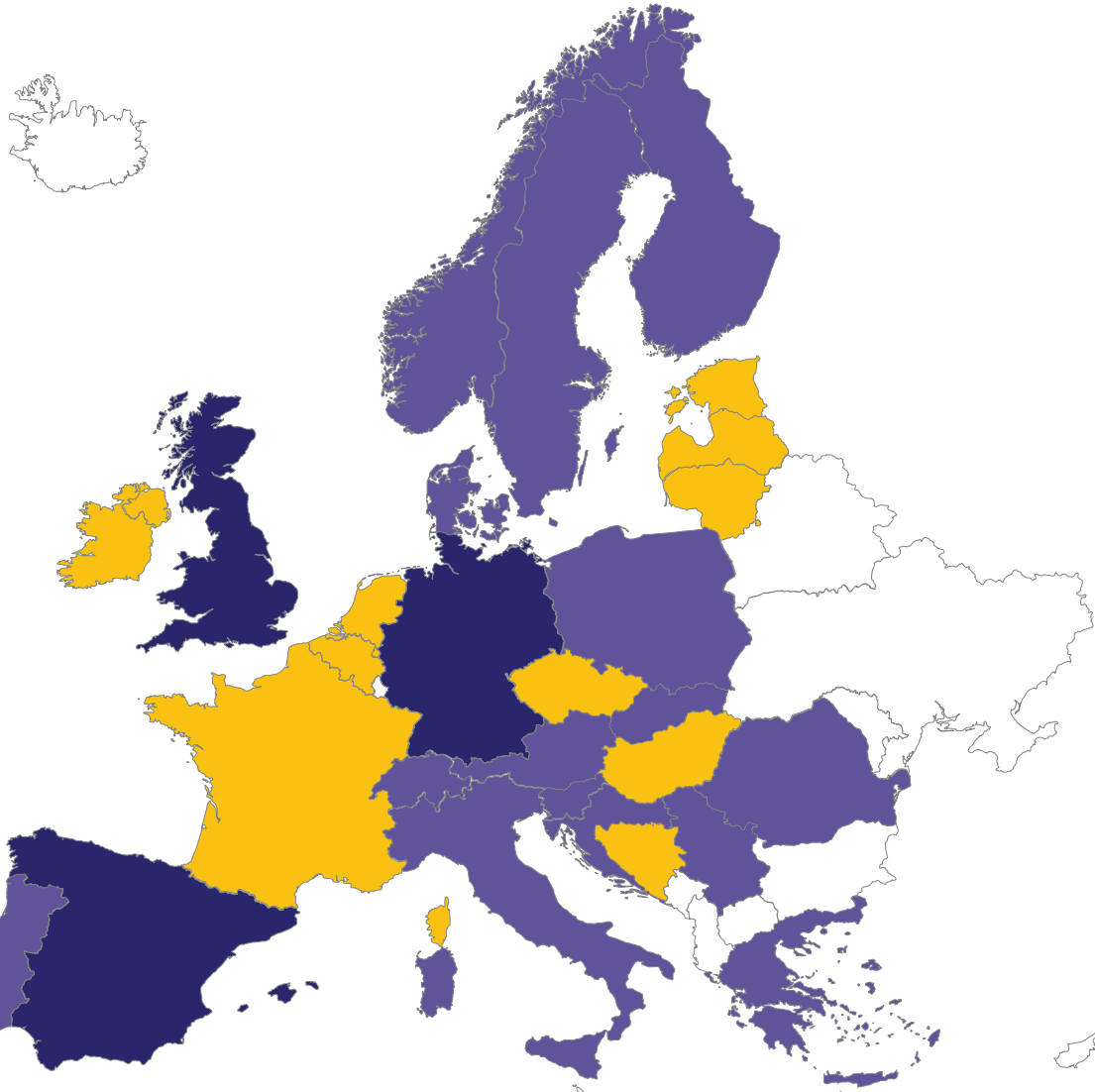
N/A

Real-Time Monitoring

Ex-Post Check

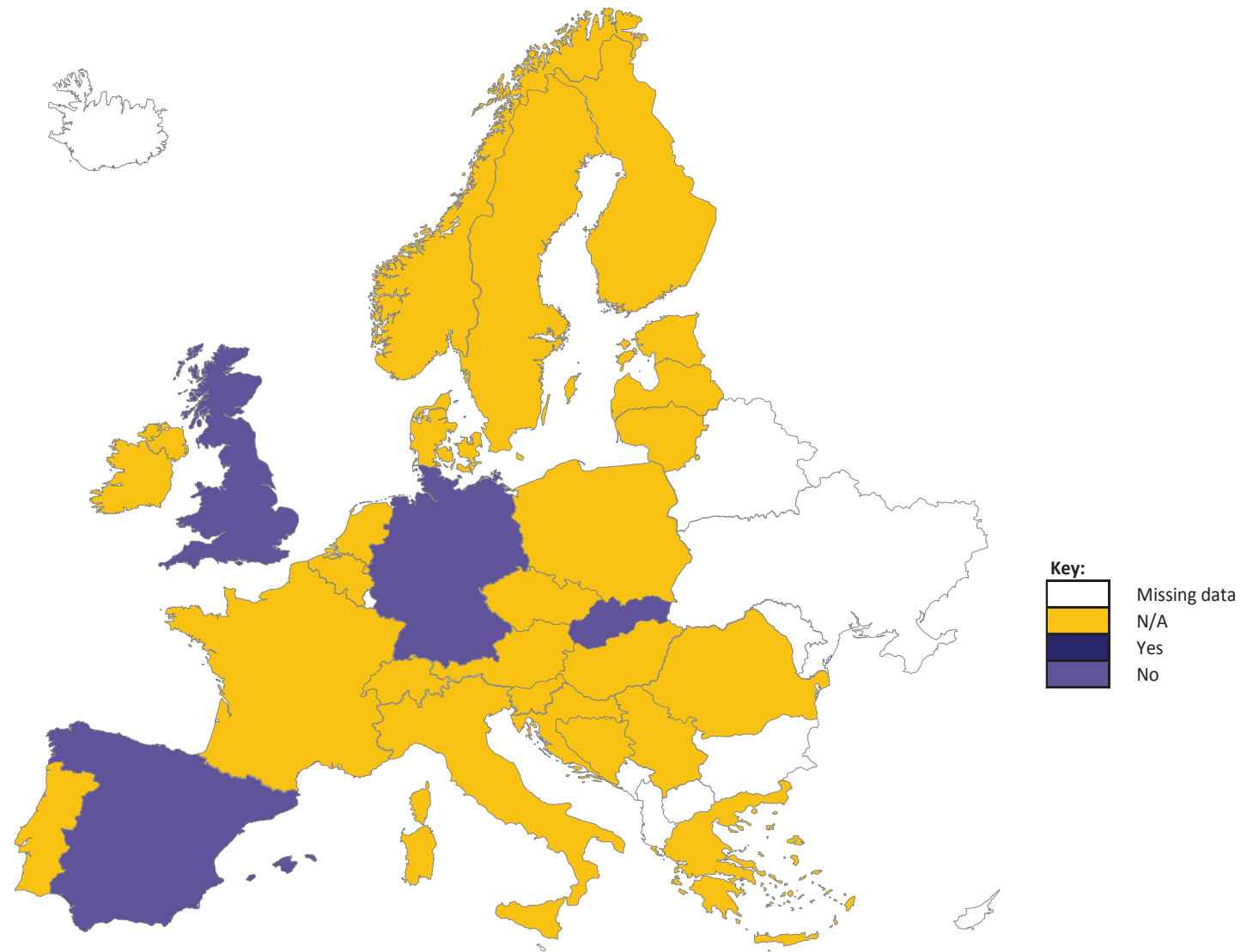
Hybrid

# Frequency Restoration Reserve (Automatic) - Energy - Transfer of obligation allowed

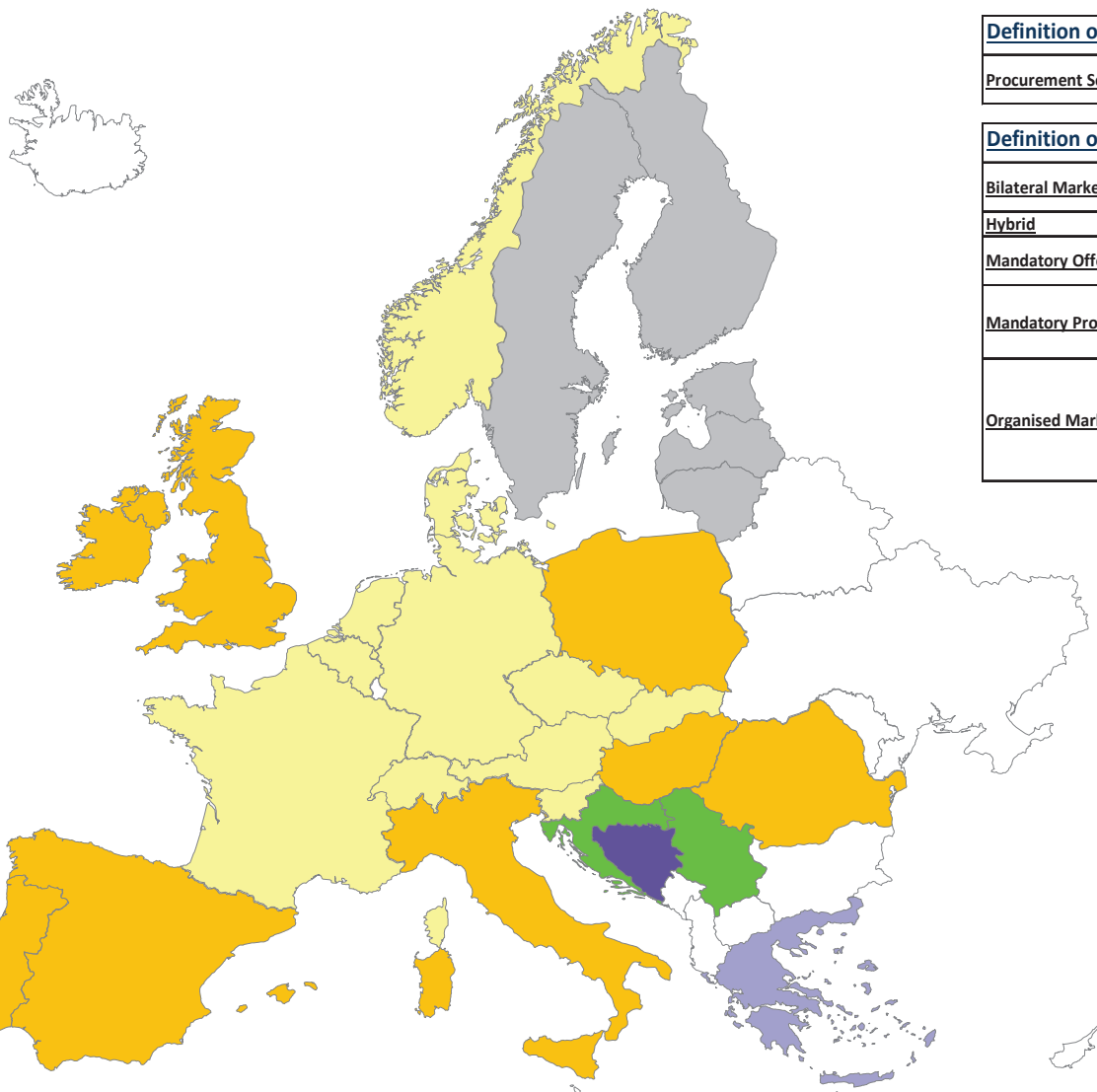




# Frequency Restoration Reserve (Automatic) - Energy - Obl. allowed, organised secondary market exists



## Frequency Restoration Reserve (Manual) - Capacity - Procurement Scheme



### Definition of question

#### Procurement Scheme

Background of the offer, which is closest to the real operation time.

### Definition of answer

#### Bilateral Market

A grid user and TSO negotiate a contract regarding the offered service and price/price system.

#### Hybrid

Combination.

#### Mandatory Offers

Generators connected to the grid are obligated to offer the remaining capacity/available capacity.

#### Mandatory Provision

Generators connected to the grid are obligated to reserve a certain amount of capacity in order to meet TSO requirements, for a fixed price set by TSO, NRA or for free.

#### Organised Market

There is no contract or obligation for a grid user to offer the reserve (before the offer). The grid user can voluntary participate in the market (e.g. tender, auction, market platform (like PX)) and bid a price or customize his offer (e.g. the volume, timeframe). The market result may lead to a bilateral contract.

### Key:



Missing data

N/A

Mandatory Offers

Mandatory Provision

Mandatory Provision without Reservation

Bilateral Market

Organised Market

Hybrid

Other

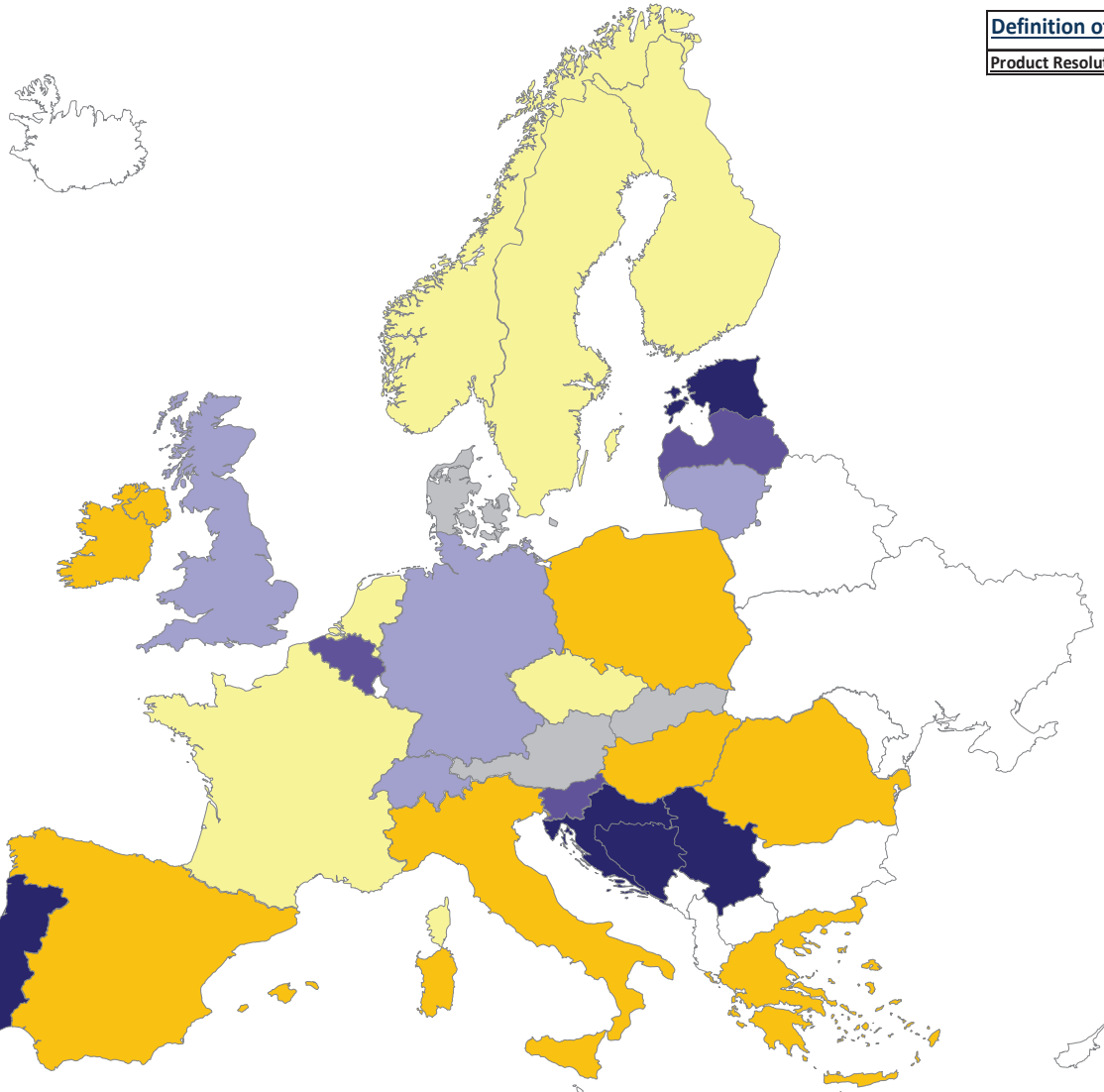
Pre-contracted Offers only

Pre-contracted and Mandatory Offers

Pre-contracted and Free Offers

# Frequency Restoration Reserve (Manual) - Capacity - Product Resolution (in MW)

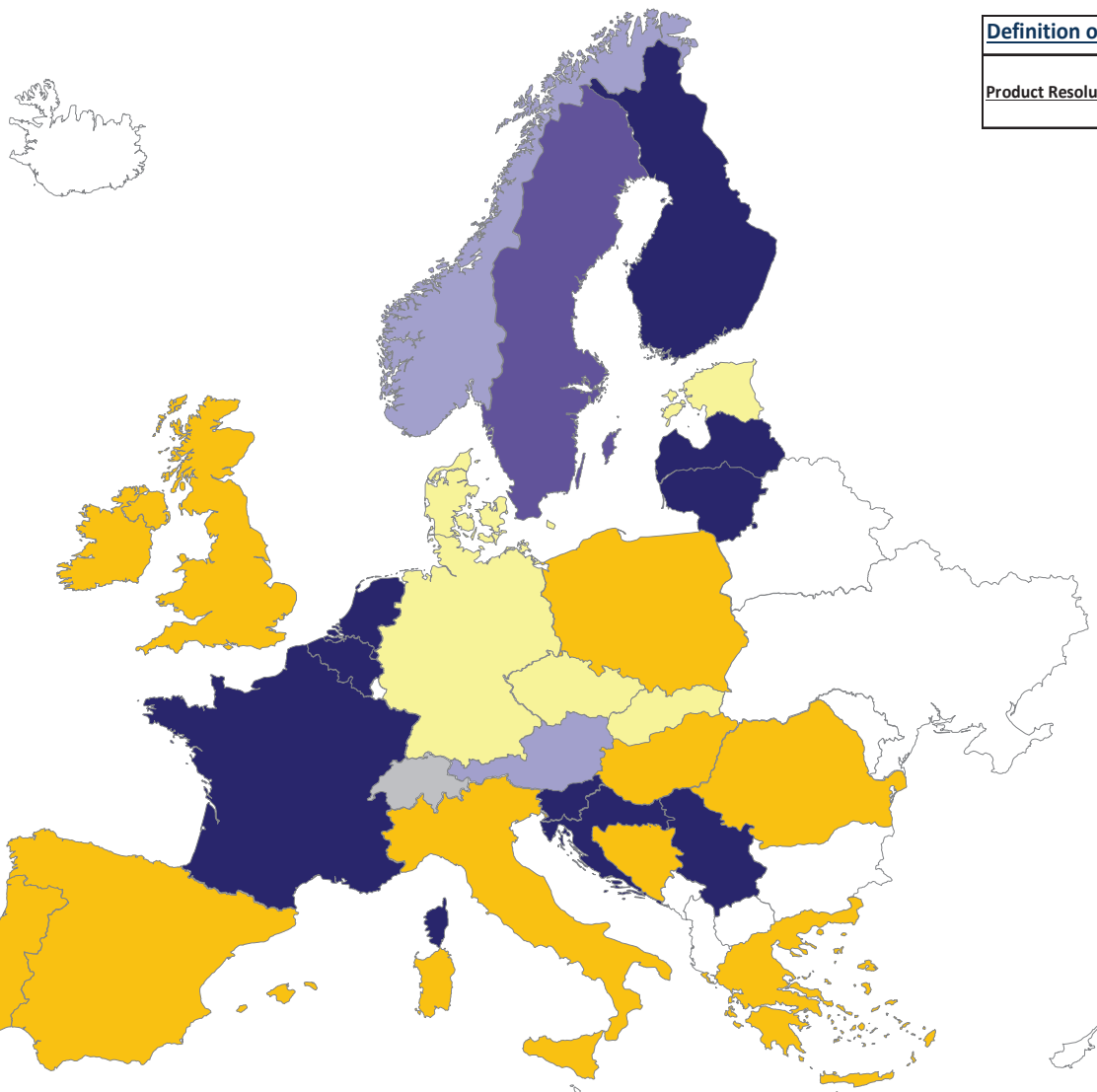
<b>Definition of question</b>	
<b>Product Resolution (in MW)</b>	The minimum bid size into the balancing market.



**Key:**

White	Missing data
Orange	N/A
Dark Blue	No minimum bid size
Purple	$x \leq 1\text{ MW}$
Light Purple	$1\text{ MW} < x \leq 5\text{ MW}$
Grey	$5\text{ MW} < x \leq 10\text{ MW}$
Yellow	$x > 10\text{ MW}$

## Frequency Restoration Reserve (Manual) - Capacity - Product Resolution (in time)



### Definition of question

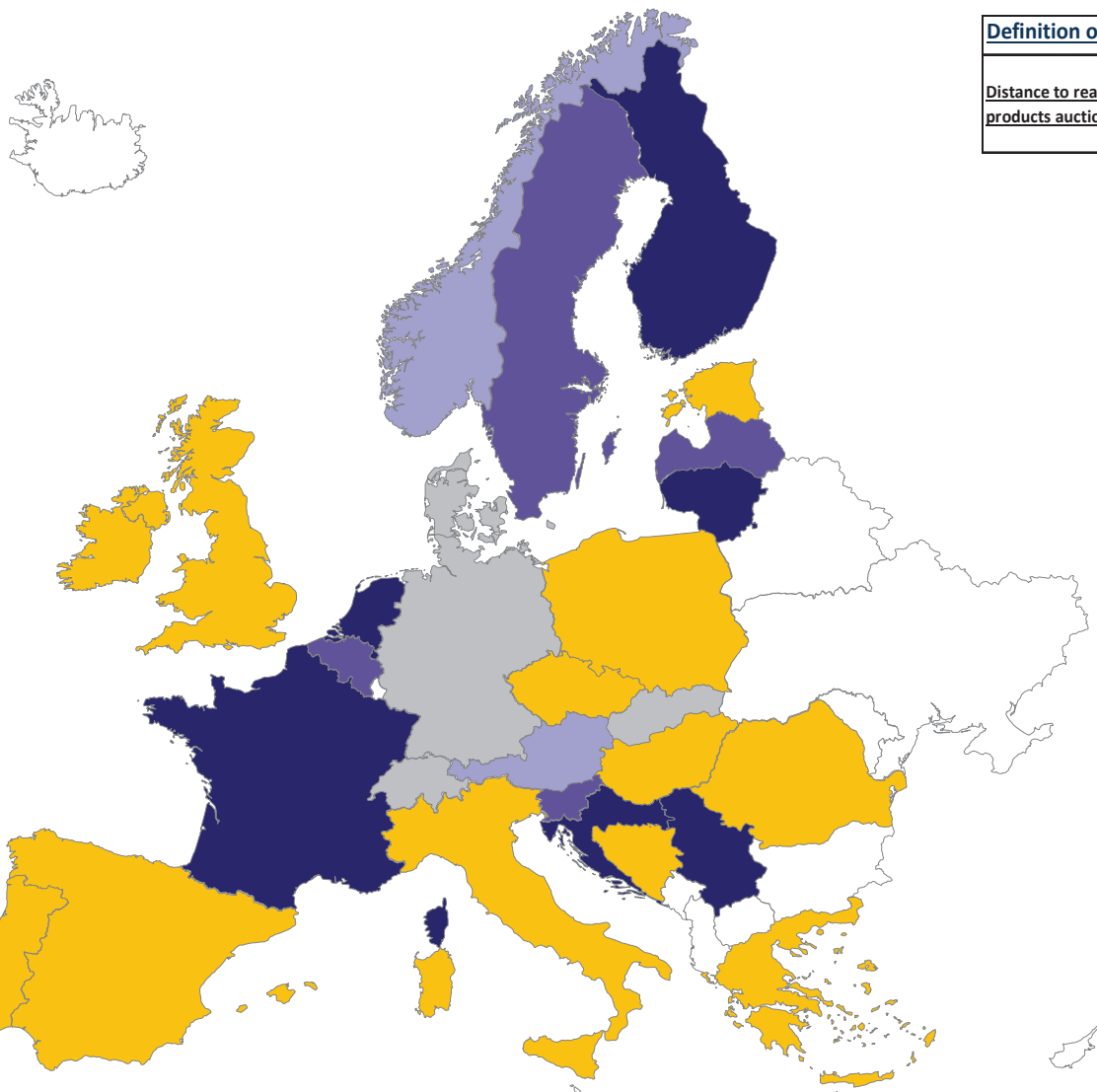
#### Product Resolution (in time)

The maximum resolution for which the product can be bid into the market (for instance =1 hour in the case of a 24 auctions day ahead market for reserve provision).

### Key:

Missing data	White
N/A	Yellow
Year or more	Dark Blue
Month(s)	Medium Purple
Week(s)	Light Purple
Day(s)	Grey
Hour(s)	Light Yellow

# Frequency Restoration Reserve (Manual) - Capacity - Distance to real time of reserve products auctions



## Definition of question

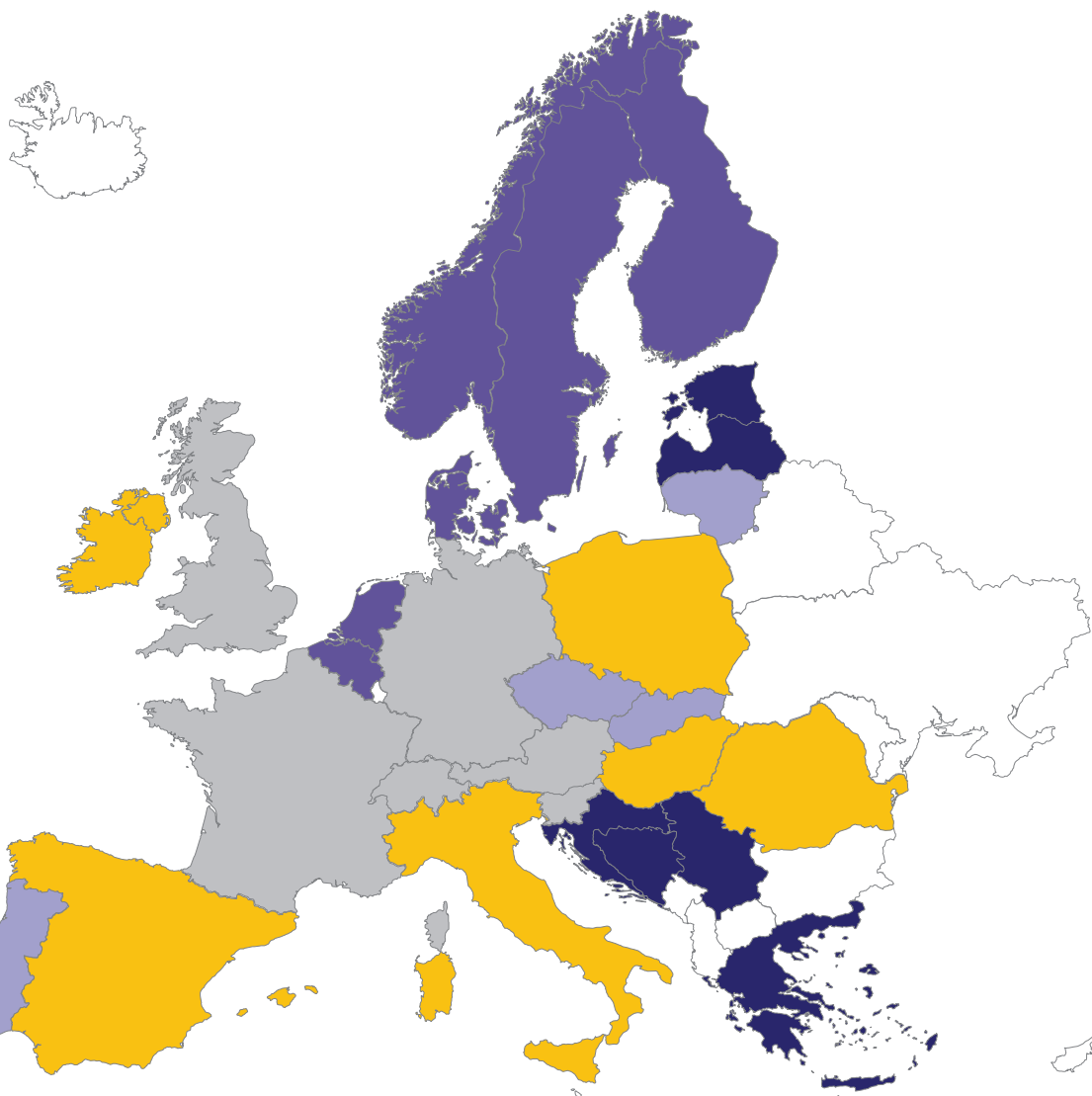
### Distance to real time of reserve products auctions

The time ahead from real time when auction/agreement for a specific balancing product takes place (for instance = 1 year in the case of a reserve agreement signed 1 year ahead of real time).

### Key:

	Missing data
	N/A
	Year or more
	Month(s)
	Week(s)
	Day(s)

# Frequency Restoration Reserve (Manual) - Capacity - Provider

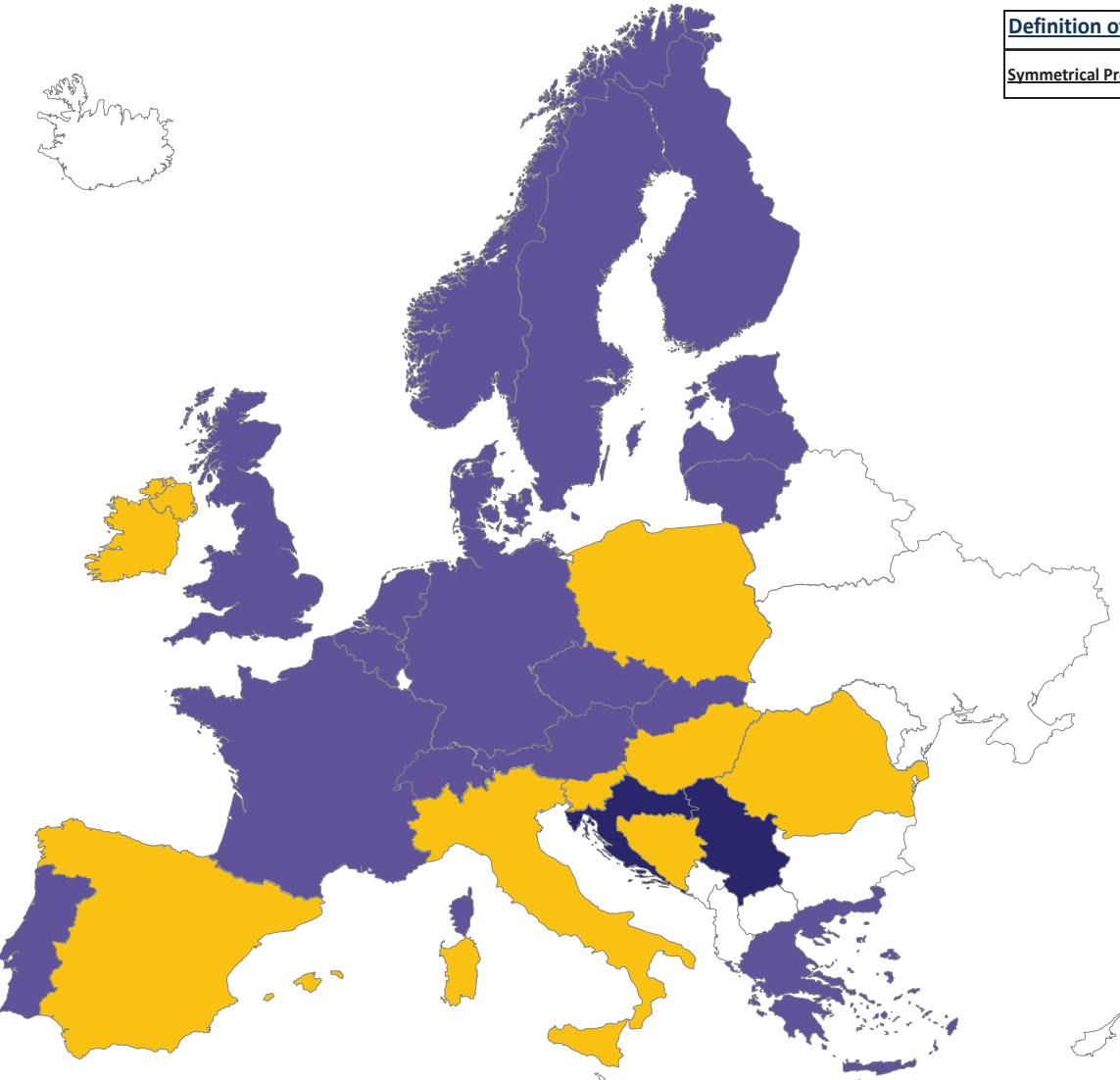


**Key:**

White	Missing data
Yellow	N/A
Dark Blue	Generators Only
Medium Blue	Generators + Load
Light Blue	Generators + Pump Storage units pumping
Grey	Generators + Pump Storage units pumping + Load

# Frequency Restoration Reserve (Manual) - Capacity - Symmetrical Product

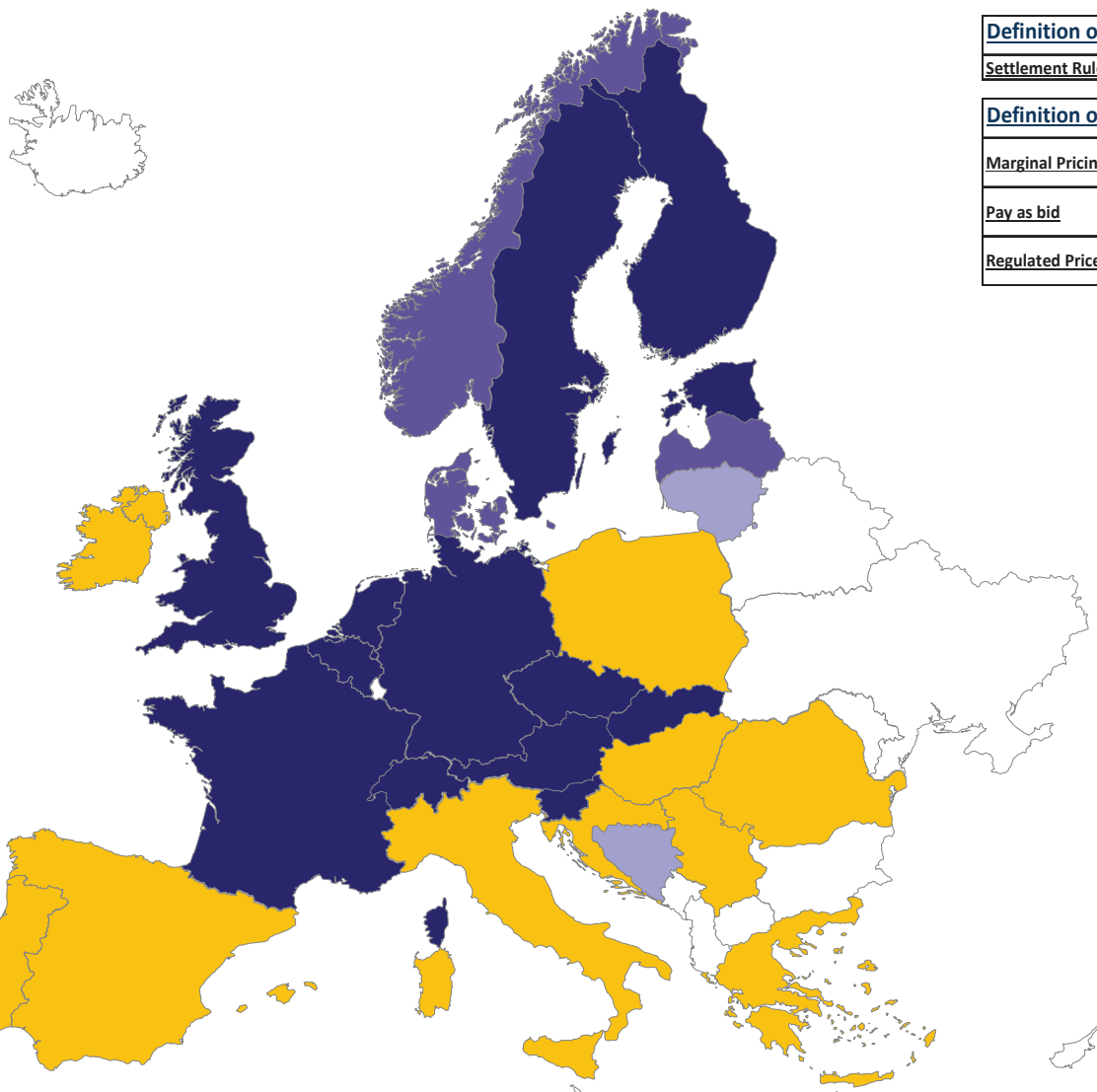
Definition of question	
Symmetrical Product	Upward regulation volume and for downward regulation volume has be equal.



**Key:**

White	Missing data
Yellow	N/A
Dark Blue	Has to be symmetrical
Light Blue	Don't need to be symmetrical

## Frequency Restoration Reserve (Manual) - Capacity - Settlement Rule



### Definition of question

<b>Settlement Rule</b>	The pricing rules for settlement.
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### Definition of answer

<b>Marginal Pricing</b>	Marginal pricing is the change in total cost that arises when the quantity produced changes by one unit.
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<b>Pay as bid</b>	Contracted parties who provide a service are paid based on their offer price.
-------------------	-------------------------------------------------------------------------------

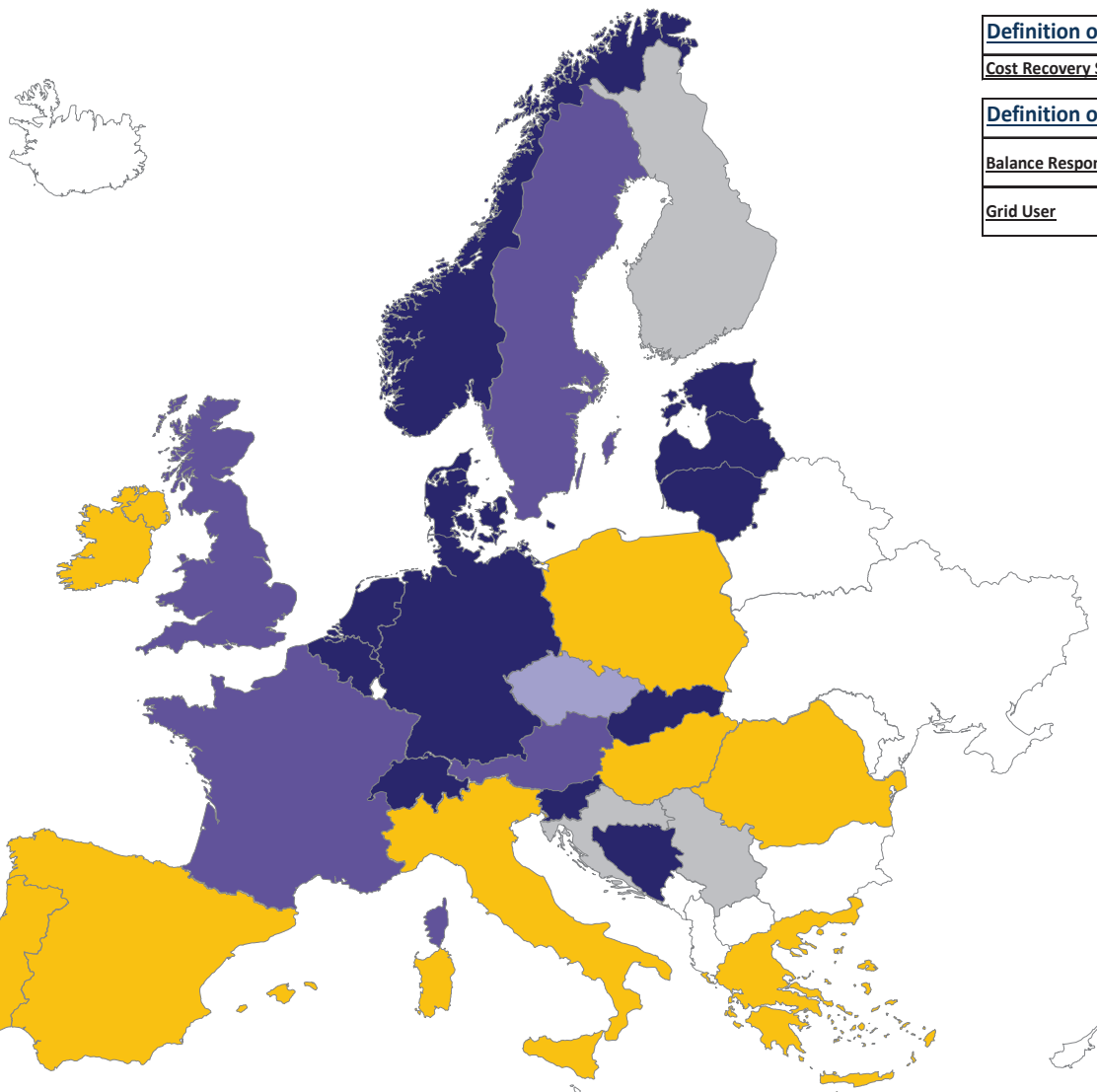
<b>Regulated Price</b>	Price for this service is based on a price that is set by the relevant regulatory authority.
------------------------	----------------------------------------------------------------------------------------------

**Key:**

	Missing data
	N/A
	Pay as bid
	Marginal Pricing
	Regulated Price



## Frequency Restoration Reserve (Manual) - Capacity - Cost Recovery Scheme



### Definition of question

#### Cost Recovery Scheme

From whom are the costs recovered.

### Definition of answer

#### Balance Responsible Party (BRP)

Balancing Responsible Party means a market participant or its chosen representative responsible for its Imbalances.

#### Grid User

The natural or legal person supplying to, or being supplied with active and/or reactive power by a TSO or DSO.

### Key:



Missing data

N/A

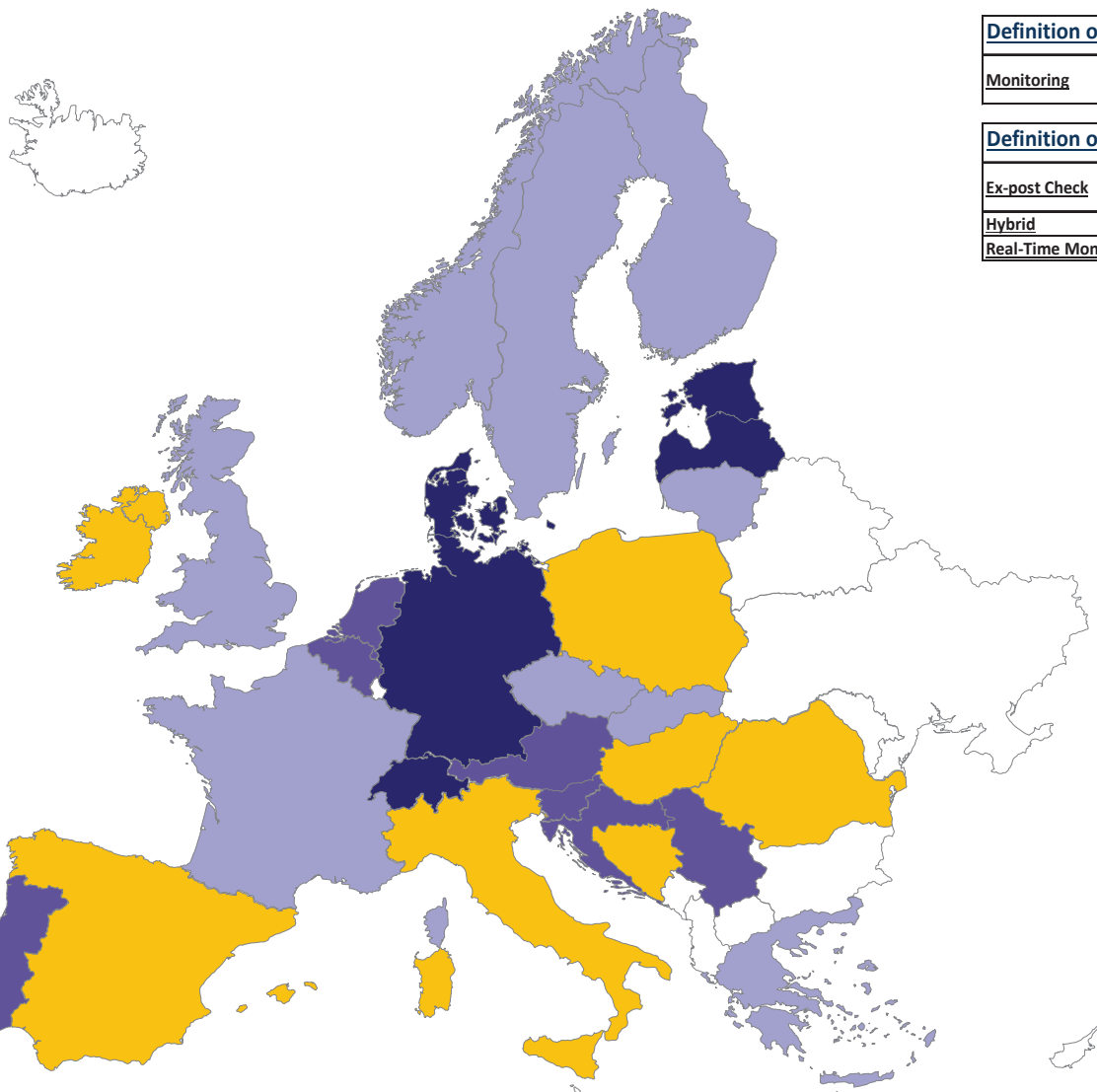
100% Grid Users

100% BRP

100% end consumers

Mix of Grid Users and BRP

## Frequency Restoration Reserve (Manual) - Capacity - Monitoring








### Definition of question

<b>Monitoring</b>	Refers to the type of monitoring in place by the system operator to ensure performance of plant.
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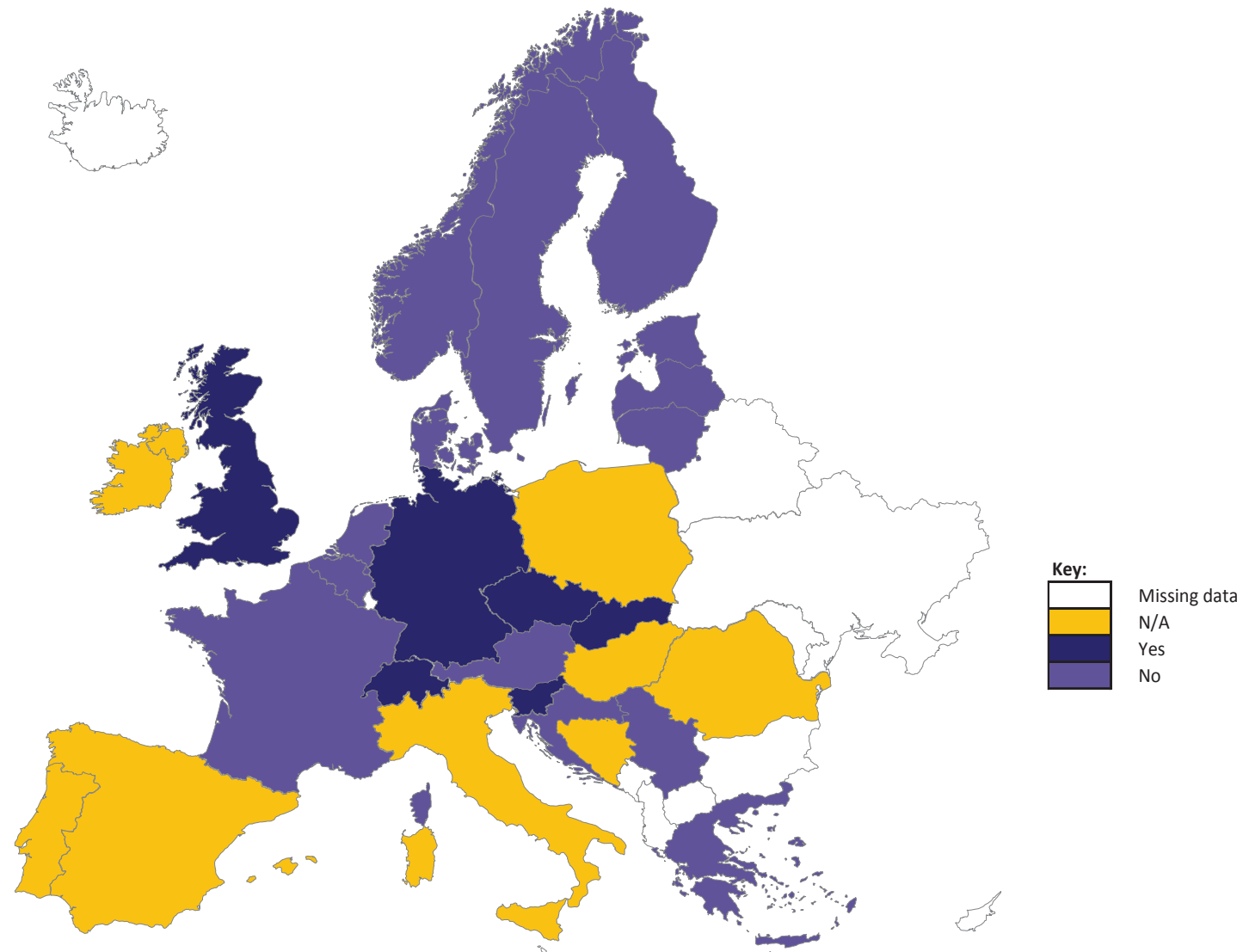
### Definition of answer

<b>Ex-post Check</b>	When the monitoring of performance of plant carried out after the event.
<b>Hybrid</b>	Combination.
<b>Real-Time Monitoring</b>	Monitoring of delivery of ancillary services in real time.

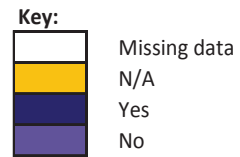
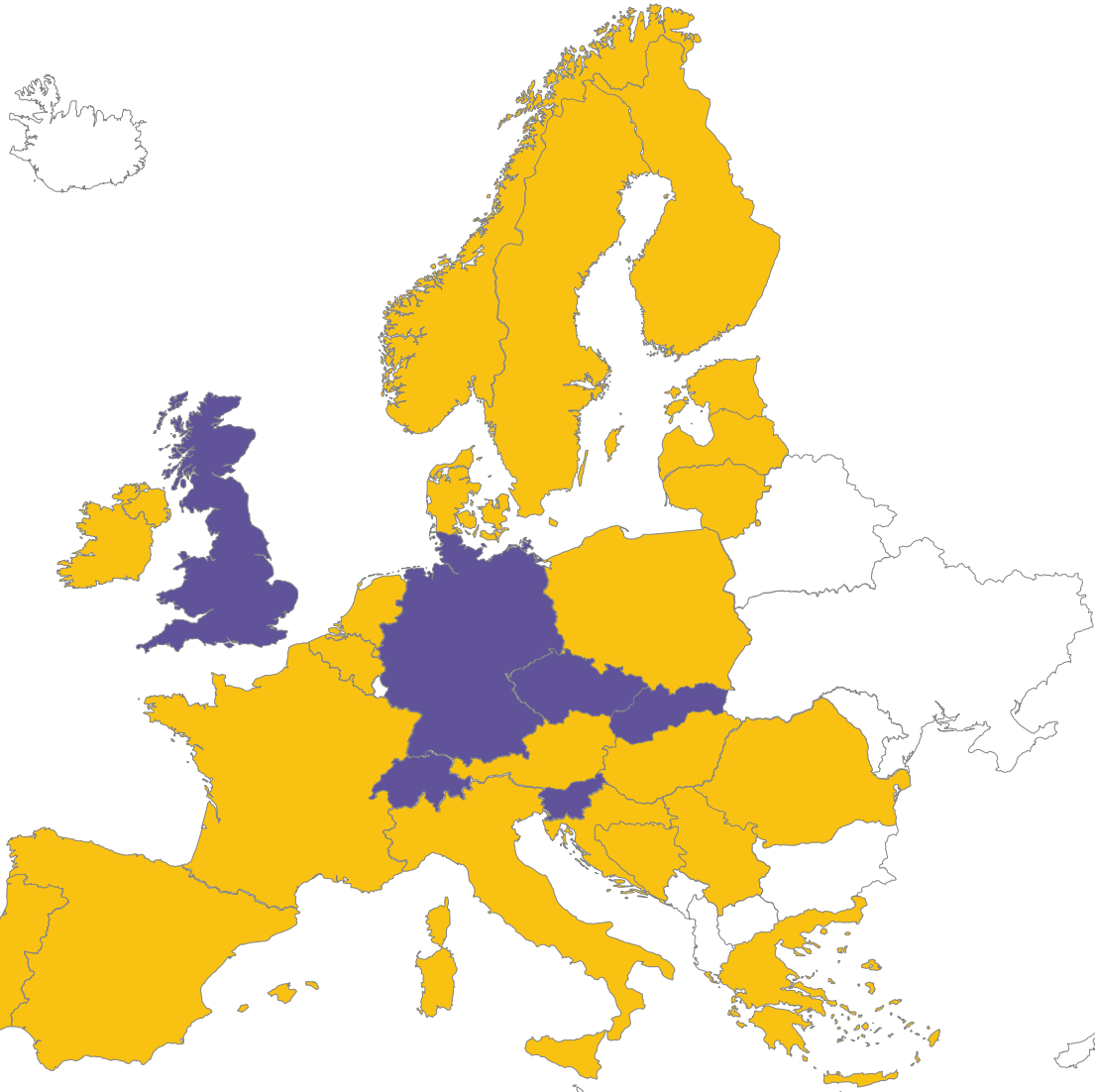
### Key:

	Missing data
	N/A
	Real-Time Monitoring
	Ex-Post Check
	Hybrid

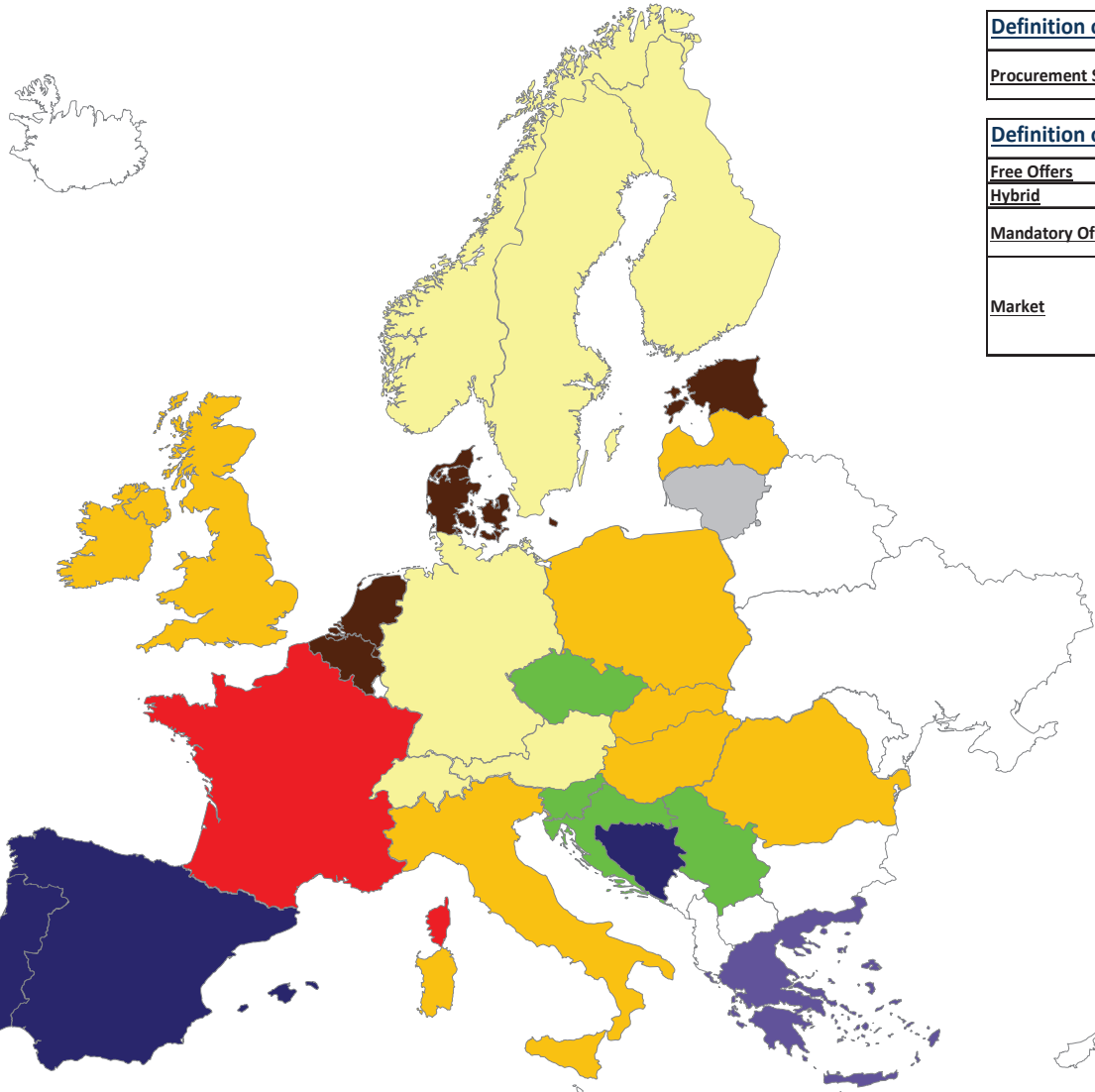
# Frequency Restoration Reserve (Manual) - Capacity - Transfer of obligation allowed



# Frequency Restoration Reserve (Manual) - Capacity - Obl. allowed, organised secondary market exists






## Frequency Restoration Reserve (Manual) - Energy - Procurement Scheme

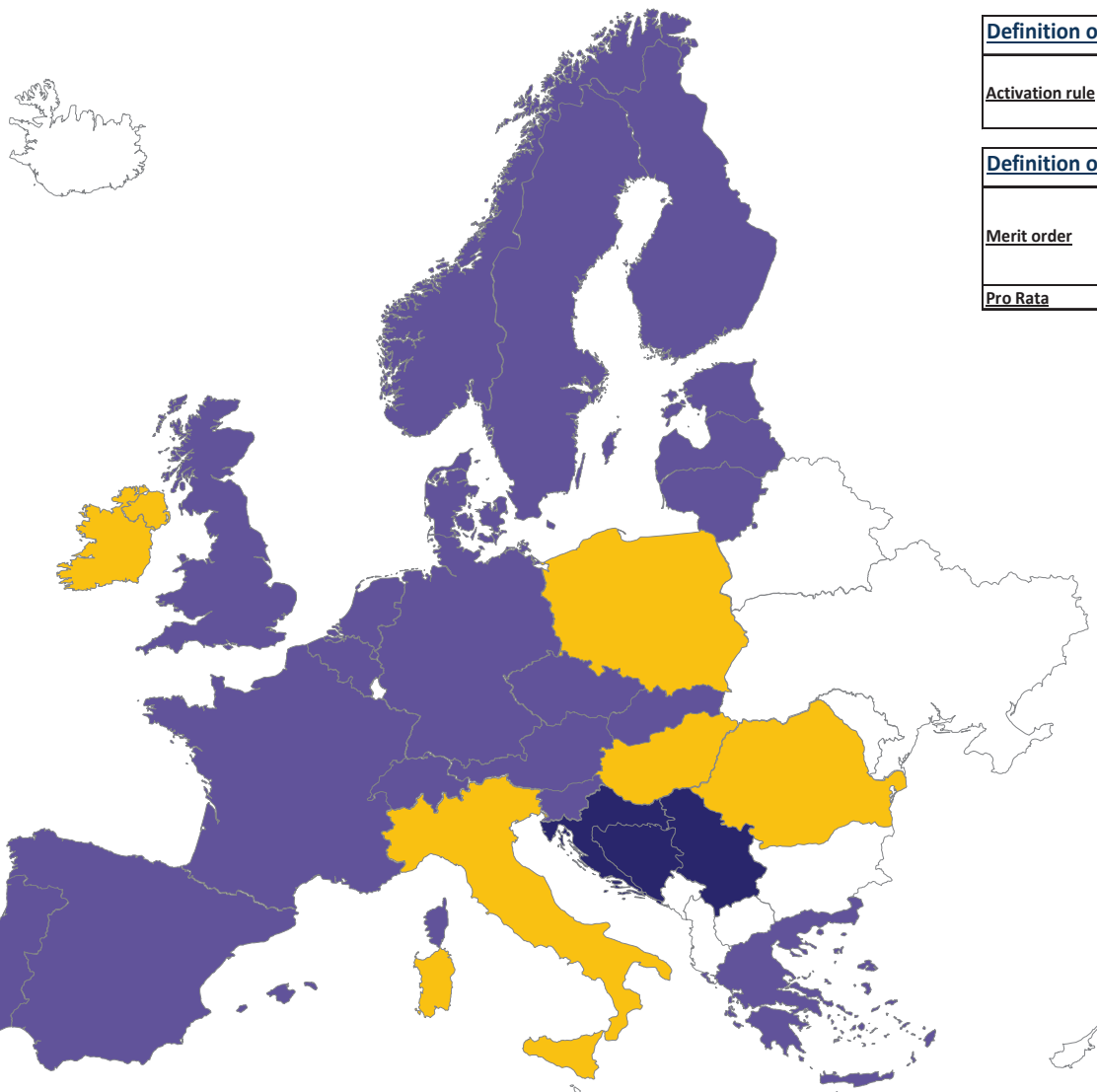


<b>Definition of question</b>	
<b>Procurement Scheme</b>	Background of the offer, which is closest to the real operation time.
<b>Definition of answer</b>	
<b>Free Offers</b>	Non-regulated offers.
<b>Hybrid</b>	Combination.
<b>Mandatory Offers</b>	Generators connected to the grid are obligated to offer the remaining capacity/available capacity.
<b>Market</b>	There is no contract or obligation for a grid user to offer the energy (before the offer). The grid user can voluntary participate in the real-time energy market and bid a price or customize his offer (e.g. the volume, timeframe).

**Key:**

	Missing data
	N/A
	Mandatory Offers
	Mandatory Provision
	Mandatory Provision without Reservation
	Bilateral Market
	Organised Market
	Hybrid
	Other
	Pre-contracted Offers only
	Pre-contracted and Mandatory Offers
	Pre-contracted and Free Offers

## Frequency Restoration Reserve (Manual) - Energy - Activation Rule



### Definition of question

#### Activation rule

How the frequency restoration reserves are activated i.e. by a Pro-Rata system or on the basis of a Merit Order (cheapest being activated first).

### Definition of answer

#### Merit order

A merit order is a way of ranking available sources of energy in ascending order of their short run marginal costs of production, so that those with the lowest marginal costs are the first ones to be brought online to meet demand.

#### Pro Rata

In Proportion (Parallel Activation).

#### Key:



Missing data

N/A

Pro Rata (Parallel Activation)

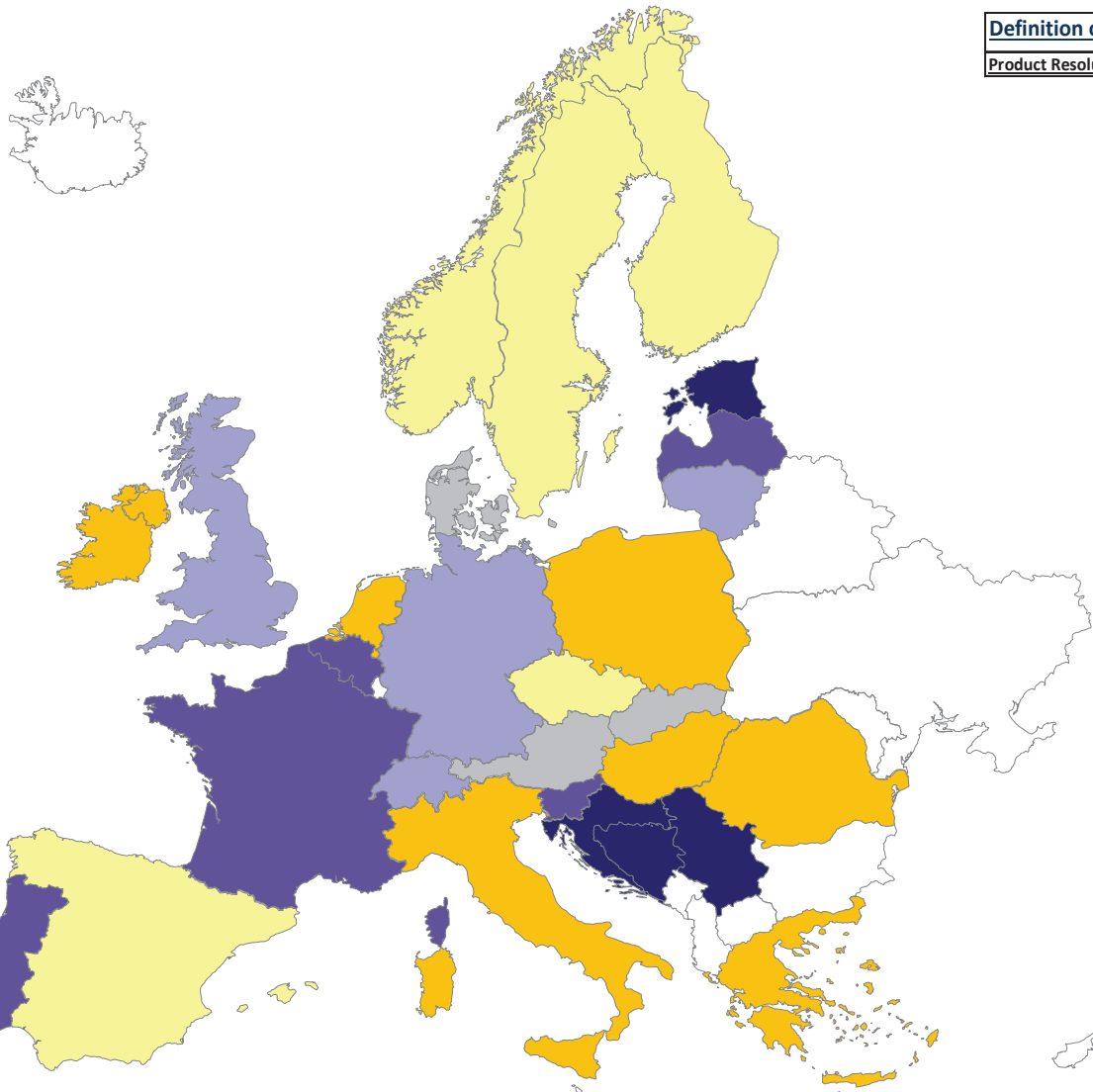
Merit order

# Frequency Restoration Reserve (Manual) - Energy - Product Resolution (in MW)

## Definition of question

Product Resolution (in MW)

The minimum bid size into the balancing market.

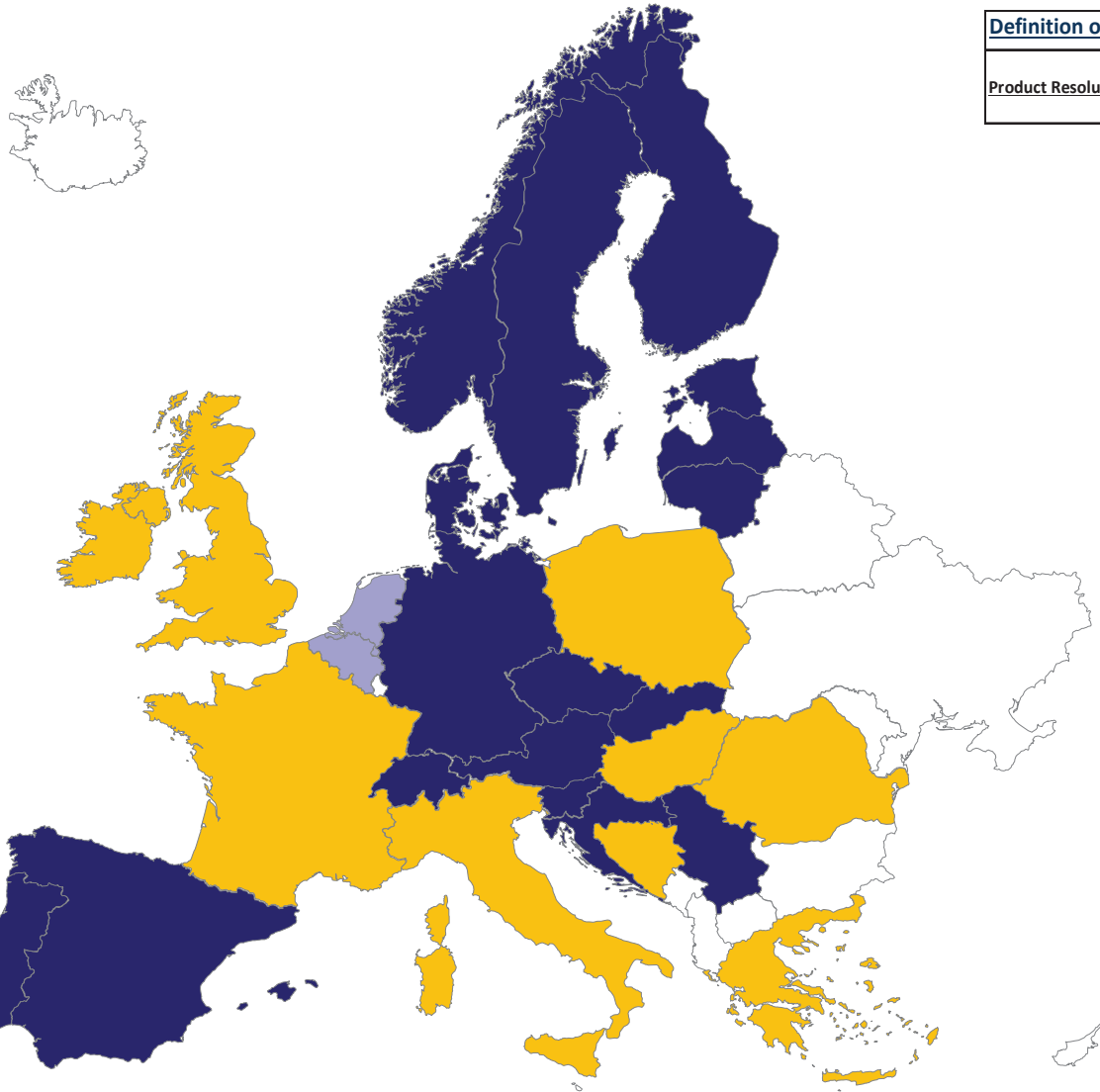


### Key:



- Missing data
- N/A
- No minimum bid size
- $x \leq 1 \text{ MW}$
- $1 \text{ MW} < x \leq 5 \text{ MW}$
- $5 \text{ MW} < x \leq 10 \text{ MW}$
- $x > 10 \text{ MW}$

## Frequency Restoration Reserve (Manual) - Energy - Product Resolution (in time)



### Definition of question

#### Product Resolution (in time)

The maximum resolution for which the product can be bid into the market (for instance =1 hour in the case of a 24 auctions day ahead market for reserve provision).

### Key:



Missing data

N/A

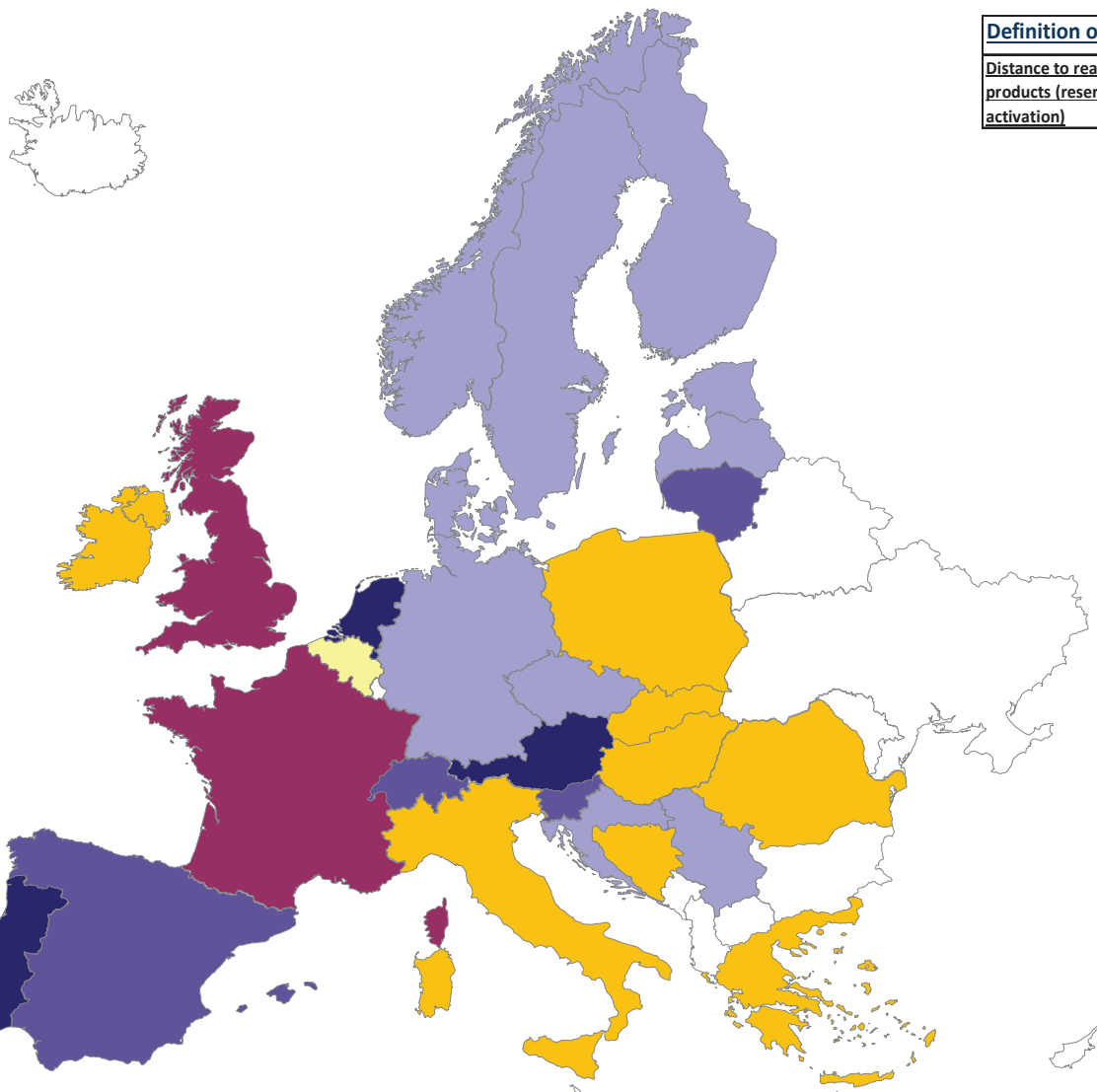
Hour (or blocks)

30 minutes

15 minutes



## Frequency Restoration Reserve (Manual) - Energy - Distance to real time of energy products



### Definition of question

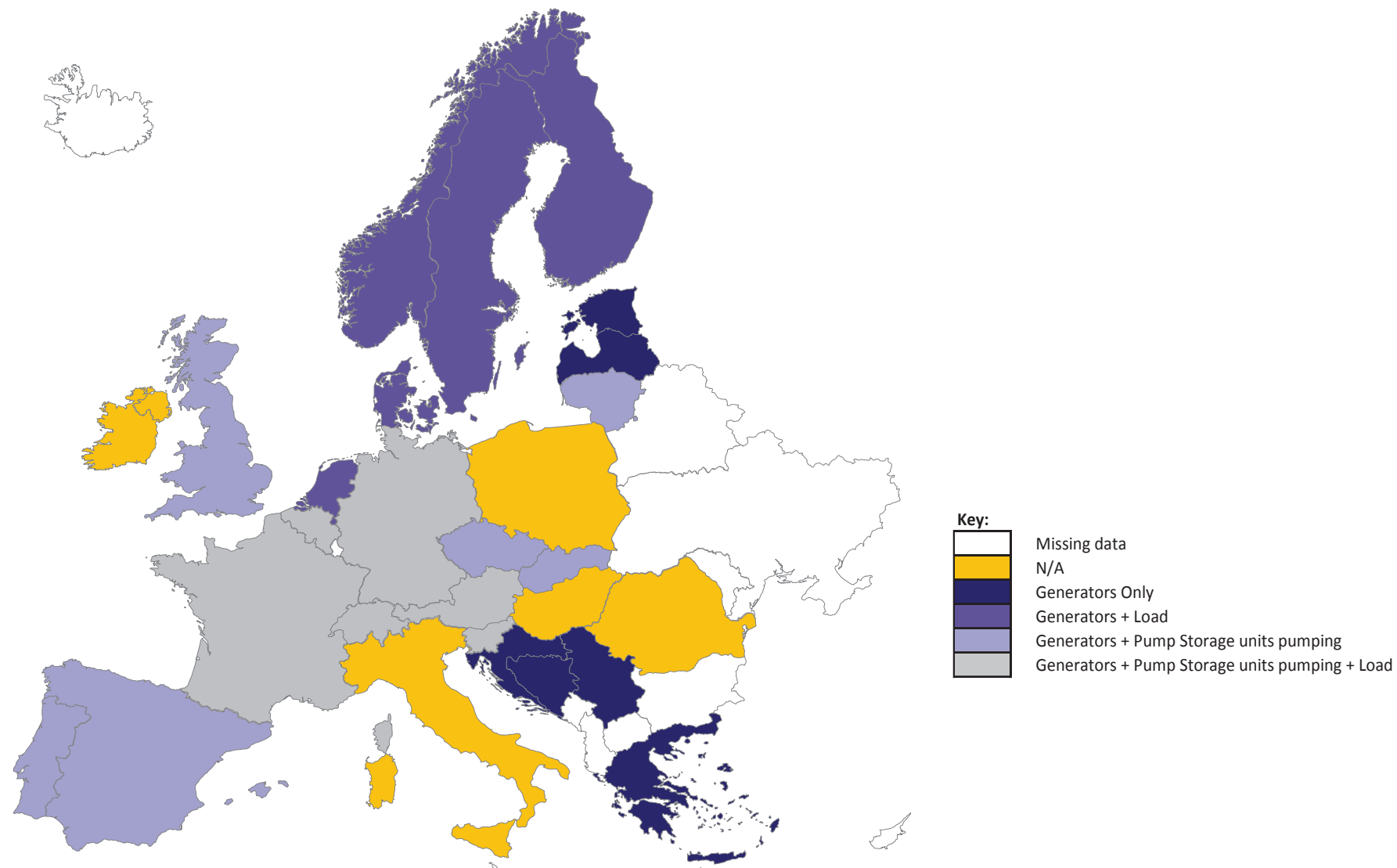
Distance to real time of energy products (reserve products activation)

The time ahead from real time when TSO activates a given product (for instance 15 minutes in the case of mFRR/tertiary energy).

### Key:

	Missing data
	N/A
	$x > H-1$
	$15 \text{ minutes} < x \leq H-1$
	$5 \text{ minutes} < x \leq 15 \text{ minutes}$
	$1 \text{ minute} < x \leq 5 \text{ minutes}$
	$x \leq 1 \text{ minute}$
	Depends on the unit

# Frequency Restoration Reserve (Manual) - Energy - Provider



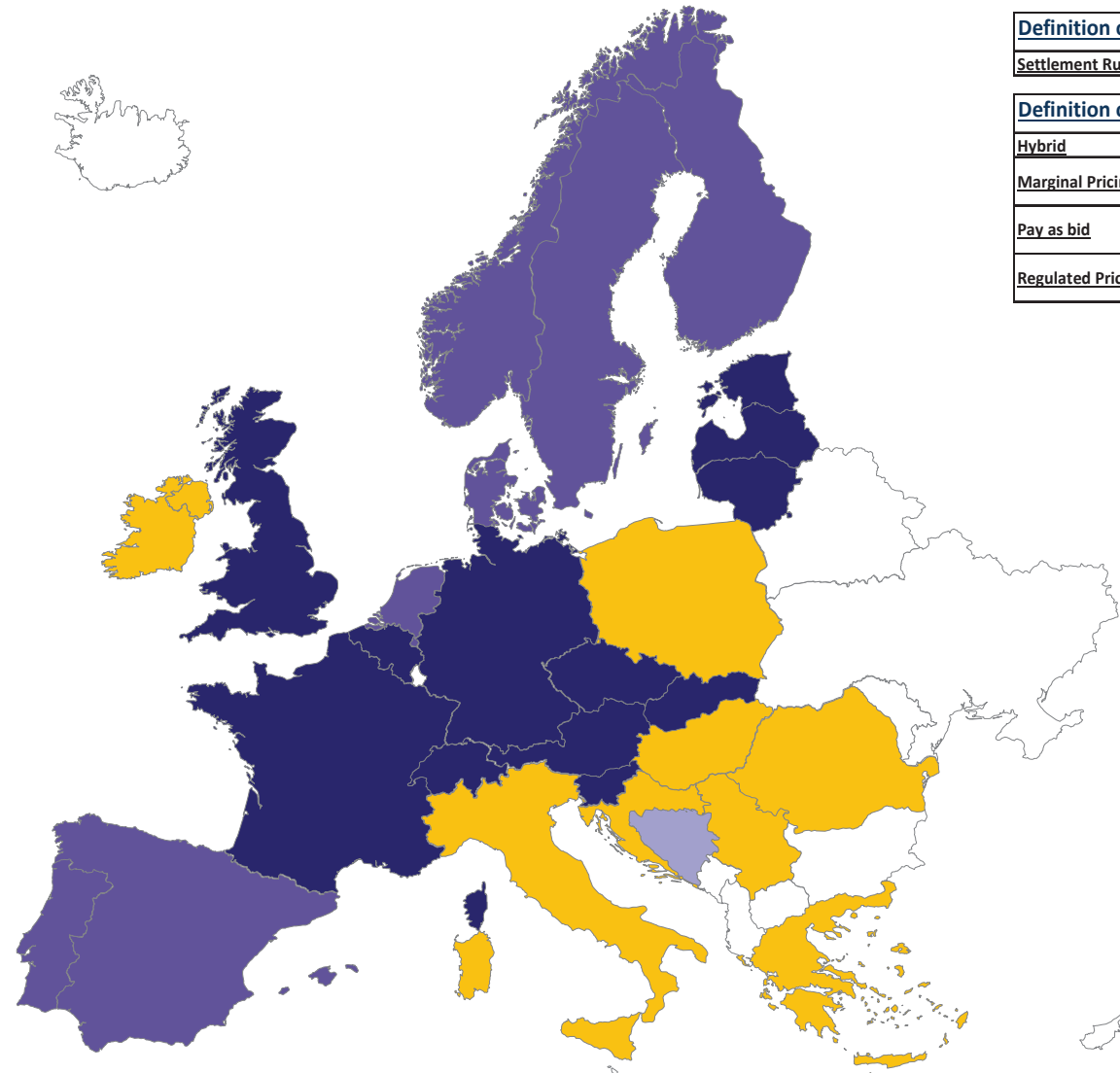
**Key:**

- Missing data
- N/A
- Generators Only
- Generators + Load
- Generators + Pump Storage units pumping
- Generators + Pump Storage units pumping + Load

## Frequency Restoration Reserve (Manual) - Energy - Settlement Rule



Definition of question	
<b>Settlement Rule</b>	The pricing rules for settlement.
Definition of answer	
<b>Hybrid</b>	Combination.
<b>Marginal Pricing</b>	Marginal pricing is the change in total cost that arises when the quantity produced changes by one unit.
<b>Pay as bid</b>	Contracted parties who provide a service are paid based on their offer price.
<b>Regulated Price</b>	Price for this service is based on a price that is set by the relevant regulatory authority.



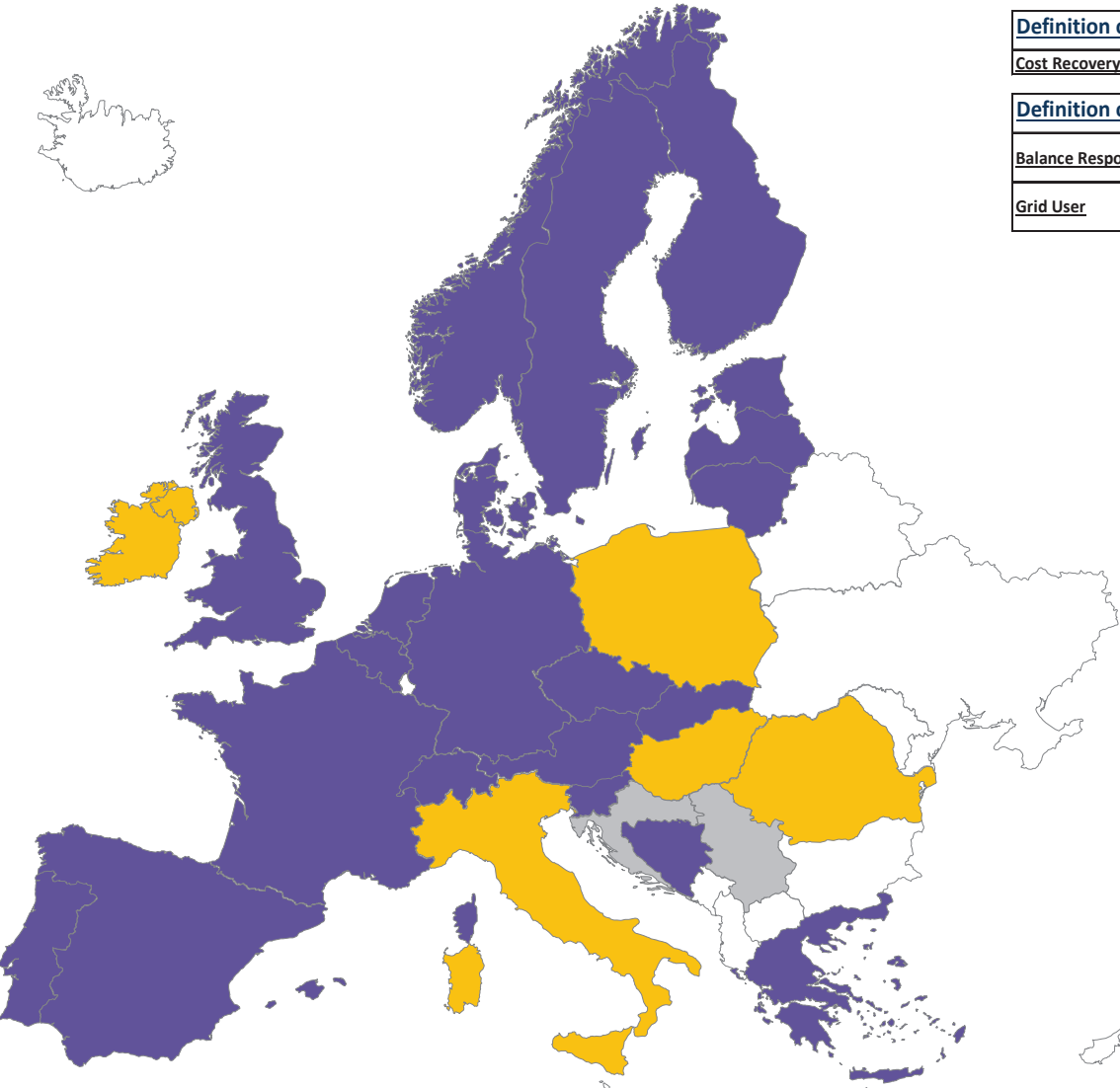
**Key:**

	Missing data
	N/A
	Pay as bid
	Marginal Pricing
	Regulated Price
	Hybrid

# Frequency Restoration Reserve (Manual) - Energy - Cost Recovery Scheme



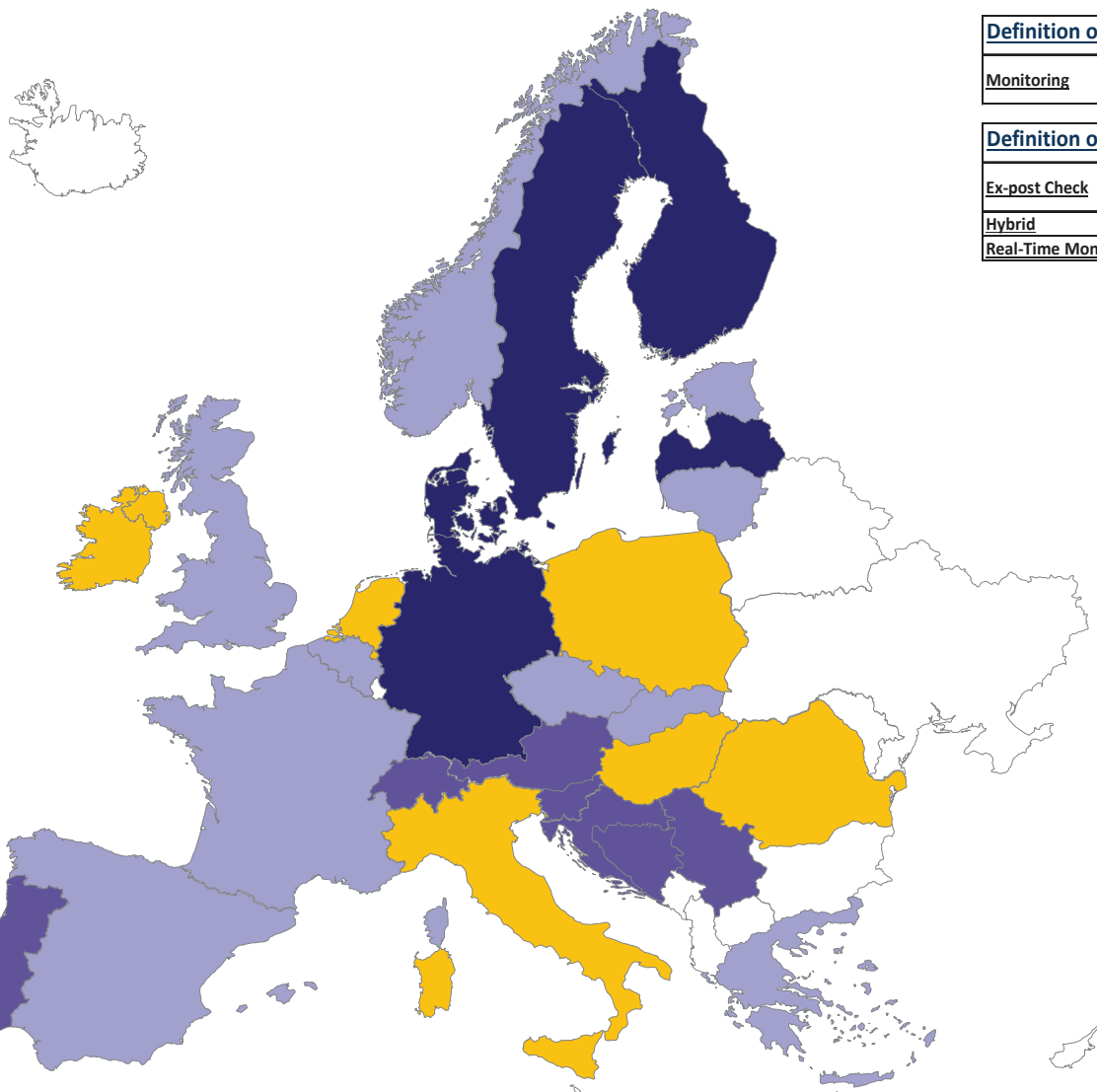
<b>Definition of question</b>	
<b>Cost Recovery Scheme</b>	From whom are the costs recovered.
<b>Definition of answer</b>	
<b>Balance Responsible Party (BRP)</b>	Balancing Responsible Party means a market participant or its chosen representative responsible for its Imbalances.
<b>Grid User</b>	The natural or legal person supplying to, or being supplied with active and/or reactive power by a TSO or DSO.



**Key:**

White	Missing data
Yellow	N/A
Dark Blue	100% Grid Users
Medium Blue	100% BRP
Light Blue	100% end consumers
Grey	Mix of Grid Users and BRP

## Frequency Restoration Reserve (Manual) - Energy - Monitoring



### Definition of question

#### Monitoring

Refers to the type of monitoring in place by the system operator to ensure performance of plant.

### Definition of answer

#### Ex-post Check

When the monitoring of performance of plant carried out after the event.

#### Hybrid

Combination.

#### Real-Time Monitoring

Monitoring of delivery of ancillary services in real time.

### Key:



Missing data

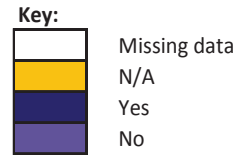
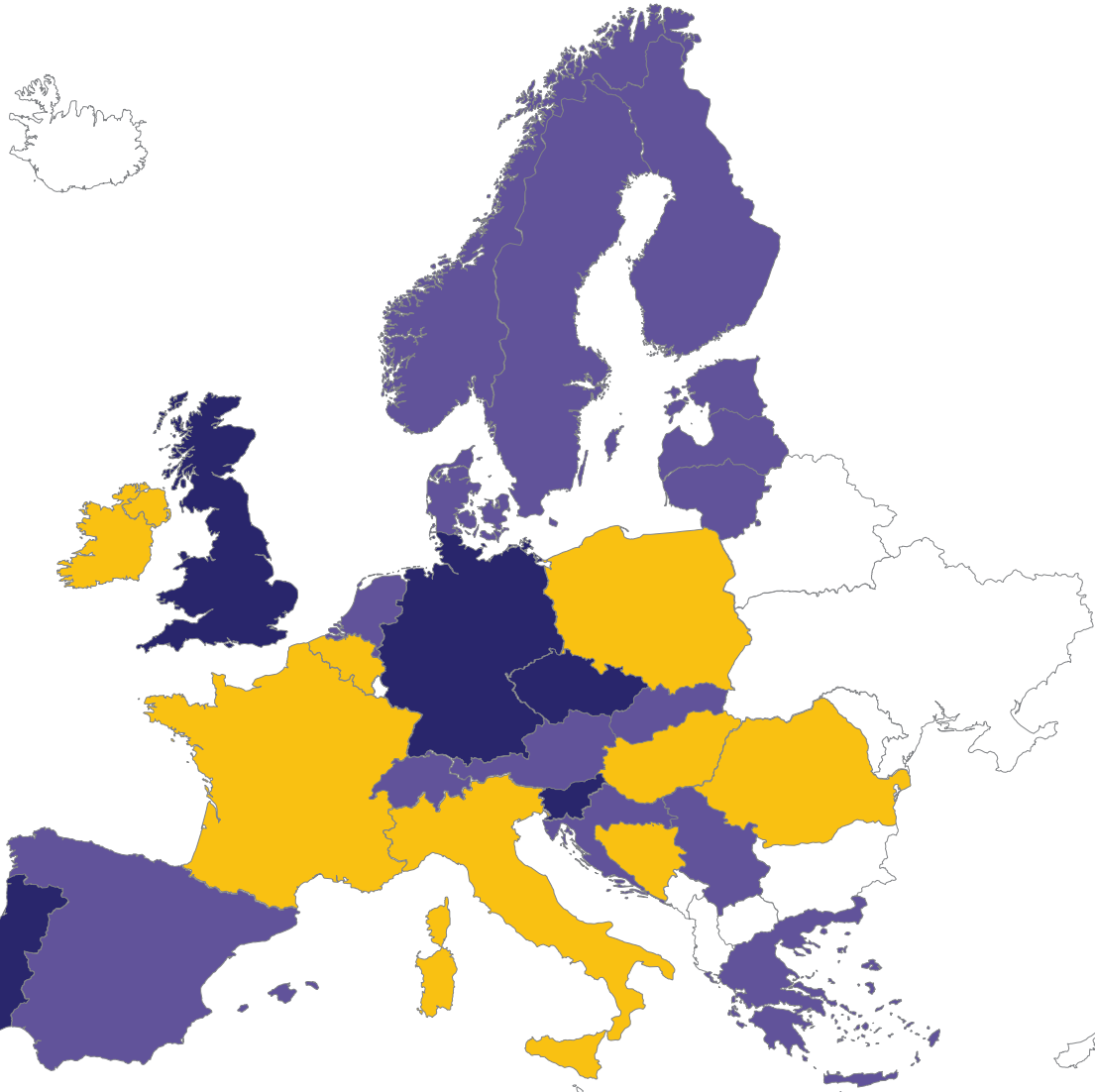
N/A

Real-Time Monitoring

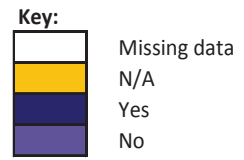
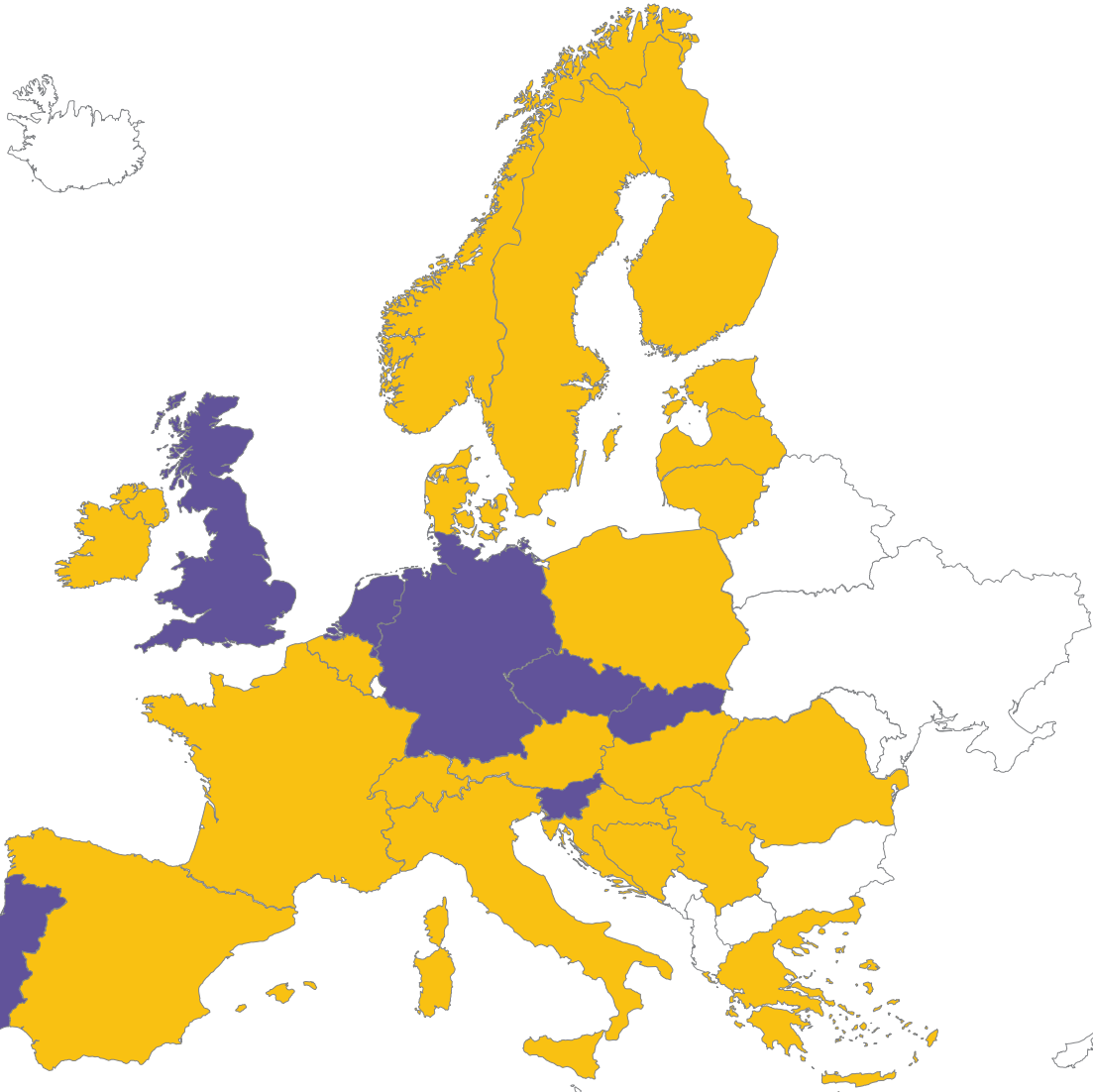
Ex-Post Check

Hybrid

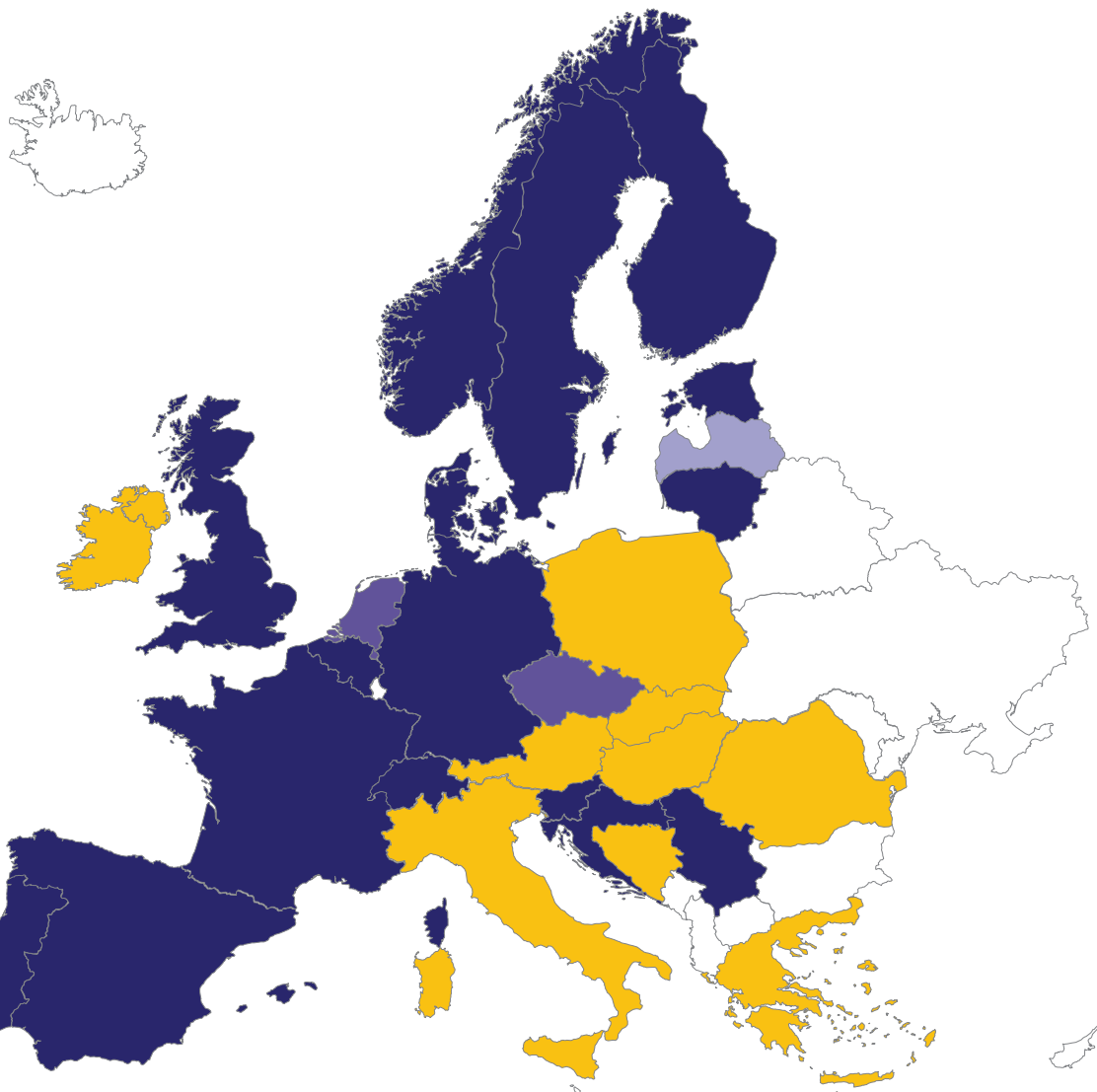
# Frequency Restoration Reserve (Manual) - Energy - Transfer of obligation allowed



# Frequency Restoration Reserve (Manual) - Energy - Obl. allowed, organised secondary market exists



# Frequency Restoration Reserve (Manual) - Energy - Partially activated product

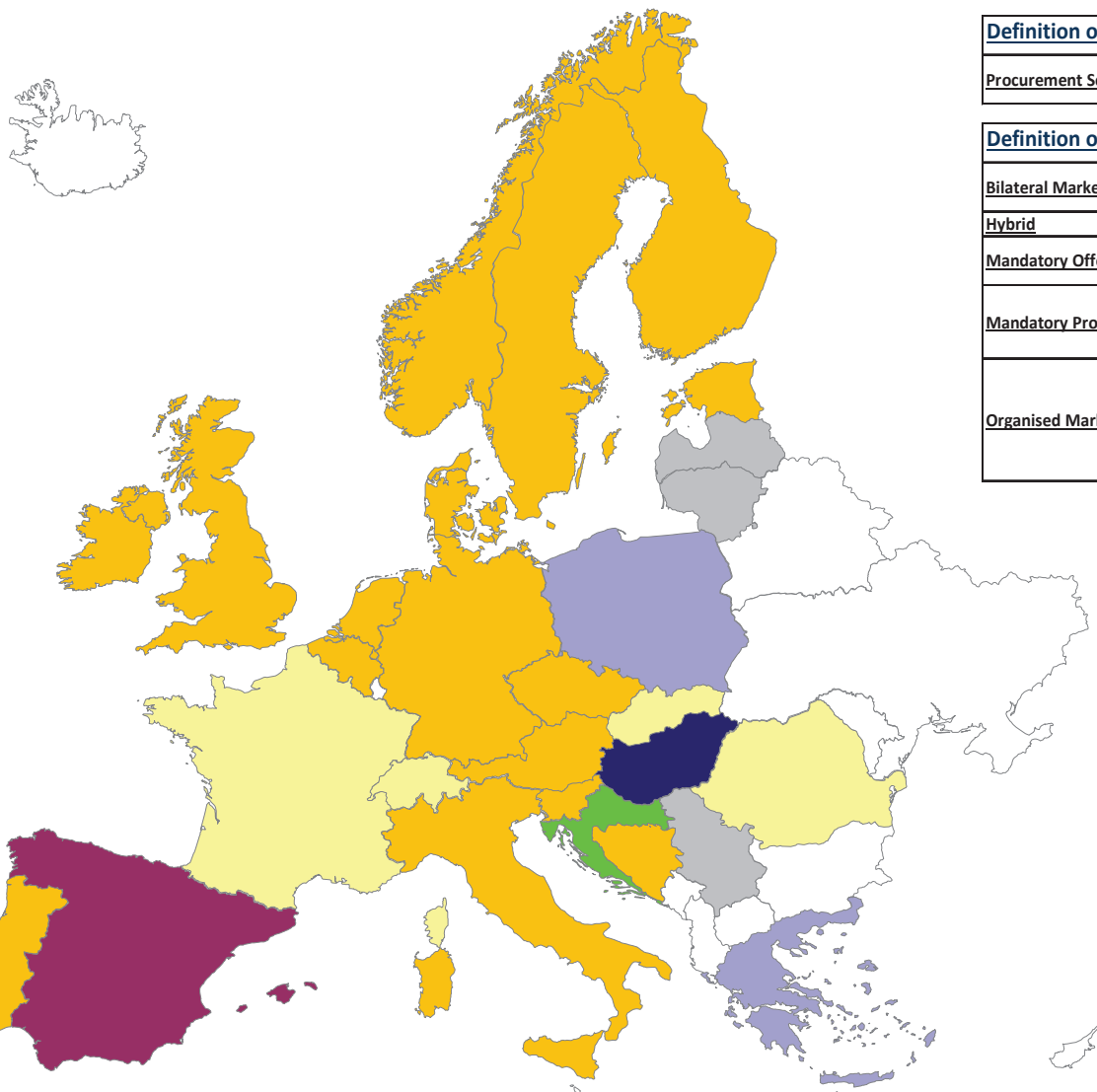


**Key:**













White	Missing data
Yellow	N/A
Dark Blue	Yes, in all directions
Purple	No in none direction
Light Blue	Only in upward direction
Grey	Only in downward direction



## Replacement Reserve - Capacity - Procurement Scheme



<u>Definition of question</u>	
<u>Procurement Scheme</u>	Background of the offer, which is closest to the real operation time.
<u>Definition of answer</u>	
<u>Bilateral Market</u>	A grid user and TSO negotiate a contract regarding the offered service and price/price system.
<u>Hybrid</u>	Combination.
<u>Mandatory Offers</u>	Generators connected to the grid are obligated to offer the remaining capacity/available capacity.
<u>Mandatory Provision</u>	Generators connected to the grid are obligated to reserve a certain amount of capacity in order to meet TSO requirements, for a fixed price set by TSO, NRA or for free.
<u>Organised Market</u>	There is no contract or obligation for a grid user to offer the reserve (before the offer). The grid user can voluntary participate in the market (e.g. tender, auction, market platform (like PX)) and bid a price or customize his offer (e.g. the volume, timeframe). The market result may lead to a bilateral contract.

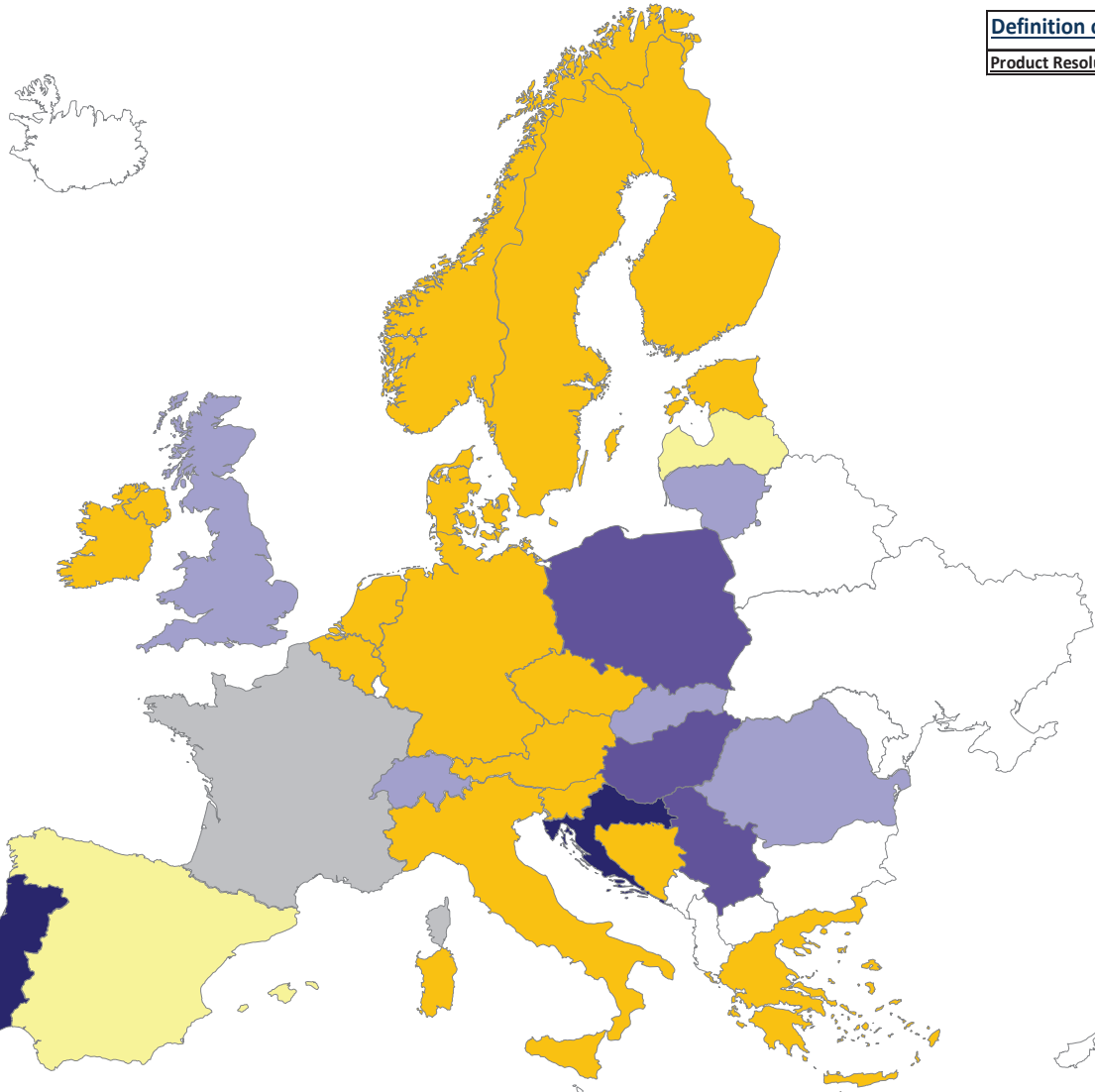
Key:	
	Missing data
	N/A
	Mandatory Offers
	Mandatory Provision
	Mandatory Provision without Reservation
	Bilateral Market
	Organised Market
	Hybrid
	Other
	Pre-contracted Offers only
	Pre-contracted and Mandatory Offers
	Pre-contracted and Free Offers

## Replacement Reserve - Capacity - Product Resolution (in MW)

### Definition of question

#### Product Resolution (in MW)

The minimum bid size into the balancing market.



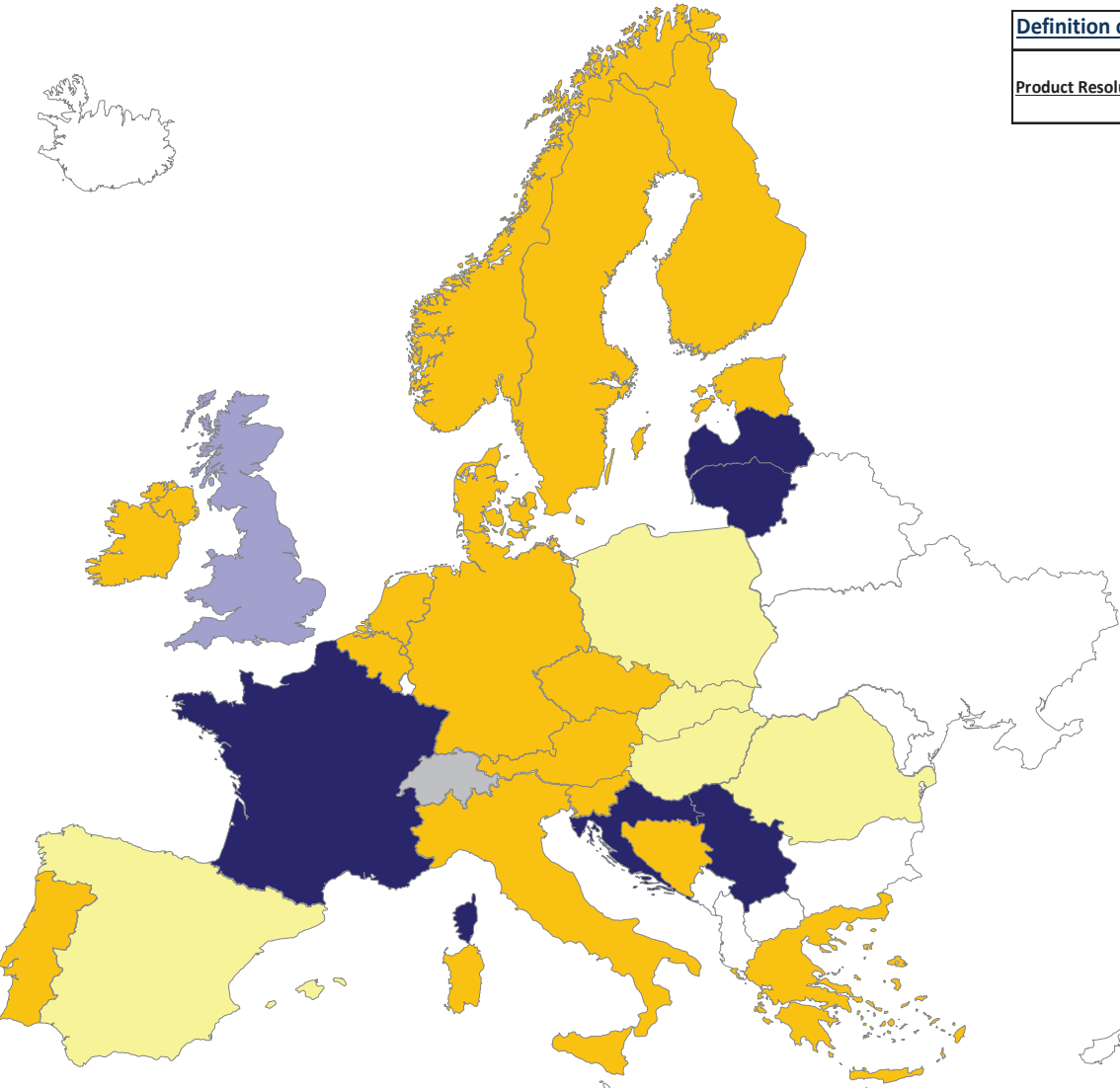
### Key:



- Missing data
- N/A
- No minimum bid size
- $x \leq 1$  MW
- $1 \text{ MW} < x \leq 5$  MW
- $5 \text{ MW} < x \leq 10$  MW
- $x > 10$  MW

# Replacement Reserve - Capacity - Product Resolution (in time)

<b>Definition of question</b>	
<b>Product Resolution (in time)</b>	The maximum resolution for which the product can be bid into the market (for instance =1 hour in the case of a 24 auctions day ahead market for reserve provision).



**Key:**

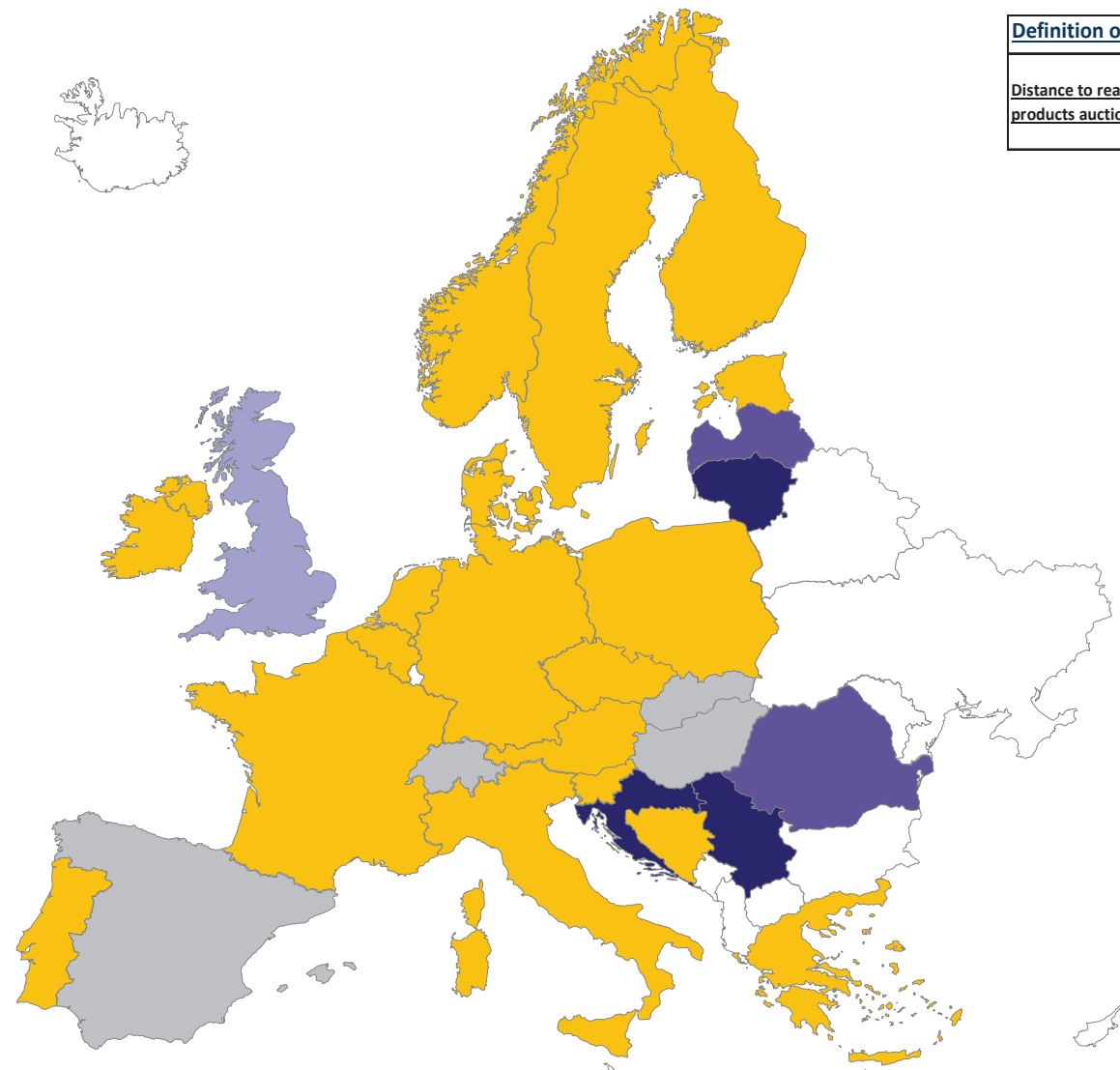
White	Missing data
Orange	N/A
Dark Blue	Year or more
Purple	Month(s)
Light Purple	Week(s)
Grey	Day(s)
Yellow	Hour(s)

## Replacement Reserve - Capacity - Distance to real time of reserve products auctions

### Definition of question

#### Distance to real time of reserve products auctions

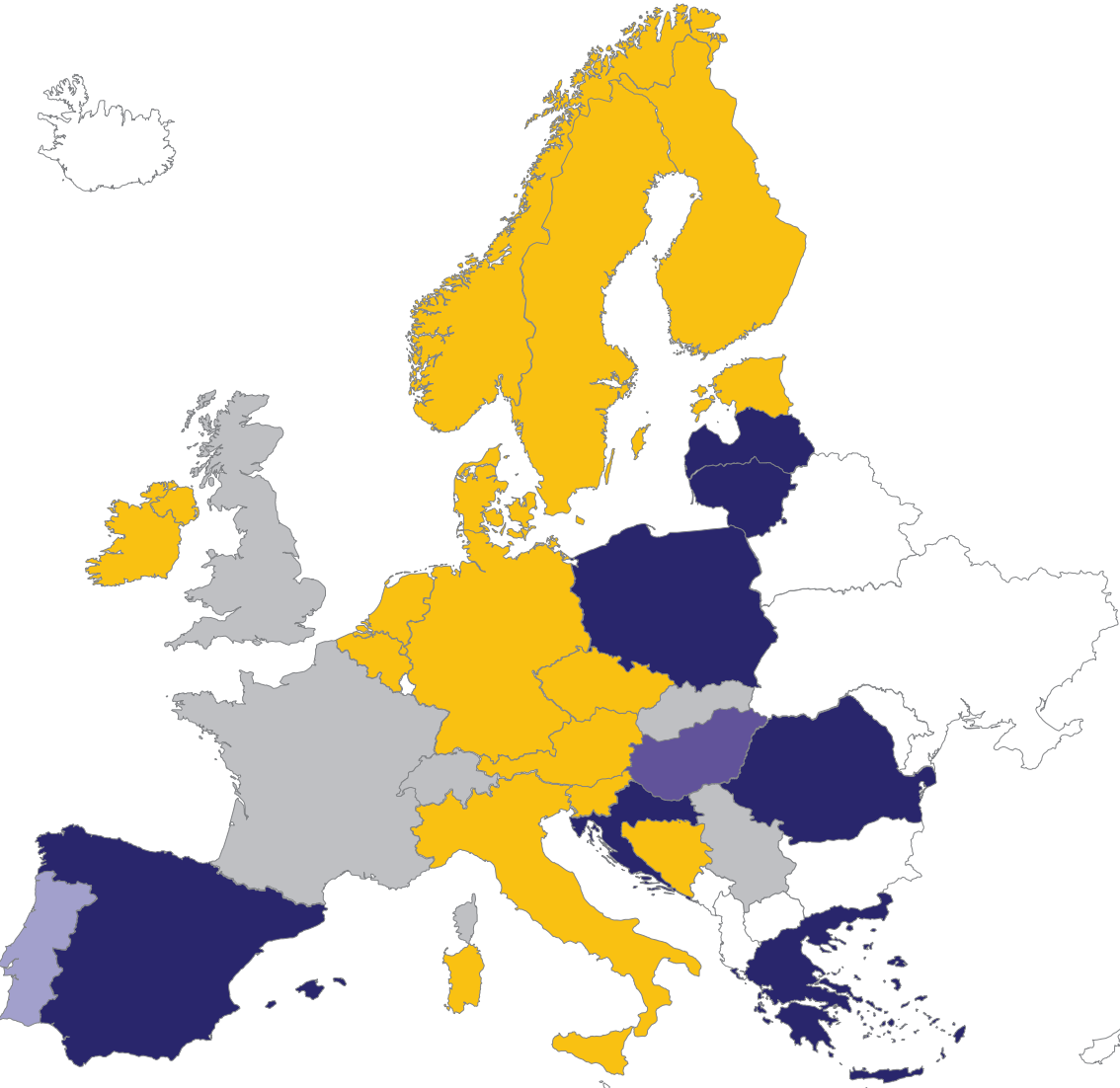
The time ahead from real time when auction/agreement for a specific balancing product takes place (for instance = 1 year in the case of a reserve agreement signed 1 year ahead of real time).



### Key:

Missing data	White box
N/A	Yellow box
Year or more	Dark blue box
Month(s)	Medium blue box
Week(s)	Light blue box
Day(s)	Grey box

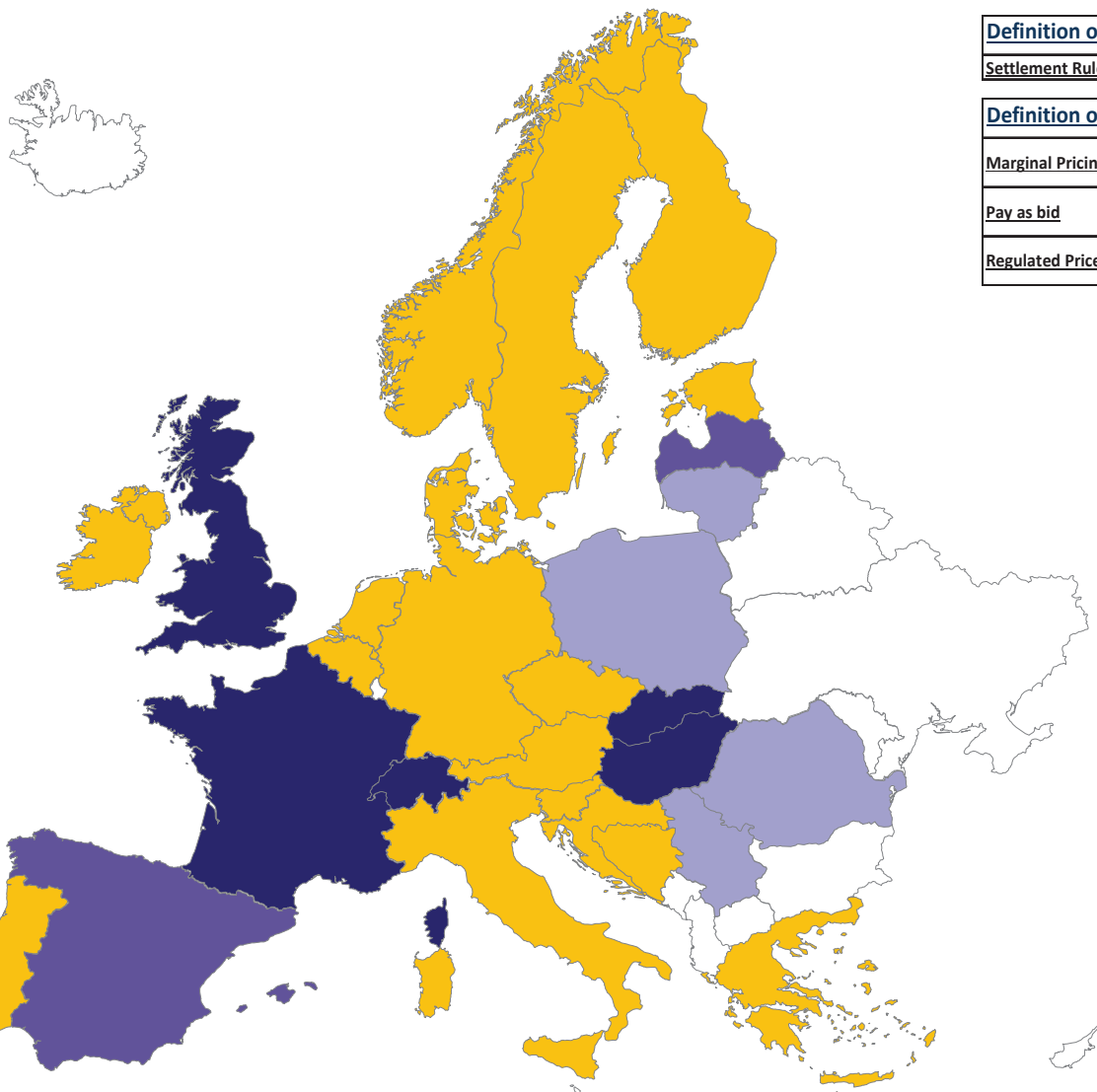
# Replacement Reserve - Capacity - Provider



**Key:**

White	Missing data
Yellow	N/A
Dark Blue	Generators Only
Medium Blue	Generators + Load
Light Blue	Generators + Pump Storage units pumping
Grey	Generators + Pump Storage units pumping + Load

## Replacement Reserve - Capacity - Settlement Rule



### Definition of question

<b>Settlement Rule</b>	The pricing rules for settlement.
------------------------	-----------------------------------






### Definition of answer

<b>Marginal Pricing</b>	Marginal pricing is the change in total cost that arises when the quantity produced changes by one unit.
-------------------------	----------------------------------------------------------------------------------------------------------

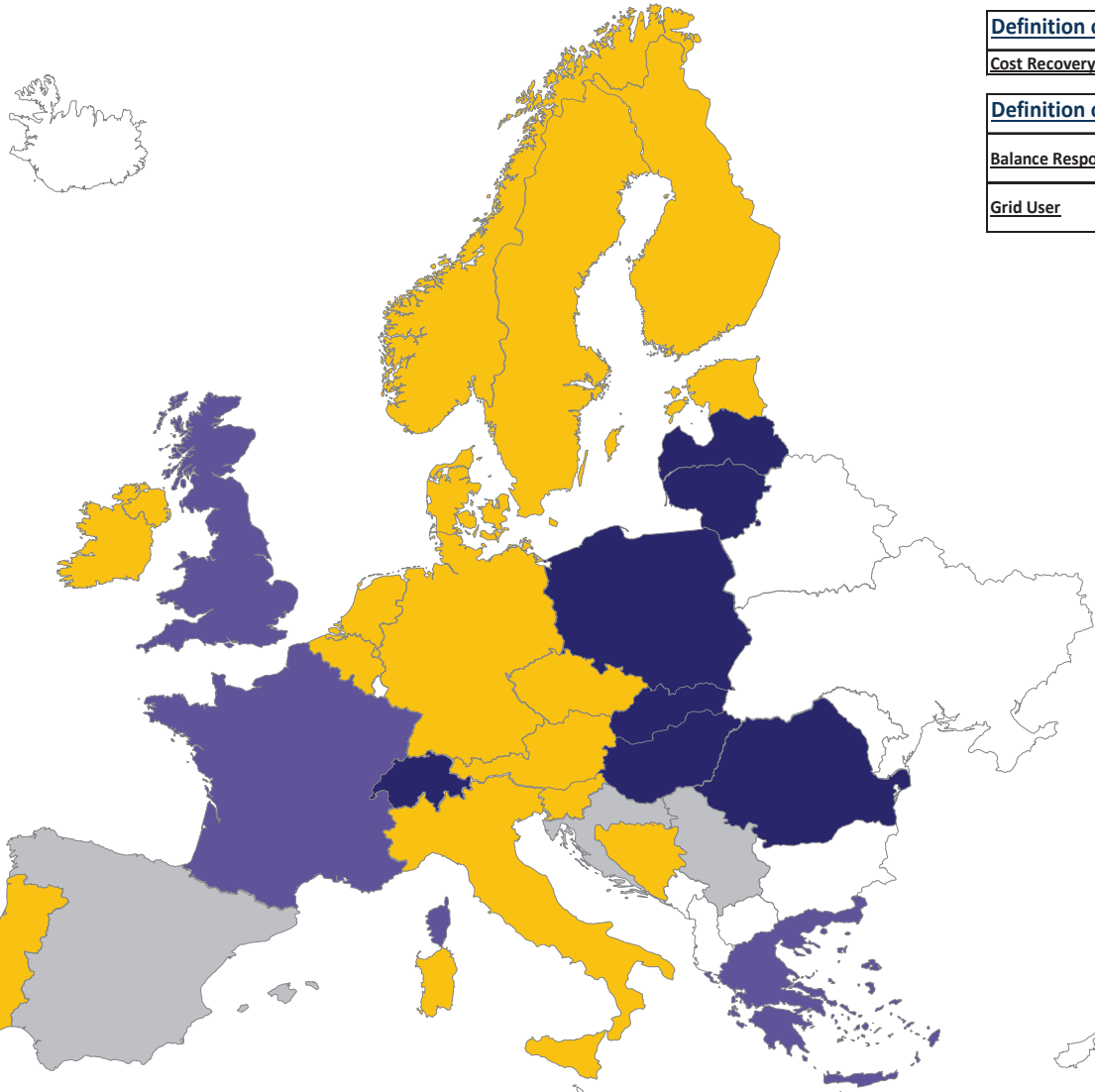
<b>Pay as bid</b>	Contracted parties who provide a service are paid based on their offer price.
-------------------	-------------------------------------------------------------------------------

<b>Regulated Price</b>	Price for this service is based on a price that is set by the relevant regulatory authority.
------------------------	----------------------------------------------------------------------------------------------

**Key:**







	Missing data
	N/A
	Pay as bid
	Marginal Pricing
	Regulated Price

## Replacement Reserve - Capacity - Cost Recovery Scheme

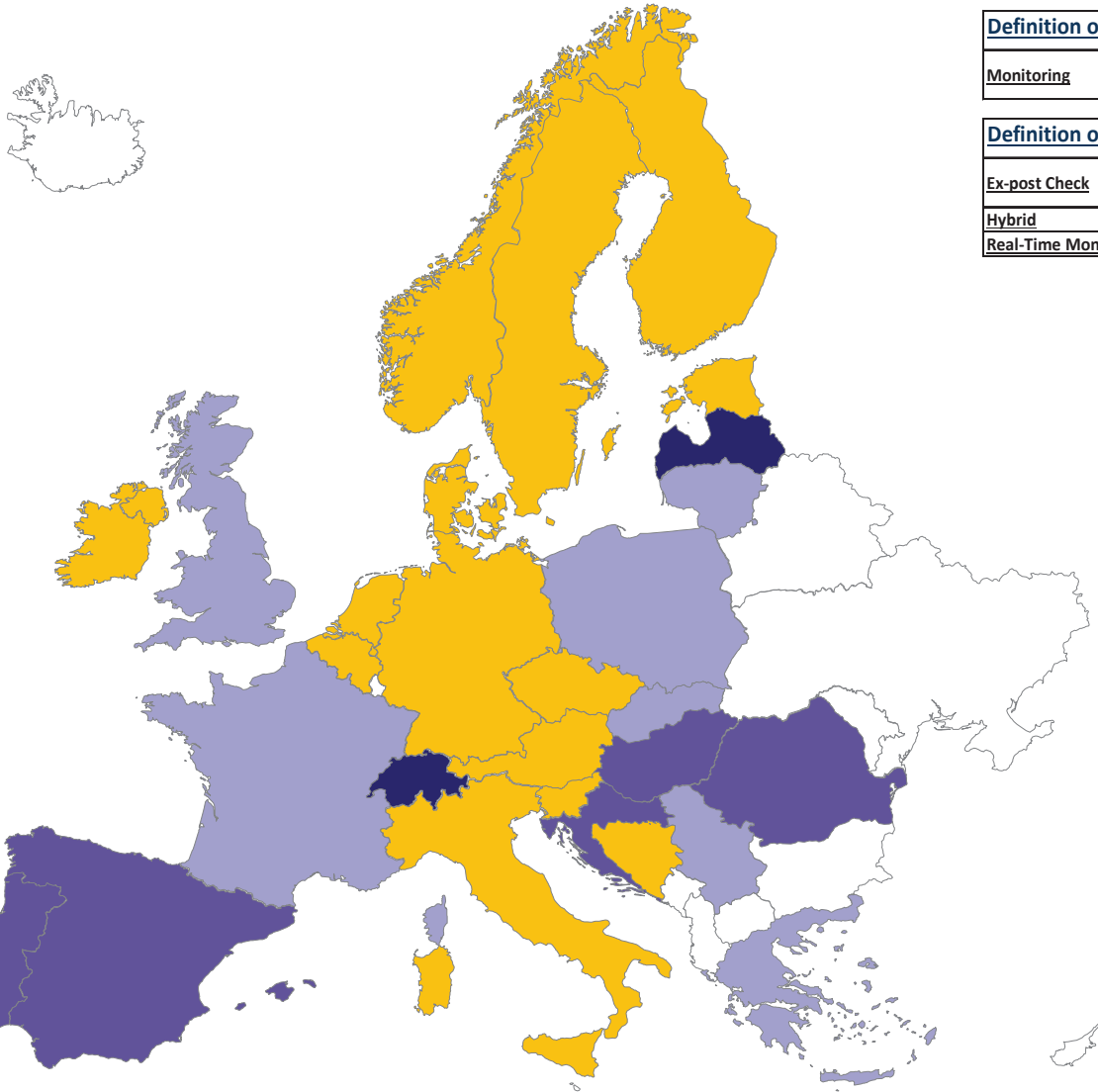


<u>Definition of question</u>	
<u>Cost Recovery Scheme</u>	From whom are the costs recovered.
<u>Definition of answer</u>	
<u>Balance Responsible Party (BRP)</u>	Balancing Responsible Party means a market participant or its chosen representative responsible for its Imbalances.
<u>Grid User</u>	The natural or legal person supplying to, or being supplied with active and/or reactive power by a TSO or DSO.

**Key:**

	Missing data
	N/A
	100% Grid Users
	100% BRP
	100% end consumers
	Mix of Grid Users and BRP

## Replacement Reserve - Capacity - Monitoring








### Definition of question

<b>Monitoring</b>	Refers to the type of monitoring in place by the system operator to ensure performance of plant.
-------------------	--------------------------------------------------------------------------------------------------

### Definition of answer

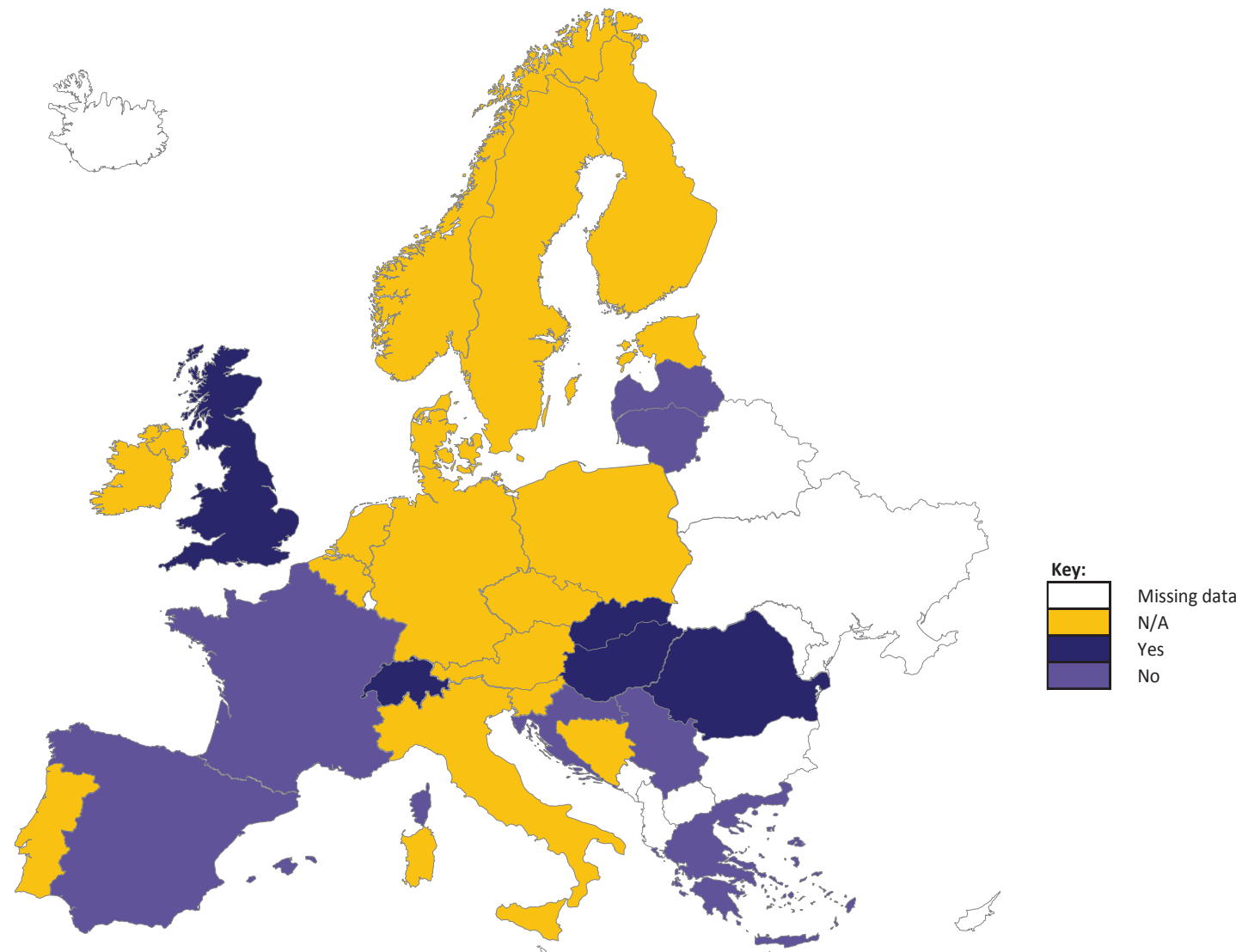
<b>Ex-post Check</b>	When the monitoring of performance of plant carried out after the event.
<b>Hybrid</b>	Combination.
<b>Real-Time Monitoring</b>	Monitoring of delivery of ancillary services in real time.

### Key:

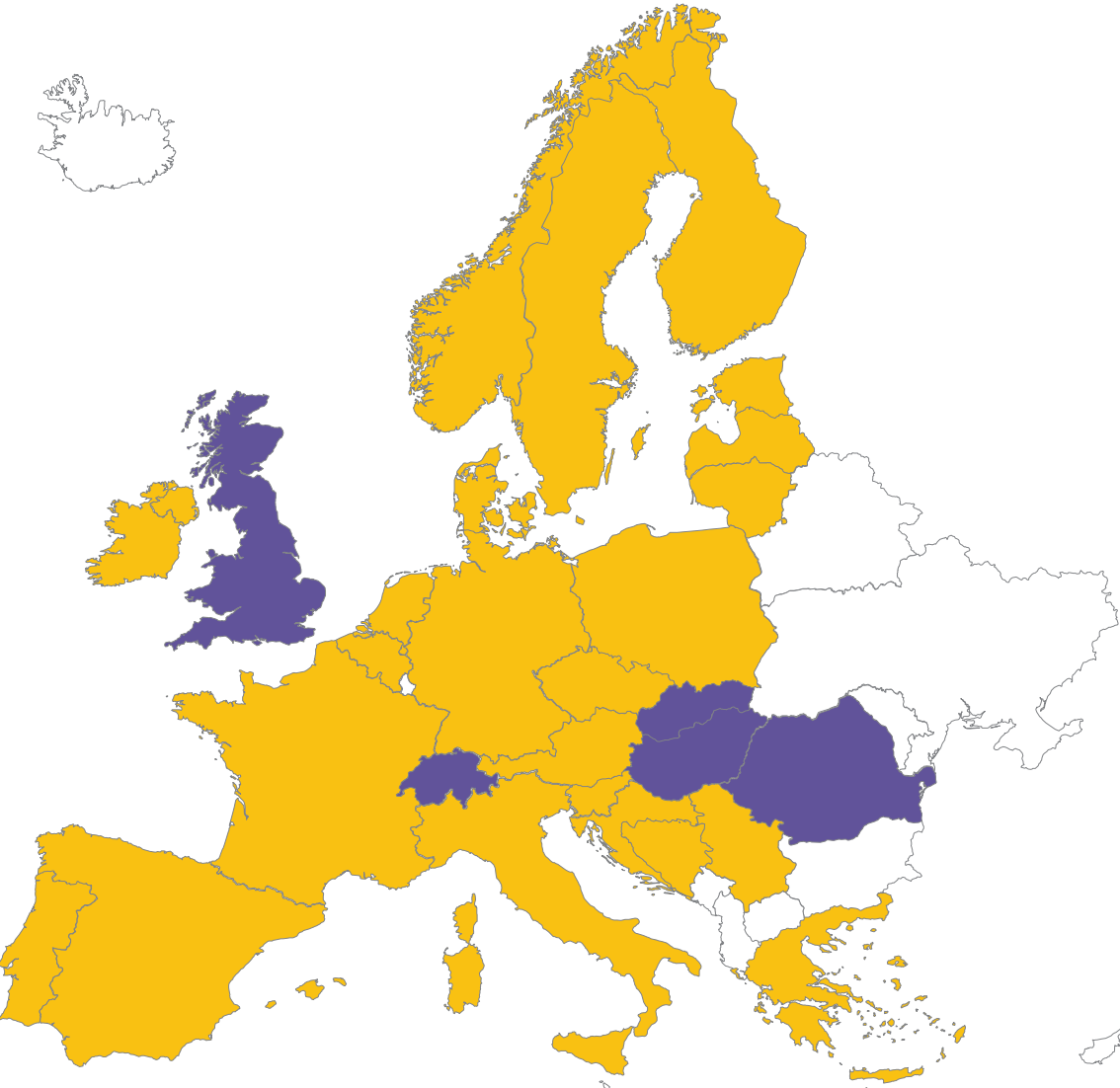
	Missing data
	N/A
	Real-Time Monitoring
	Ex-Post Check
	Hybrid



## Replacement Reserve - Capacity - Transfer of obligation allowed



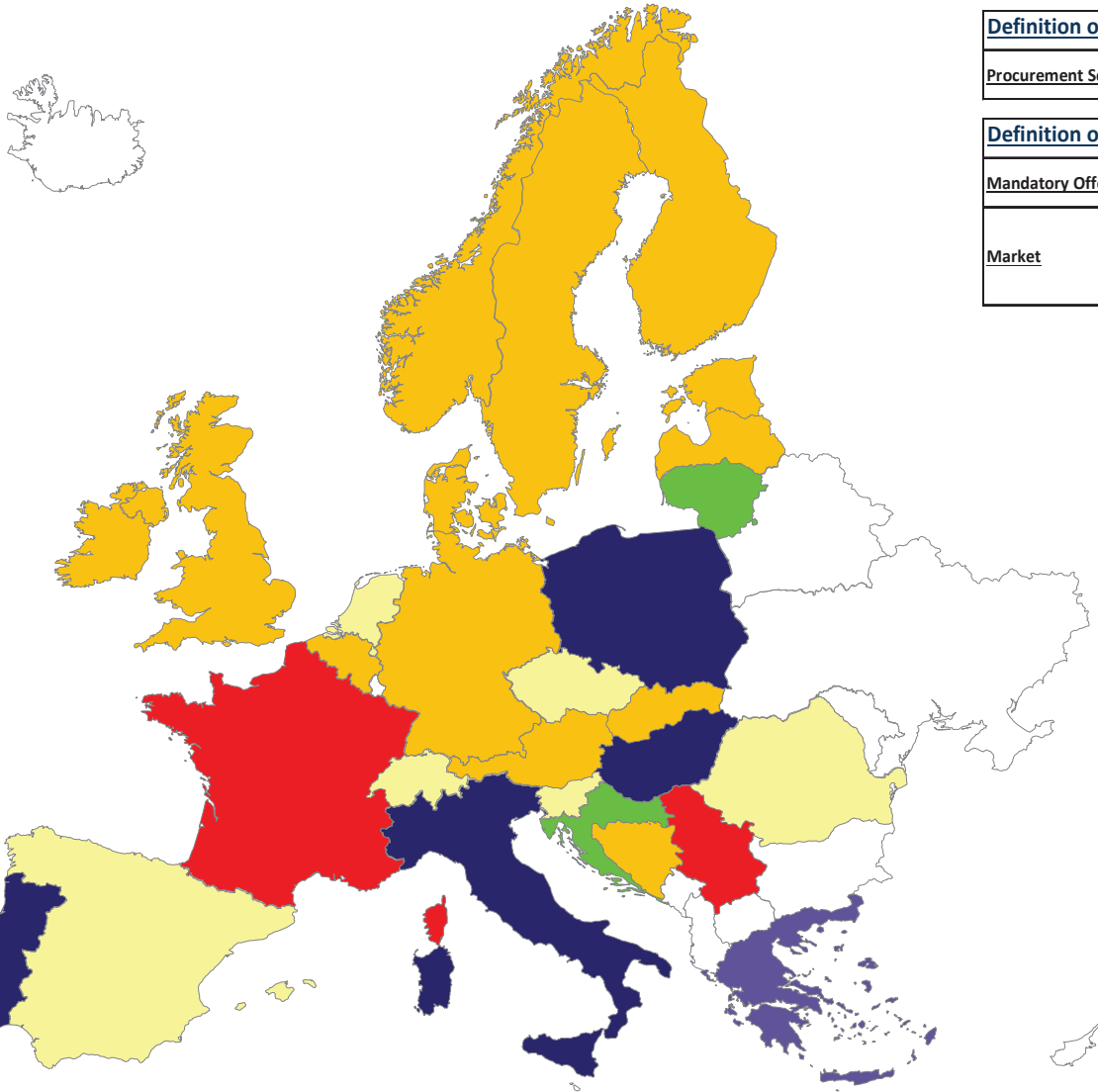
Replacement Reserve - Capacity - Obl. allowed, organised secondary market exists



**Key:**

White	Missing data
Yellow	N/A
Dark Blue	Yes
Light Blue	No

# Replacement Reserve - Energy - Procurement Scheme

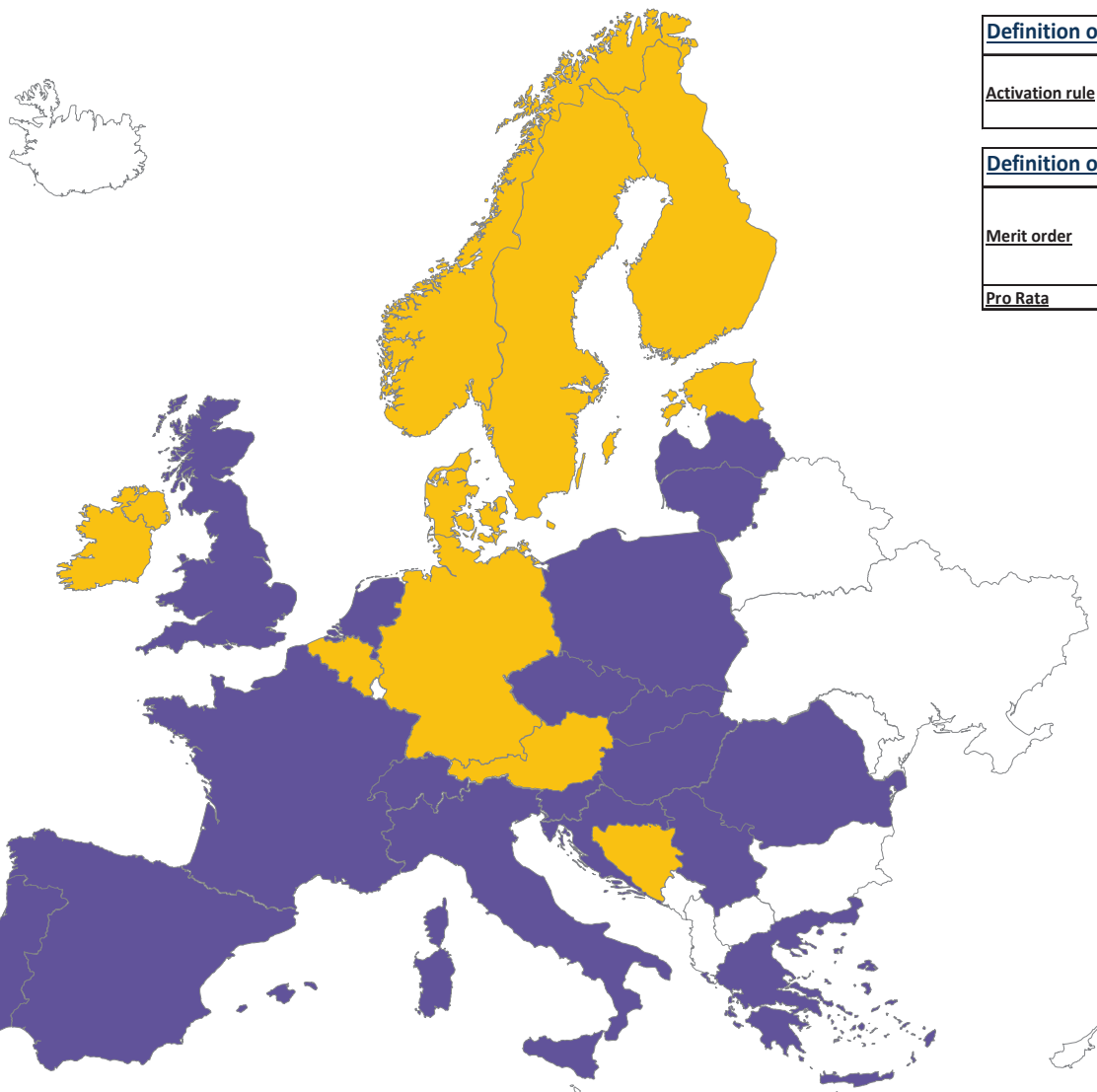


<b>Definition of question</b>	
<b>Procurement Scheme</b>	Background of the offer, which is closest to the real operation time.
<b>Definition of answer</b>	
<b>Mandatory Offers</b>	Generators connected to the grid are obligated to offer the remaining capacity/available capacity.
<b>Market</b>	There is no contract or obligation for a grid user to offer the energy (before the offer). The grid user can voluntary participate in the real-time energy market and bid a price or customize his offer (e.g. the volume, timeframe).

**Key:**

[White]	Missing data
[Orange]	N/A
[Dark Blue]	Mandatory Offers
[Purple]	Mandatory Provision
[Light Purple]	Mandatory Provision without Reservation
[Grey]	Bilateral Market
[Yellow]	Organised Market
[Maroon]	Hybrid
[Green]	Other
[Light Green]	Pre-contracted Offers only
[Red]	Pre-contracted and Mandatory Offers
[Brown]	Pre-contracted and Free Offers

## Replacement Reserve - Energy - Activation Rule



### Definition of question

#### Activation rule

How the frequency restoration reserves are activated i.e. by a Pro-Rata system or on the basis of a Merit Order (cheapest being activated first).

### Definition of answer

#### Merit order

A merit order is a way of ranking available sources of energy in ascending order of their short run marginal costs of production, so that those with the lowest marginal costs are the first ones to be brought online to meet demand.

#### Pro Rata

In Proportion (Parallel Activation).

#### Key:



Missing data

N/A

Pro Rata (Parallel Activation)

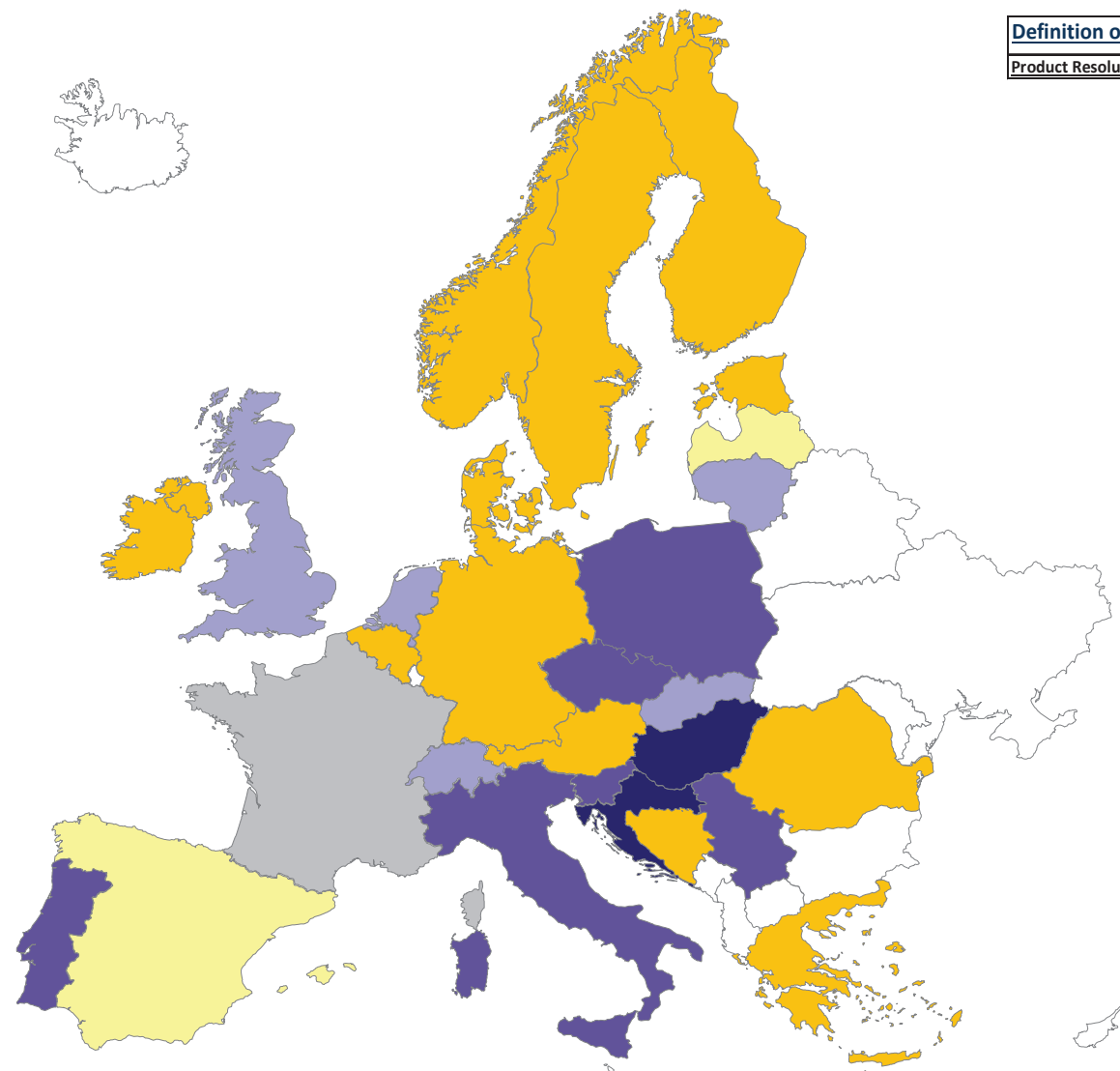
Merit order

## Replacement Reserve - Energy - Product Resolution (in MW)

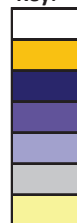
### Definition of question

#### Product Resolution (in MW)

The minimum bid size into the balancing market.



### Key:



Missing data

N/A

No minimum bid size

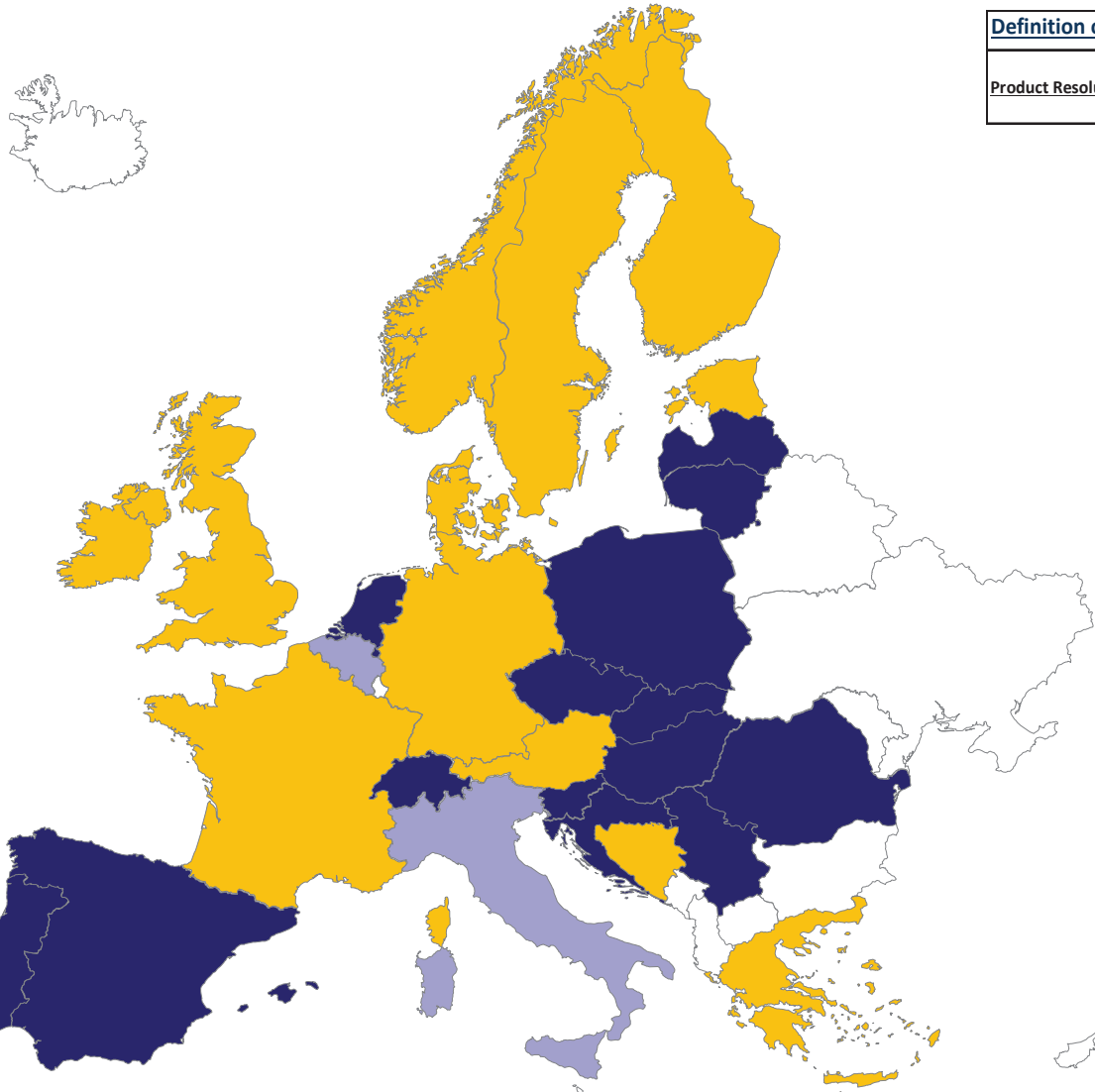
$x \leq 1\text{MW}$

$1\text{MW} < x \leq 5\text{MW}$

$5\text{MW} < x \leq 10\text{MW}$

$x > 10\text{MW}$

## Replacement Reserve - Energy - Product Resolution (in time)



### Definition of question

#### Product Resolution (in time)

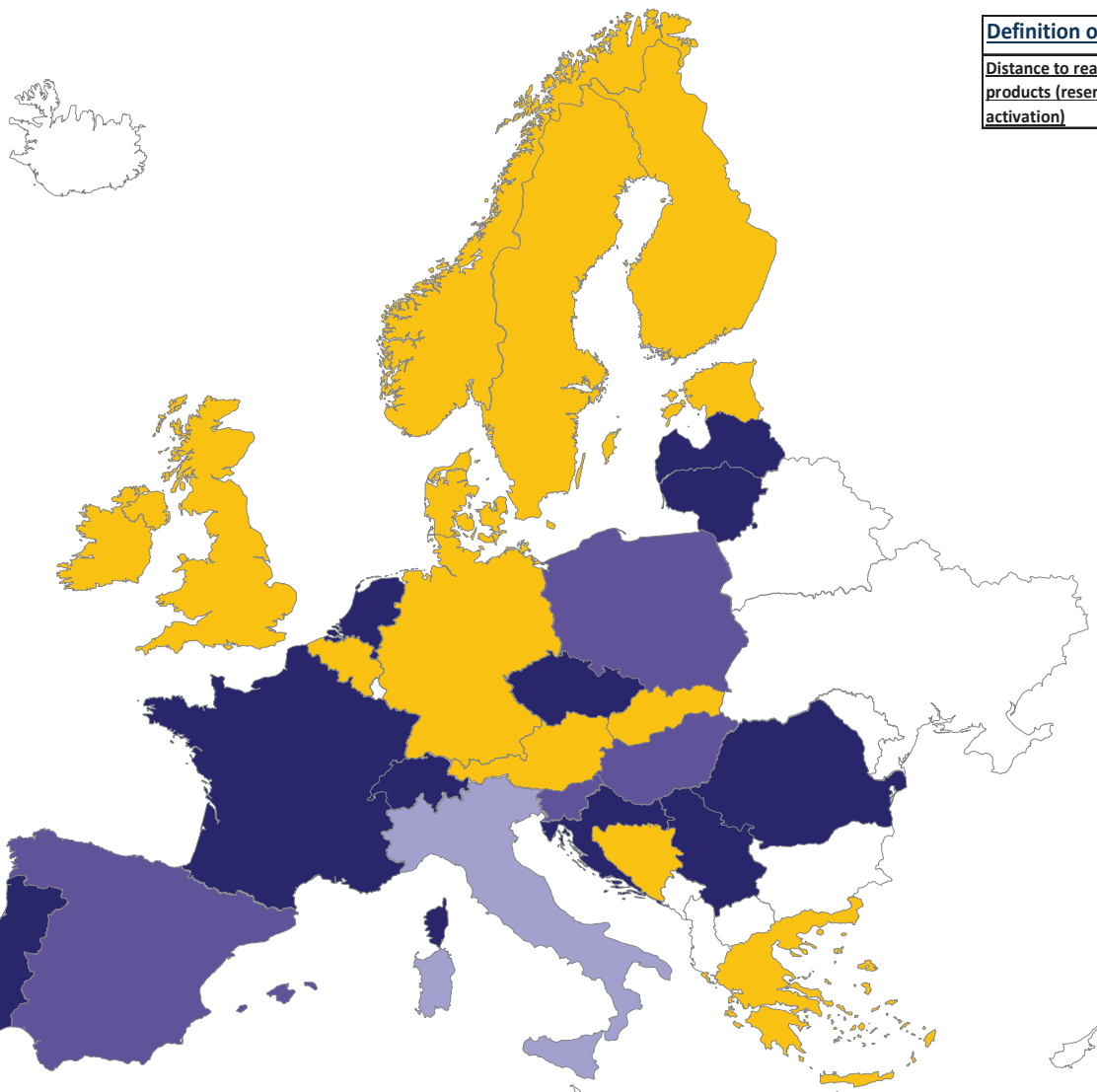
The maximum resolution for which the product can be bid into the market (for instance =1 hour in the case of a 24 auctions day ahead market for reserve provision).

### Key:



Missing data  
N/A  
Hour (or blocks)  
30 minutes  
15 minutes

## Replacement Reserve - Energy - Distance to real time of energy products



### Definition of question

Distance to real time of energy products (reserve products activation)

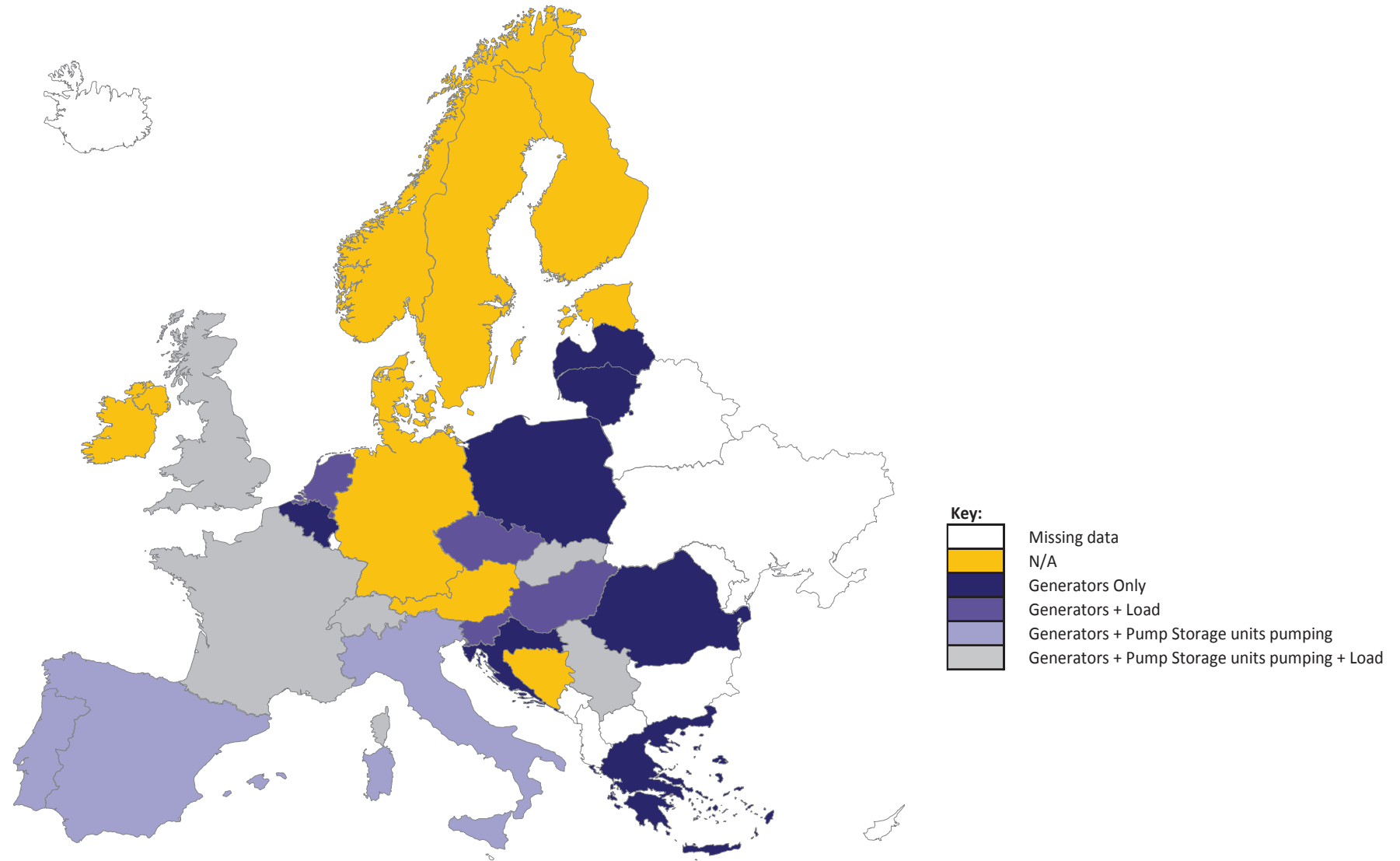
The time ahead from real time when TSO activates a given product (for instance 15 minutes in the case of mFRR/tertiary energy).

### Key:



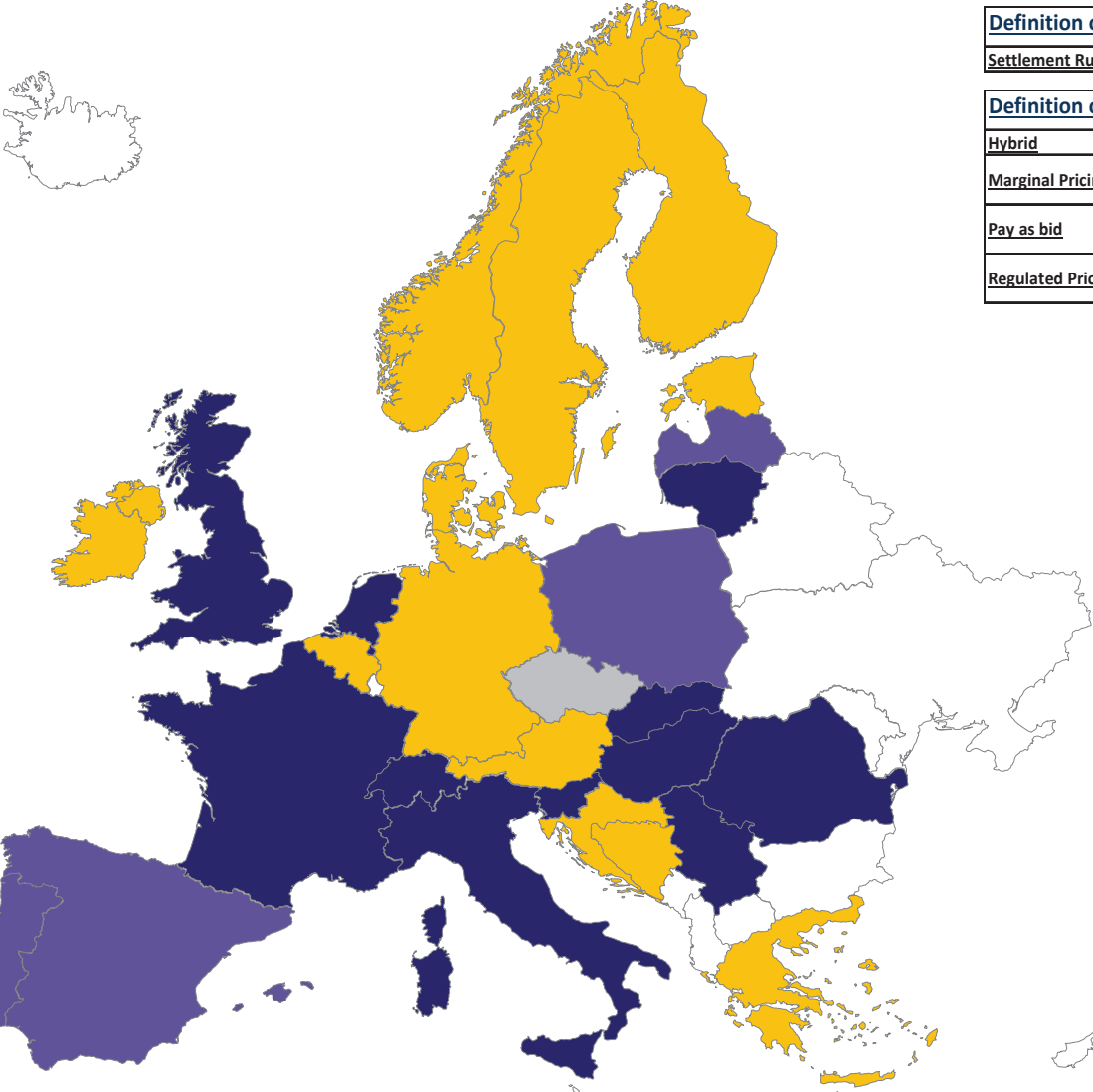
Missing data  
N/A  
Hour (or blocks)  
15 minutes  
 $x > H-1$

# Replacement Reserve - Energy - Provider





# Replacement Reserve - Energy - Settlement Rule



**Definition of question**

<b>Settlement Rule</b>	The pricing rules for settlement.
------------------------	-----------------------------------

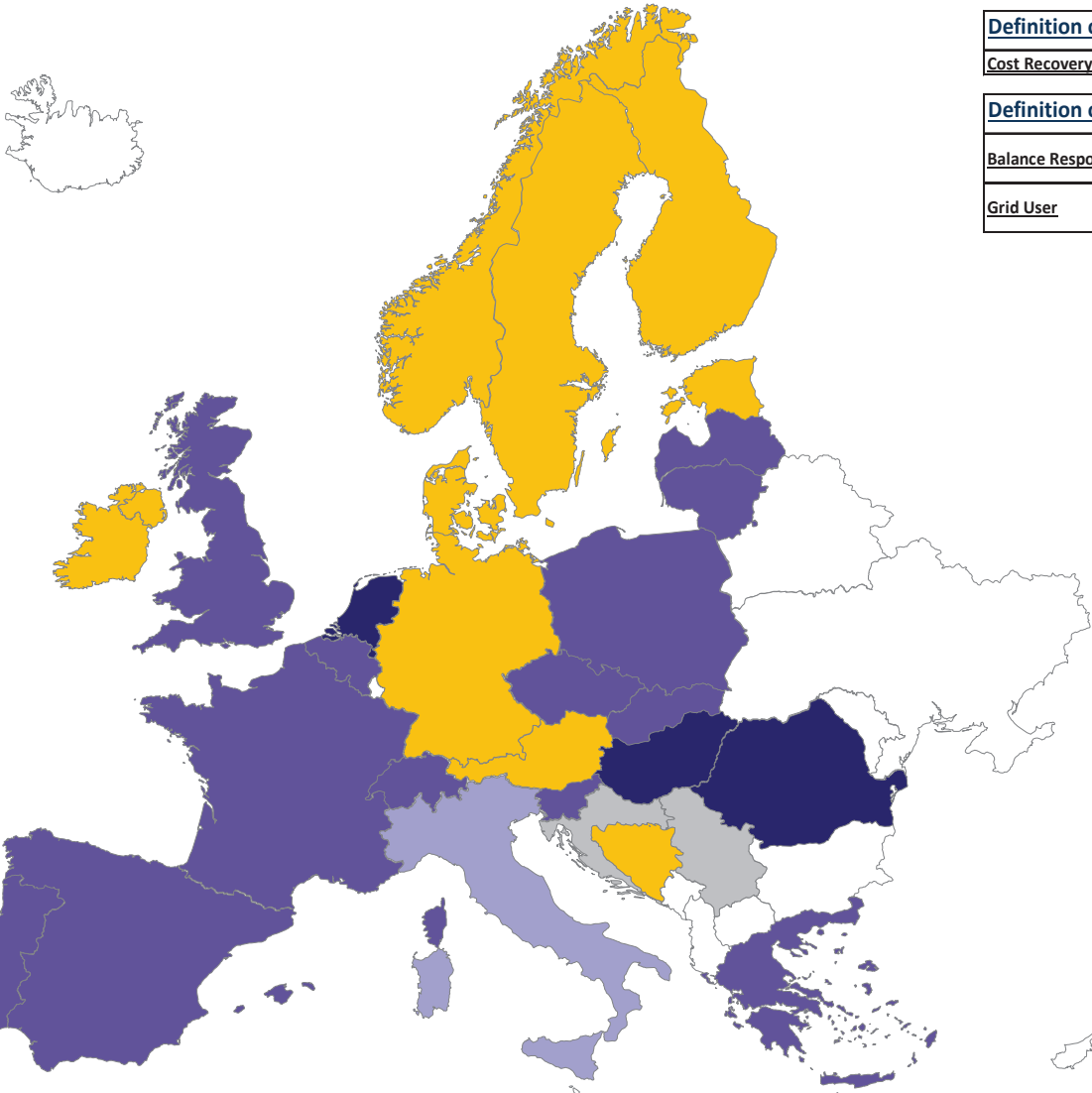
**Definition of answer**

<b>Hybrid</b>	Combination.
<b>Marginal Pricing</b>	Marginal pricing is the change in total cost that arises when the quantity produced changes by one unit.
<b>Pay as bid</b>	Contracted parties who provide a service are paid based on their offer price.
<b>Regulated Price</b>	Price for this service is based on a price that is set by the relevant regulatory authority.

**Key:**







- Missing data
- N/A
- Pay as bid
- Marginal Pricing
- Regulated Price
- Hybrid

## Replacement Reserve - Energy - Cost Recovery Scheme

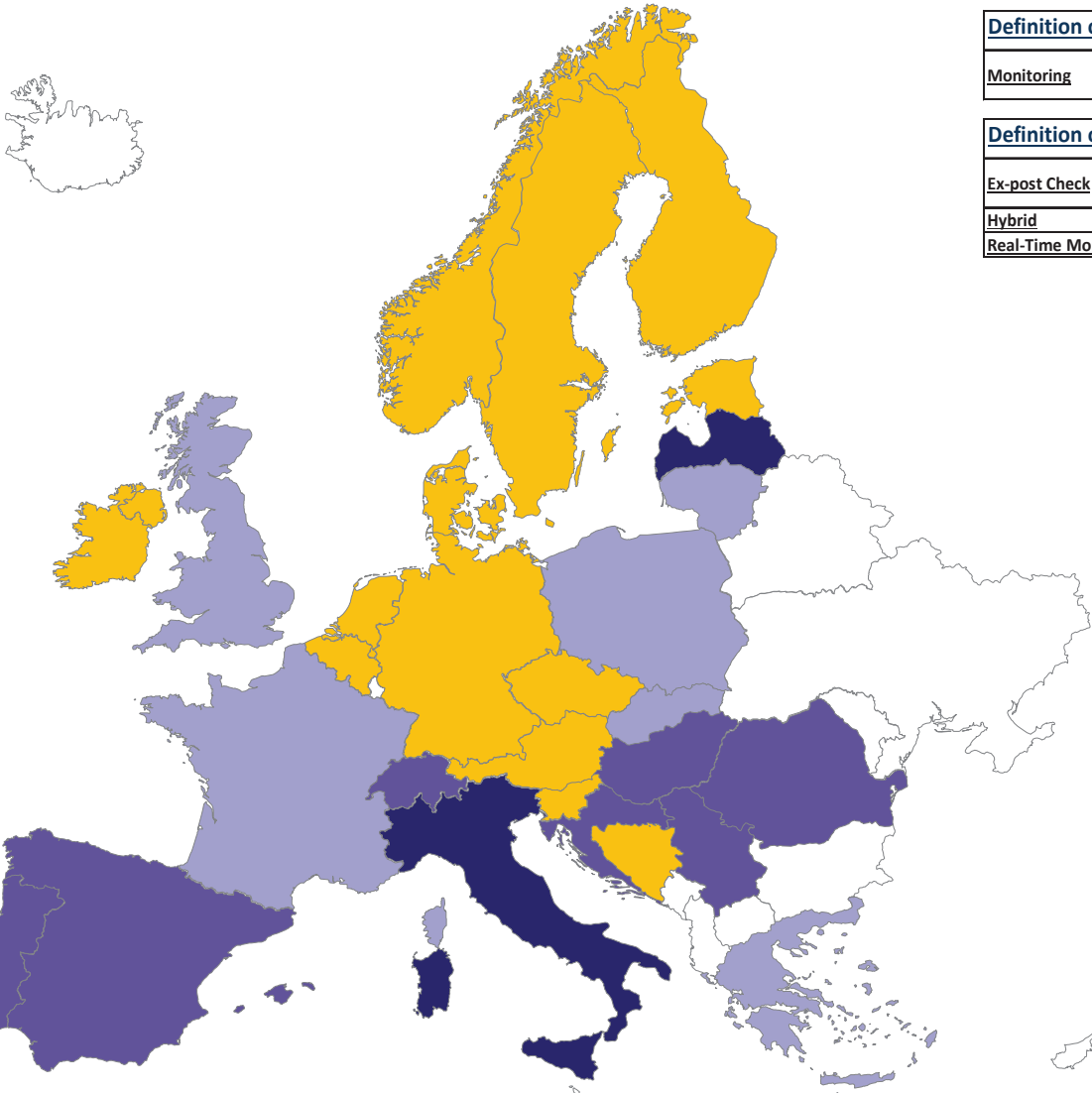


<u>Definition of question</u>	
<u>Cost Recovery Scheme</u>	From whom are the costs recovered.
<u>Definition of answer</u>	
<u>Balance Responsible Party (BRP)</u>	Balancing Responsible Party means a market participant or its chosen representative responsible for its Imbalances.
<u>Grid User</u>	The natural or legal person supplying to, or being supplied with active and/or reactive power by a TSO or DSO.

**Key:**

	Missing data
	N/A
	100% Grid Users
	100% BRP
	100% end consumers
	Mix of Grid Users and BRP






# Replacement Reserve - Energy - Monitoring



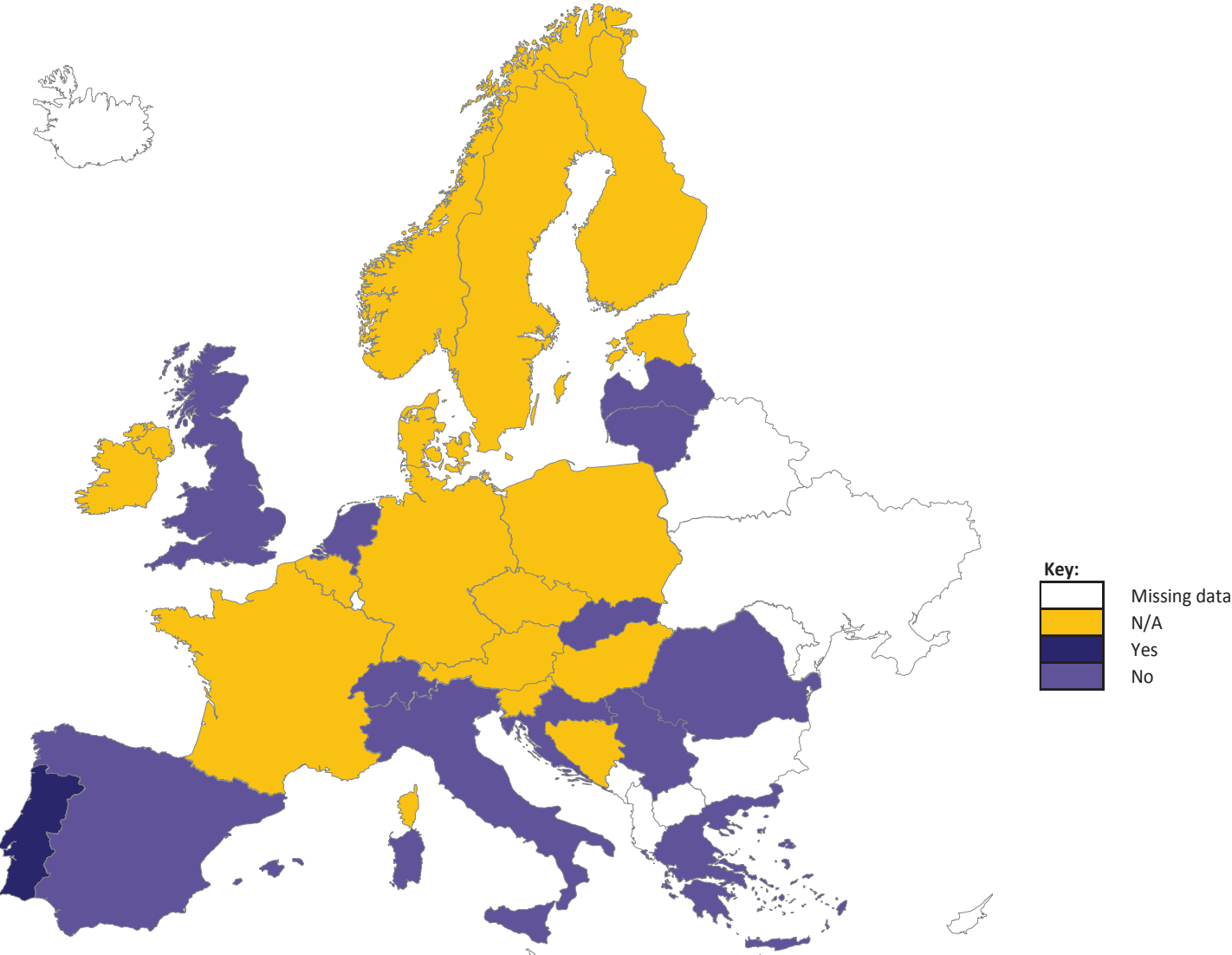
<u>Definition of question</u>	
<b>Monitoring</b>	Refers to the type of monitoring in place by the system operator to ensure performance of plant.

<u>Definition of answer</u>	
<b>Ex-post Check</b>	When the monitoring of performance of plant carried out after the event.
<b>Hybrid</b>	Combination.
<b>Real-Time Monitoring</b>	Monitoring of delivery of ancillary services in real time.

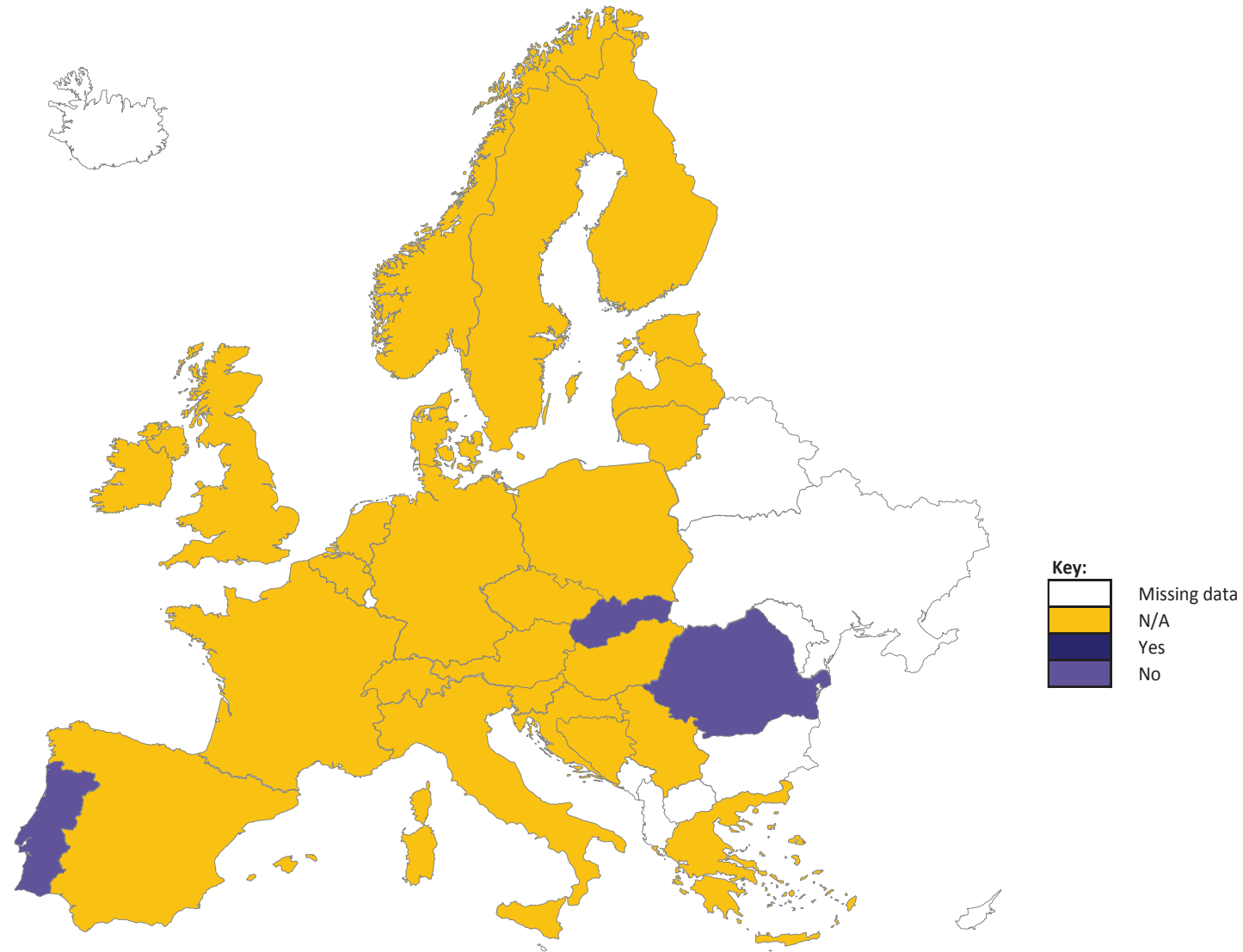
**Key:**

	Missing data
	N/A
	Real-Time Monitoring
	Ex-Post Check
	Hybrid

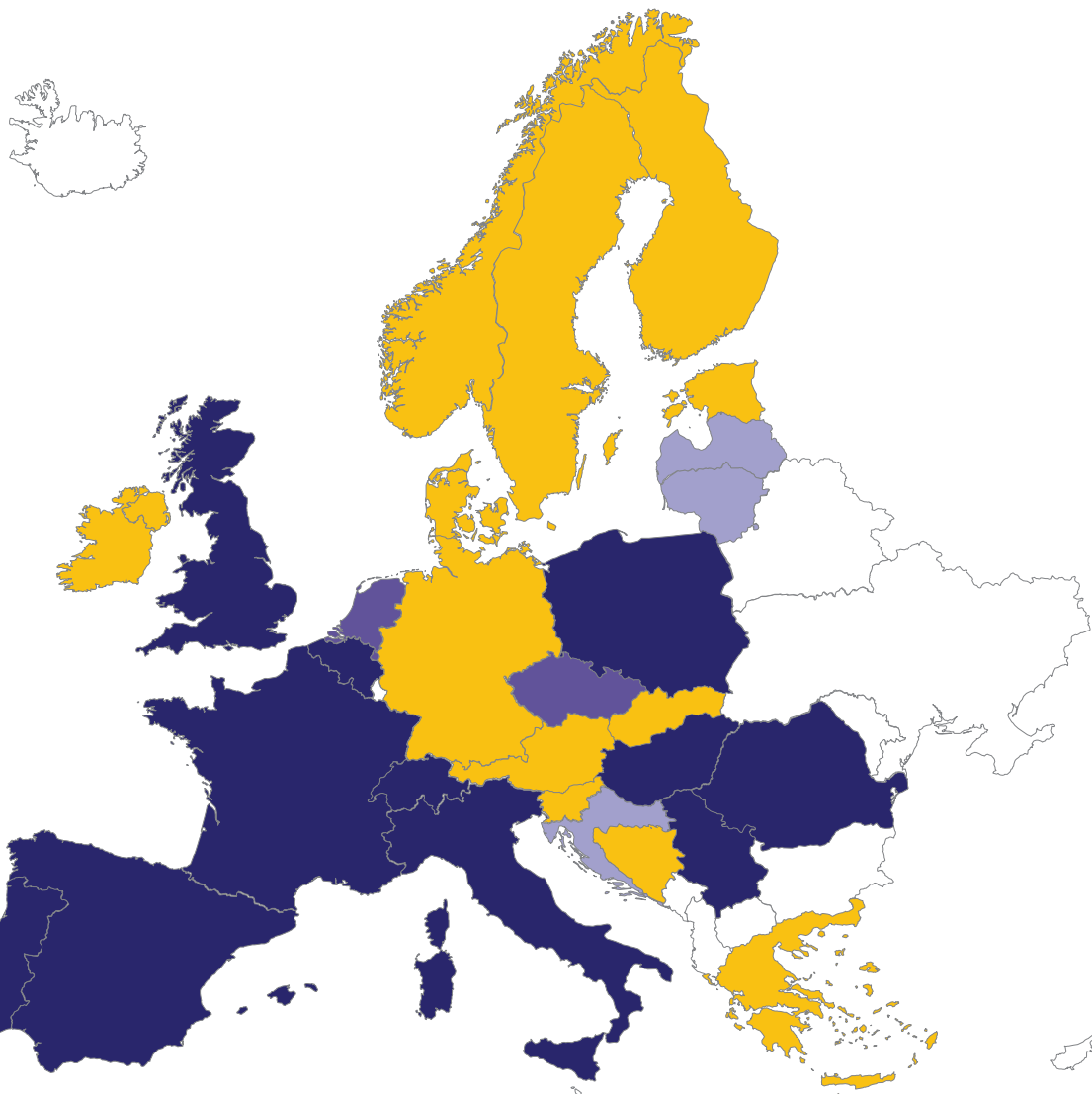
# Replacement Reserve - Energy - Transfer of obligation allowed



# Replacement Reserve - Energy - Obl. allowed, organised secondary market exists



# Replacement Reserve - Energy - Partially activated product



**Key:**

White	Missing data
Yellow	N/A
Dark Blue	Yes, in all directions
Purple	No in none direction
Light Blue	Only in upward direction
Grey	Only in downward direction

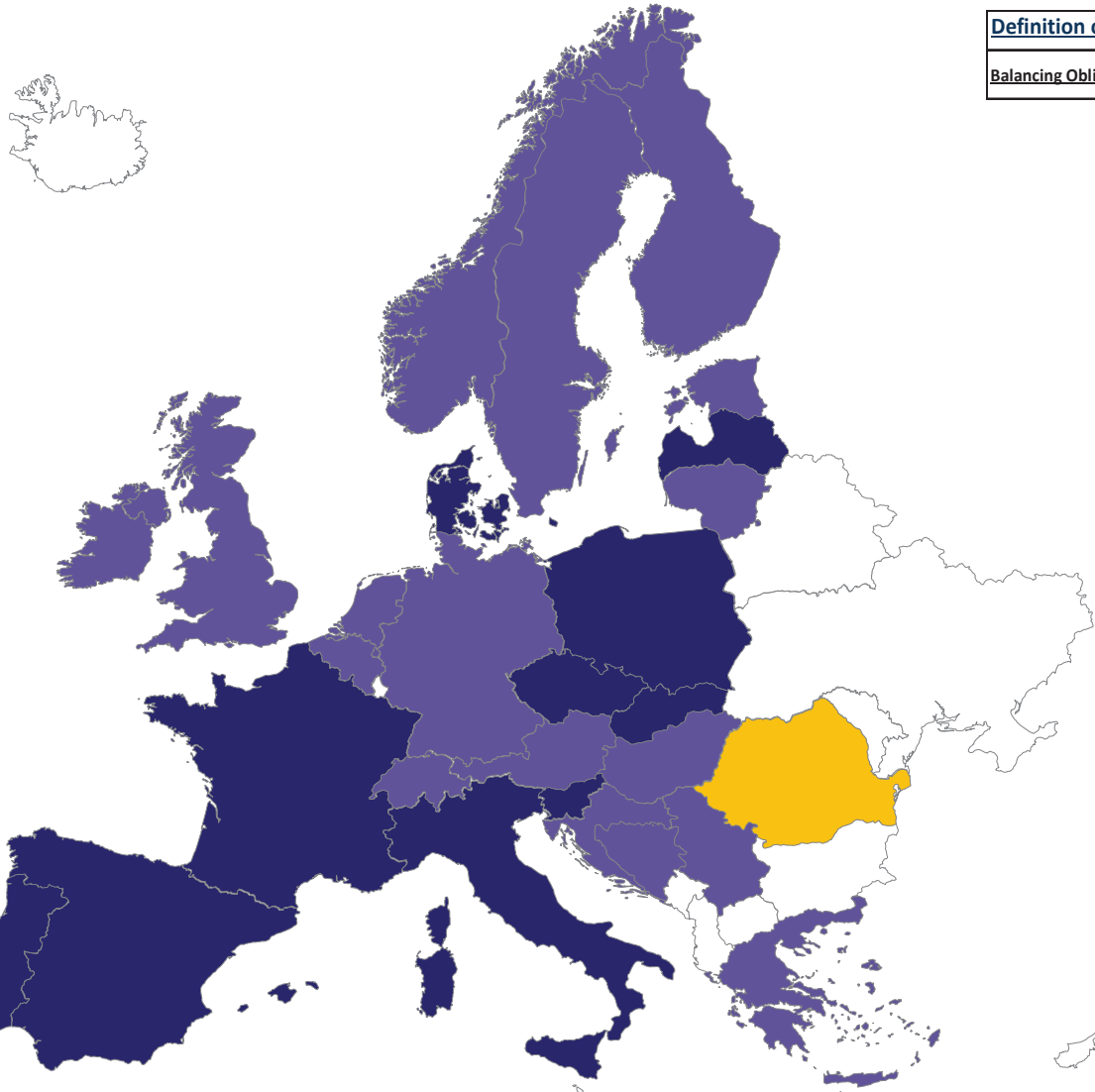


# Imbalance settlement





(Referring to questions of AS survey from IS1.0 to IS15.0)

# Imbalance settlement - Nature of the Balancing Obligation

Definition of question	
<b>Balancing Obligation</b>	Balancing obligation may apply, when the Balance Responsible Party makes imbalanced volume.



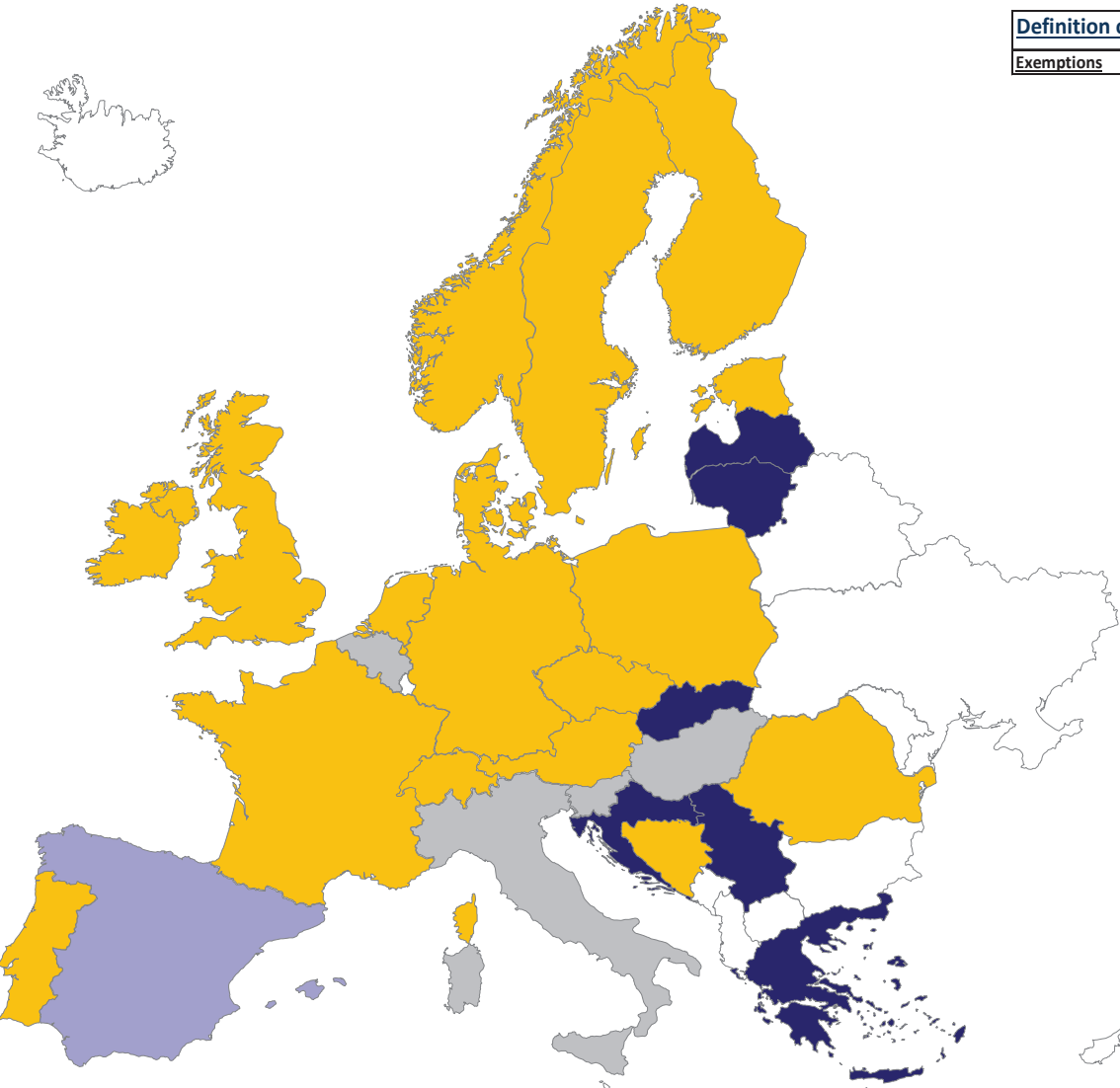
**Key:**

	Missing data
	N/A
	Financial only
	Legal+financial



# Imbalance settlement - Exemptions

<b>Definition of question</b>	
<b>Exemptions</b>	Those parties that do not have a balancing obligation.

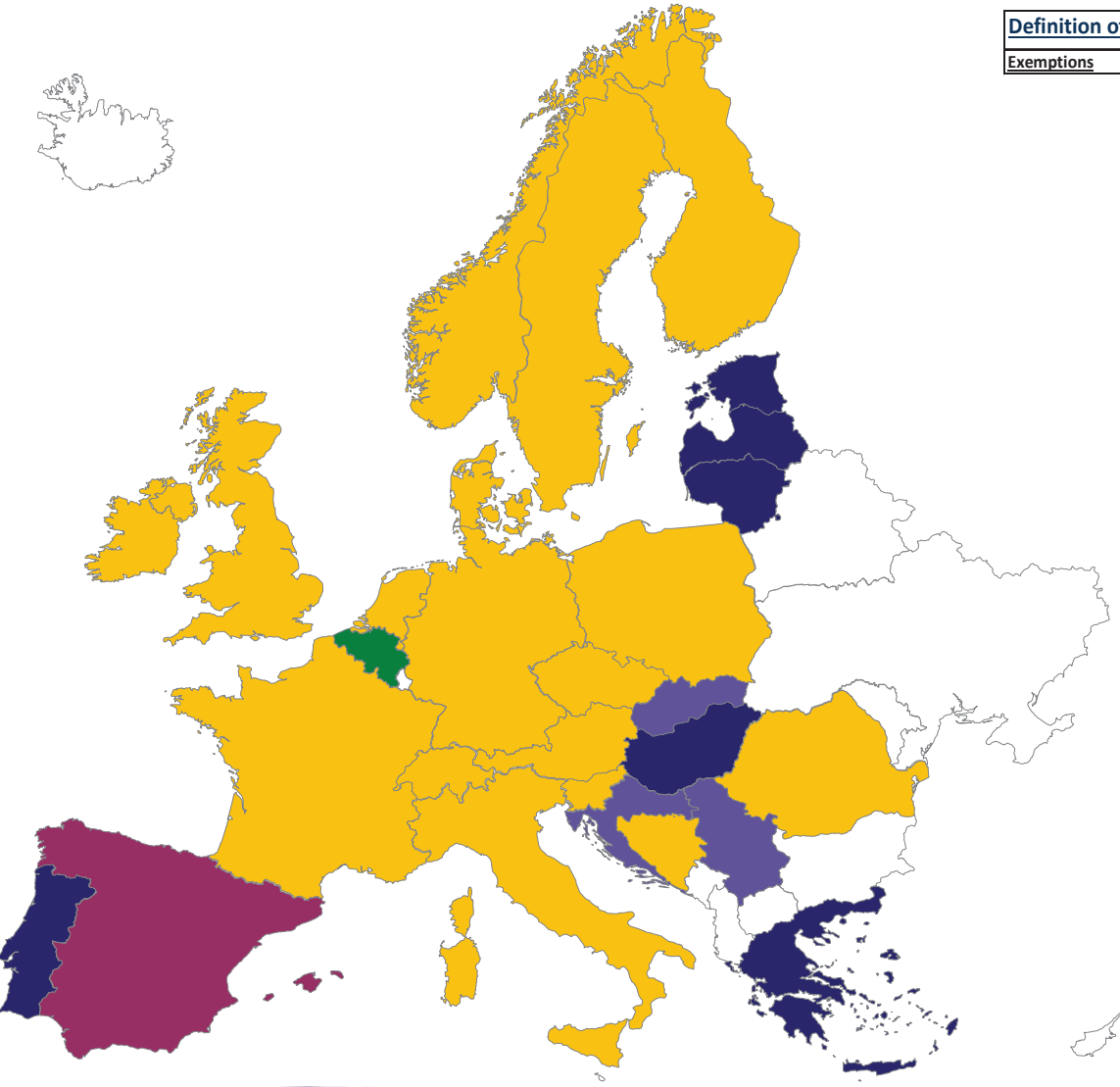


**Key:**

- Missing data
- N/A
- RES
- Generators licensed for the AS market
- Other
- RES+Other

# Imbalance settlement - Limit to exemption

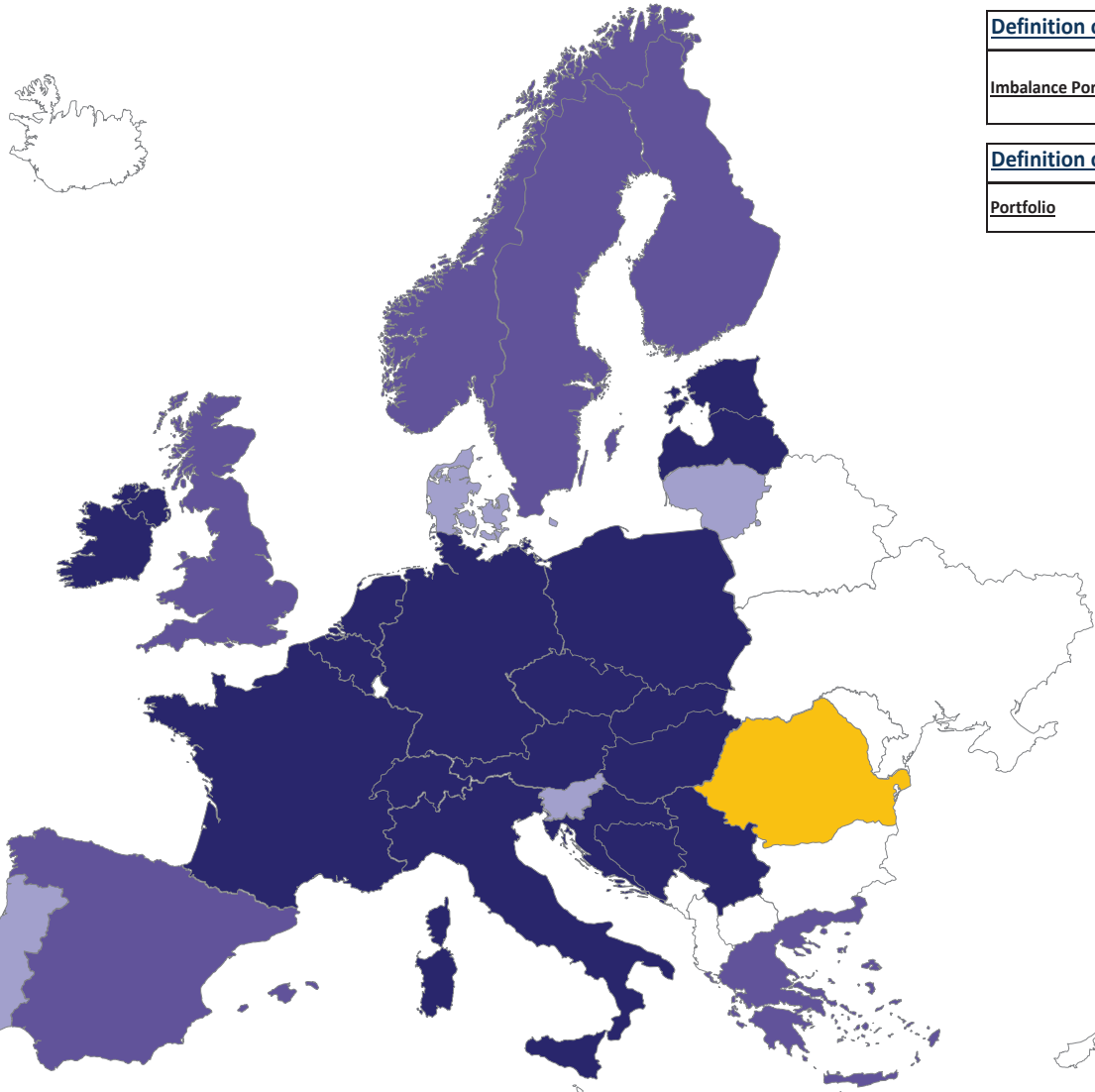
<b>Definition of question</b>	
<b>Exemptions</b>	Those parties that do not have a balancing obligation.



**Key:**

White	Missing data
Yellow	N/A
Dark Blue	No
Purple	$x \leq 1\text{MW}$
Light Purple	$1\text{MW} < x \leq 5\text{MW}$
Grey	$5\text{MW} < x \leq 10\text{MW}$
Light Yellow	$x > 10\text{MW}$
Maroon	Other
Green	% of nominations

## Imbalance settlement - Number of Imbalance Portfolios



### Definition of question

#### Imbalance Portfolios

A fundamental property of local market design is the number of Imbalance Volumes to be calculated, attributed and charged to BRP's (Market) per settlement time unit.

### Definition of answer

#### Portfolio

A group of plant which could be a mix of generation, demand etc., which bid in aggregate into the relevant market.

#### Key:

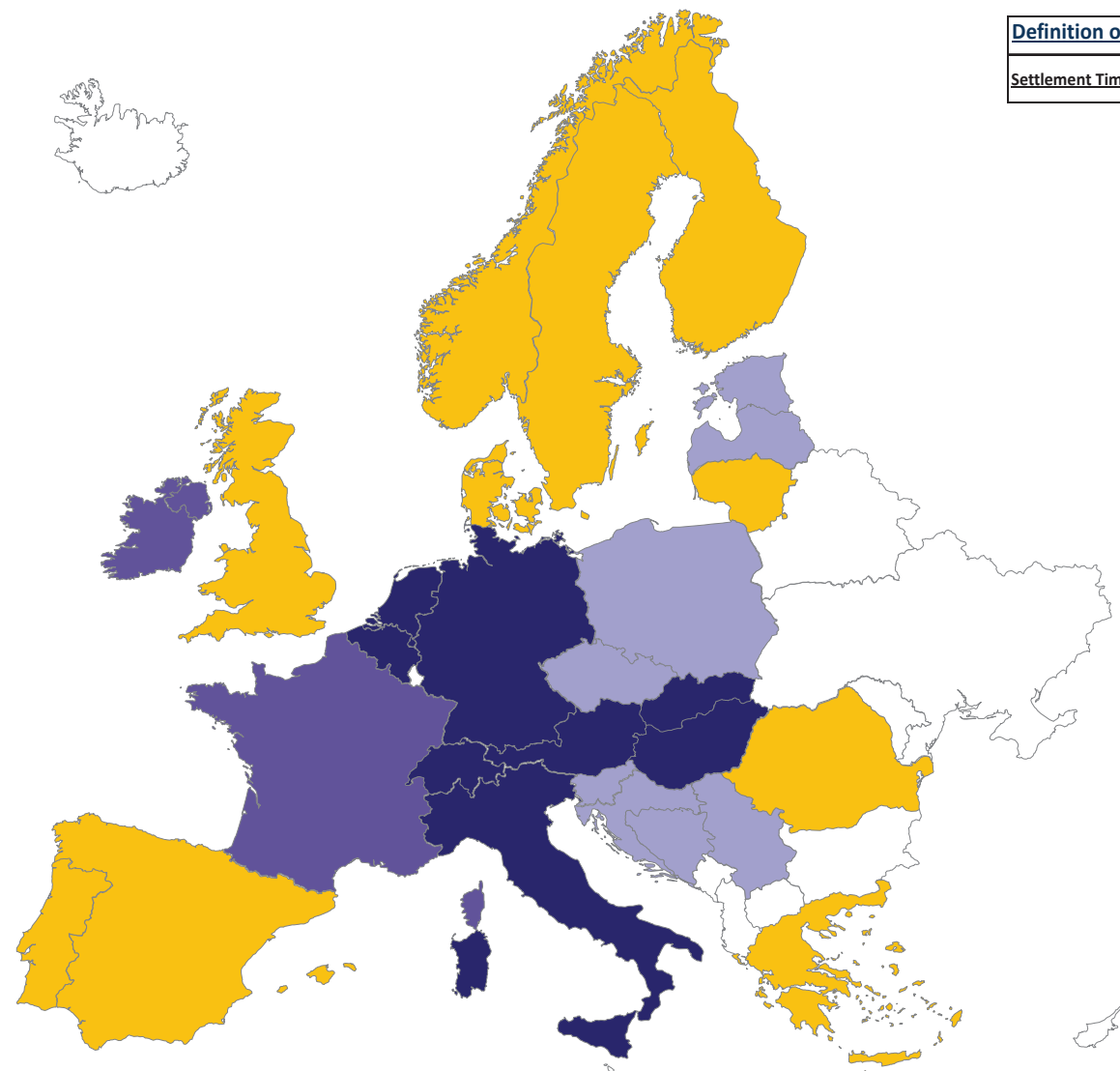
	Missing data
	N/A
	1 portfolio
	2 portfolios
	> 2 portfolios

# Imbalance settlement - Settlement Time Unit - If 1 volume

## Definition of question

### Settlement Time Unit

The unit of settlement that is applied to the quantities in which the time series is expressed.



### Key:

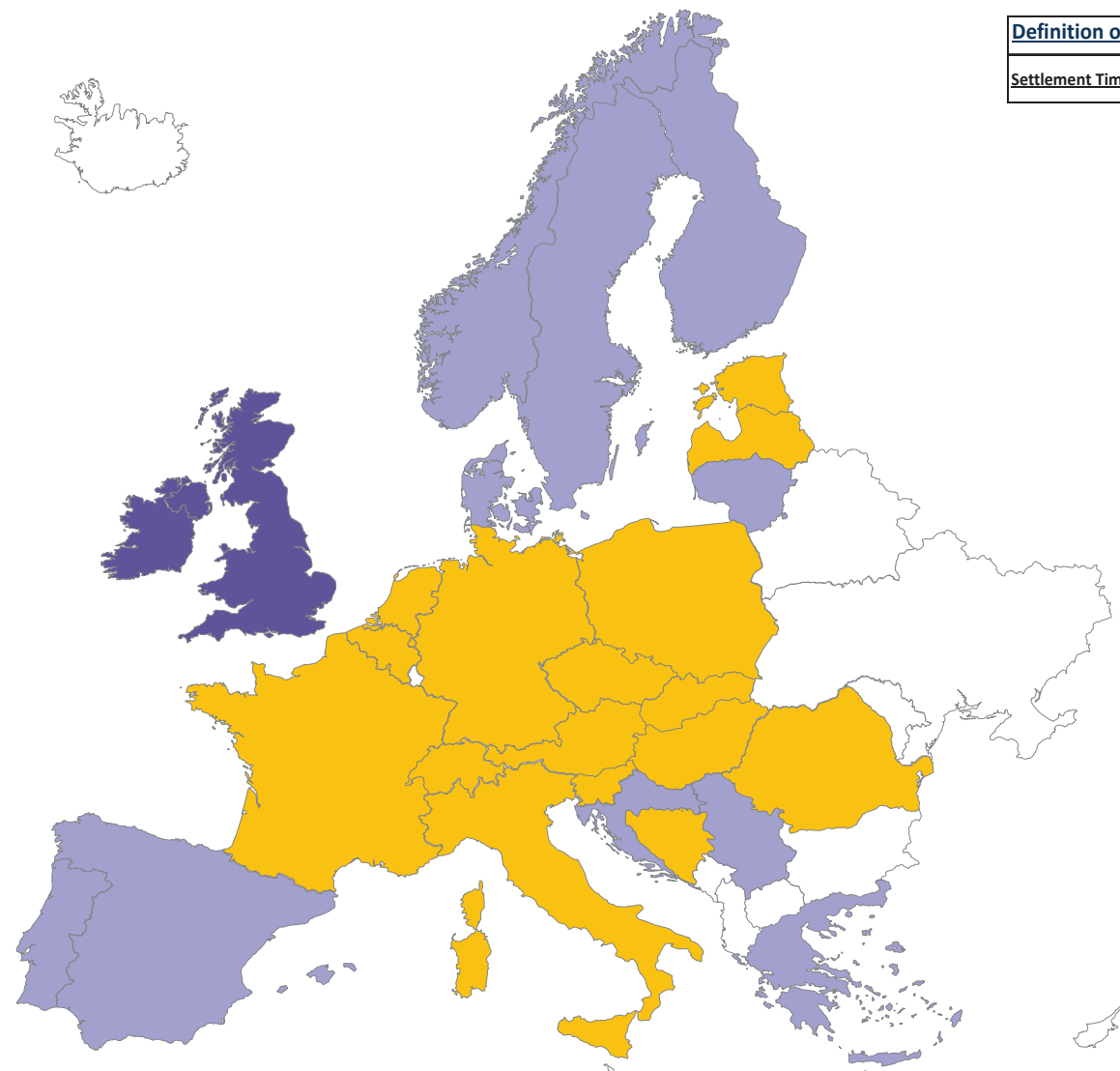
White	Missing data
Yellow	N/A
Dark Blue	15 min
Medium Blue	30 min
Light Blue	1 hour
Grey	x > 1 hour

## Imbalance settlement - Settlement Time Unit - If 2 volumes - Generation







### Definition of question

#### Settlement Time Unit

The unit of settlement that is applied to the quantities in which the time series is expressed.



#### Key:

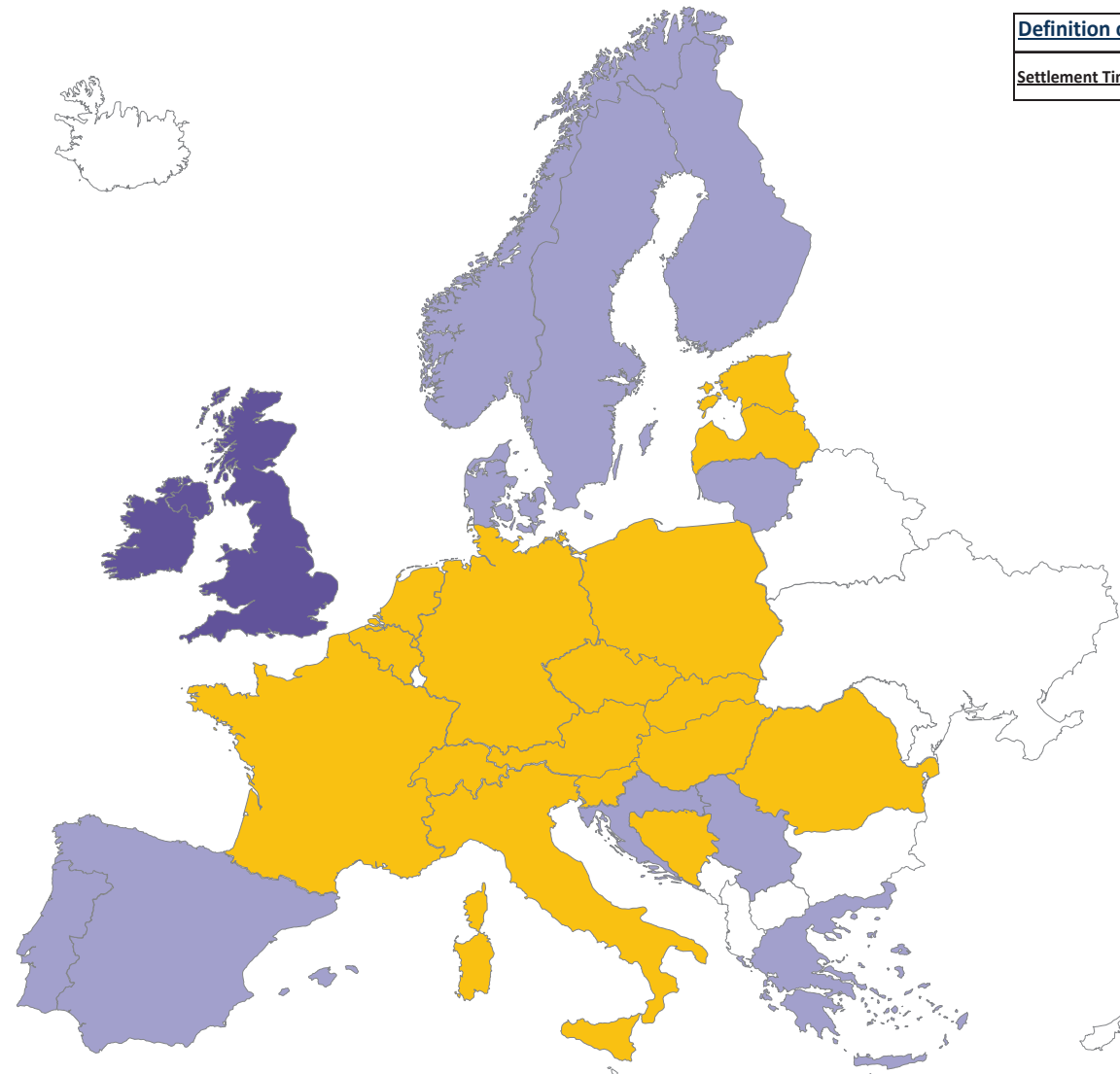
	Missing data
	N/A
	15 min
	30 min
	1 hour
	x > 1 hour

## Imbalance settlement - Settlement Time Unit - If 2 volumes - Consumption

### Definition of question

#### Settlement Time Unit

The unit of settlement that is applied to the quantities in which the time series is expressed.

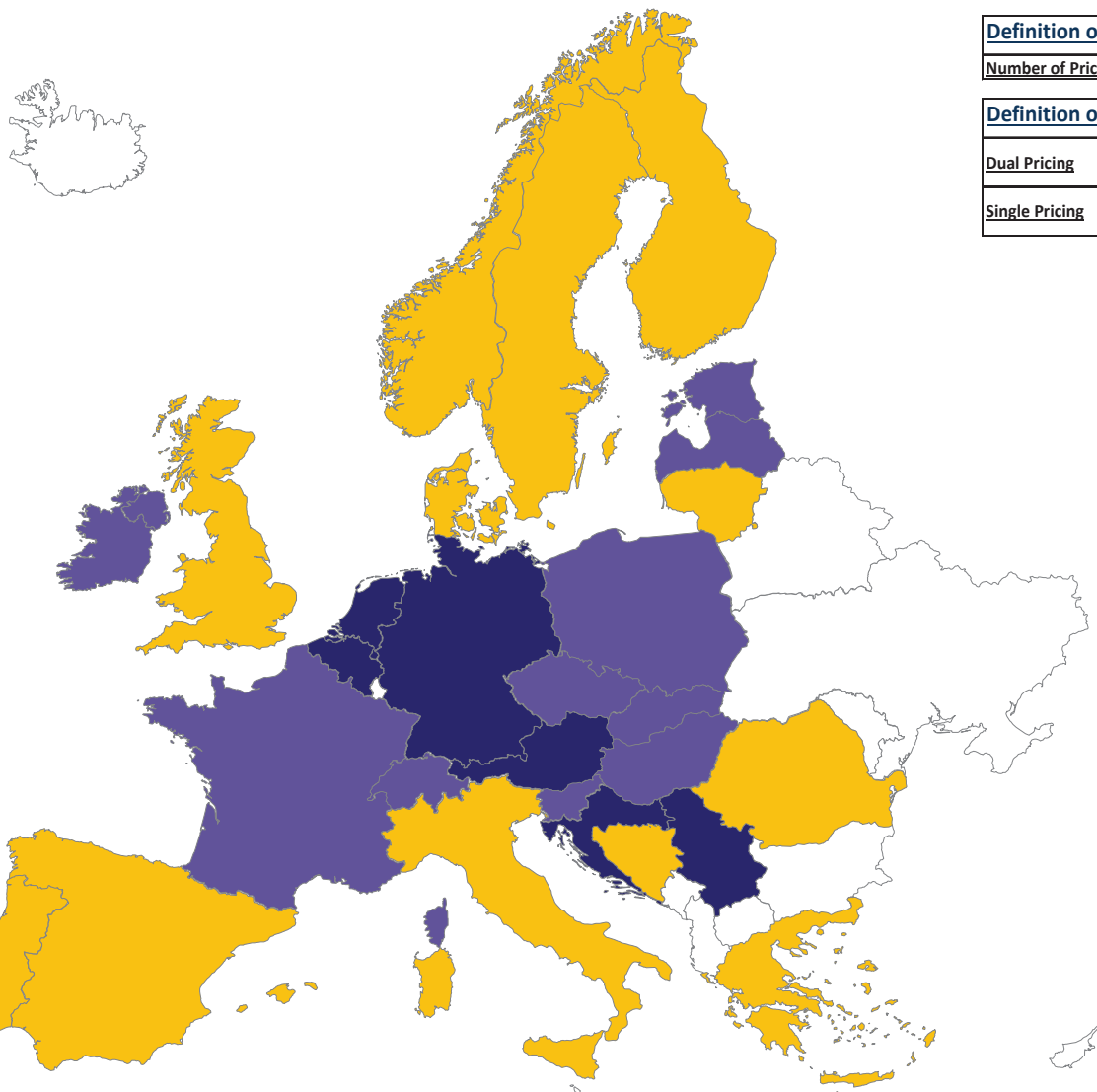


### Key:







Missing data  
N/A  
15 min  
30 min  
1 hour  
x > 1 hour

## Imbalance settlement - Number of Prices - If 1 portfolio

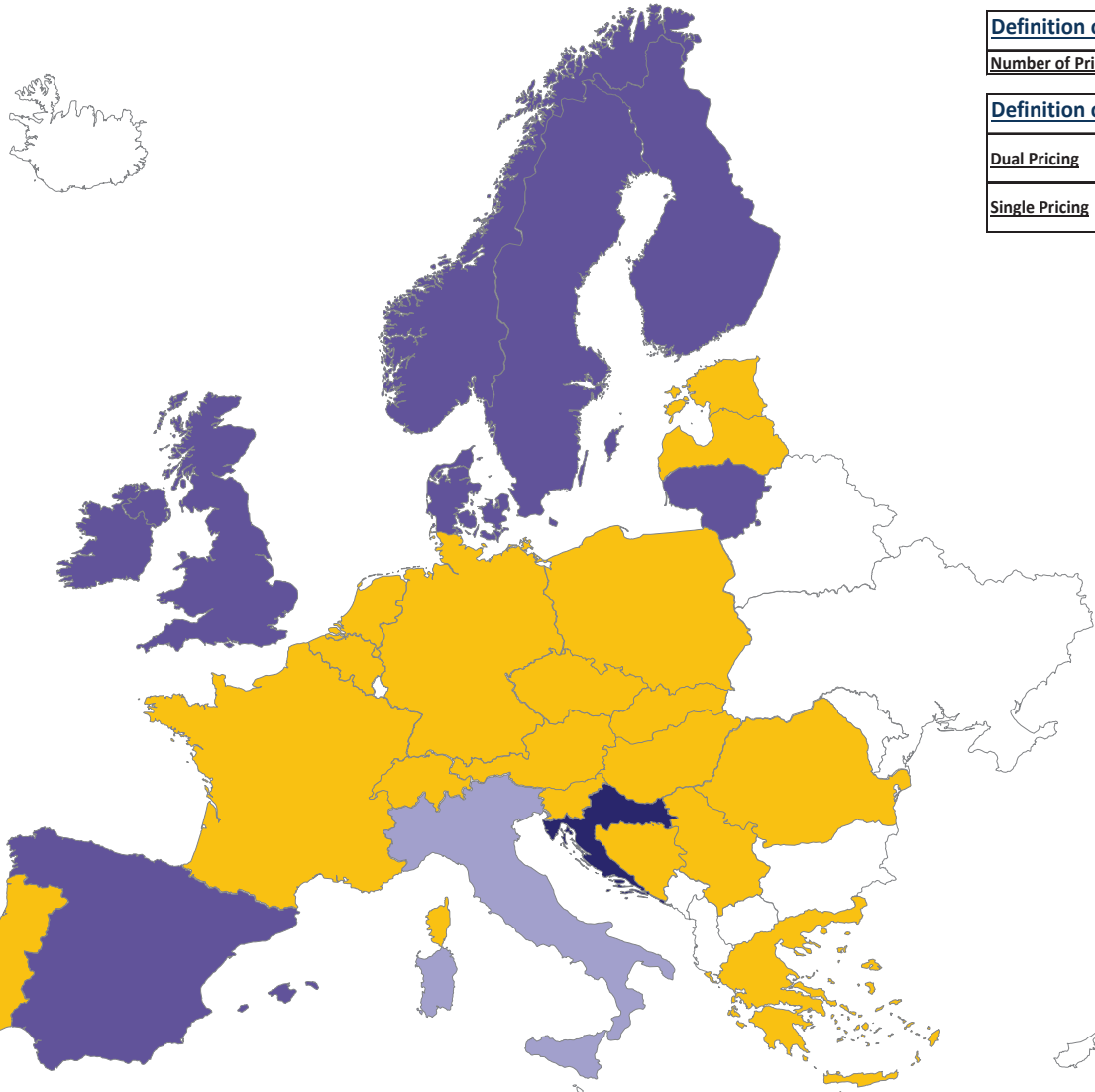


<b>Definition of question</b>	
<b>Number of Prices</b>	Number of prices which are owed by the portfolio(s).
<b>Definition of answer</b>	
<b>Dual Pricing</b>	Prices dependent on deviation direction of specific BRP type and deviation direction of System or Control Area Imbalance.
<b>Single Pricing</b>	Price independent from deviation direction, one side pays, the other gets paid.

**Key:**

	Missing data
	N/A
	Single Pricing
	Dual Pricing

## Imbalance settlement - Number of Prices - If 2 portfolios - Generation



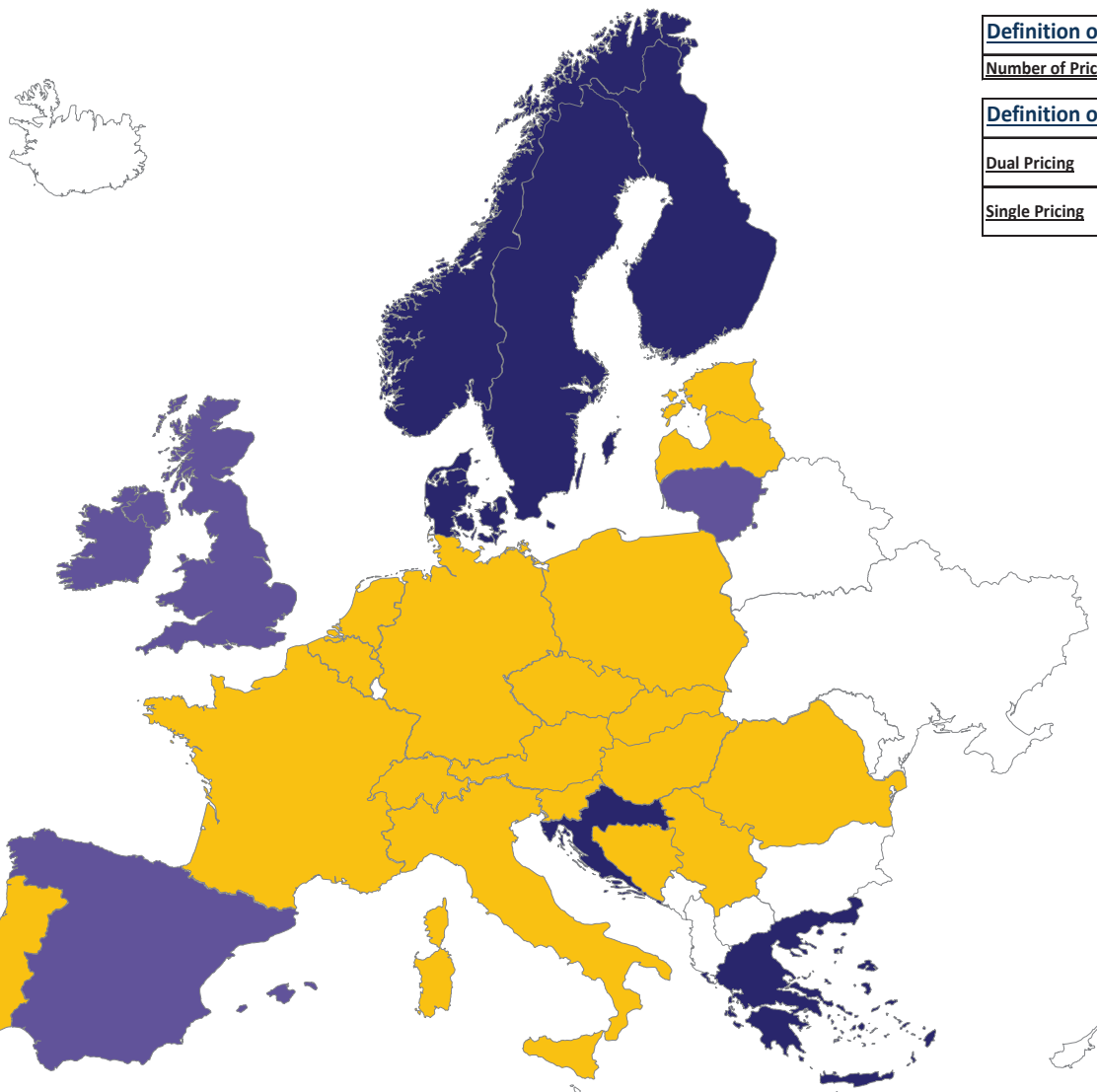
<u>Definition of question</u>	
<b>Number of Prices</b>	Number of prices which are owed by the portfolio(s).
<u>Definition of answer</u>	
<b>Dual Pricing</b>	Prices dependent on deviation direction of specific BRP type and deviation direction of System or Control Area Imbalance.
<b>Single Pricing</b>	Price independent from deviation direction, one side pays, the other gets paid.

**Key:**

	Missing data
	N/A
	Single Pricing
	Dual Pricing
	Other



## Imbalance settlement - Number of Prices - If 2 portfolios - Consumption

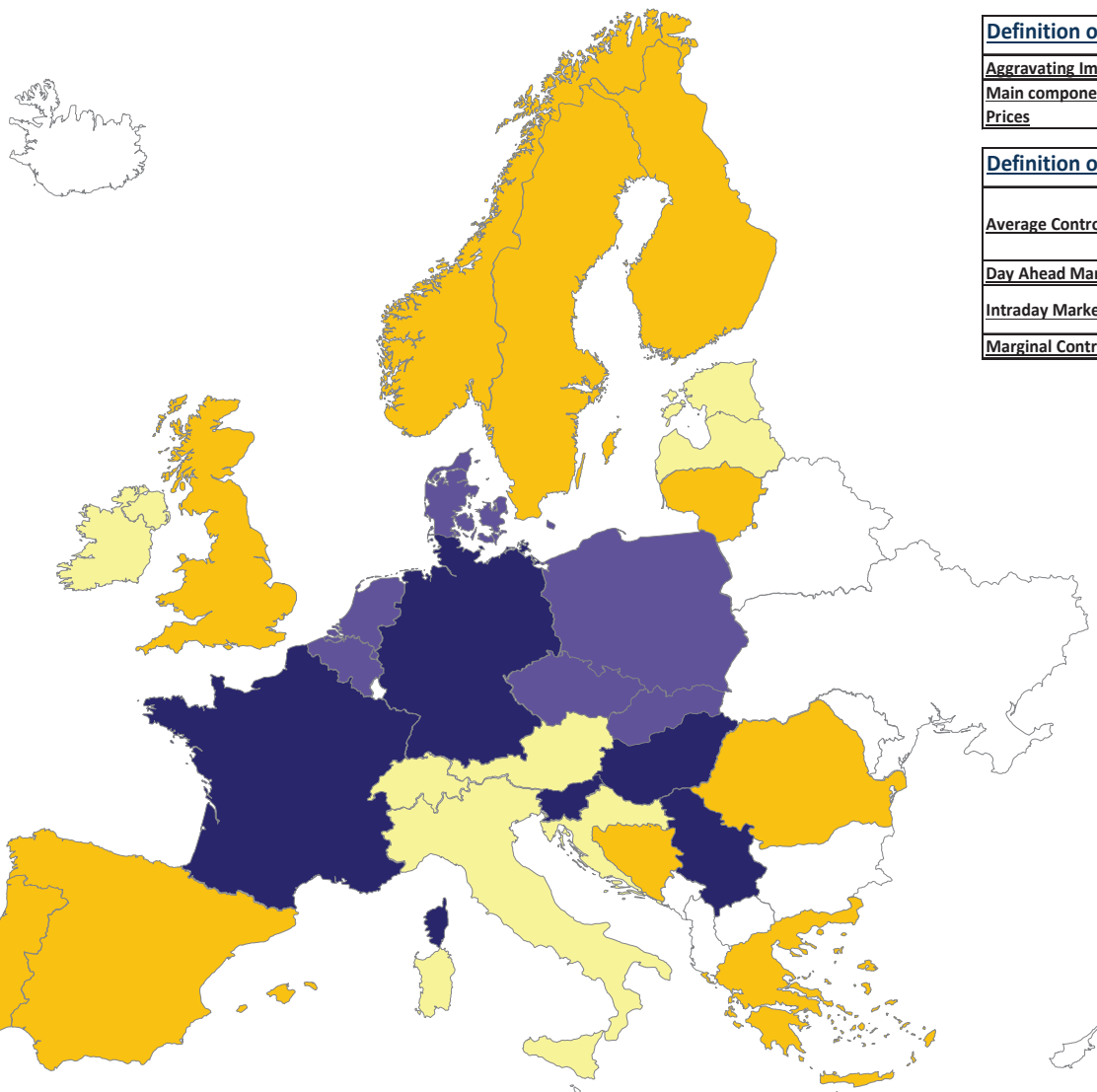


<b>Definition of question</b>	
<b>Number of Prices</b>	Number of prices which are owed by the portfolio(s).
<b>Definition of answer</b>	
<b>Dual Pricing</b>	Prices dependent on deviation direction of specific BRP type and deviation direction of System or Control Area Imbalance.
<b>Single Pricing</b>	Price independent from deviation direction, one side pays, the other gets paid.

**Key:**

	Missing data
	N/A
	Single Pricing
	Dual Pricing
	Other

## Imbalance settlement - Main comp. of Imb. Prices - If 1 portfolio - Aggravating imb.










### Definition of question

<b>Aggravating Imbalance</b>	Imbalance volumes are increasing.
<b>Main component of Imbalance Prices</b>	The component that determines imbalance charges most of the time.

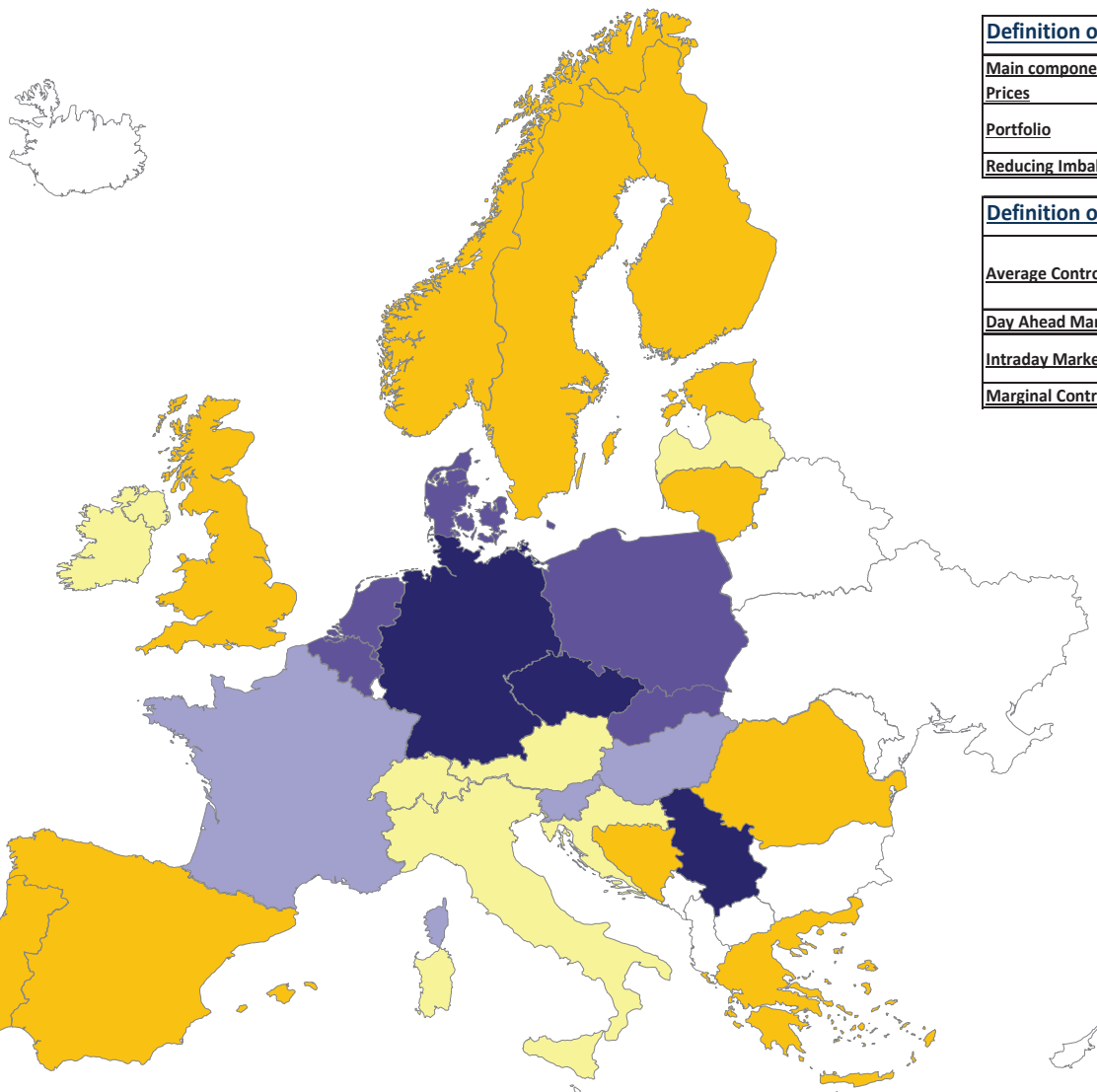
### Definition of answer

<b>Average Control Energy Price</b>	Average Control Energy Price is calculated by taking the sum of the control energy prices and dividing it by the number of the prices being examined.
<b>Day Ahead Market Price</b>	Price which evolved on the day ahead market.
<b>Intraday Market Price</b>	The price of the market within regular business hours, short-term prices.
<b>Marginal Control Energy Price</b>	The highest price, which can be acceptable.

**Key:**

	Missing data
	N/A
	Average Control Energy Price
	Marginal Control Energy Price
	Day-Ahead Market Price
	Intraday Market Price
	Other

## Imbalance settlement - Main comp. of Imb. Prices - If 1 portfolio - Reducing imb.










### Definition of question

<b>Main component of Imbalance Prices</b>	The component that determines imbalance charges most of the time.
<b>Portfolio</b>	A group of plant which could be a mix of generation, demand etc., which bid in aggregate into the relevant market.
<b>Reducing Imbalance</b>	Imbalance volumes are decreasing.

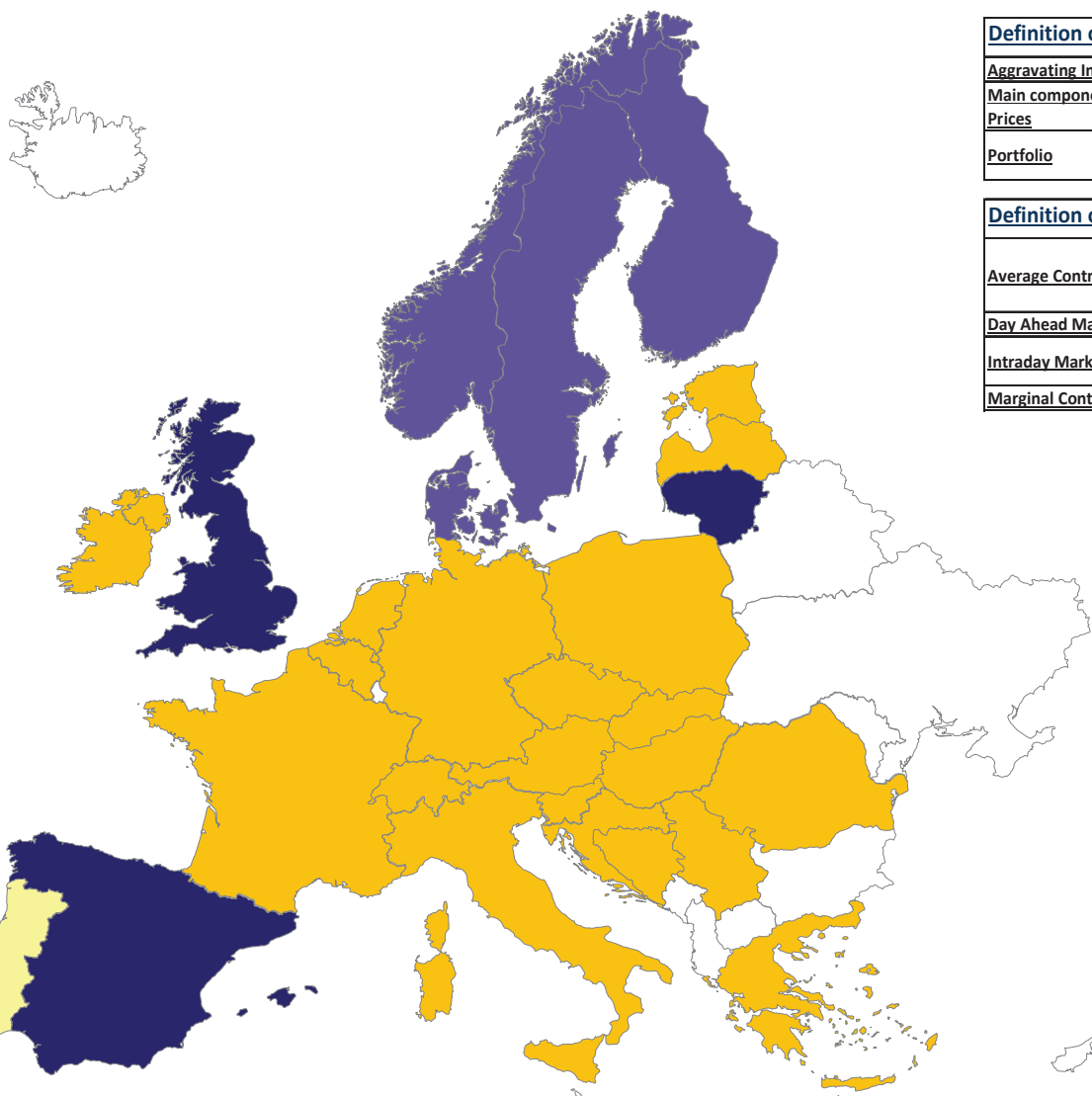
### Definition of answer

<b>Average Control Energy Price</b>	Average Control Energy Price is calculated by taking the sum of the control energy prices and dividing it by the number of the prices being examined.
<b>Day Ahead Market Price</b>	Price which evolved on the day ahead market.
<b>Intraday Market Price</b>	The price of the market within regular business hours, short-term prices.
<b>Marginal Control Energy Price</b>	The highest price, which can be acceptable.

### Key:

	Missing data
	N/A
	Average Control Energy Price
	Marginal Control Energy Price
	Day-Ahead Market Price
	Intraday Market Price
	Other

# Imbalance settlement - Main comp. of Imb. Prices - If 2 portfolios - For generation "aggravating imb."



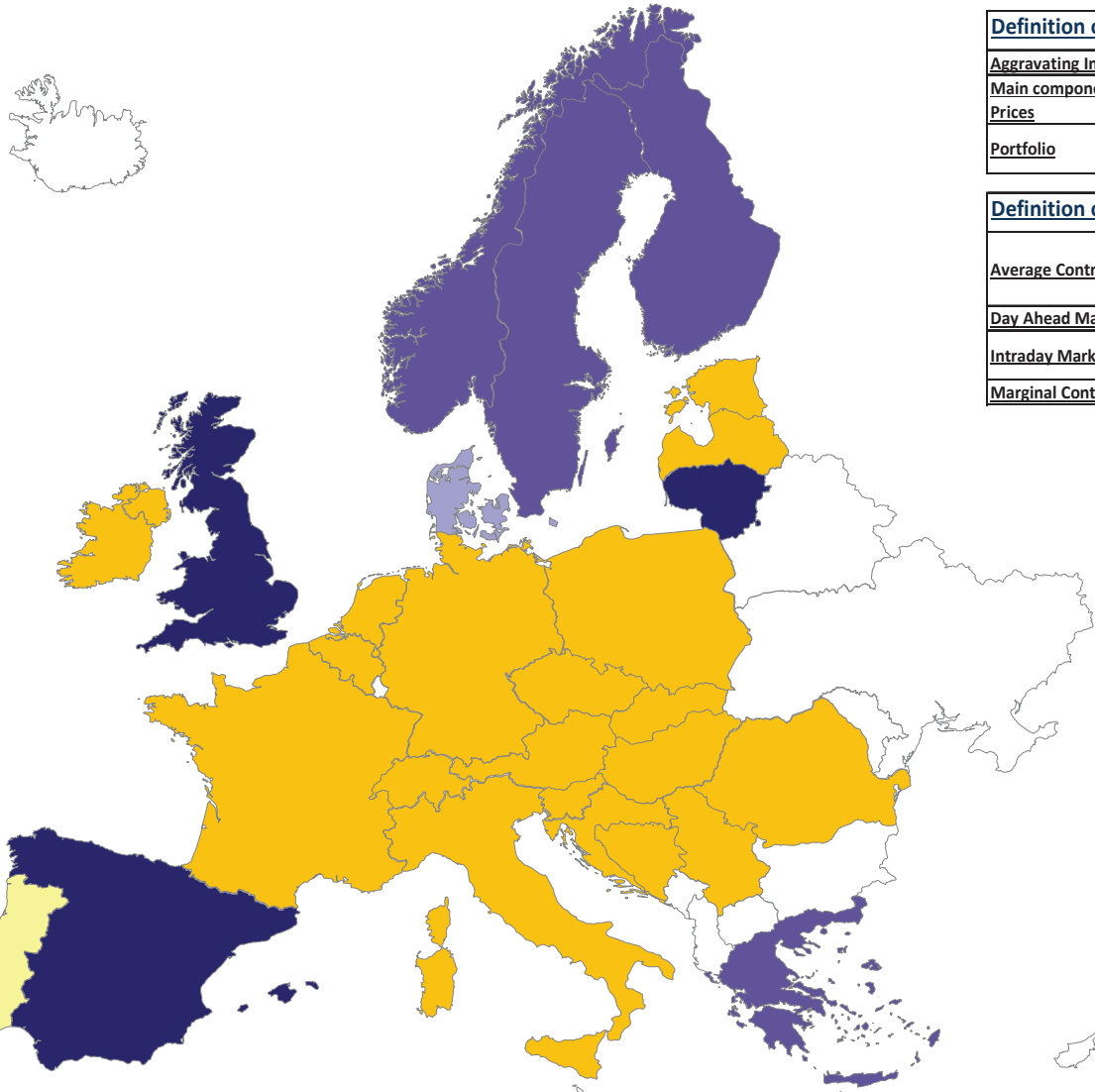
<b>Definition of question</b>	
<b>Aggravating Imbalance</b>	Imbalance volumes are increasing.
<b>Main component of Imbalance Prices</b>	The component that determines imbalance charges most of the time.
<b>Portfolio</b>	A group of plant which could be a mix of generation, demand etc., which bid in aggregate into the relevant market.

<b>Definition of answer</b>	
<b>Average Control Energy Price</b>	Average Control Energy Price is calculated by taking the sum of the control energy prices and dividing it by the number of the prices being examined.
<b>Day Ahead Market Price</b>	Price which evolved on the day ahead market.
<b>Intraday Market Price</b>	The price of the market within regular business hours, short-term prices.
<b>Marginal Control Energy Price</b>	The highest price, which can be acceptable.

**Key:**

	Missing data
	N/A
	Average Control Energy Price
	Marginal Control Energy Price
	Day-Ahead Market Price
	Intraday Market Price
	Other








# Imbalance settlement - Main comp. of Imb. Prices - If 2 portfolios - For consumption "aggravating imb."



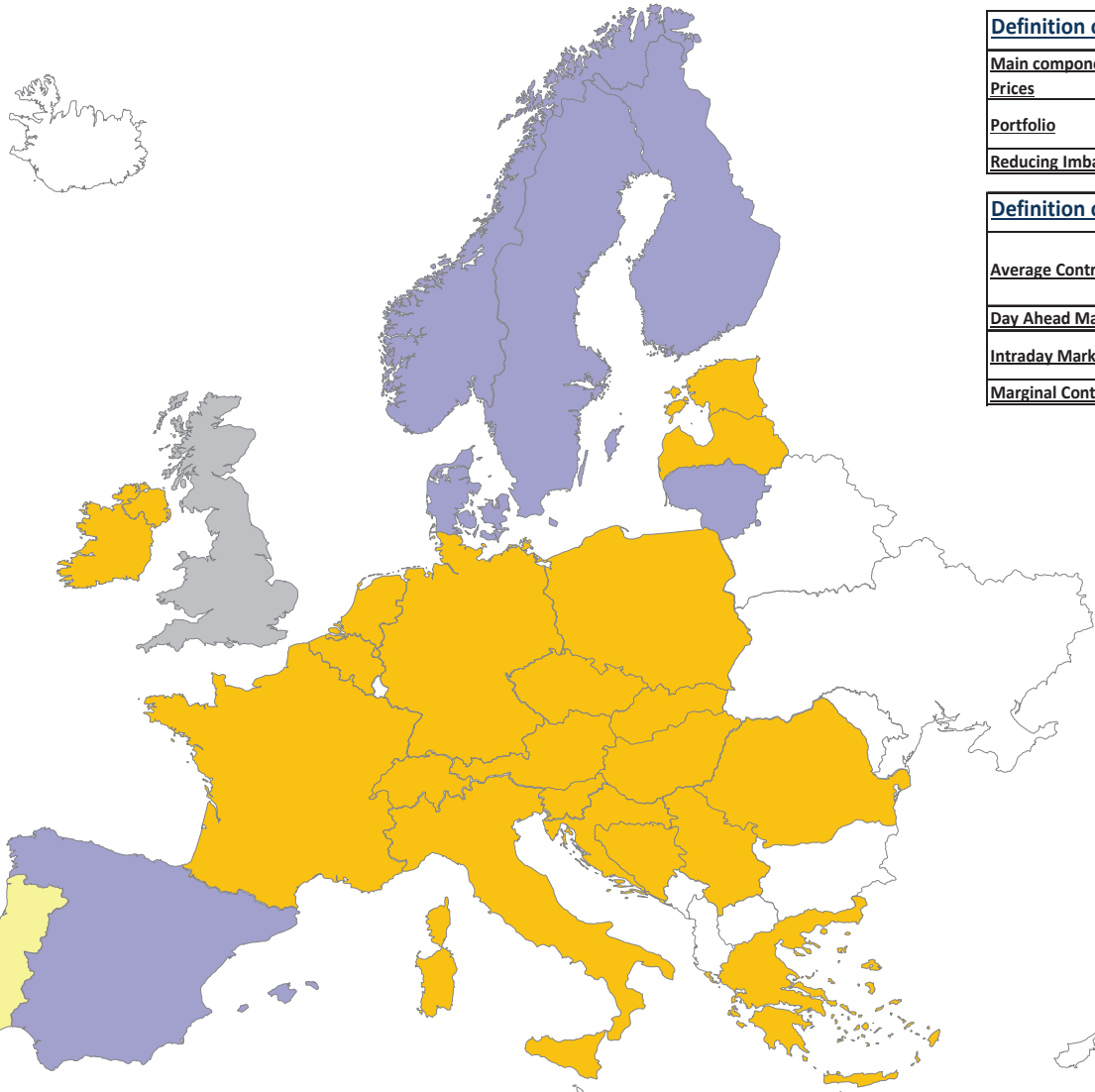
<b>Definition of question</b>	
<b>Aggravating Imbalance</b>	Imbalance volumes are increasing.
<b>Main component of Imbalance Prices</b>	The component that determines imbalance charges most of the time.
<b>Portfolio</b>	A group of plant which could be a mix of generation, demand etc., which bid in aggregate into the relevant market.

<b>Definition of answer</b>	
<b>Average Control Energy Price</b>	Average Control Energy Price is calculated by taking the sum of the control energy prices and dividing it by the number of the prices being examined.
<b>Day Ahead Market Price</b>	Price which evolved on the day ahead market.
<b>Intraday Market Price</b>	The price of the market within regular business hours, short-term prices.
<b>Marginal Control Energy Price</b>	The highest price, which can be acceptable.

**Key:**

	Missing data
	N/A
	Average Control Energy Price
	Marginal Control Energy Price
	Day-Ahead Market Price
	Intraday Market Price
	Other

# Imbalance settlement - Main comp. of Imb. Prices - If 2 portfolios - For generation "reducing imb."



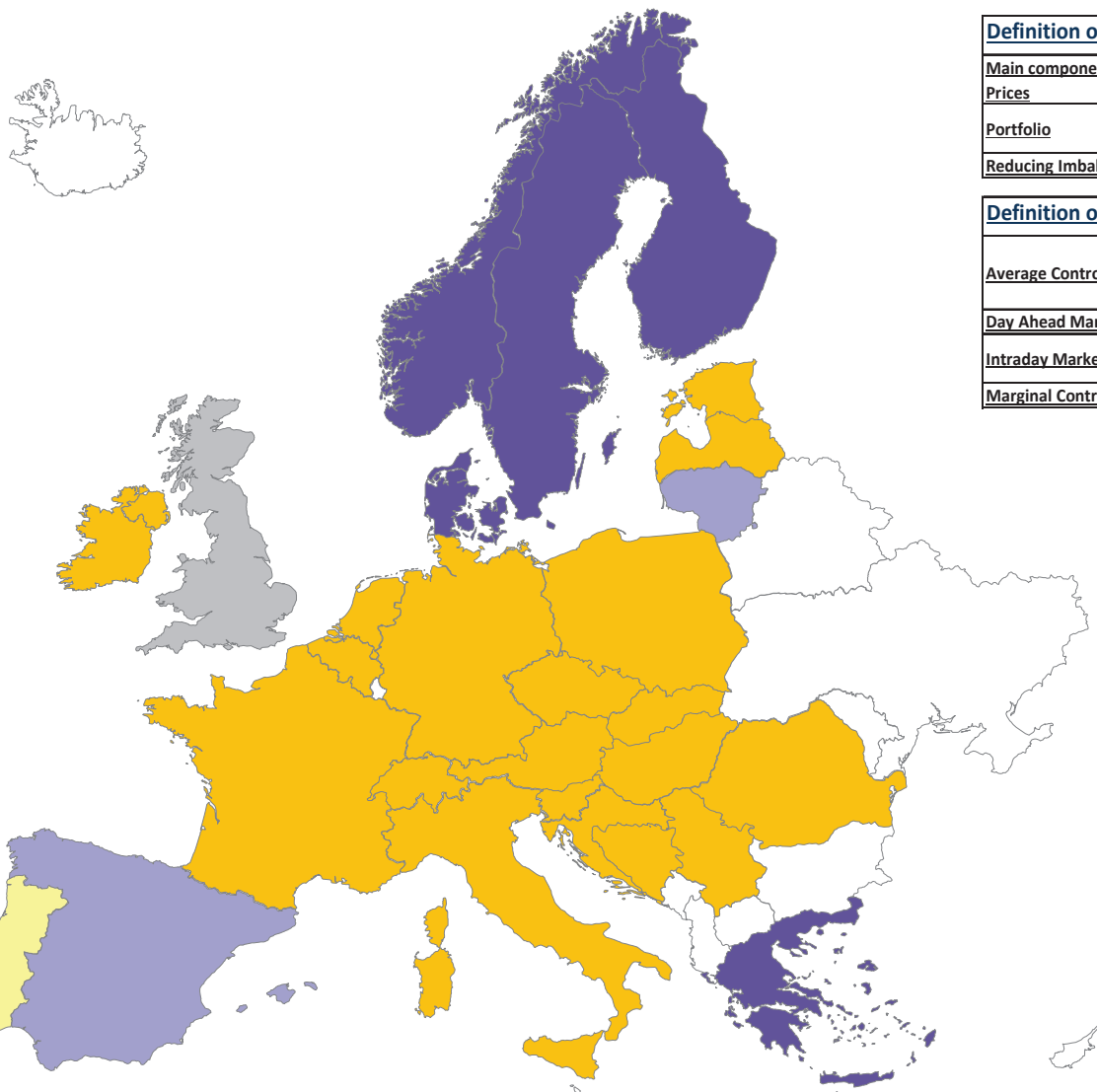
<u>Definition of question</u>	
<u>Main component of Imbalance Prices</u>	The component that determines imbalance charges most of the time.
<u>Portfolio</u>	A group of plant which could be a mix of generation, demand etc., which bid in aggregate into the relevant market.
<u>Reducing Imbalance</u>	Imbalance volumes are decreasing.

<u>Definition of answer</u>	
<u>Average Control Energy Price</u>	Average Control Energy Price is calculated by taking the sum of the control energy prices and dividing it by the number of the prices being examined.
<u>Day Ahead Market Price</u>	Price which evolved on the day ahead market.
<u>Intraday Market Price</u>	The price of the market within regular business hours, short-term prices.
<u>Marginal Control Energy Price</u>	The highest price, which can be acceptable.

**Key:**

	Missing data
	N/A
	Average Control Energy Price
	Marginal Control Energy Price
	Day-Ahead Market Price
	Intraday Market Price
	Other








# Imbalance settlement - Main comp. of Imb. Prices - If 2 portfolios - For consumption "reducing imb."



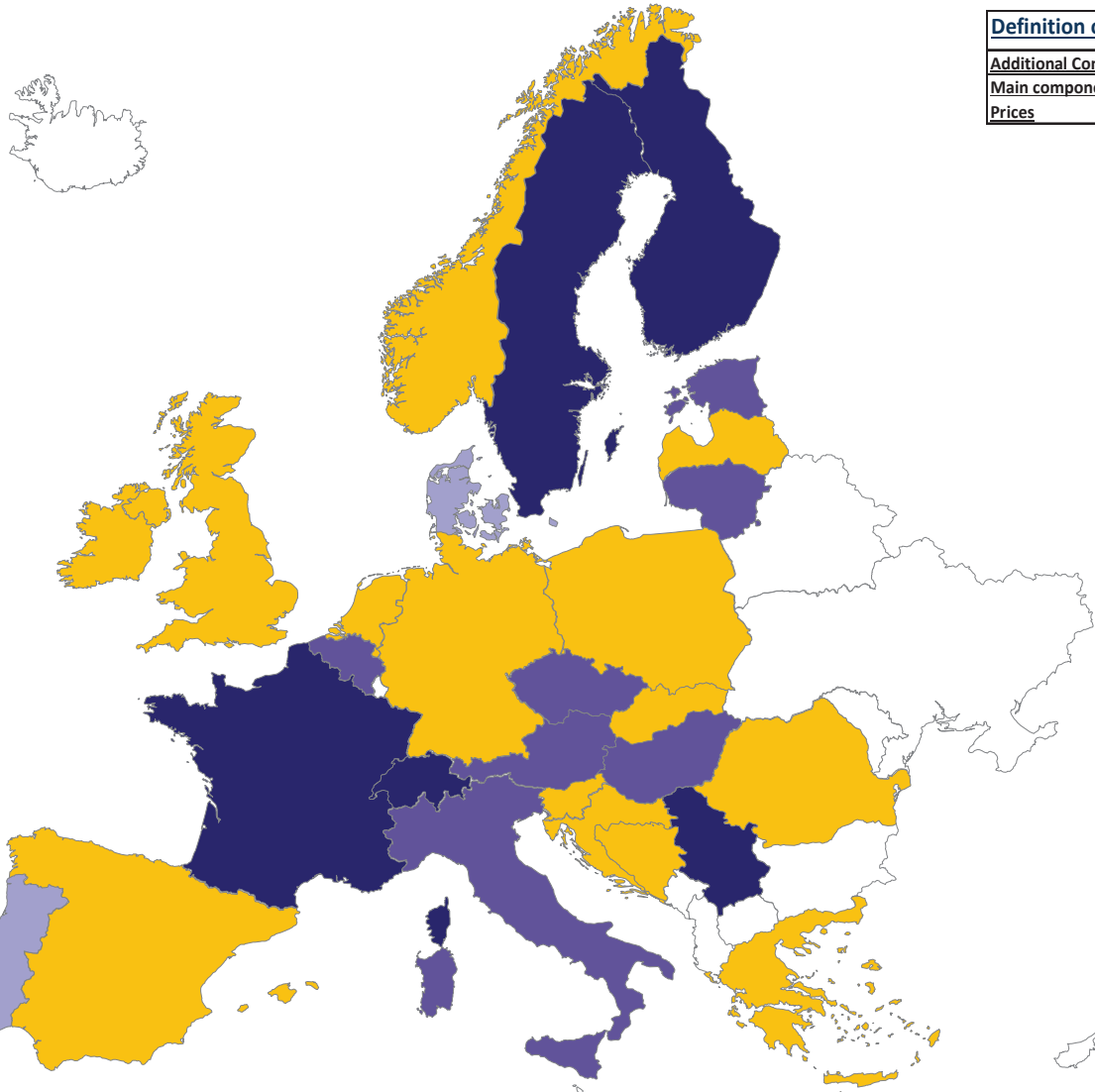
<u>Definition of question</u>	
<u>Main component of Imbalance Prices</u>	The component that determines imbalance charges most of the time.
<u>Portfolio</u>	A group of plant which could be a mix of generation, demand etc., which bid in aggregate into the relevant market.
<u>Reducing Imbalance</u>	Imbalance volumes are decreasing.

<u>Definition of answer</u>	
<u>Average Control Energy Price</u>	Average Control Energy Price is calculated by taking the sum of the control energy prices and dividing it by the number of the prices being examined.
<u>Day Ahead Market Price</u>	Price which evolved on the day ahead market.
<u>Intraday Market Price</u>	The price of the market within regular business hours, short-term prices.
<u>Marginal Control Energy Price</u>	The highest price, which can be acceptable.

**Key:**






	Missing data
	N/A
	Average Control Energy Price
	Marginal Control Energy Price
	Day-Ahead Market Price
	Intraday Market Price
	Other

## Imbalance settlement - Main comp. of Imb. Prices - Additional Components



Definition of question	
<b>Additional Components</b>	Other components which determine imbalance charges.
<b>Main component of Imbalance Prices</b>	The component that determines imbalance charges most of the time.

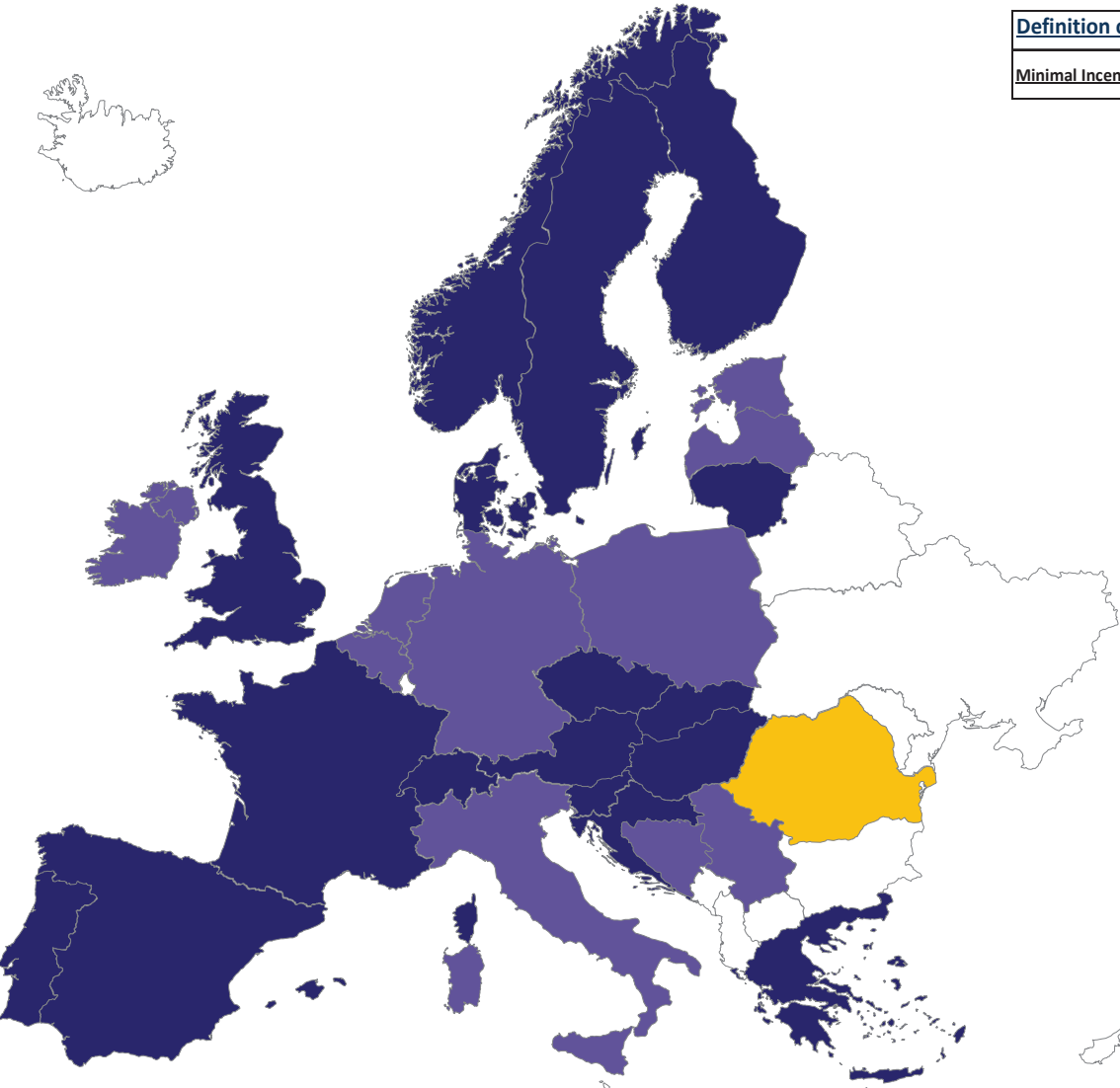
**Key:**

	Missing data
	N/A
	Constant component
	Variable component
	Other



# Imbalance settlement - Is there a minimal incentive?

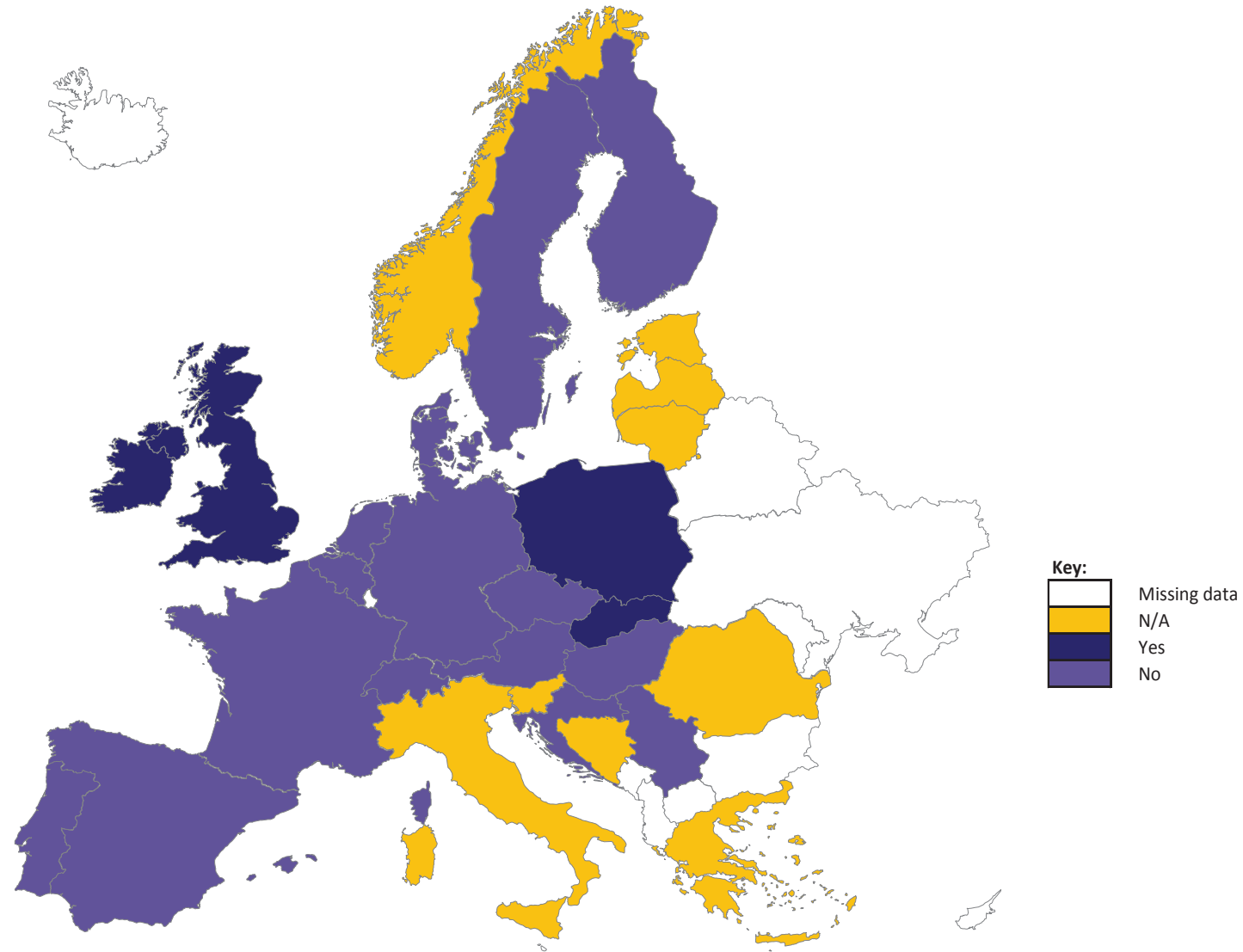
Definition of question	
Minimal Incentives	Minimal incentives means that there is some method which leads the BRPs to balance their schedules.



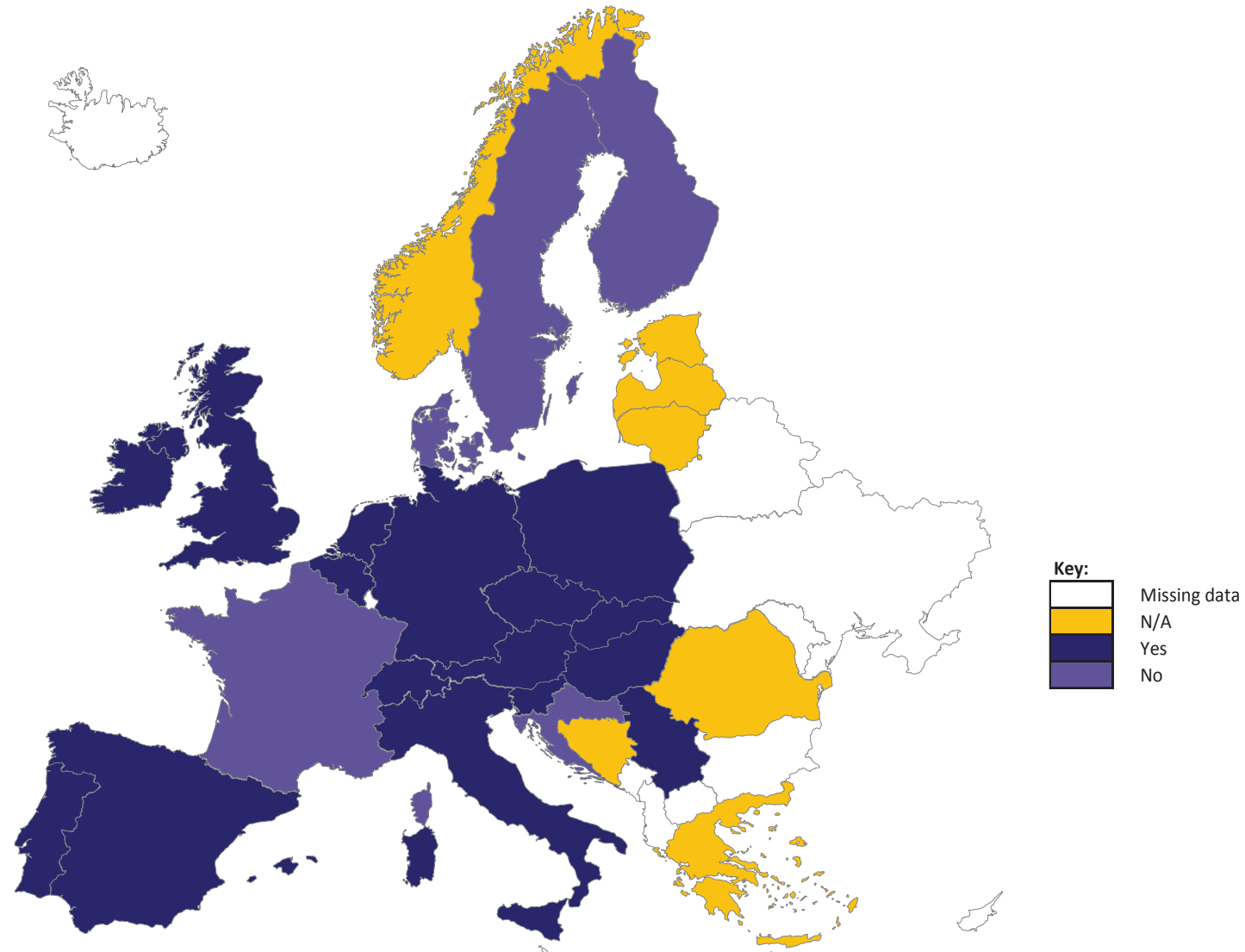
**Key:**

White	Missing data
Yellow	N/A
Dark Blue	Yes
Purple	No

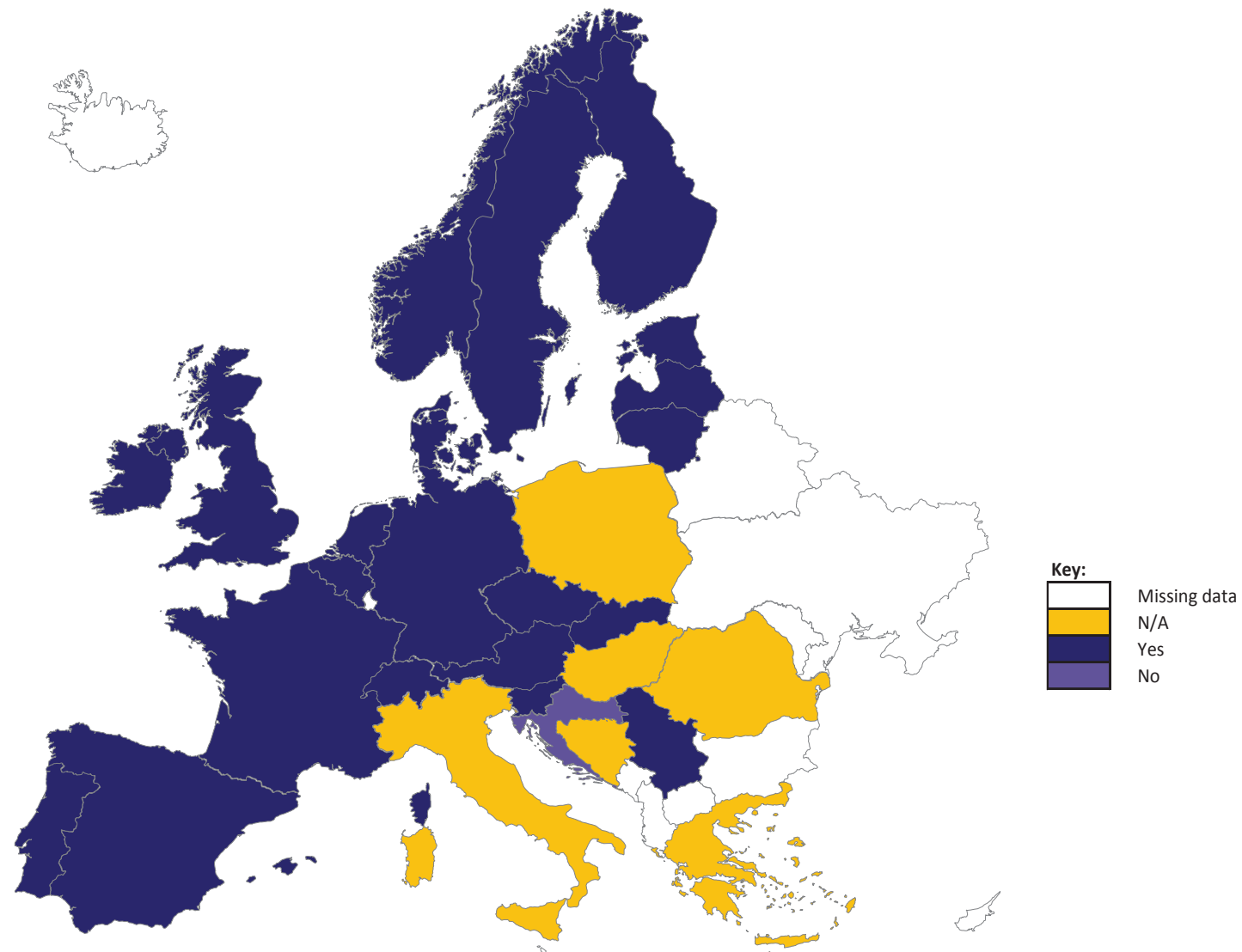
# Imbalance settlement - Control Energy Prices used - FCR



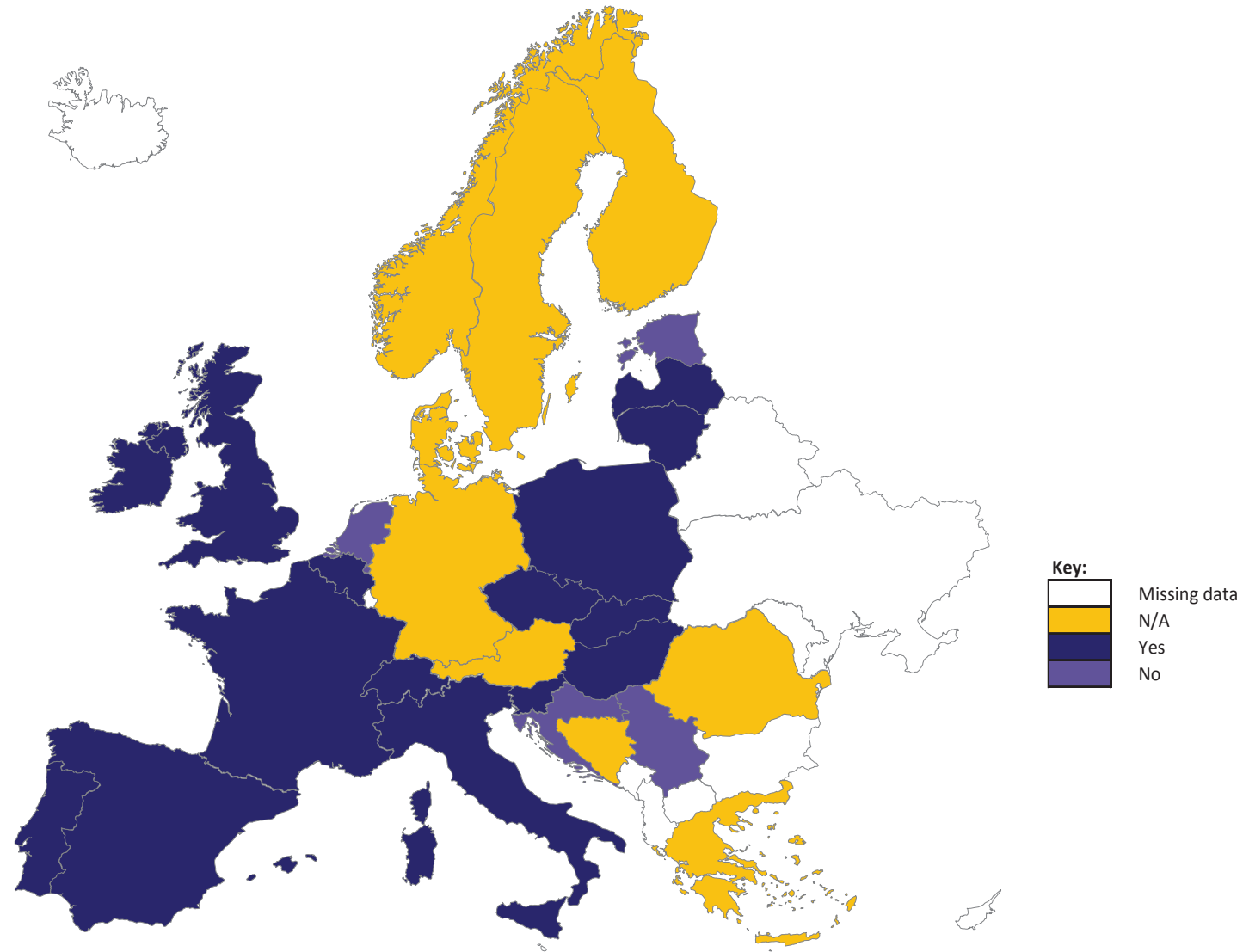
## Imbalance settlement - Control Energy Prices used - FRR (Automatic)



# Imbalance settlement - Control Energy Prices used - FRR (Manual)



# Imbalance settlement - Control Energy Prices used - RR

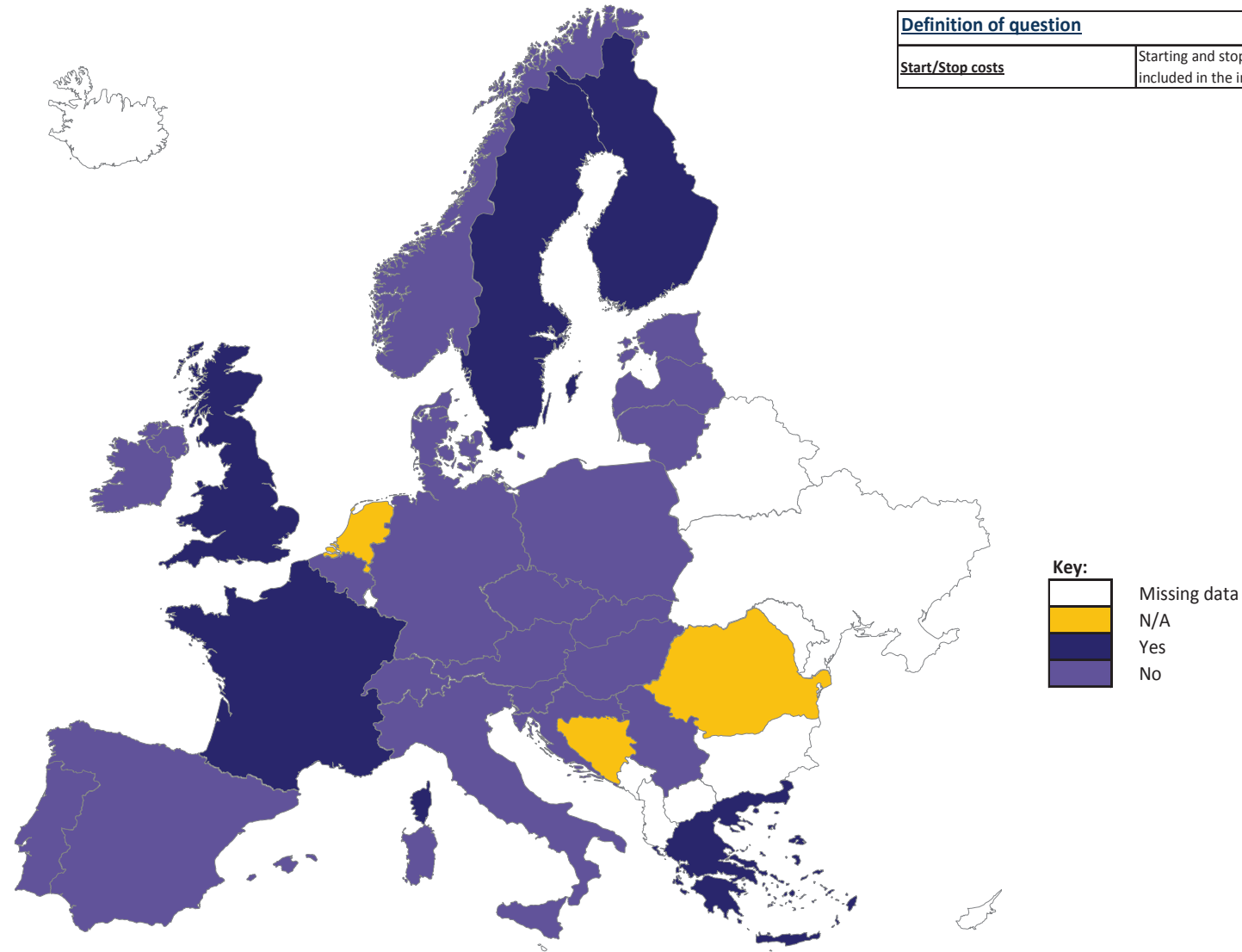


## Imbalance settlement - Start/Stop costs in Imbalance Charges

### Definition of question

#### Start/Stop costs

Starting and stopping of the power plants have costs, which can be included in the imbalance charges.



### Key:

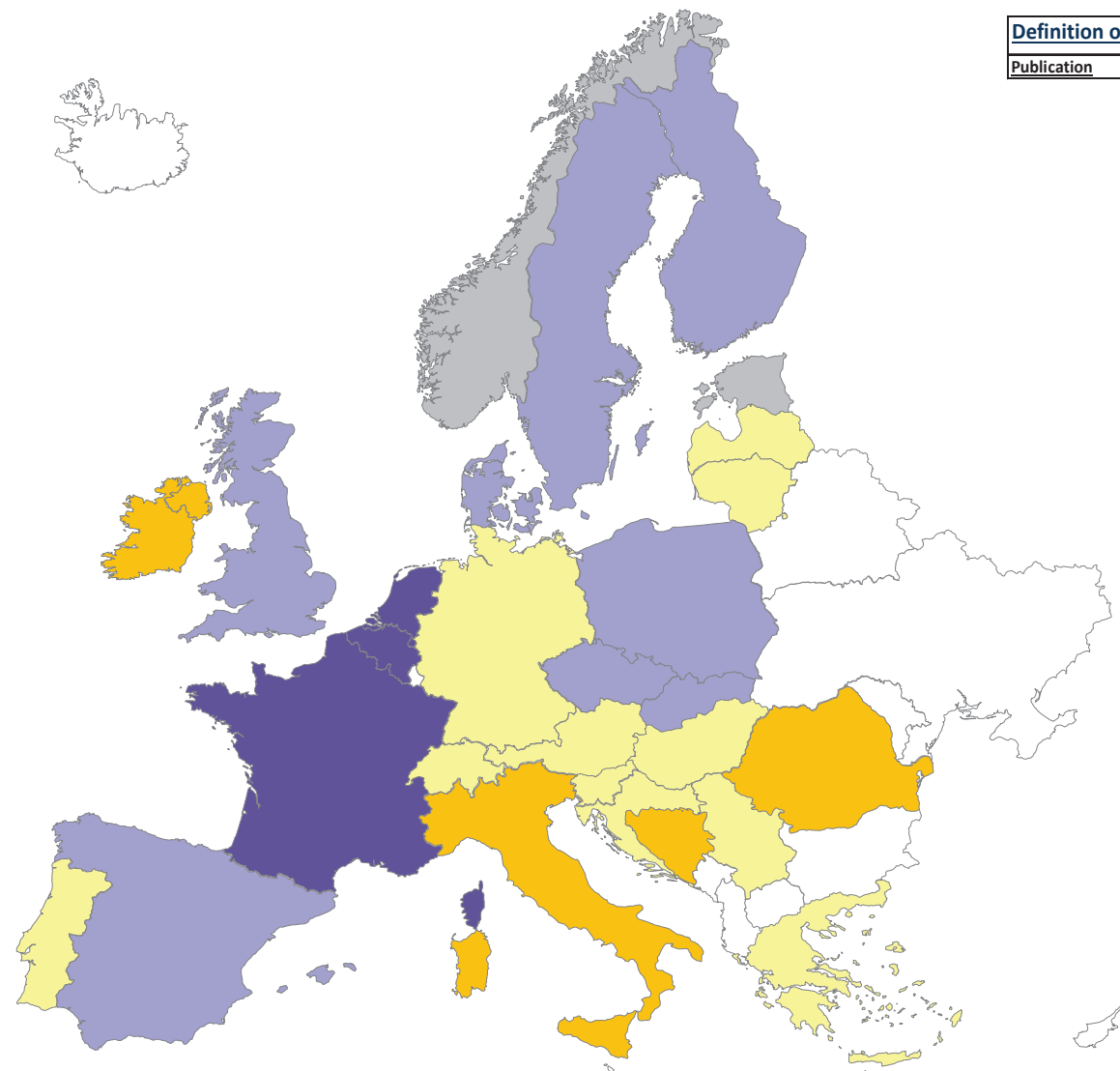
Missing data	Missing data
N/A	N/A
Yes	Yes
No	No

## Imbalance settlement - Publication

### Definition of question

#### Publication

Definitive imbalance charges are published.



### Key:



Missing data

N/A

Prior to delivery

$x \leq 1$  hour after delivery

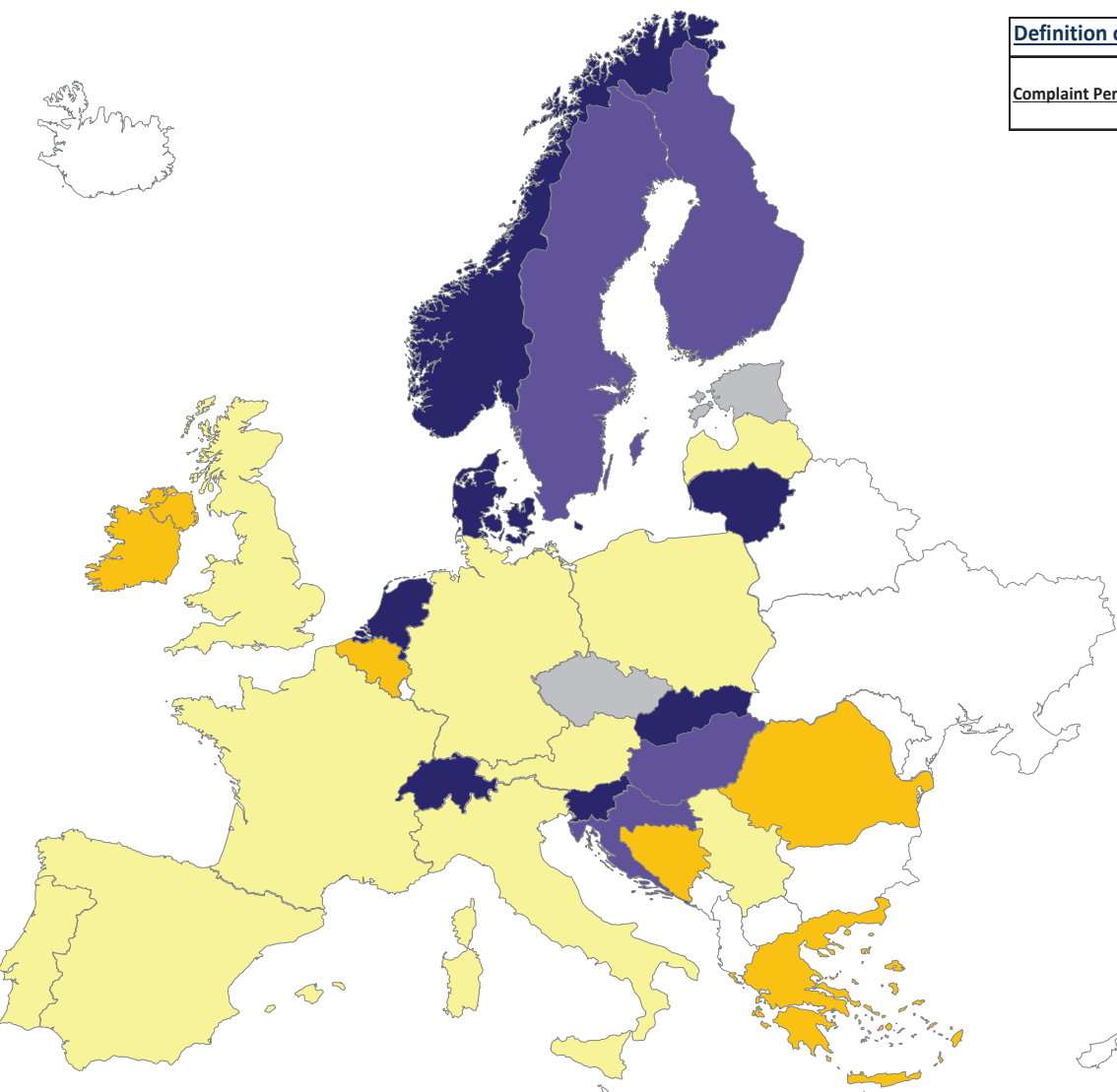
$x \leq 1$  day after delivery

$x \leq 1$  week after delivery

$x > 1$  week after delivery

# Imbalance settlement - Complaint Period

Definition of question	
Complaint Period	Length of time for which complaints can be made which will be considered in relation to settlement (after the finalised data are produced).

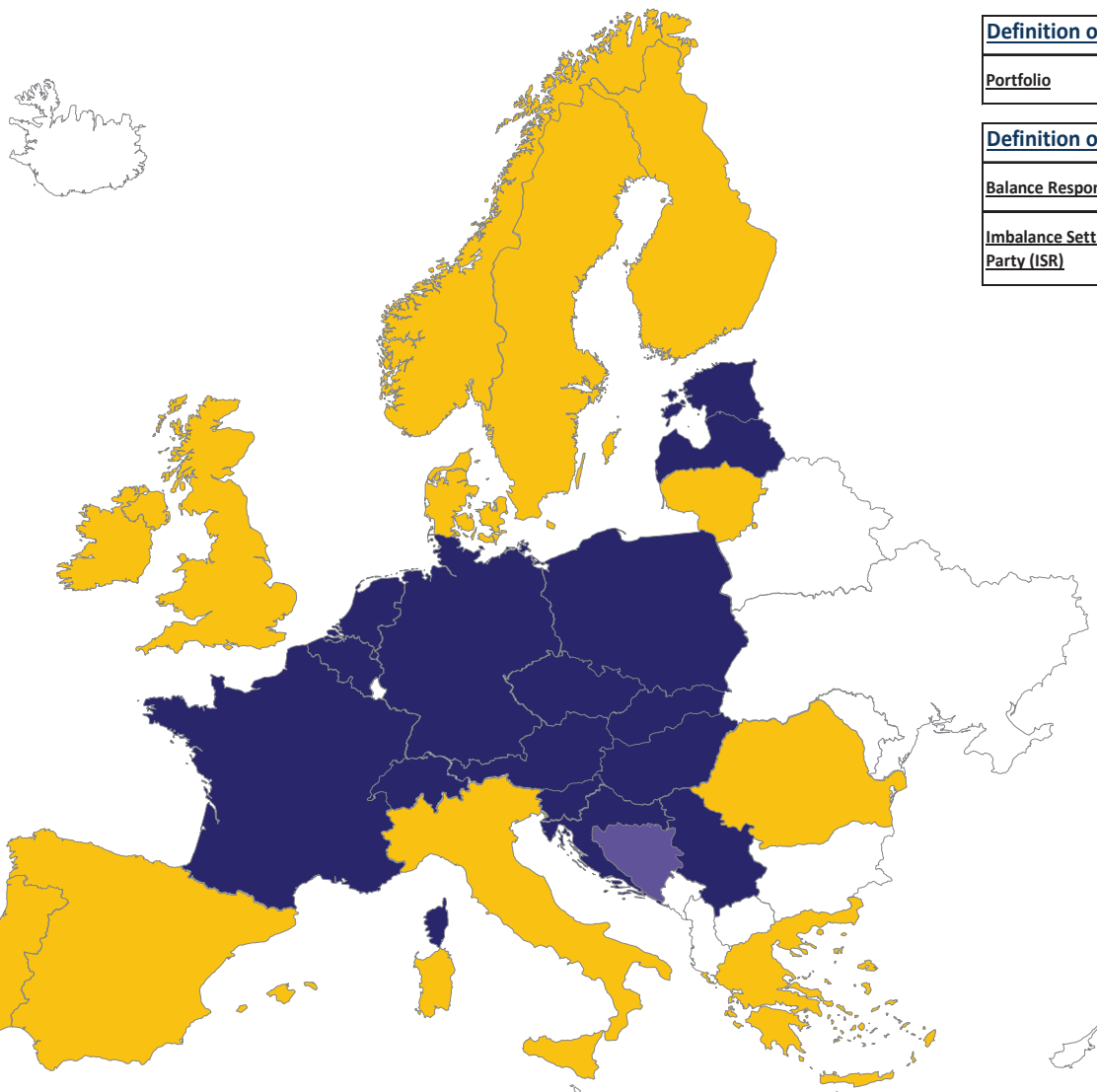


**Key:**

White	Missing data
Orange	N/A
Dark Blue	$x \leq 3$ weeks
Medium Purple	$3 < x \leq 6$ weeks
Light Purple	$6 < x \leq 9$ weeks
Grey	$9 < x \leq 12$ weeks
Yellow	$x > 12$ weeks



## Imbalance settlement - Settlement - If 1 portfolio



### Definition of question

#### Portfolio

A group of plant which could be a mix of generation, demand etc., which bid in aggregate into the relevant market.

### Definition of answer

#### Balance Responsible Party (BRP)

Balancing Responsible Party means a market participant or its chosen representative responsible for its Imbalances.

#### Imbalance Settlement Responsible Party (ISR)

A party that is responsible for settlement of the difference between the contracted quantities and the realized quantities of energy products for the BRPs in a Market Balance Area.

#### Key:



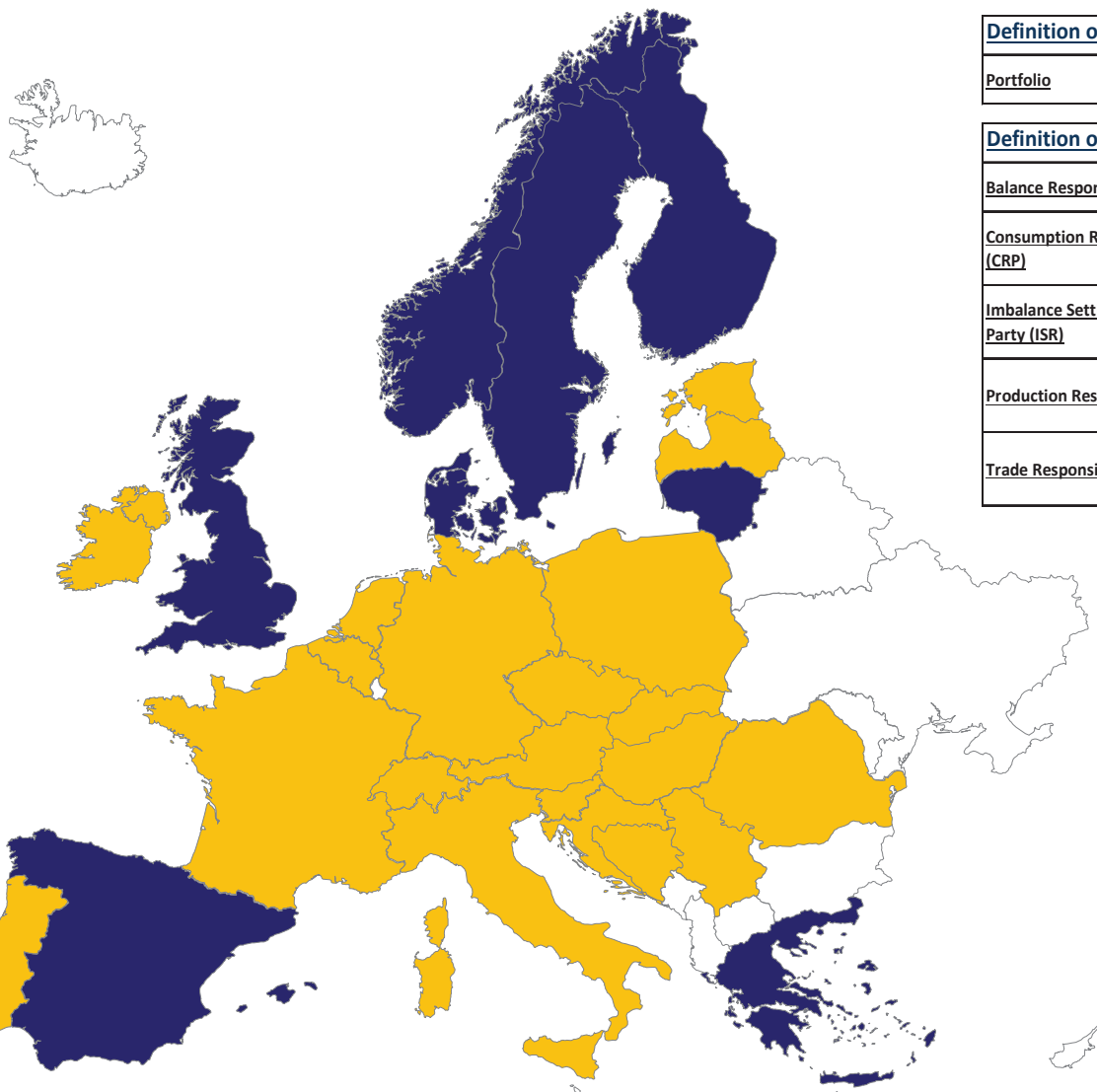
Missing data

N/A

BRP

ISR

## Imbalance settlement - Settlement - If 2 portfolios - Generation










### Definition of question

<b>Portfolio</b>	A group of plant which could be a mix of generation, demand etc., which bid in aggregate into the relevant market.
------------------	--------------------------------------------------------------------------------------------------------------------

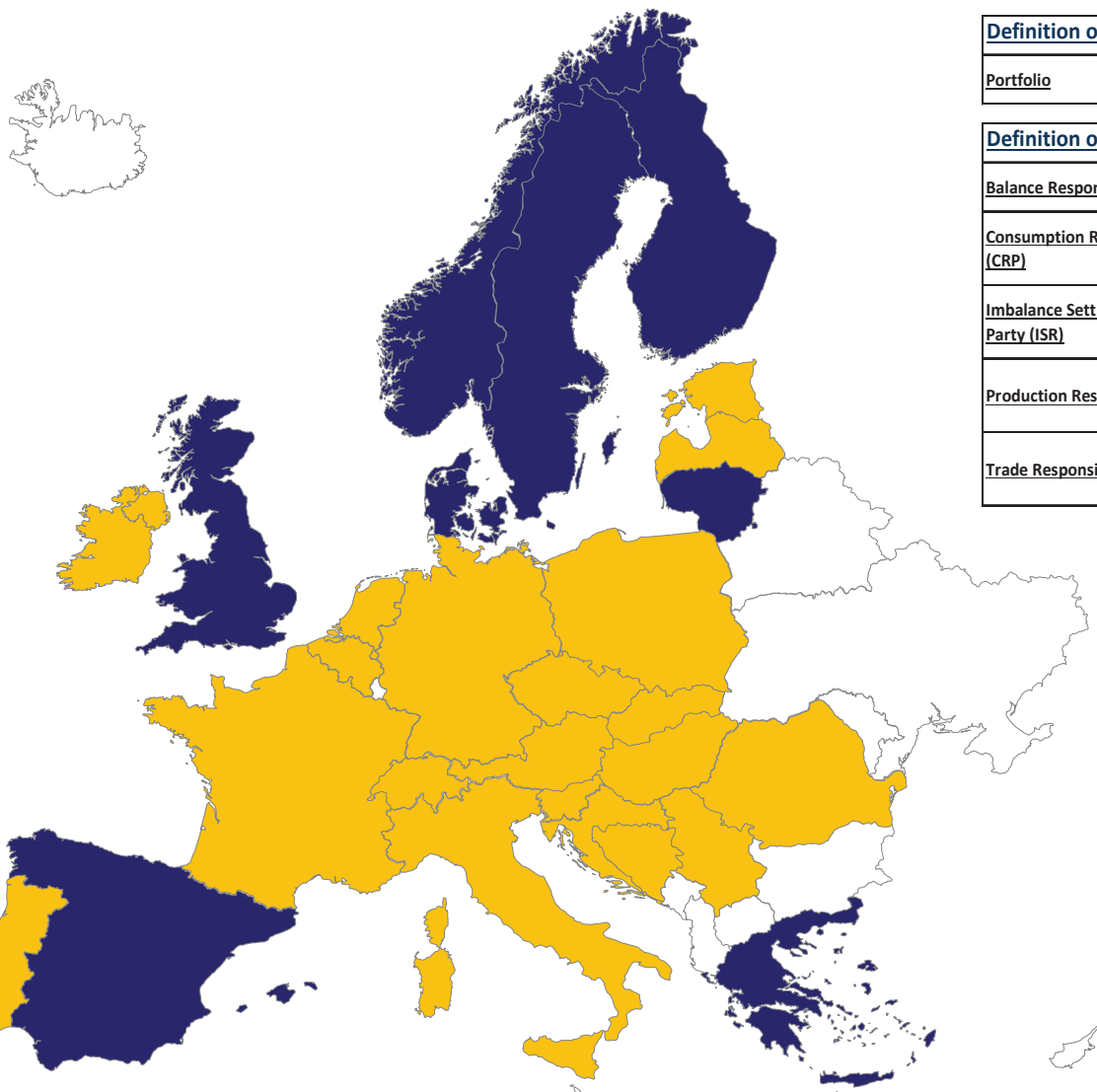
### Definition of answer

<b>Balance Responsible Party (BRP)</b>	Balancing Responsible Party means a market participant or its chosen representative responsible for its Imbalances.
<b>Consumption Responsible Party (CRP)</b>	A party who can be brought to rights, legally and financially, for any imbalance between energy nominated and consumed for all associated Accounting Points.
<b>Imbalance Settlement Responsible Party (ISR)</b>	A party that is responsible for settlement of the difference between the contracted quantities and the realized quantities of energy products for the BRPs in a Market Balance Area.
<b>Production Responsible Party (PRP)</b>	A party who can be brought to rights, legally and financially, for any imbalance between energy nominated and produced for all associated Accounting Points.
<b>Trade Responsible Party (TRP)</b>	A party who can be brought to rights, legally and financially, for any imbalance between energy nominated and consumed for all associated Accounting Points.

### Key:

	Missing data
	N/A
	BRP
	ISR
	TRP
	PRP
	CRR

## Imbalance settlement - Settlement - If 2 portfolios - Consumption










### Definition of question

<b>Portfolio</b>	A group of plant which could be a mix of generation, demand etc., which bid in aggregate into the relevant market.
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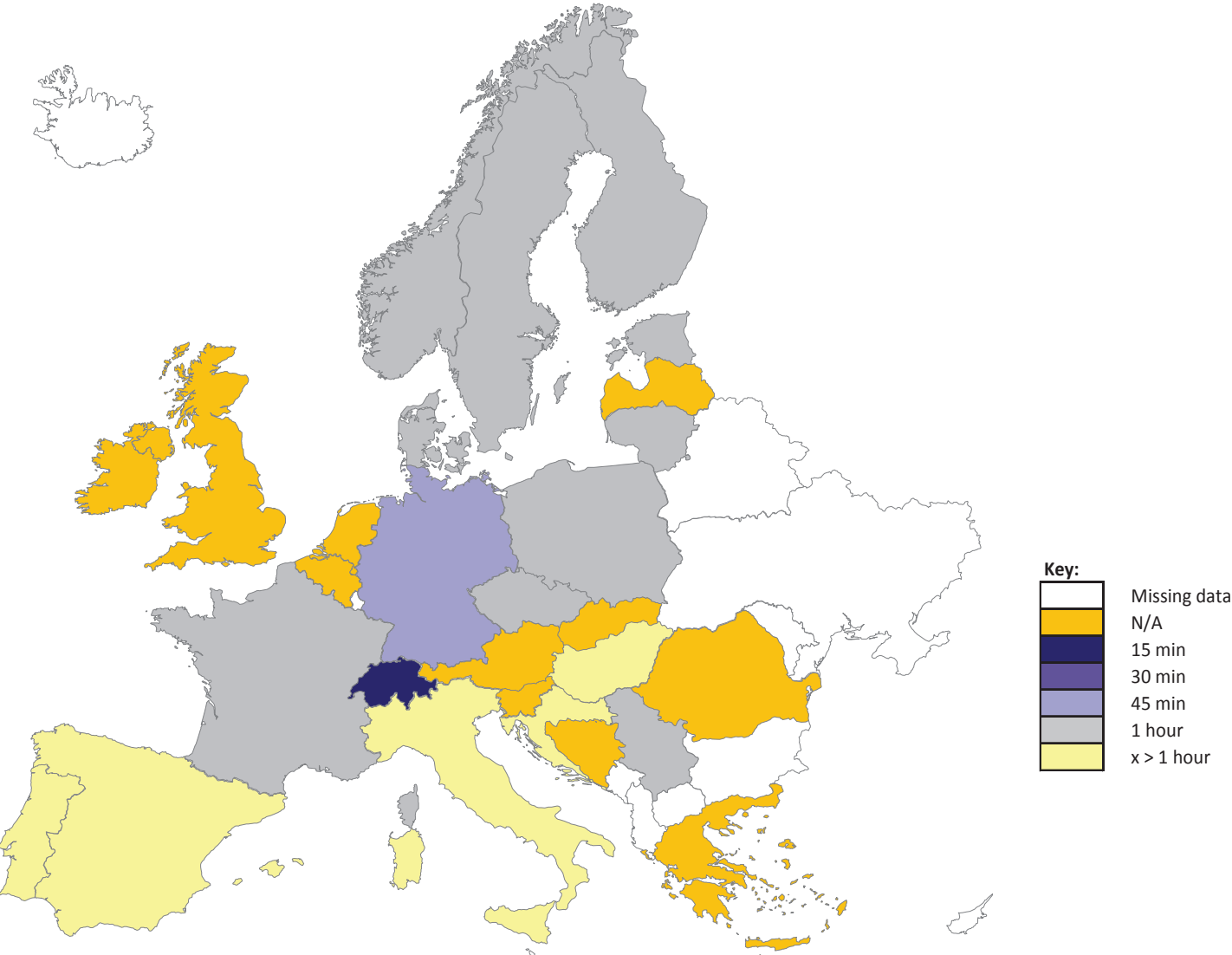
### Definition of answer

<b>Balance Responsible Party (BRP)</b>	Balancing Responsible Party means a market participant or its chosen representative responsible for its Imbalances.
<b>Consumption Responsible Party (CRP)</b>	A party who can be brought to rights, legally and financially, for any imbalance between energy nominated and consumed for all associated Accounting Points.
<b>Imbalance Settlement Responsible Party (ISR)</b>	A party that is responsible for settlement of the difference between the contracted quantities and the realized quantities of energy products for the BRPs in a Market Balance Area.
<b>Production Responsible Party (PRP)</b>	A party who can be brought to rights, legally and financially, for any imbalance between energy nominated and produced for all associated Accounting Points.
<b>Trade Responsible Party (TRP)</b>	A party who can be brought to rights, legally and financially, for any imbalance between energy nominated and consumed for all associated Accounting Points.

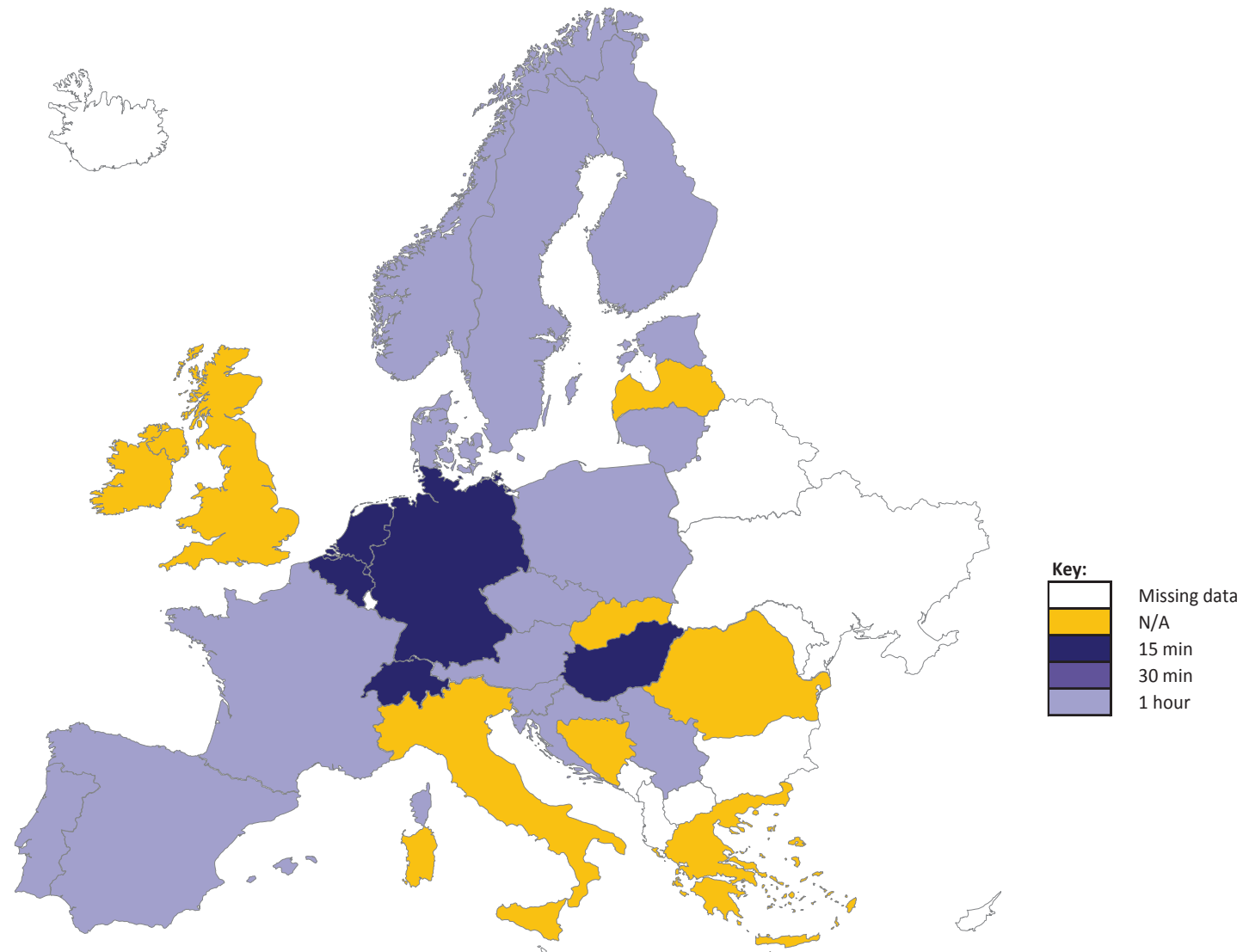
### Key:

	Missing data
	N/A
	BRP
	ISR
	TRP
	PRP
	CRR

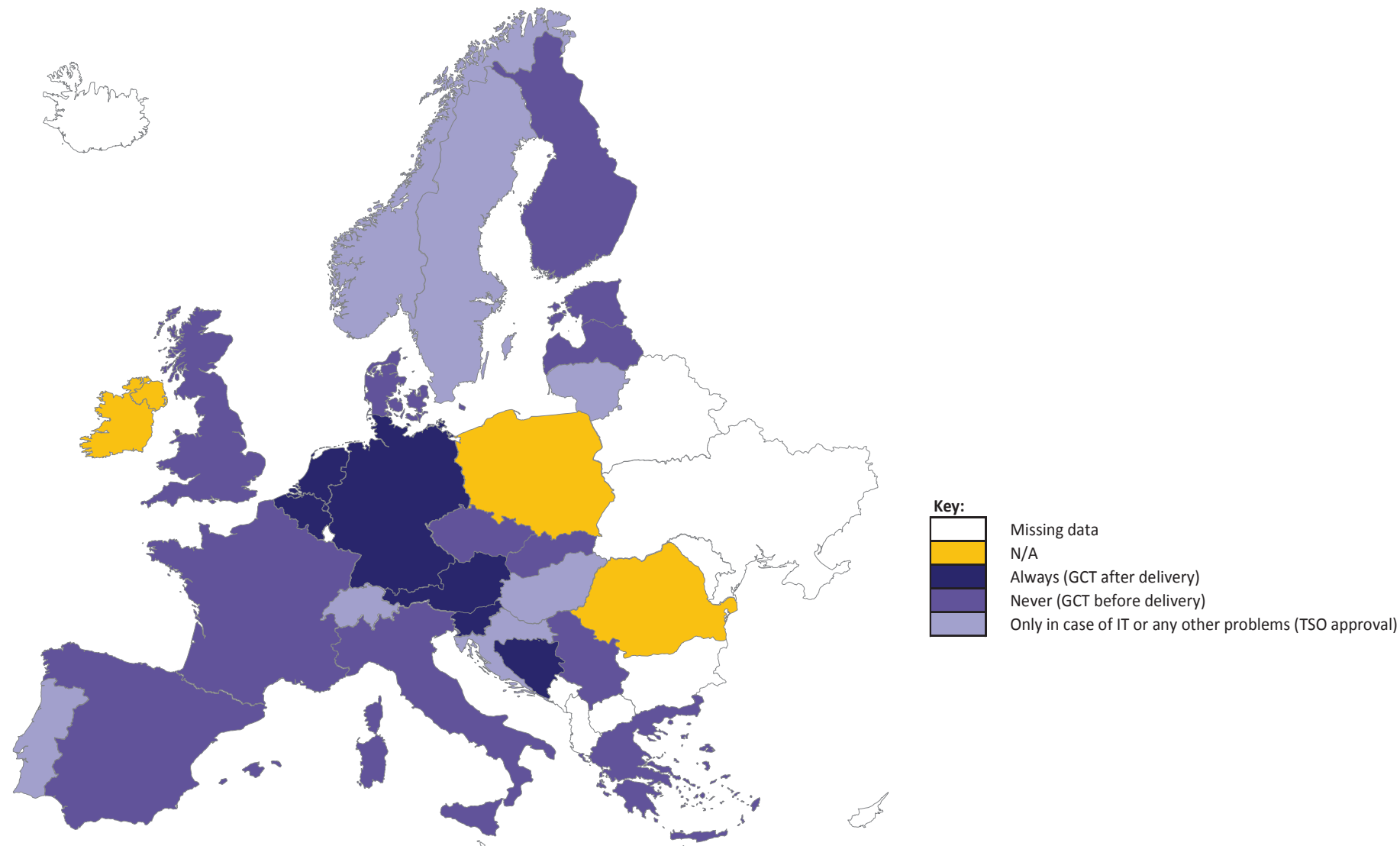
Imbalance settlement - Time before real time for BRP to carry out a re-schedule in Internal ID market



## Imbalance settlement - Internal Intra Day Market time period



# Imbalance settlement - Can market participants change the approved schedules after Delivery?



**Key:**

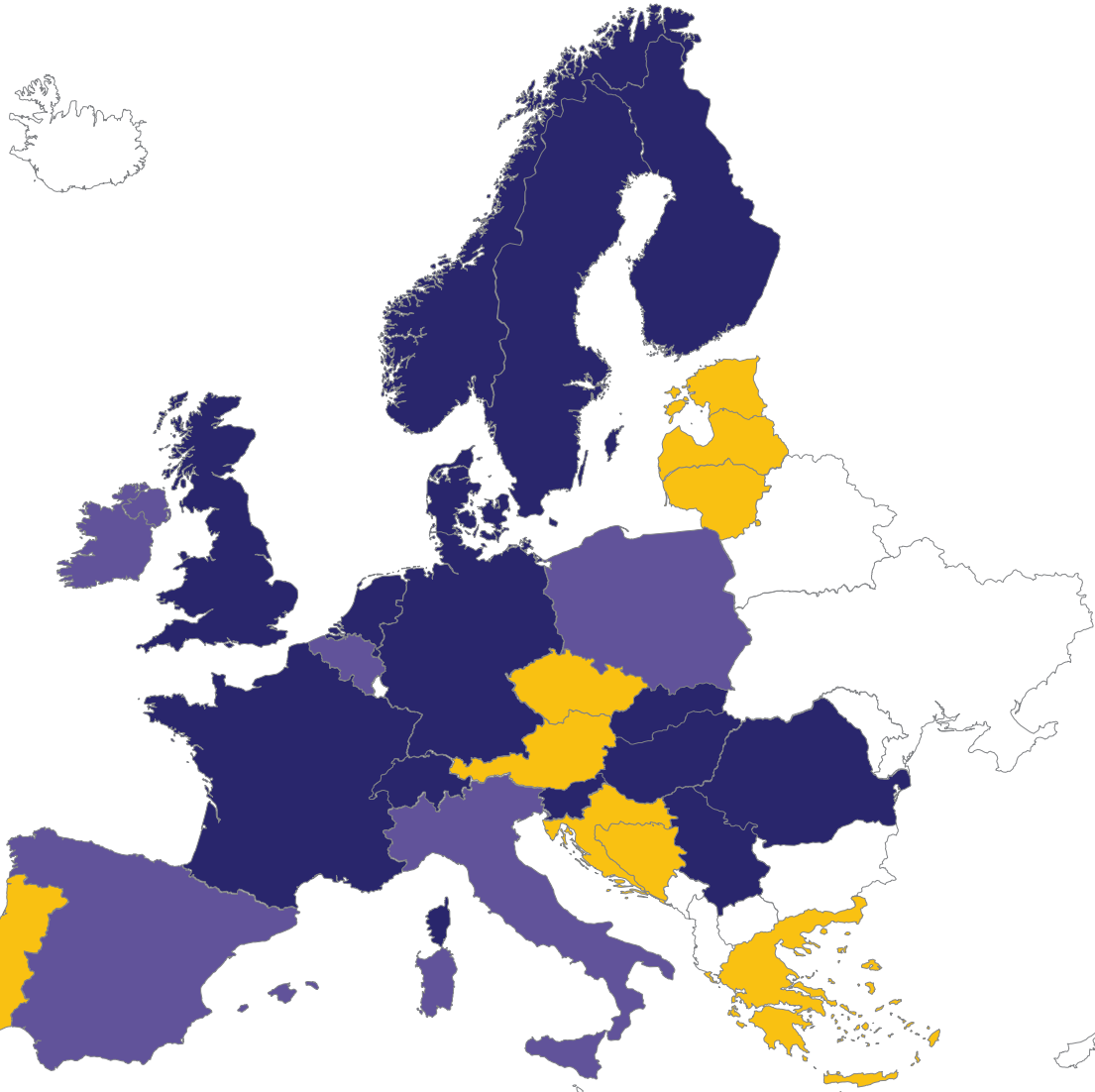
- Missing data
- N/A
- Always (GCT after delivery)
- Never (GCT before delivery)
- Only in case of IT or any other problems (TSO approval)



# Load participation

(Referring to questions of AS survey from L1.0 to L7.0)

Load participation - Load providers use the same market mech. and act. proc. as generation (cap.&energy)

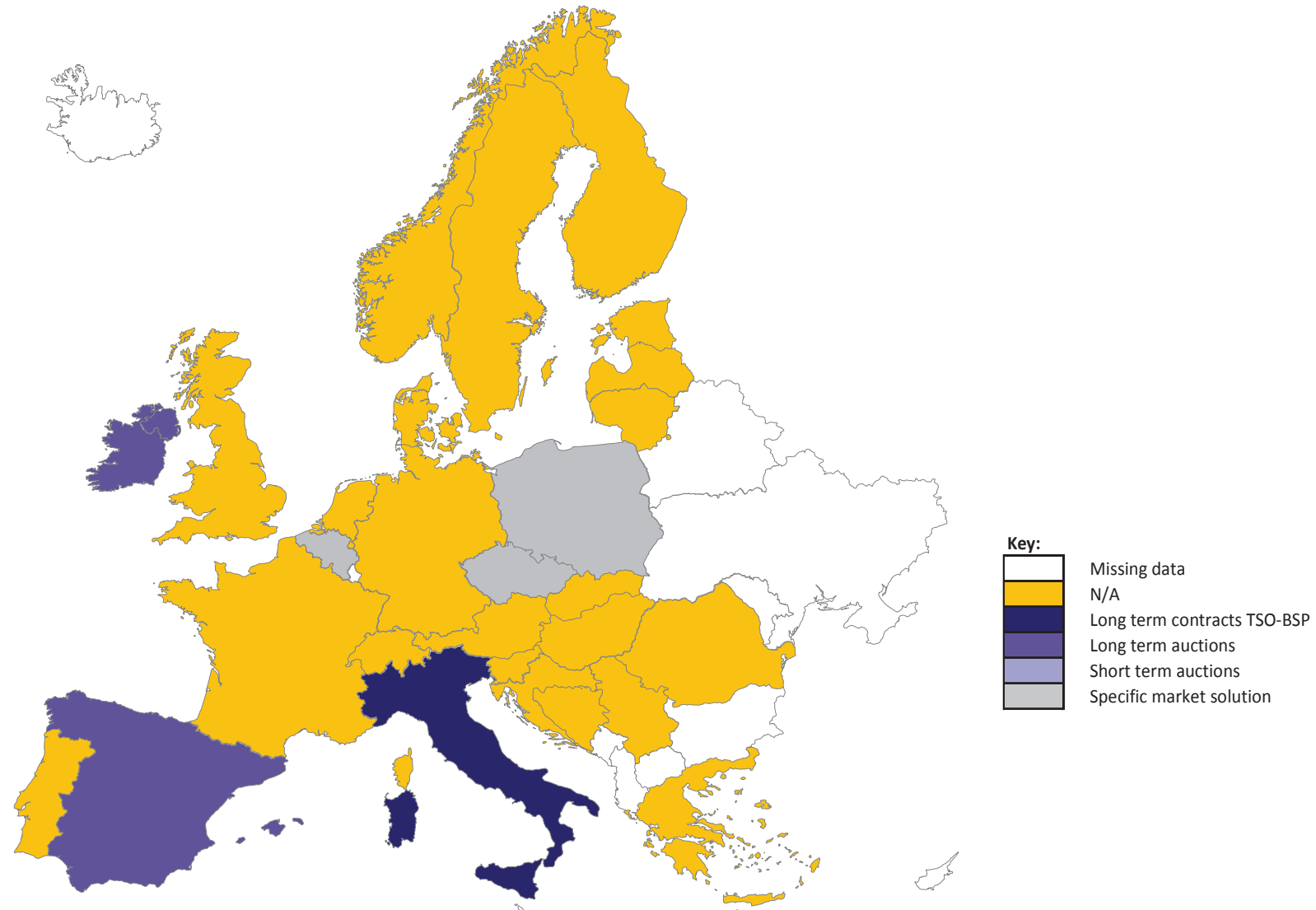


**Key:**

White	Missing data
Yellow	N/A
Dark Blue	Yes
Purple	No



# Load participation - Specific market solution use for load providers of balancing services (cap.&energy)

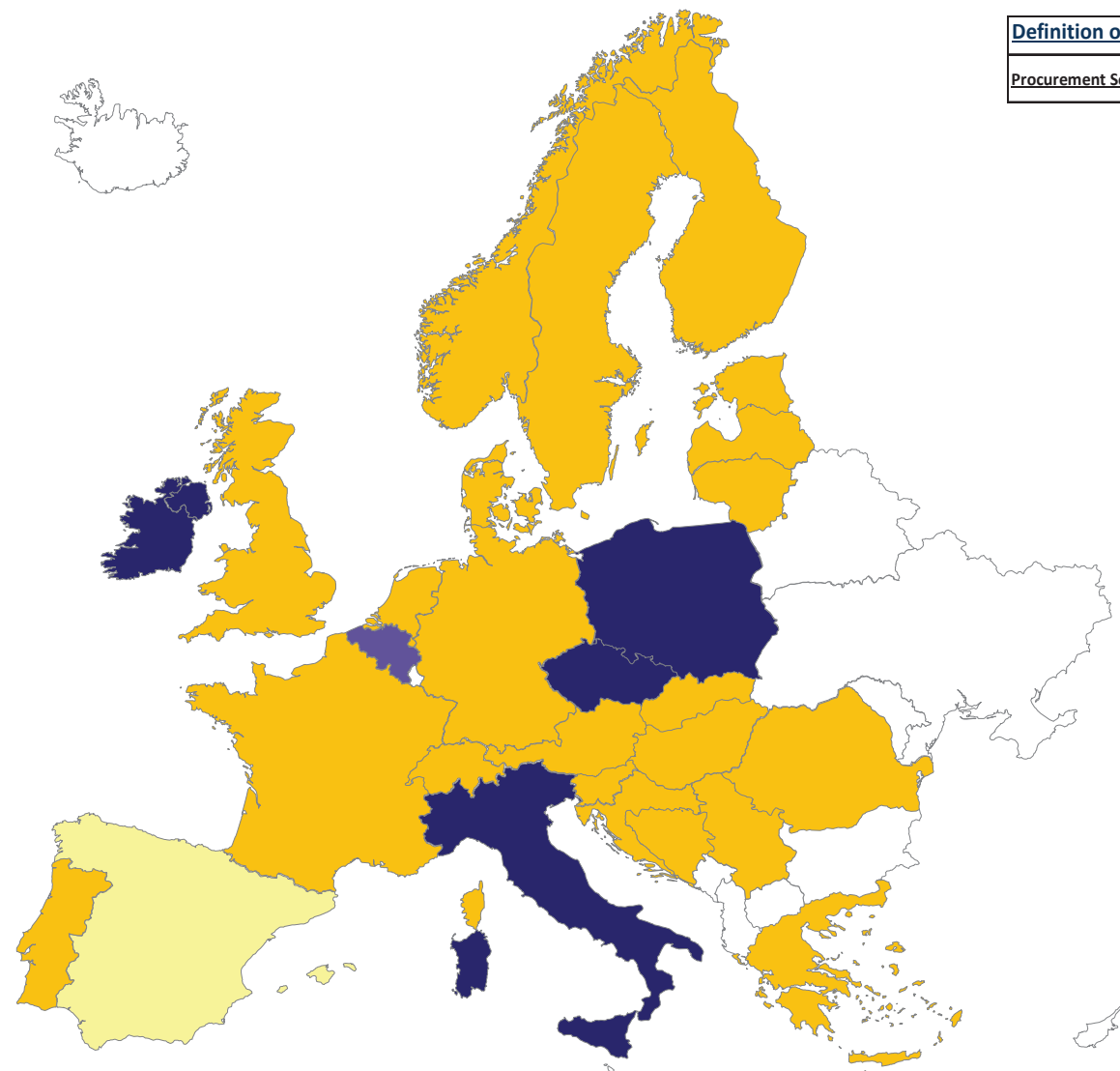


## Load participation - Product Resolution (in MW)

### Definition of question

#### Procurement Scheme

Background of the offer, which is closest to the real operation time.

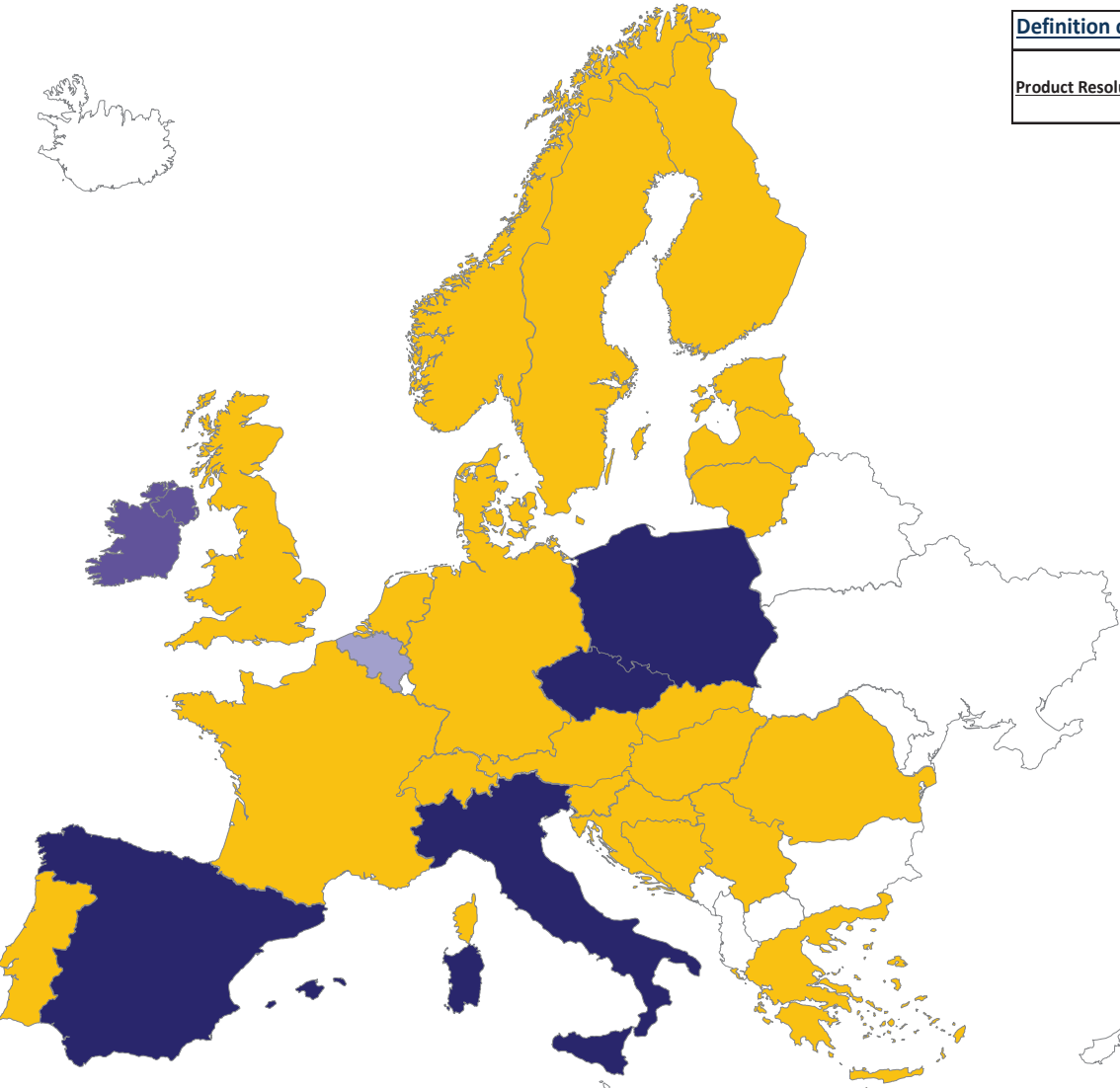


### Key:

Missing data
N/A
$x \leq 1\text{ MW}$
$1\text{ MW} < x \leq 5\text{ MW}$
$5\text{ MW} < x \leq 10\text{ MW}$
$x > 10\text{ MW}$
Other

# Load participation - Product Resolution (in time)

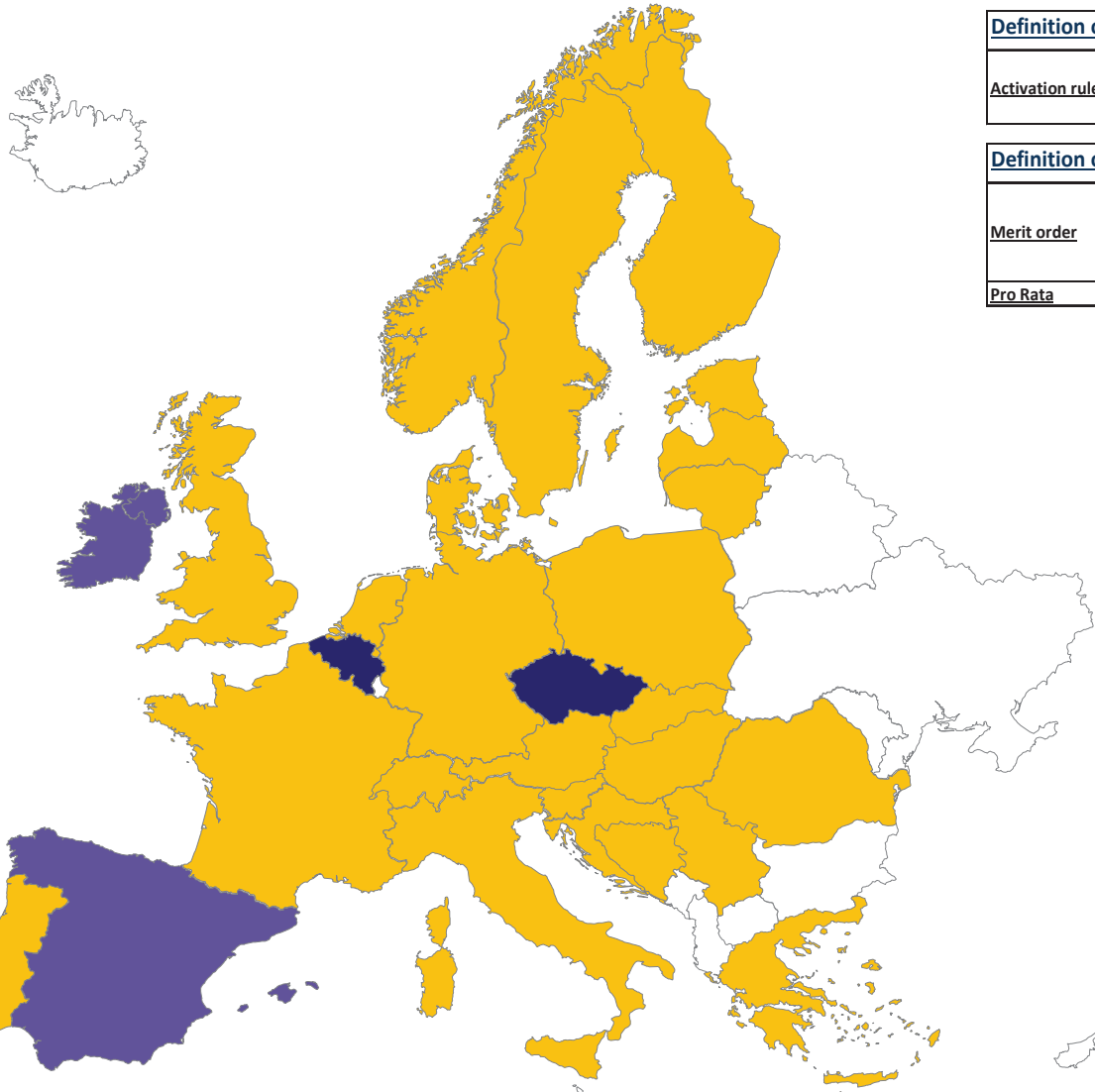
<b>Definition of question</b>	
<b>Product Resolution (in time)</b>	The maximum resolution for which the product can be bid into the market (for instance =1 hour in the case of a 24 auctions day ahead market for reserve provision).



**Key:**

White	Missing data
Yellow	N/A
Dark Blue	Hour (or blocks)
Light Purple	30 minutes
Medium Purple	15 minutes

## Load participation - Specific act. rule for load type BSP's



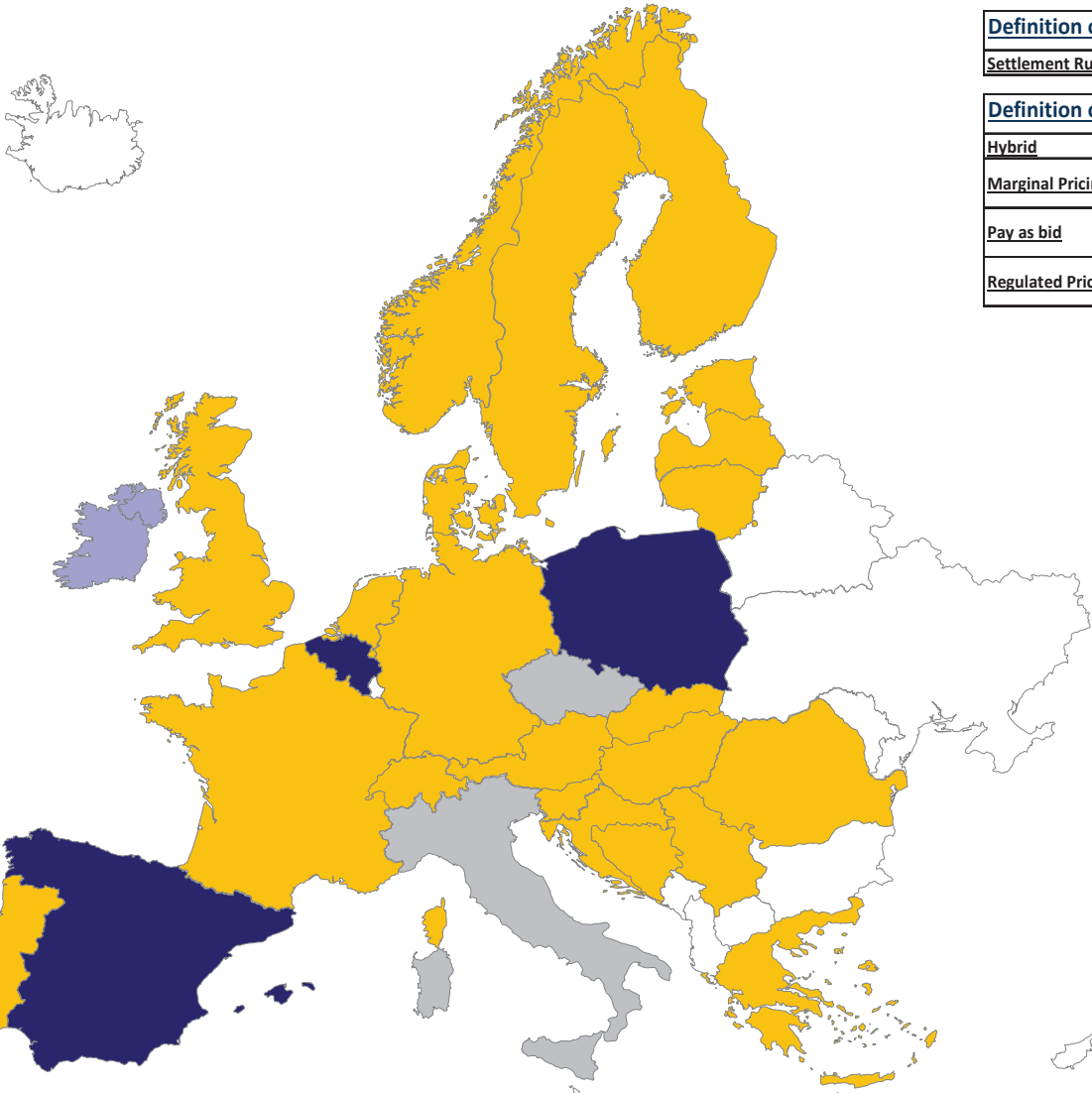
<b>Definition of question</b>	
<b>Activation rule</b>	How the frequency restoration reserves are activated i.e. by a Pro-Rata system or on the basis of a Merit Order (cheapest being activated first).

<b>Definition of answer</b>	
<b>Merit order</b>	A merit order is a way of ranking available sources of energy in ascending order of their short run marginal costs of production, so that those with the lowest marginal costs are the first ones to be brought online to meet demand.
<b>Pro Rata</b>	In Proportion (Parallel Activation).

**Key:**

	Missing data
	N/A
	Merit Order
	Pro Rata

## Load participation - Settlement Rule

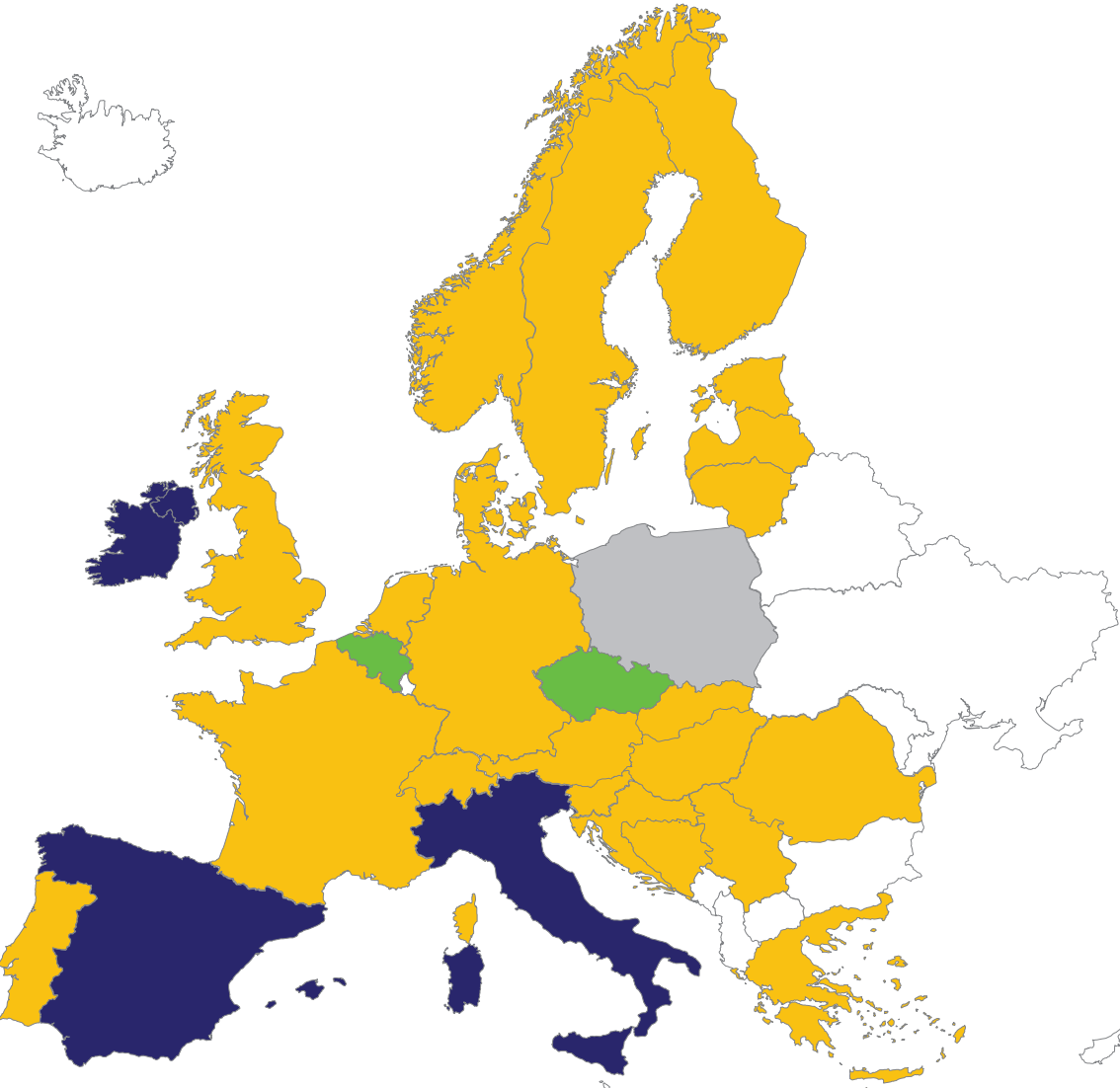


Definition of question	
<b>Settlement Rule</b>	The pricing rules for settlement.
Definition of answer	
<b>Hybrid</b>	Combination.
<b>Marginal Pricing</b>	Marginal pricing is the change in total cost that arises when the quantity produced changes by one unit.
<b>Pay as bid</b>	Contracted parties who provide a service are paid based on their offer price.
<b>Regulated Price</b>	Price for this service is based on a price that is set by the relevant regulatory authority.

**Key:**

	Missing data
	N/A
	Pay as bid
	Marginal Pricing
	Regulated Price
	Hybrid

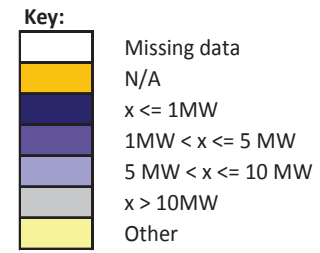
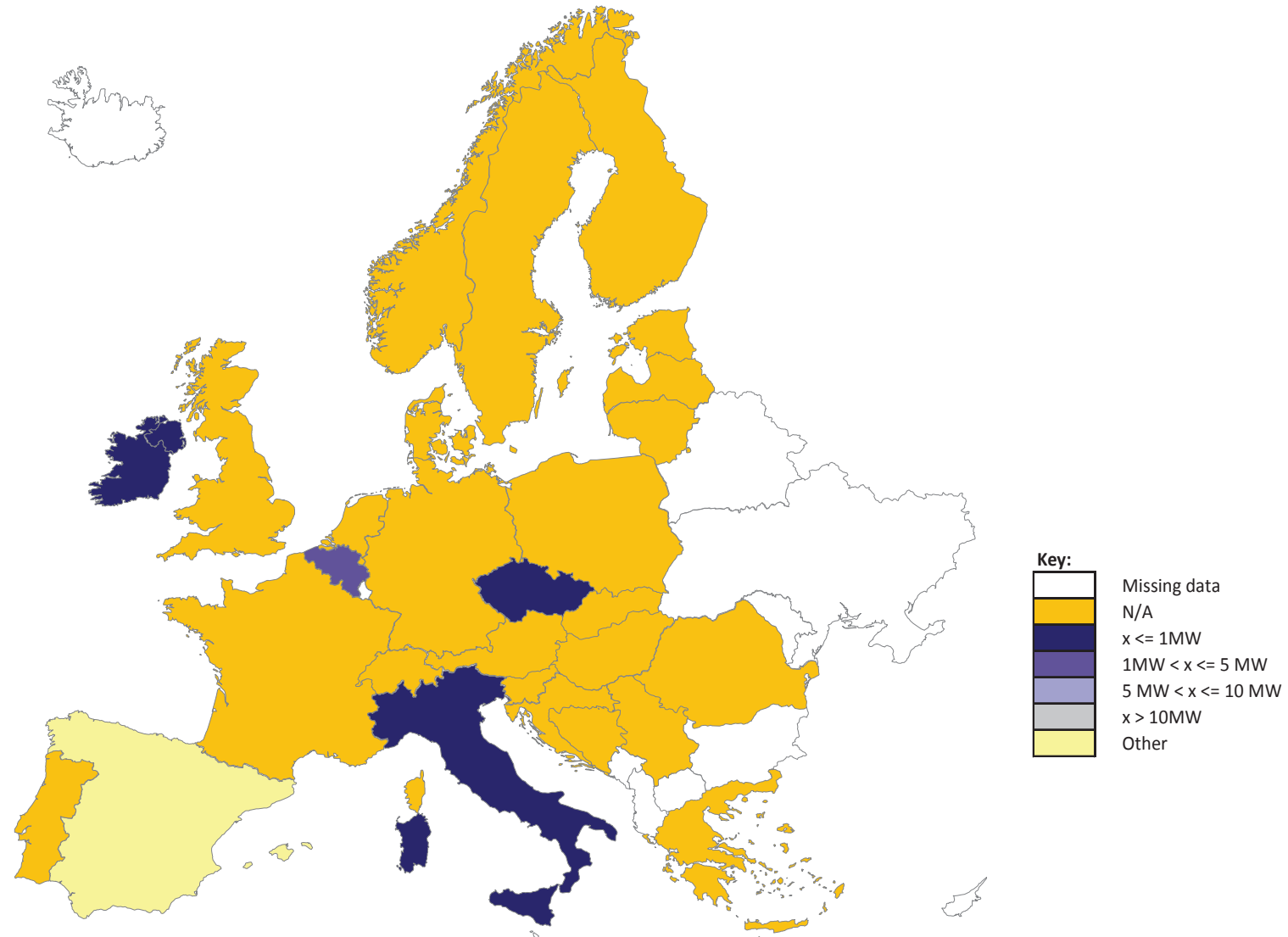
# Load participation - Type of consumers participates in the balancing services



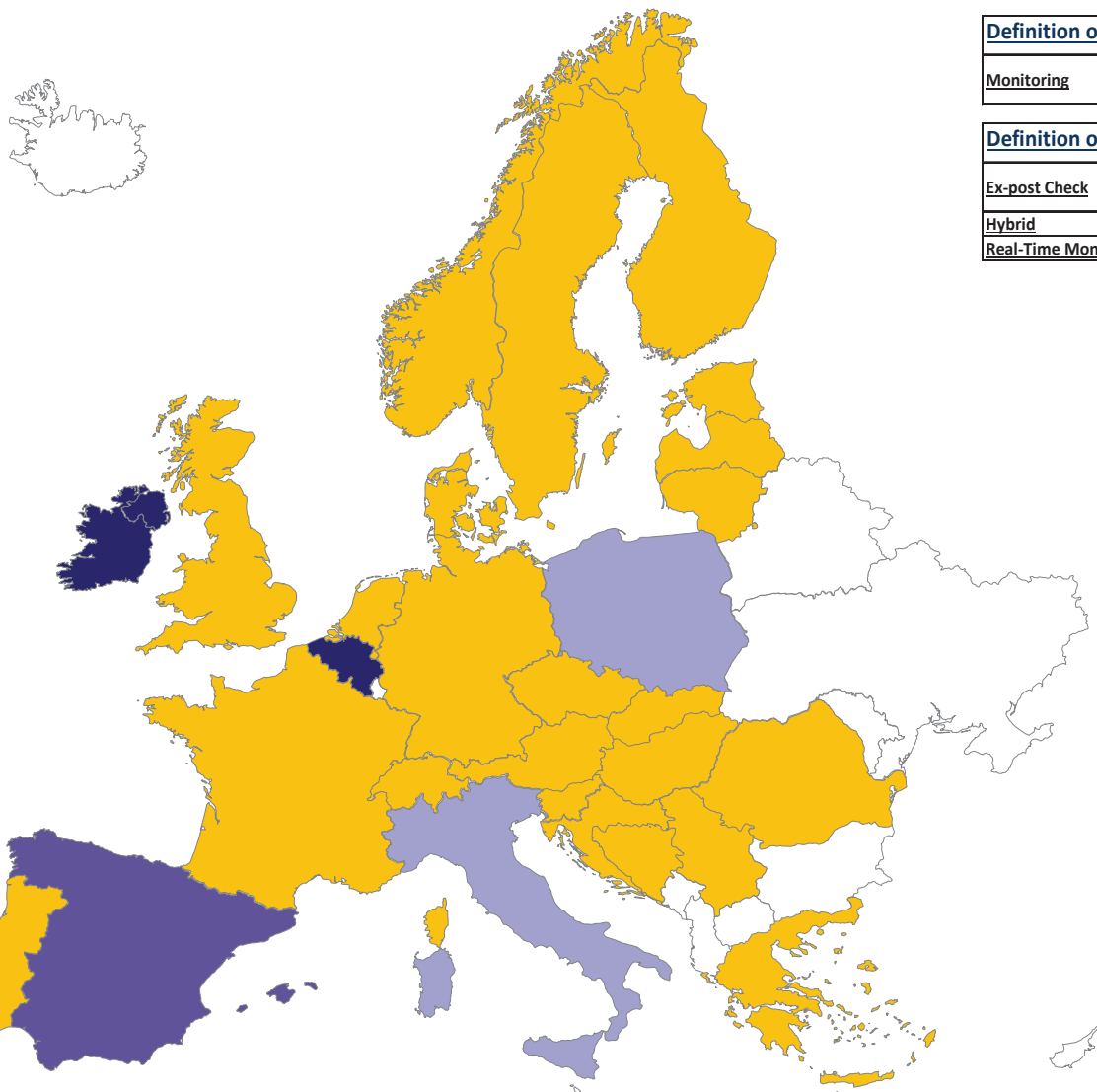
**Key:**

White	Missing data
Yellow	N/A
Dark Blue	Large Industrial consumers only
Purple	Pump storage units only
Light Grey	Aggregated small size consumers only
Grey	Large and small consumers
Light Yellow	Large and small consumers and pump storage
Maroon	Large & small consumers, pump storage & other storage
Green	Other
Light Green	Large consumers and aggregators

## Load participation - Product resolution for load BSP's in the balancing services








## Load participation - Monitoring



<u>Definition of question</u>	
<b>Monitoring</b>	Refers to the type of monitoring in place by the system operator to ensure performance of plant.

<u>Definition of answer</u>	
<b>Ex-post Check</b>	When the monitoring of performance of plant carried out after the event.
<b>Hybrid</b>	Combination.
<b>Real-Time Monitoring</b>	Monitoring of delivery of ancillary services in real time.

**Key:**

	Missing data
	N/A
	Ex-Post Check
	Real-Time Monitoring
	Hybrid

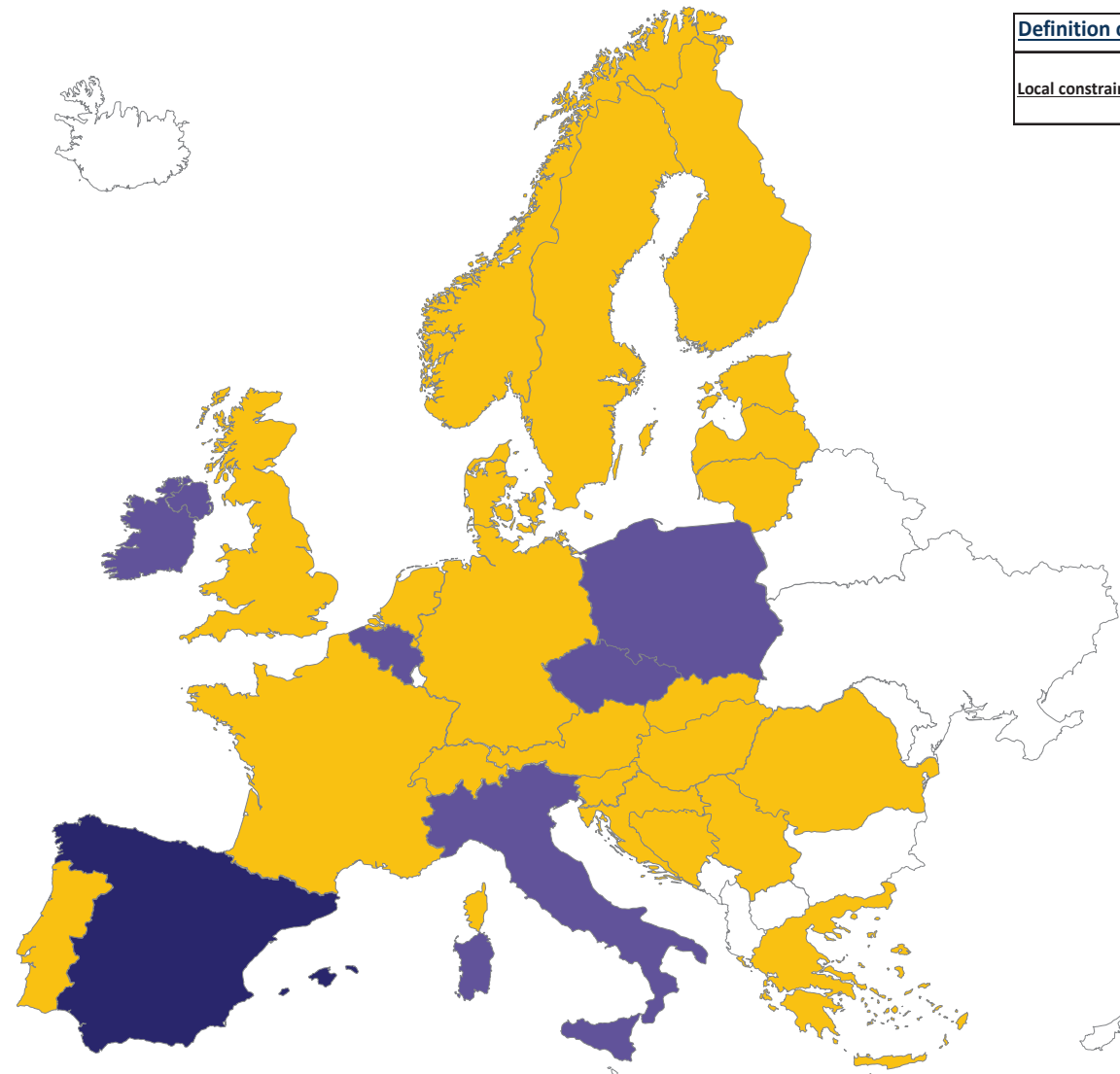


## Load participation - Using load BSP's in order to solve local constraints

### Definition of question

#### Local constraint

Local constraint means a situation in which there is a need to implement Remedial Action in order to respect Operational Security Limits in the matter of the location.



#### Key:



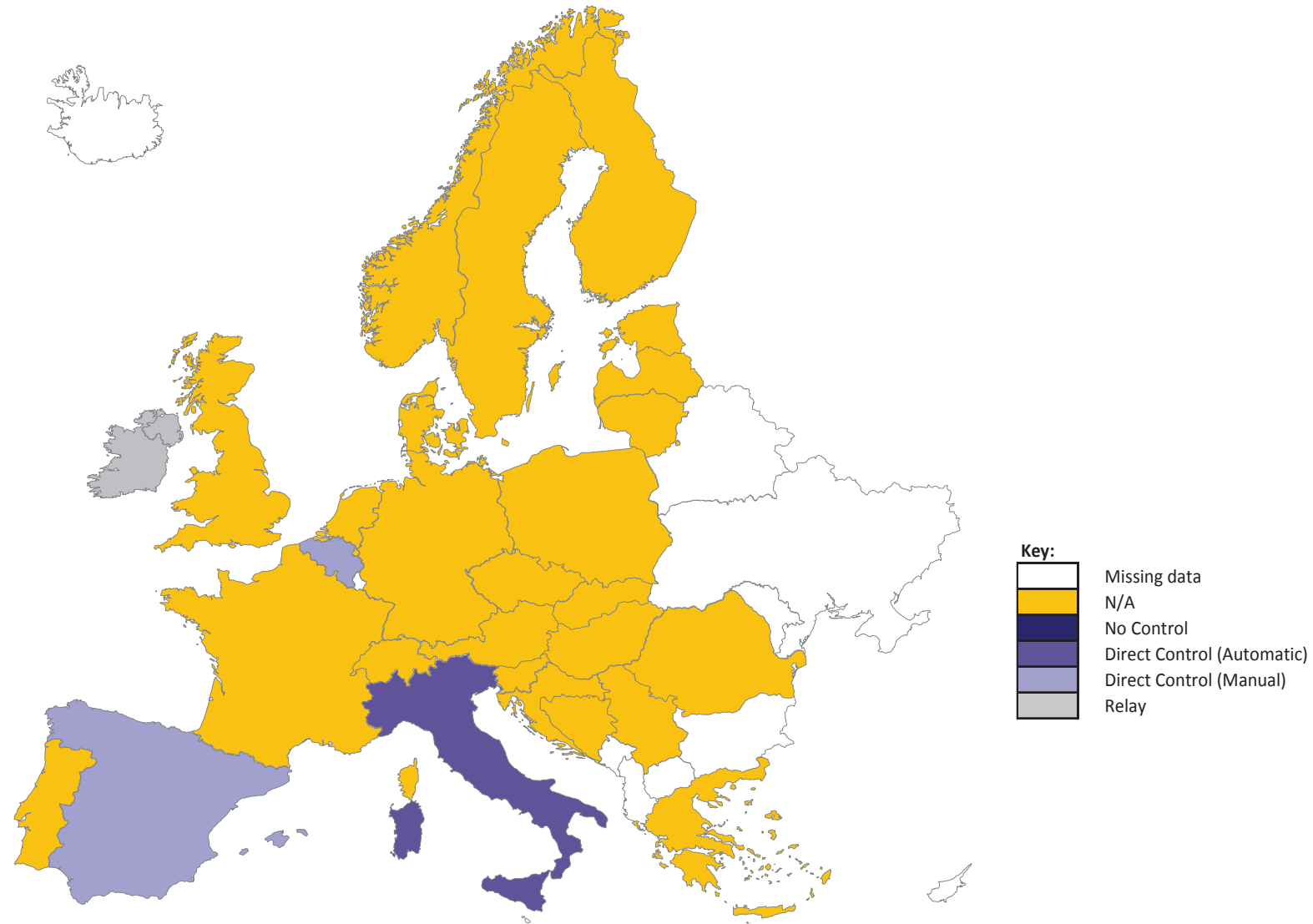
Missing data

N/A

Yes

No

## Load participation - Level of the control of the TSO

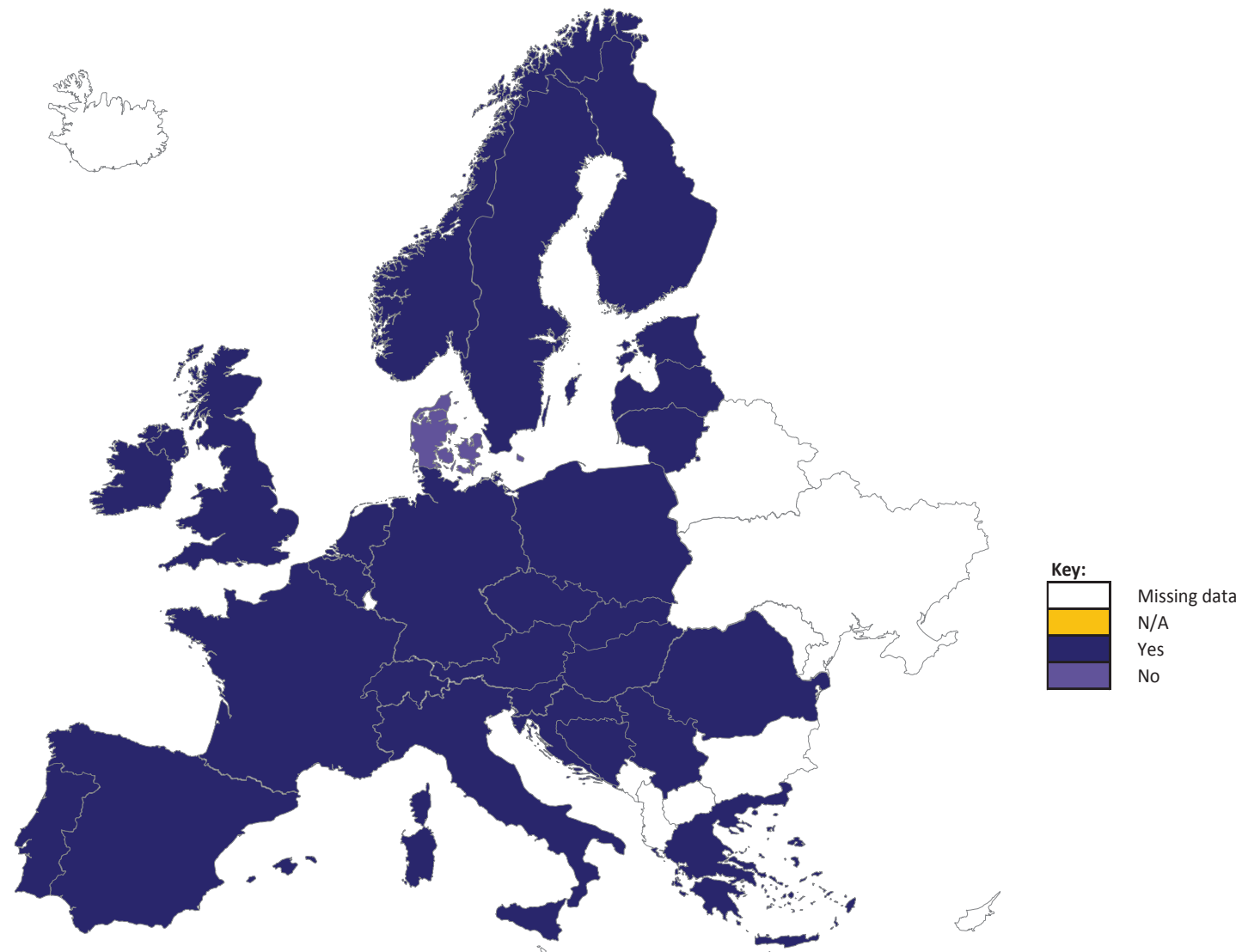




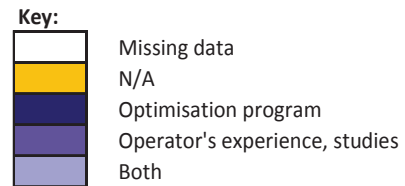
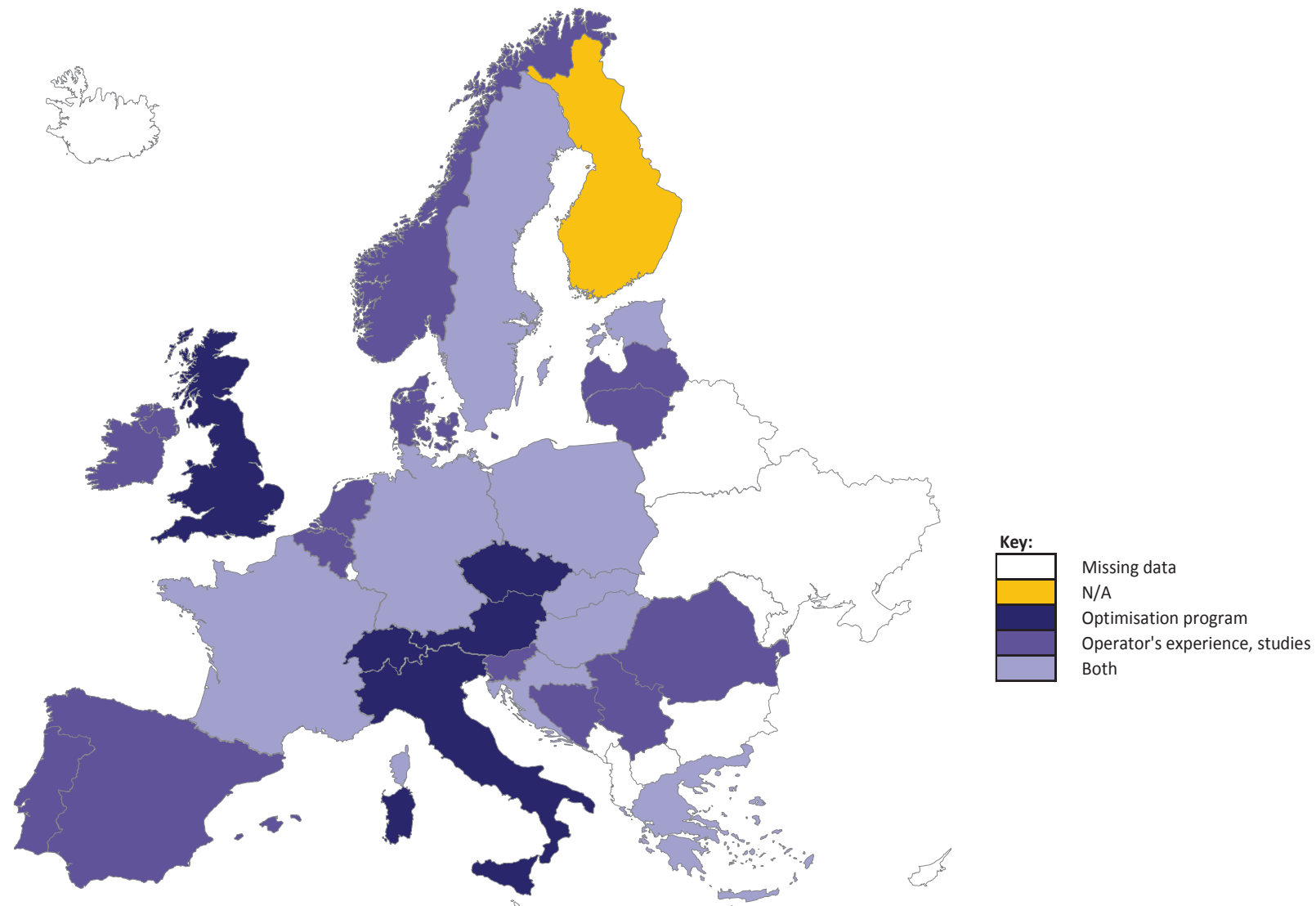
# Additional questions

(Referring to questions of AS survey from VC1.0 to VC7.0)

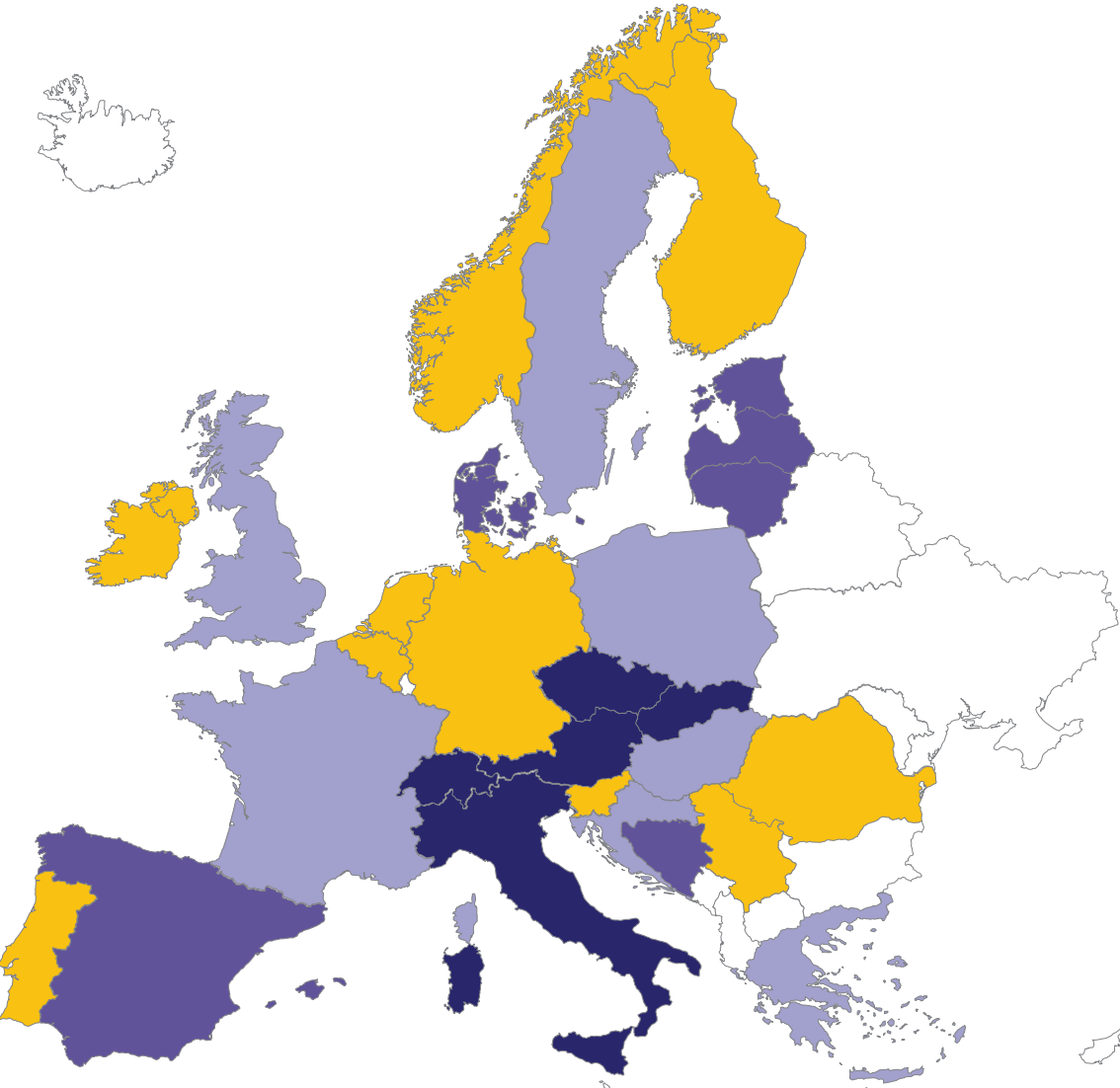
## Additional questions - Voltage support as part of ancillary services



## Additional questions - Determination the optimal use of reactive energy



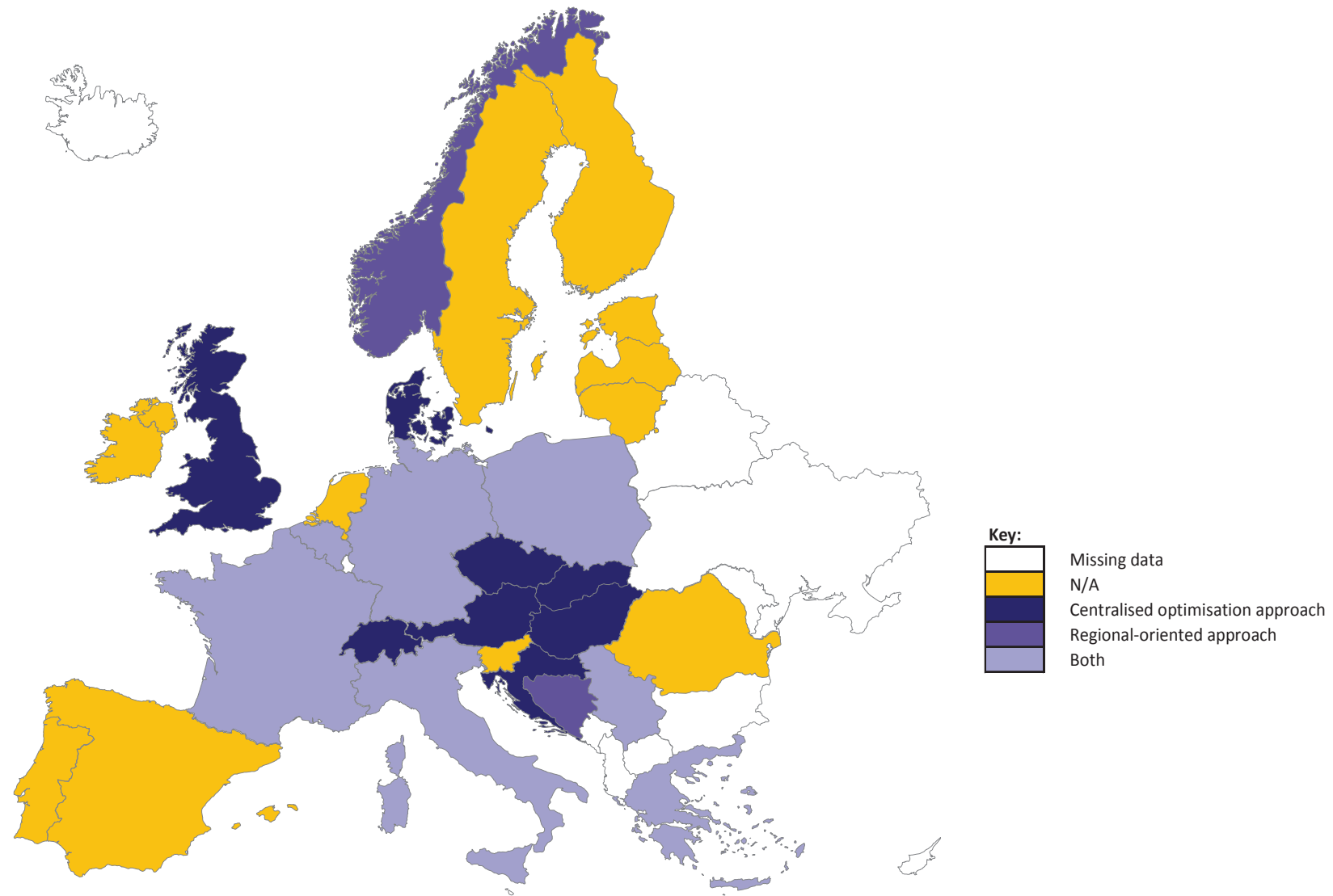
Additional questions - In case of opt.problem - objective function



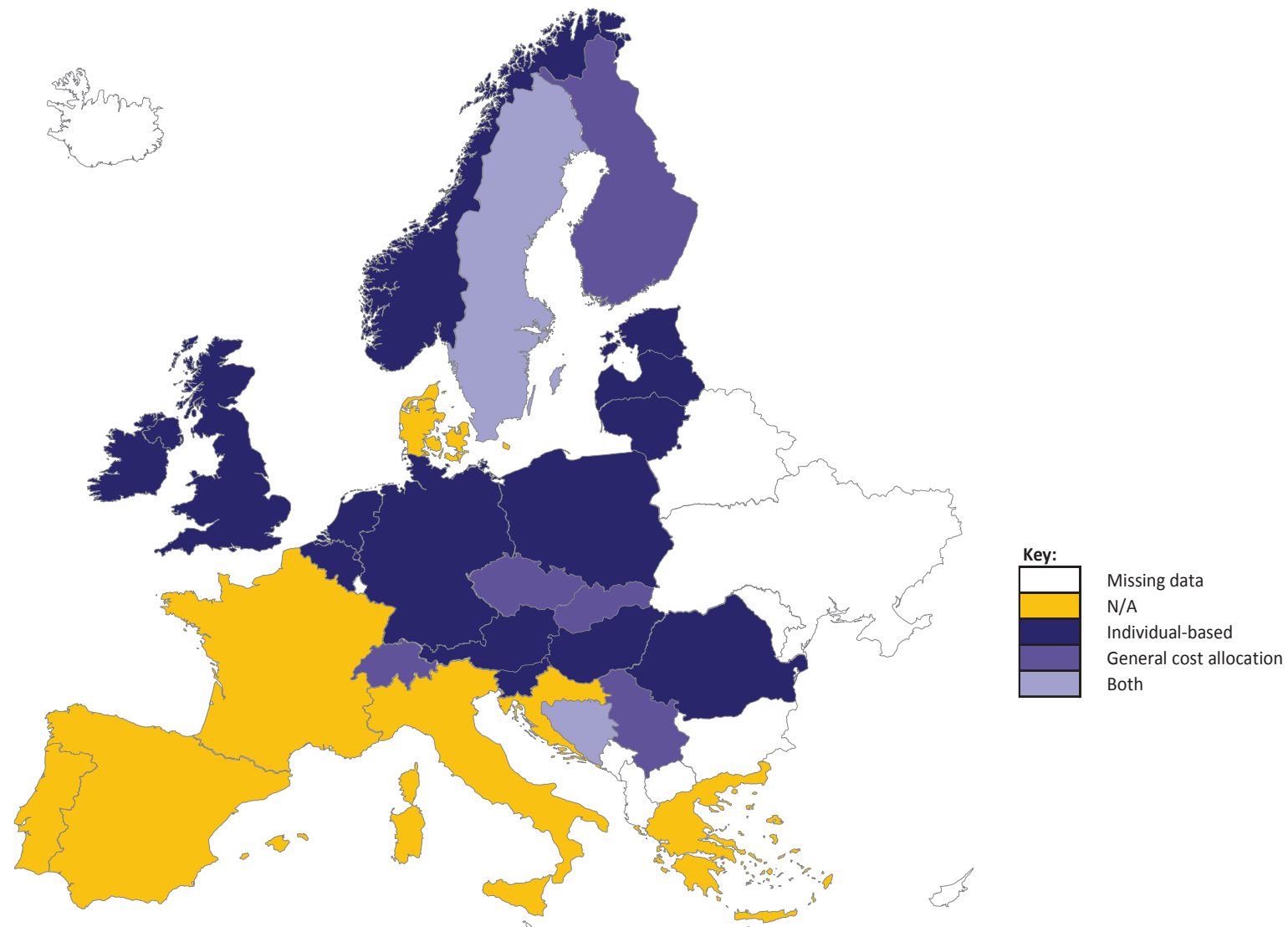
**Key:**

White	Missing data
Yellow	N/A
Dark Blue	Optimisation program
Medium Blue	Operator's experience
Light Blue	Both

## Additional questions - Type of optimization approach

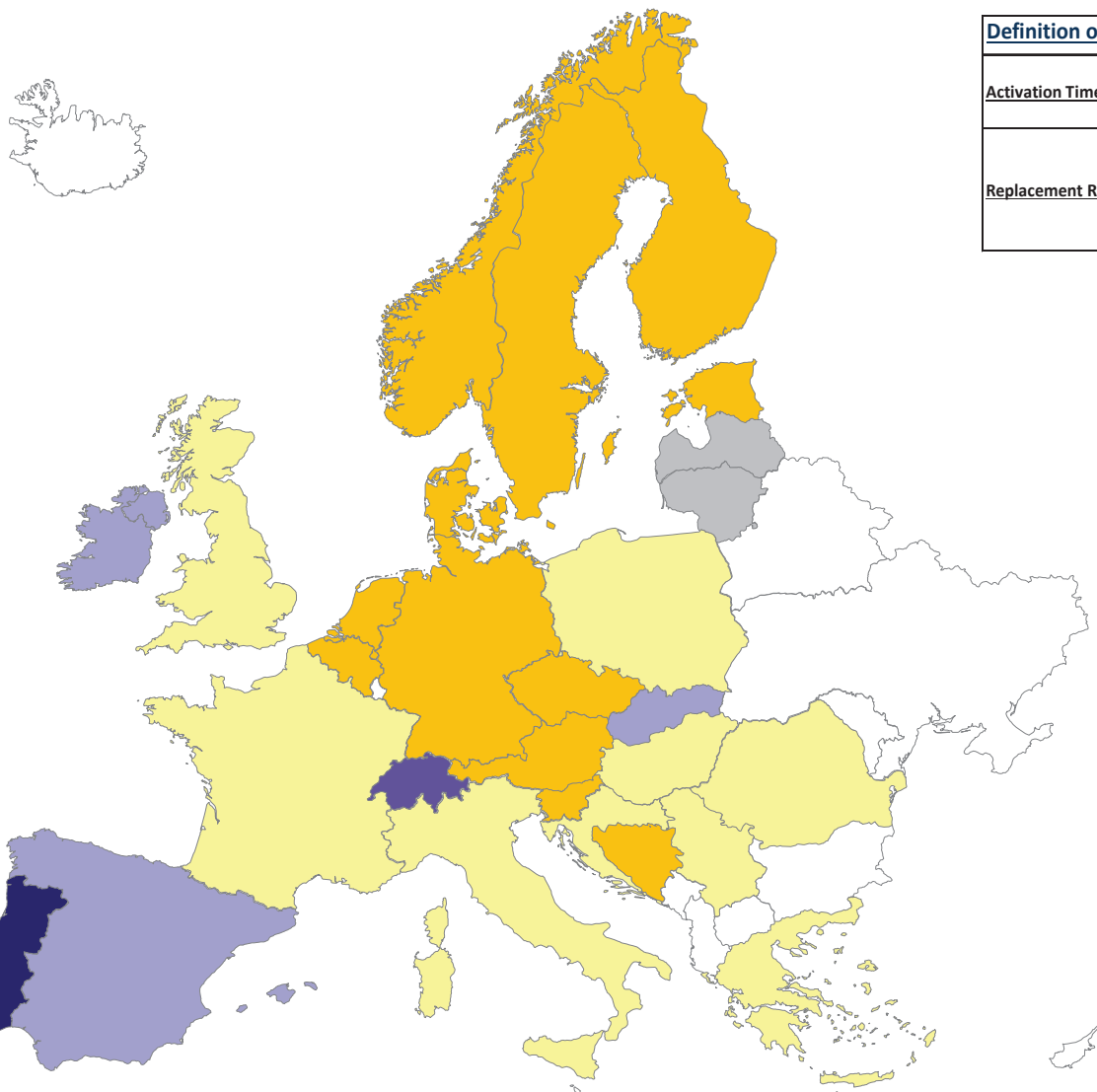


## Additional questions - Covering of the costs for voltage support / reactive energy

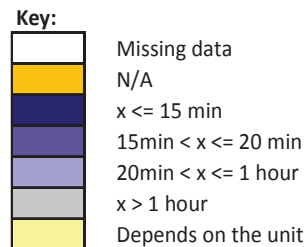




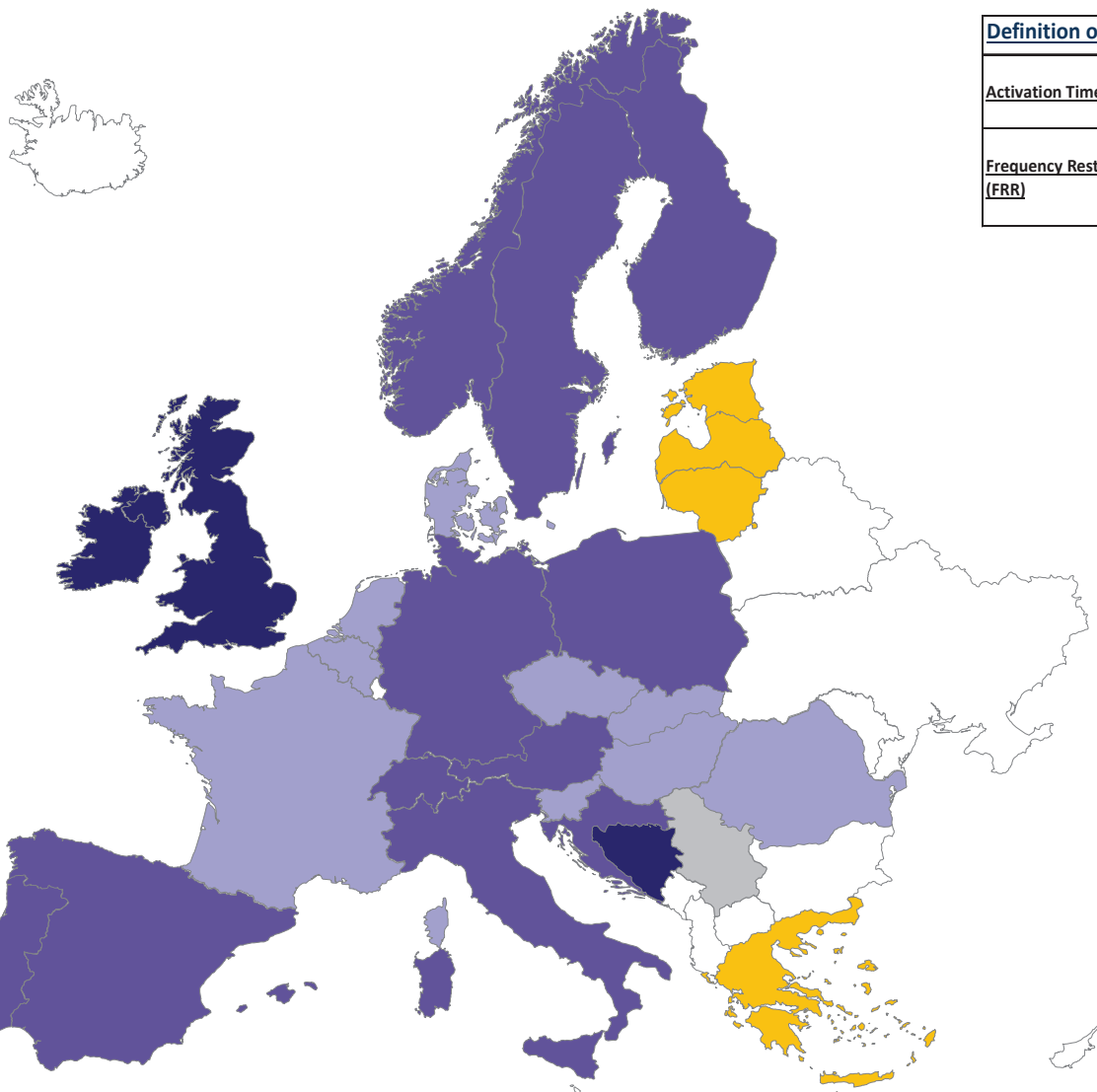
## Additional questions - Activation time of RR from 0 to max



Definition of question	
<b>Activation Time</b>	Activation Time means the period of time between receipt of a valid instruction by the Activation Optimisation Function and the end of ramping to meet that instruction.
<b>Replacement Reserve (RR)</b>	Replacement Reserves (RR) means the reserves used to restore/support the required level of FRR to be prepared for further system imbalances. This category includes operating reserves with activation time from Time to Restore Frequency up to hours.



## Additional questions - Activation time of FRRa from 0 to max



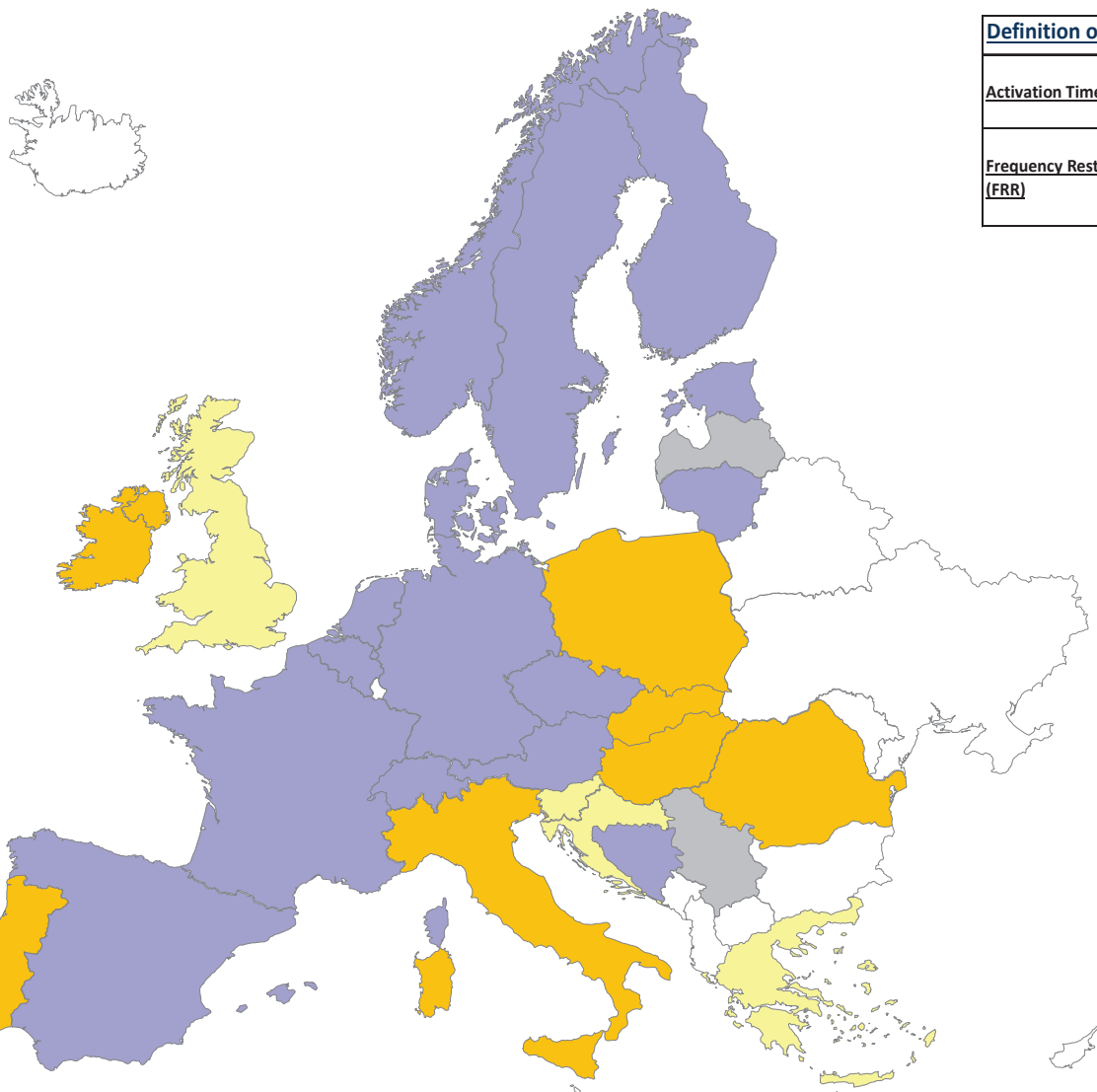
### Definition of question

<b>Activation Time</b>	Activation Time means the period of time between receipt of a valid instruction by the Activation Optimisation Function and the end of ramping to meet that instruction.
<b>Frequency Restoration Reserve (FRR)</b>	Reserves activated to restore System Frequency to the Nominal Frequency and, where applicable, power balance to the scheduled value. FRRa means automatic FRR, FRRm means manual FRR.

### Key:

	Missing data
	N/A
	$x \leq 90s$
	$90s < x \leq 5 \text{ min}$
	$5\text{min} < x \leq 15 \text{ min}$
	$x > 15 \text{ min}$

## Additional questions - Activation time of FRRm from 0 to max



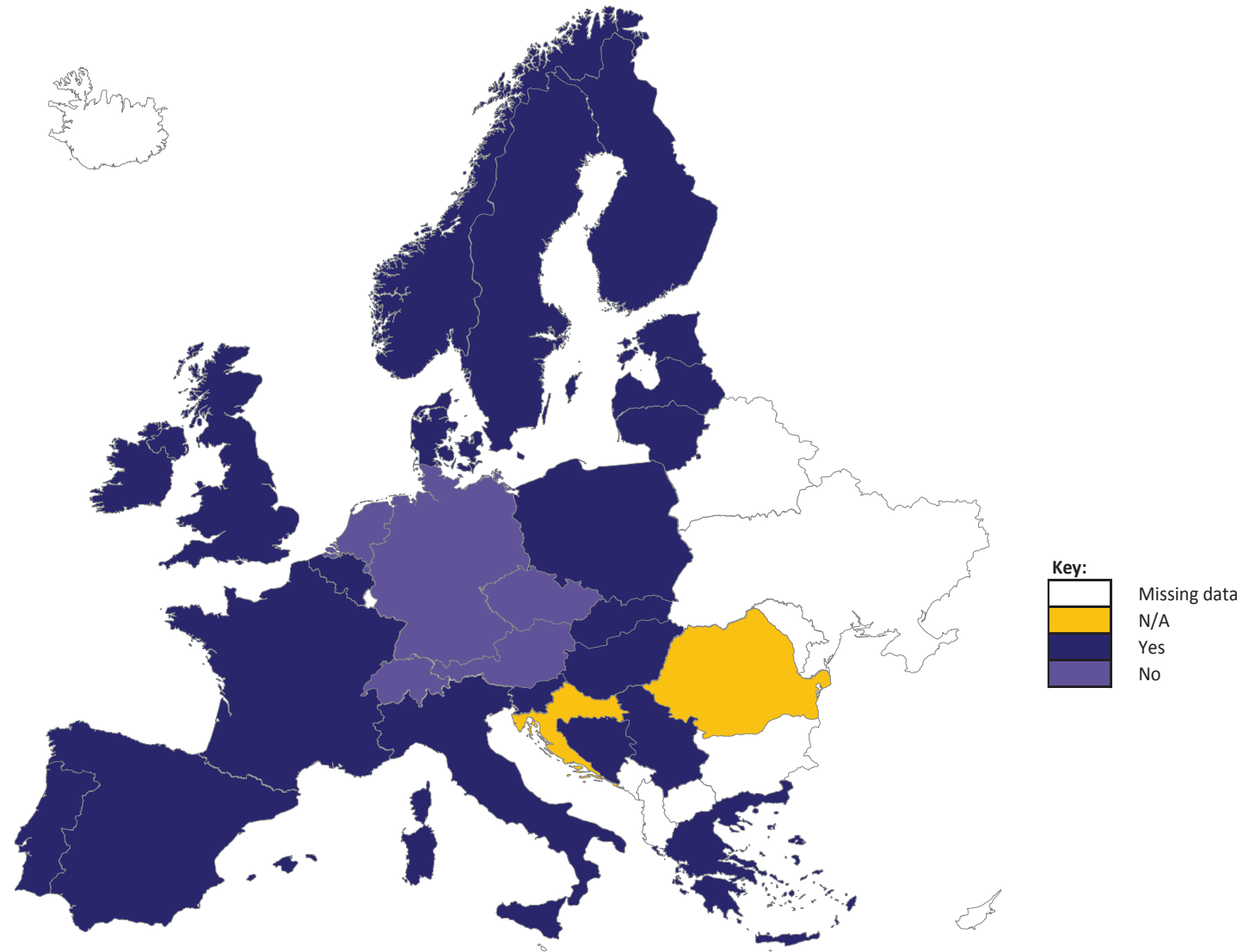
### Definition of question

<b>Activation Time</b>	Activation Time means the period of time between receipt of a valid instruction by the Activation Optimisation Function and the end of ramping to meet that instruction.
<b>Frequency Restoration Reserve (FRR)</b>	Reserves activated to restore System Frequency to the Nominal Frequency and, where applicable, power balance to the scheduled value. FRRa means automatic FRR, FRRm means manual FRR.

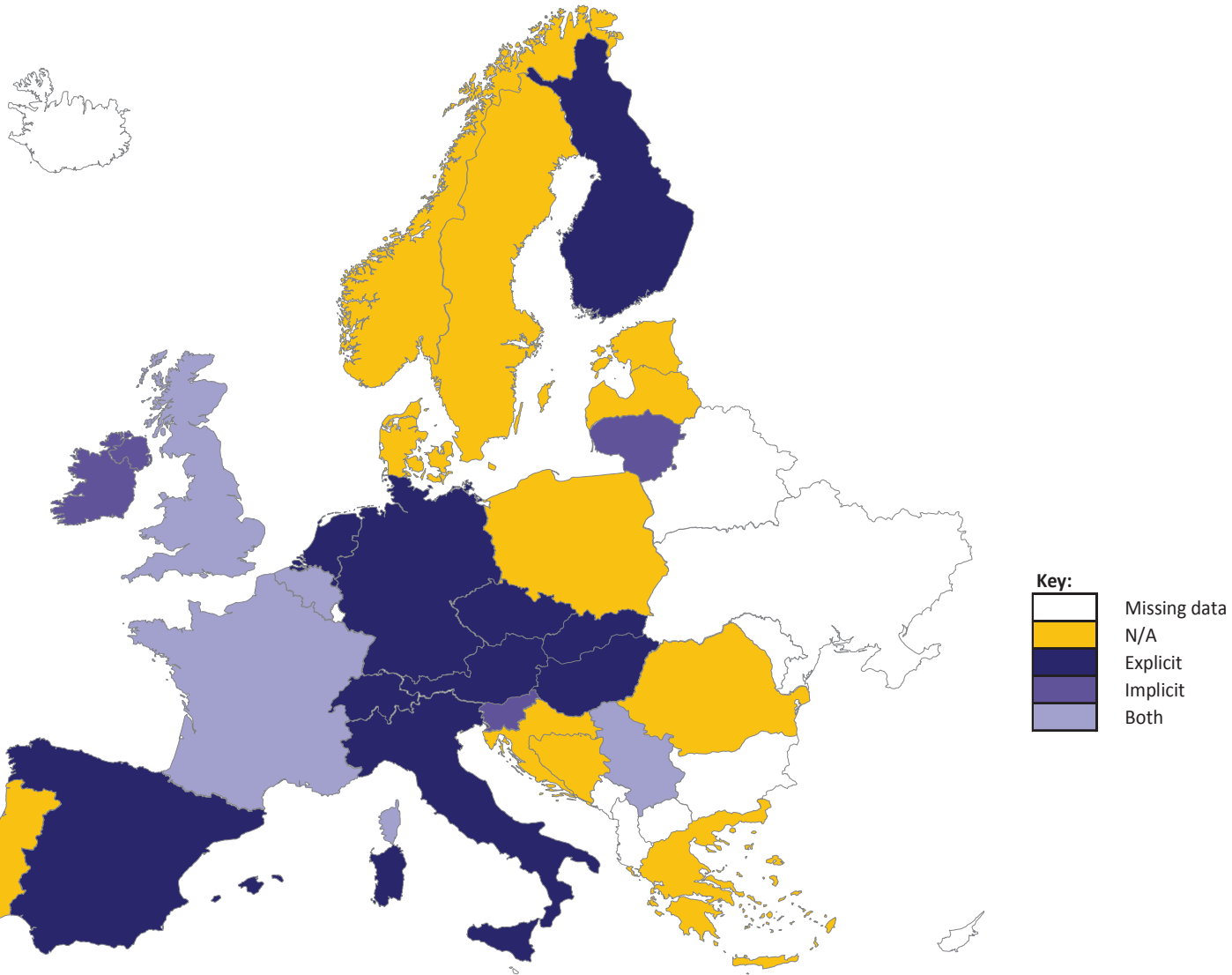
### Key:

White	Missing data
Yellow	N/A
Dark Blue	$x \leq 90s$
Medium Blue	$90s < x \leq 5 \text{ min}$
Light Blue	$5 \text{ min} < x \leq 15 \text{ min}$
Grey	$x > 15 \text{ min}$
Pale Yellow	Depends on the unit

## Additional questions - Using the energy of balancing in the redispatching / countertrading actions



## Additional questions - Implicit / explicit offers bids from BSP



## Additional questions - Owning (or partly owning) and operating of reactive power comp. systems

