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# Southeast Electricity Network Coordination Center (SEleNe-CC)

A Regional Coordination Center in Thessaloniki

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President and CEO

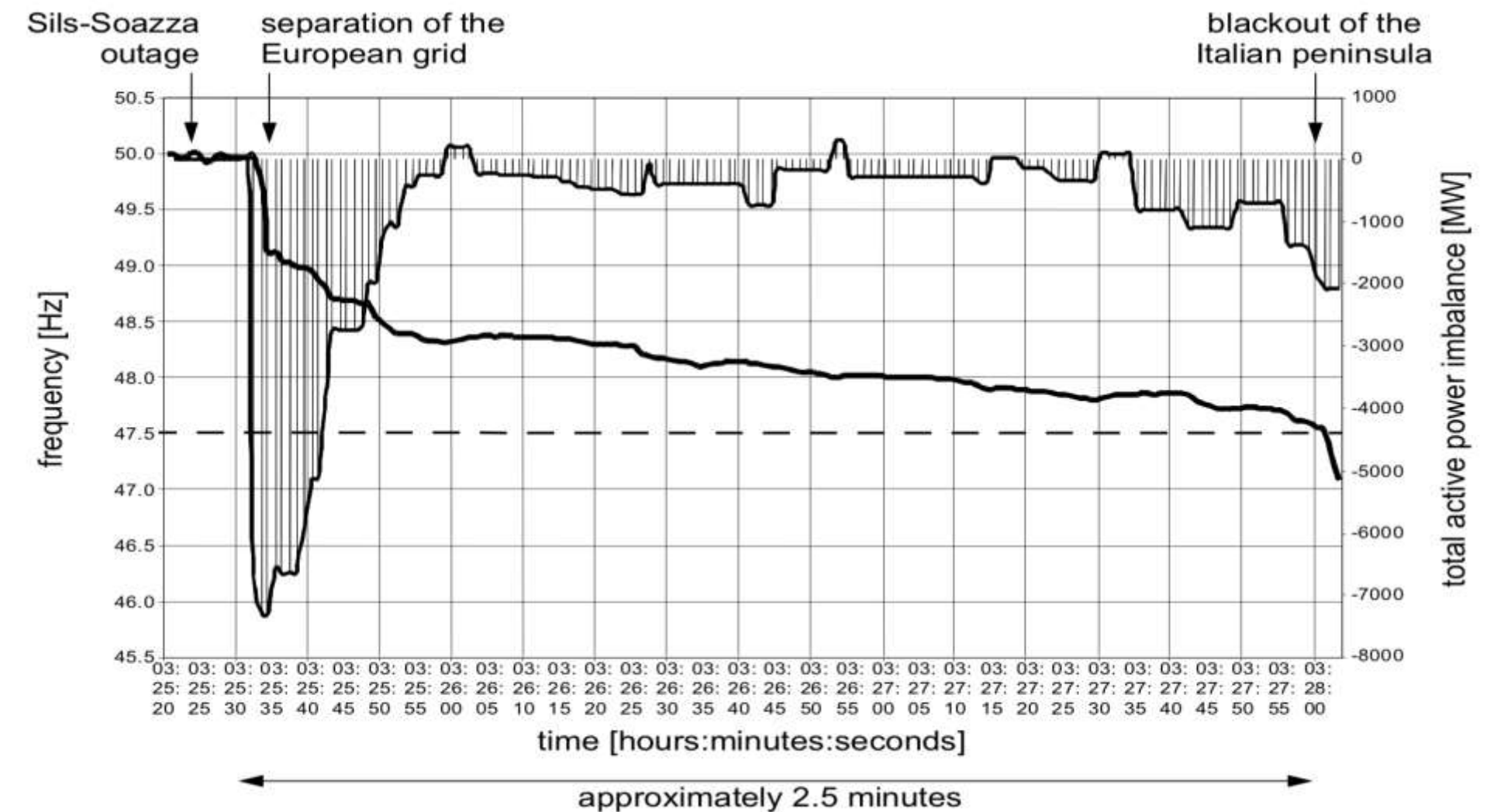
# Outline

- **Regional Coordination Centres (RCCs) – Why do we need them?**
- What is the role of an RCC
- Provided Services
- RCCs in Europe
- The Southeast Electricity Network Coordination Centre (SEleNe-CC)
- A look into the future

# Main triggering events to create the Regional Coordination structures

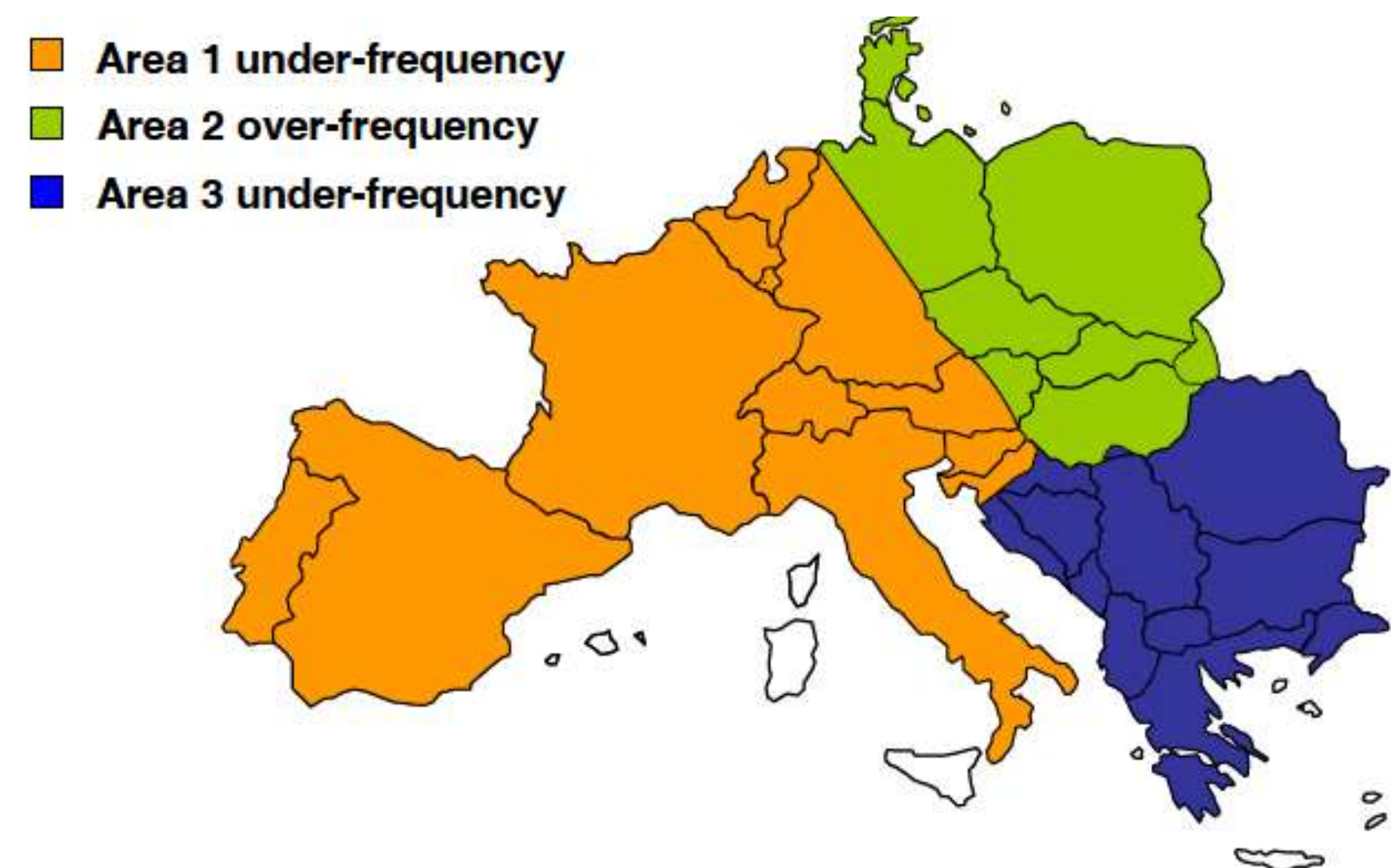
## ➤ 28<sup>th</sup> September 2003: Black-out in Italy

- at 03:01. Italy imports bulk power (mainly from Switzerland)
- Cascading disconnection north interconnectors due to a SC (loading was 85%)



## ➤ 4<sup>th</sup> November 2006: The worst incident in Europe

- at 21:38 a series of unfortunate events led to the separation of the European network into 3 parts
- The event led TSOs to closer cooperation and relevant measures



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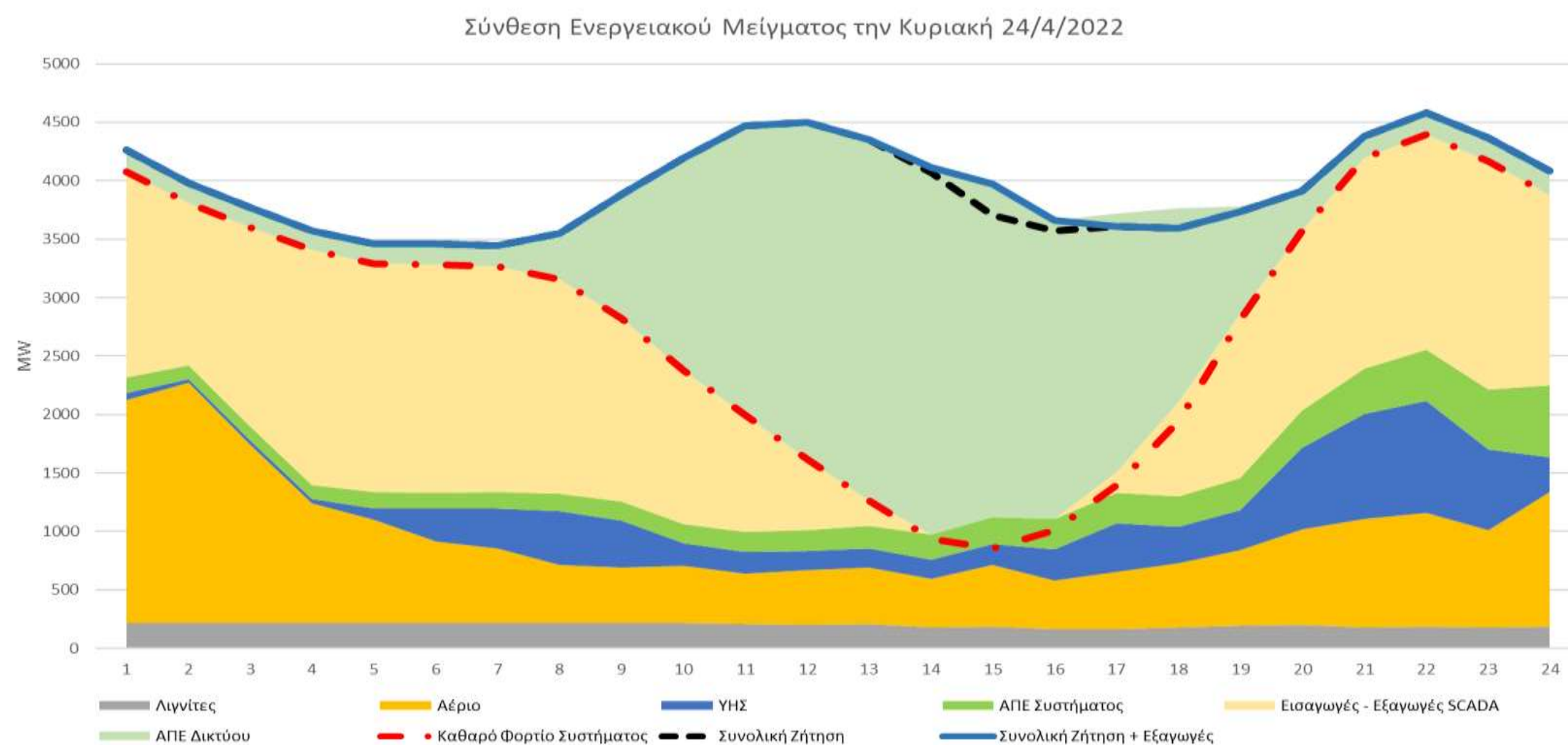
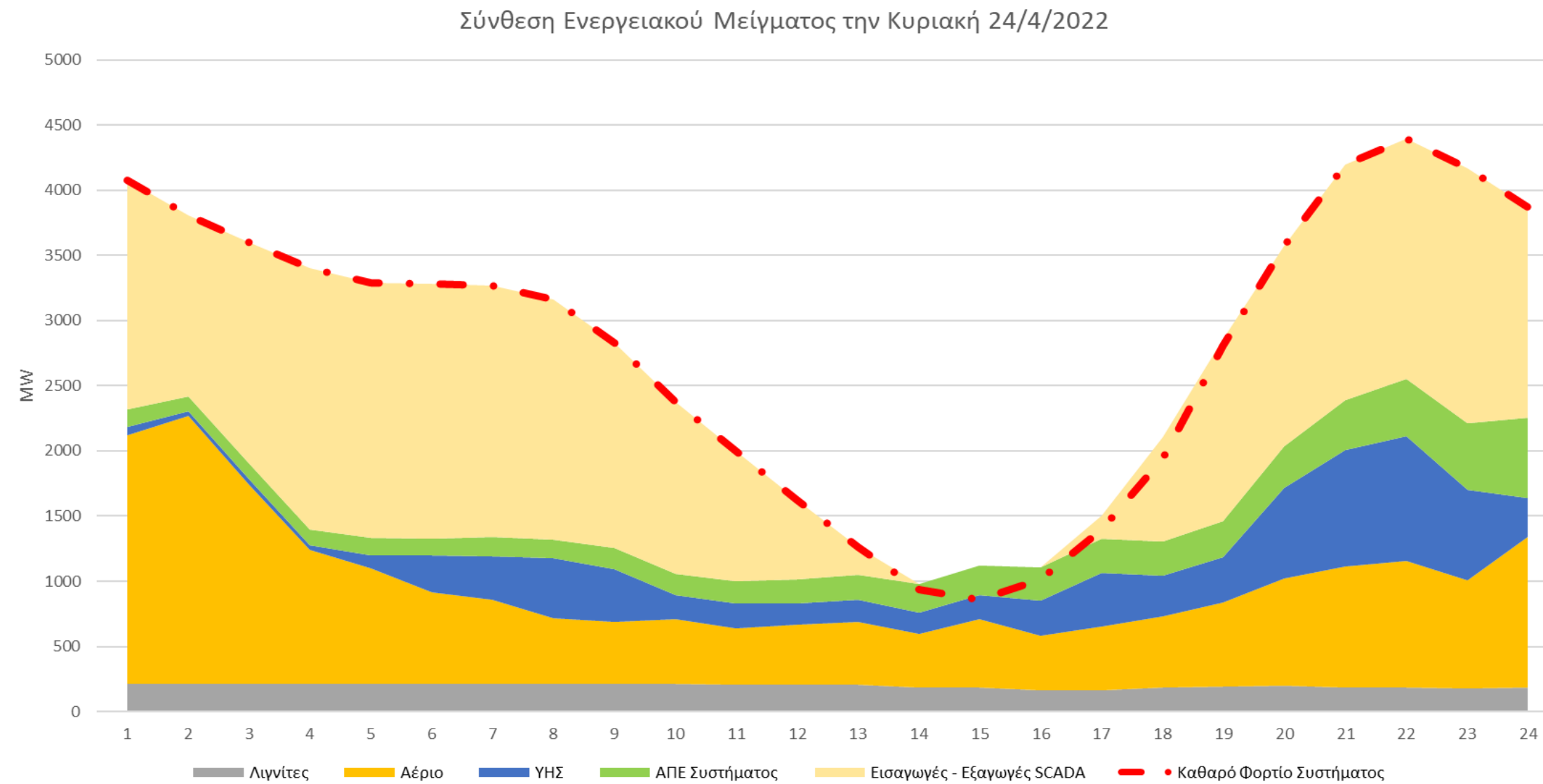
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# The Role of RCCs

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- The **massive integration of renewable sources** (which are by nature intermittent) as well as the **increase in cross-border exchanges** within the European electricity market make electricity flows increasingly variable. They are therefore much more difficult to predict and calculate than in the past
- **RCCs coordinate high-voltage electricity flows** for European Transmission System Operators (TSOs) to support them ensuring the **security** of electricity supply on a European regional basis and to guarantee **transparency**
- RCC activities consist in performing analyses, recommending and coordinating solutions (both in the short and long term) for TSOs in different areas in Europe

# Greece: A low load day with difficulties



Easter 2022

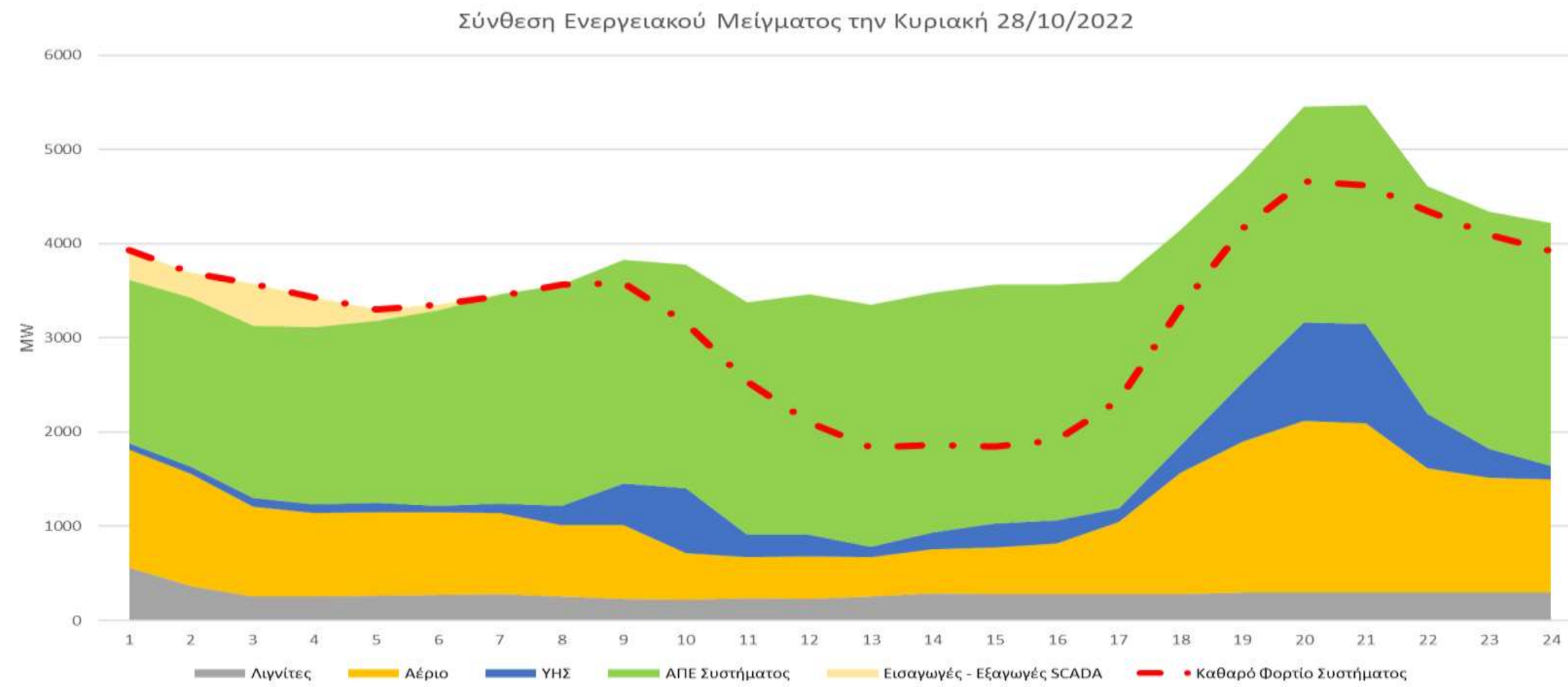
Extremely low loads

During noon hours (13:00 to 17:00), due to high PV production reduced number of thermal units in operation and limited reserves

IPTO cancelled the transmission rights

Increased ACE (300 to 400 MW)

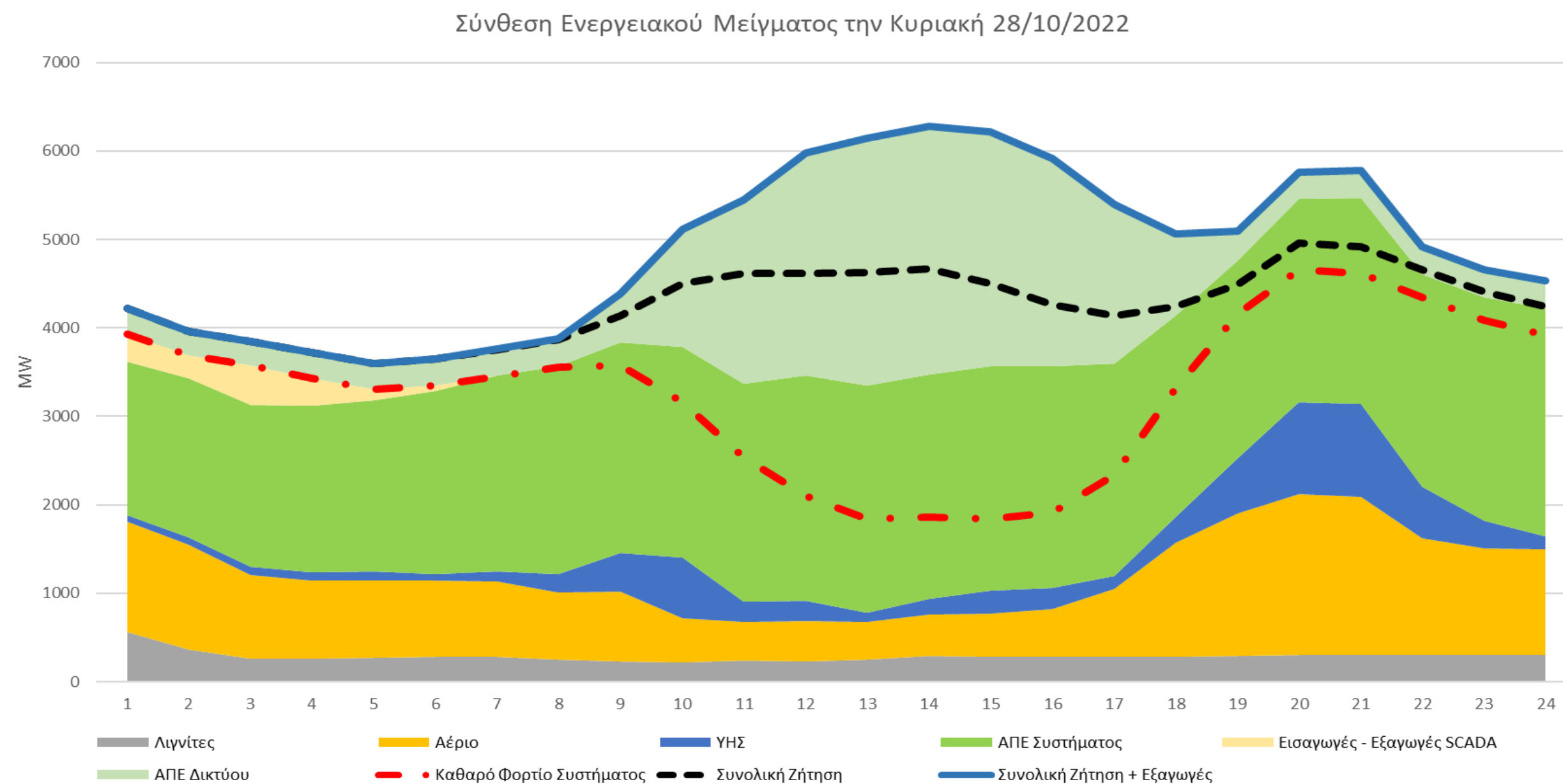
# Greece: A day with wind power curtailments



28<sup>th</sup> October 2022 (National holiday)

Low loads and very high wind and PV production

Although scheduled exports, wind curtailments were unavoidable to guarantee system security (from 10:00 up to sunset at 17:30)



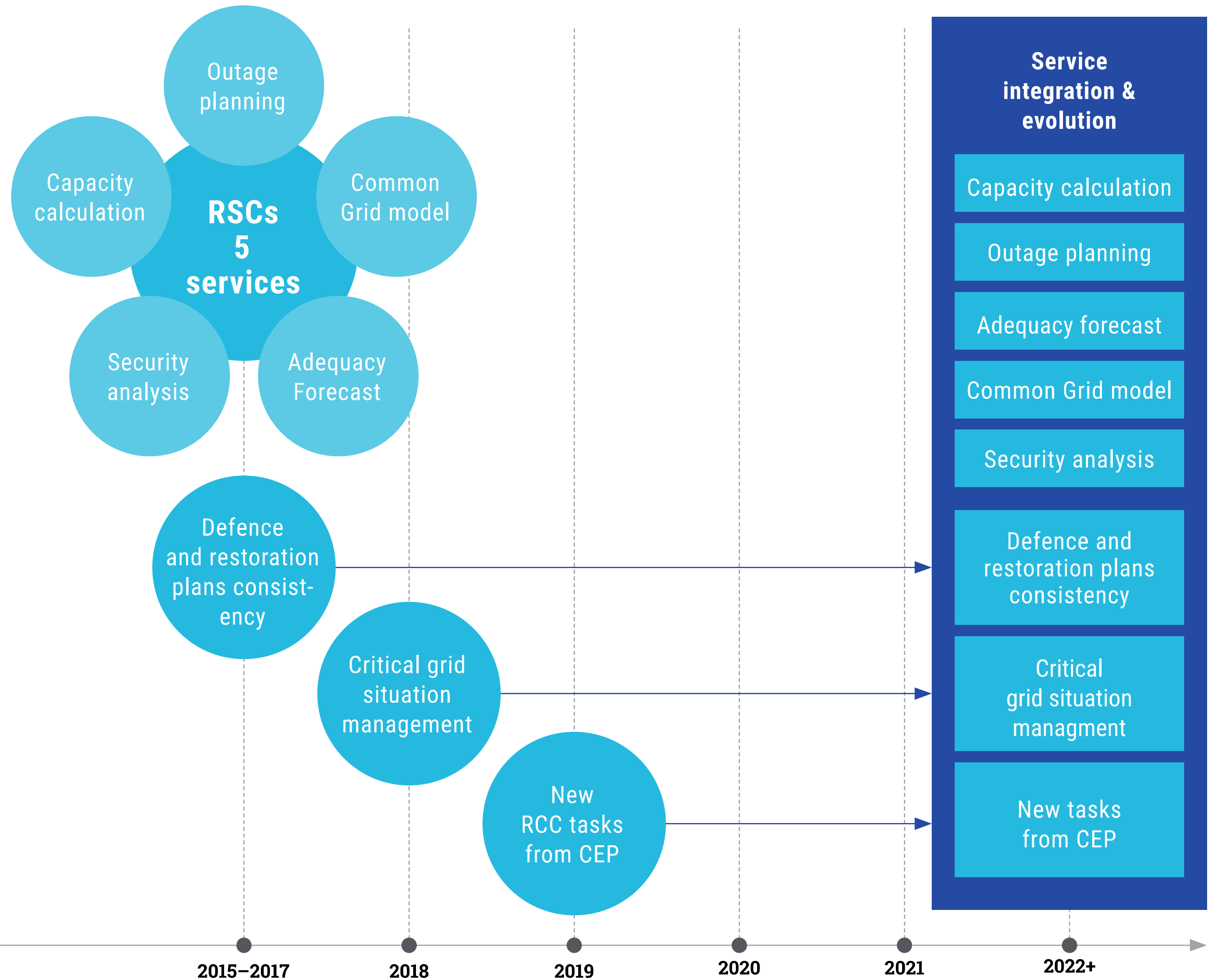
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# Services Provided by RCCs

1. **Common European grid model delivery** (Individual Grid Models from TSOs → Common Grid Model)
2. **Coordinated Security Analysis** (focus: flows)
3. **Coordinated Capacity Calculation** (input for the day ahead markets),
4. **Short-term Adequacy** (short term matching of generation-load for one week ahead; link with balancing)
5. **Outage planning coordination** (optimized use of assets, incl PST (Phase Shifter Transfo) and HVDC coordination)
6. **Critical grid situations management** (facilitation of TSOs in handling of rare but very severe events)



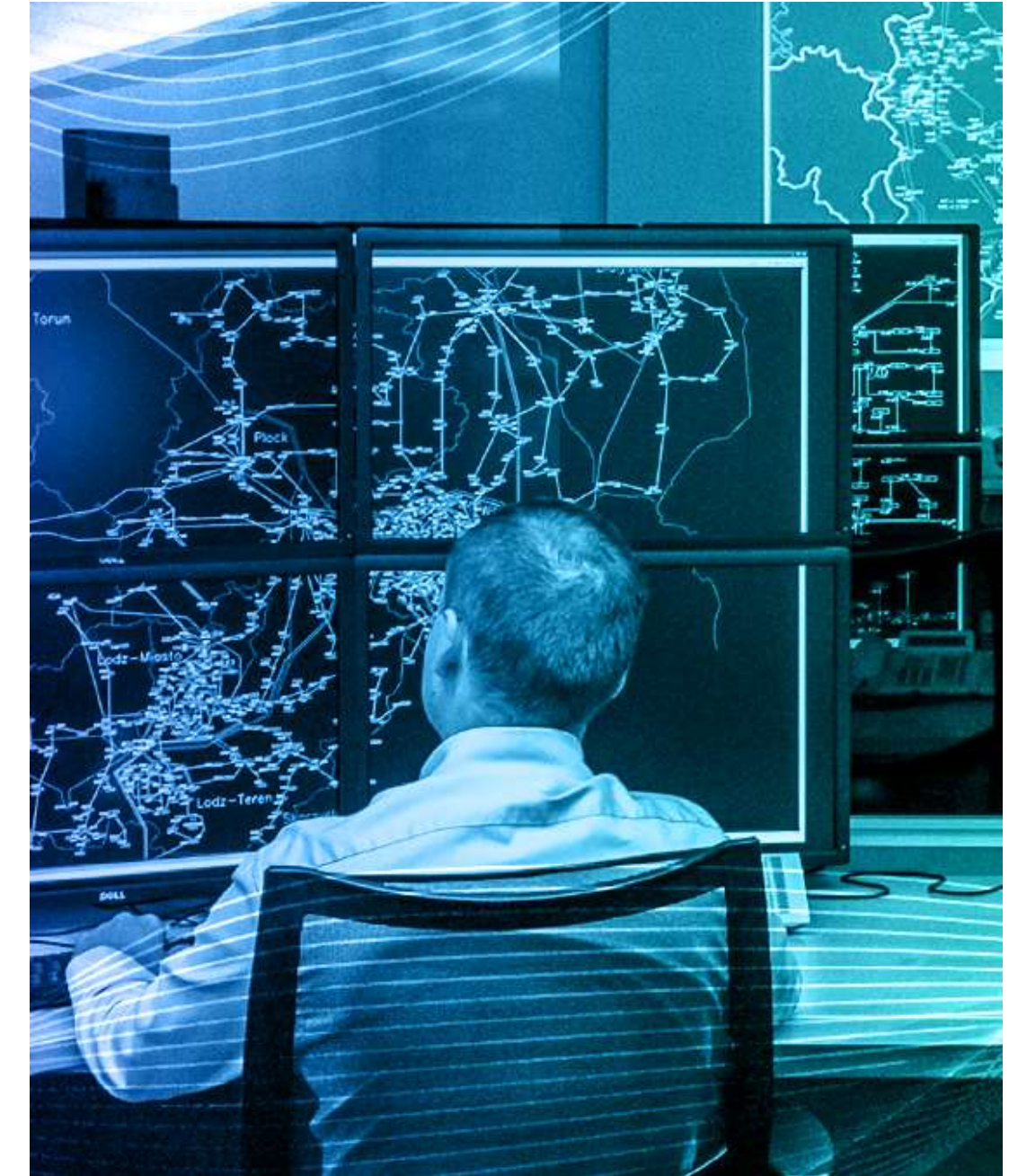
# Common Grid Model (CGM)

- **Scope:** To provide an overview of the European Power System to all TSOs
- **Each TSO** creates a representation of its own grid (computer model integrating information regarding grid topology, generation pattern, load consumption, thermal and voltage limits). This is the so-called **Individual Grid Model (IGM)**
- **RCCs** receive IGMs from TSOs across Europe and **merge** everything together to create **CGM**, that represents the **electricity grid at European level**
- This way all relevant parties (TSOs, RCCs) have a **common** and **accurate** “picture” about the European power system. Therefore, they can study grid behavior under several cases/contingencies
- CGMs are created a year, a week, two days, and one day in advance and they are updated several times during the actual delivery day



# Coordinated Security Assessment (CSA)

- **Scope:** To ensure grid security by minimizing the probability of major disruptions
- For TSOs the **security** of the electricity system has always been and remains a **key issue** (now more than before due to the massive integration of renewables)
- To assess grid security the CGM is used and various combinations of potential risks (**N-x contingencies**) are examined
- In case of potential risks (e.g. congestion issues, over-, under-voltage issues), **remedial actions** are designed in cooperation with affected TSOs
- Nevertheless, no one can predict the unpredictable! Thus, major disruption cannot be always prevented. In these cases, RCCs provide vital information to the TSOs as the situation develops in order to help them manage tense situations



# Coordinated Capacity Calculation (CCC)

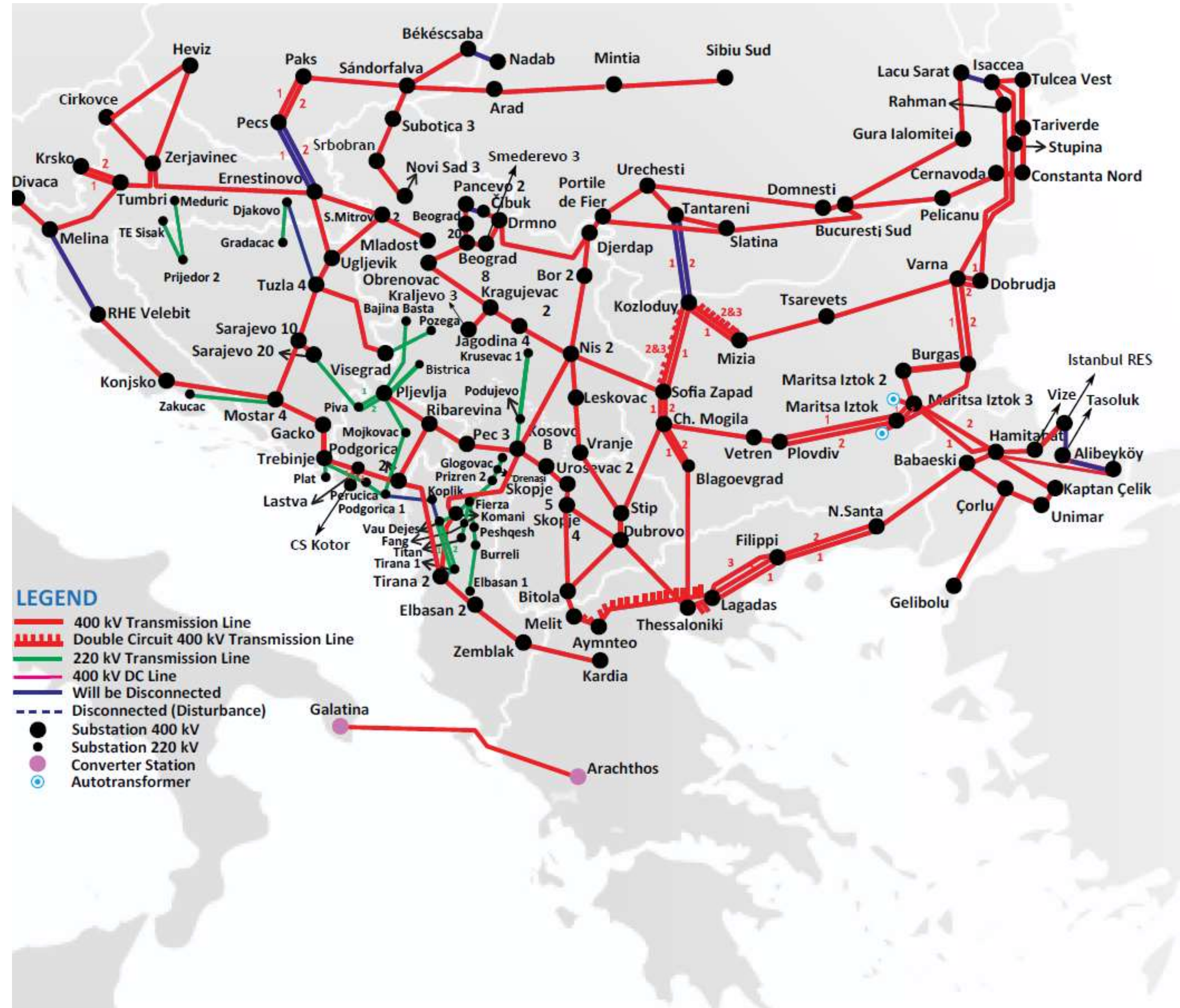
- **Scope:** Compute the **maximum power that can be traded between countries**, thus minimizing costs
- Preliminary calculations: One year and one month in advance, considering worst case scenarios. These procedures are known as long term coordinated capacity calculation (LT-CCC)
- Daily calculations for:
  - Two days in advance (D-2 calculation)
  - One day in advance (D-1 calculation)
  - The last 12 hours of the delivery day (Intra-Day calculation)
- Coordinated capacity calculation results are submitted to energy markets operators

# Outage Planning Coordination (OPC)

- **Scope:** To facilitate the **secure maintenance** of all grid assets. OPC is practically a CSA (but on a different time horizon!)
- Every day TSOs implement hundreds of maintenance projects, thus several power system **elements may be unavailable**
- TSOs want to be informed when their neighbors carry out maintenances that may affect their power systems
- Until recently, this coordination was done bilaterally between neighboring countries
- **RCCs** use weak ahead (and year ahead) CGMs to **assess all combinations of upcoming maintenance plans and possible N-x contingencies** in order to evaluate grid security
- In case of identified issues, **remedial actions** and/or canceling of maintenance tasks is proposed

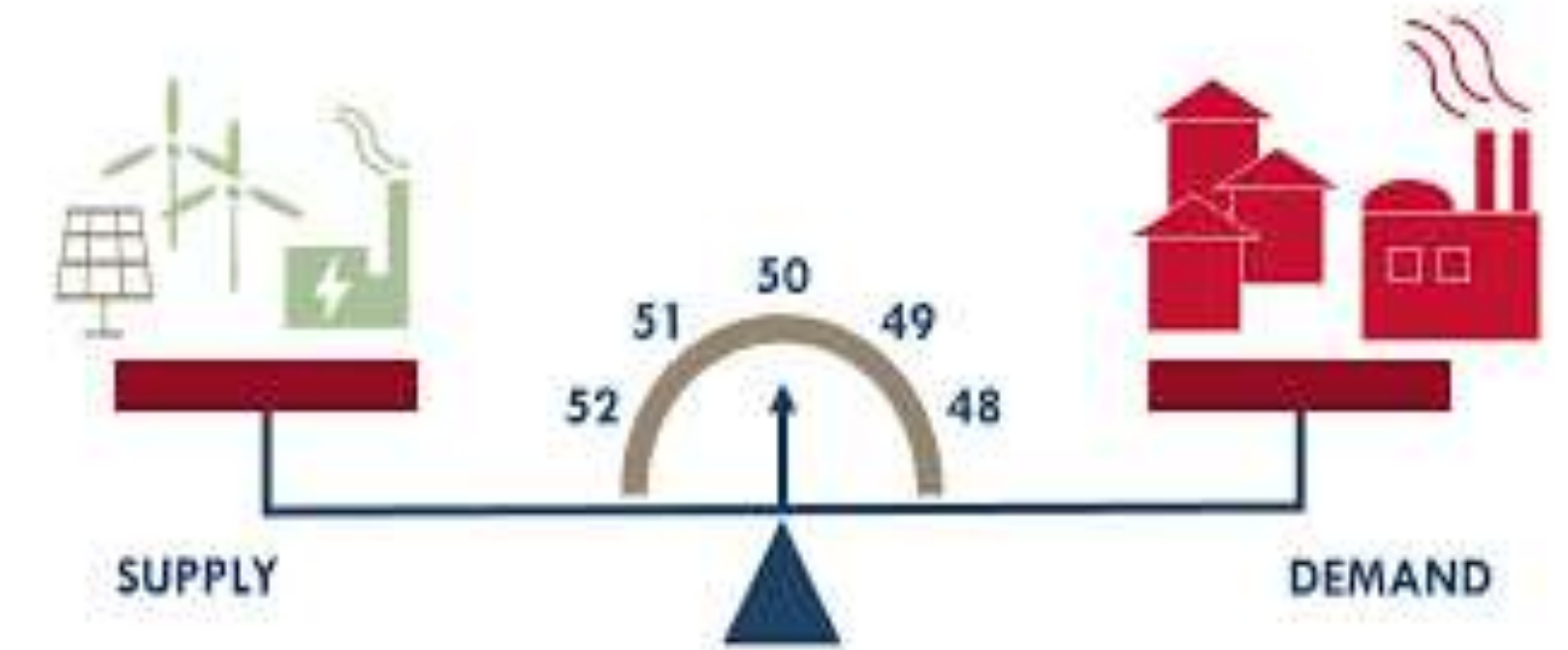
# Outage Planning Coordination (OPC)

14



# Short-Term Adequacy (STA)

- **Scope:** To ensure frequency stability of the European power system
- To maintain grid frequency, a **balance** between **generation** and **consumption** is required
- To maintain this balance RCCs use a **probabilistic framework** to evaluate whether energy, generated in the short-term, at regional levels is sufficient to meet load demand
  - RCCs receive from all TSOs load and generation forecasts (time horizon of seven days) and evaluate on a probabilistic manner the probability for power shortage
- In case a power shortage is identified, **remedial actions** are designed in coordination with the affected TSOs



# Critical Grid Situation (CGS)

16

- **Scope:** To facilitate TSOs in handling of **rare events**
- In case of **rare events** (e.g. extreme weather conditions, hurricanes, solar eclipse, strikes in the power industry, fuel supply shortage, forest fires) the **conventional/ordinary remedial actions may not be adequate**
- In these cases, regionally coordinated **extraordinary countermeasures** shall be defined
- Role of RCCs is to facilitate coordination between all affected TSOs and to assist with the analysis of the situation using available tools (by performing *ad hoc* CCC and/or CSA)





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# RCCs in Europe

18

- Coreso (2008), located in Brussels
- TSCNET (2008), located in Munich
- SCC (2015), located in Belgrade
- Nordic (2016), located in Copenhagen
- Baltic (2016), circulating in Talin, Riga and Vilnius
- SEleNe-CC (2020), located in Thessaloniki



■ Services obtained from several RSCs

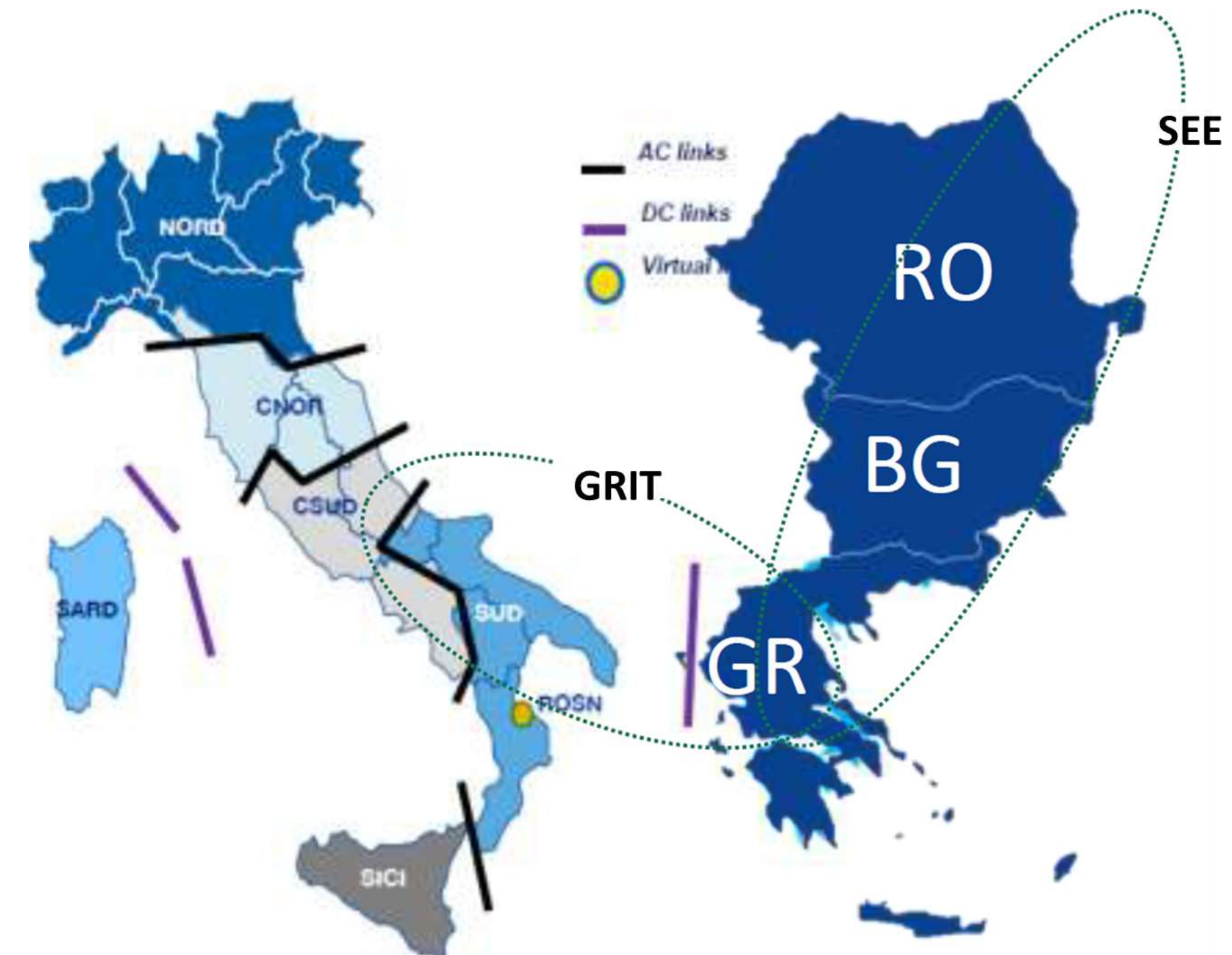
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# The Southeast Electricity Network Coordination Center

20

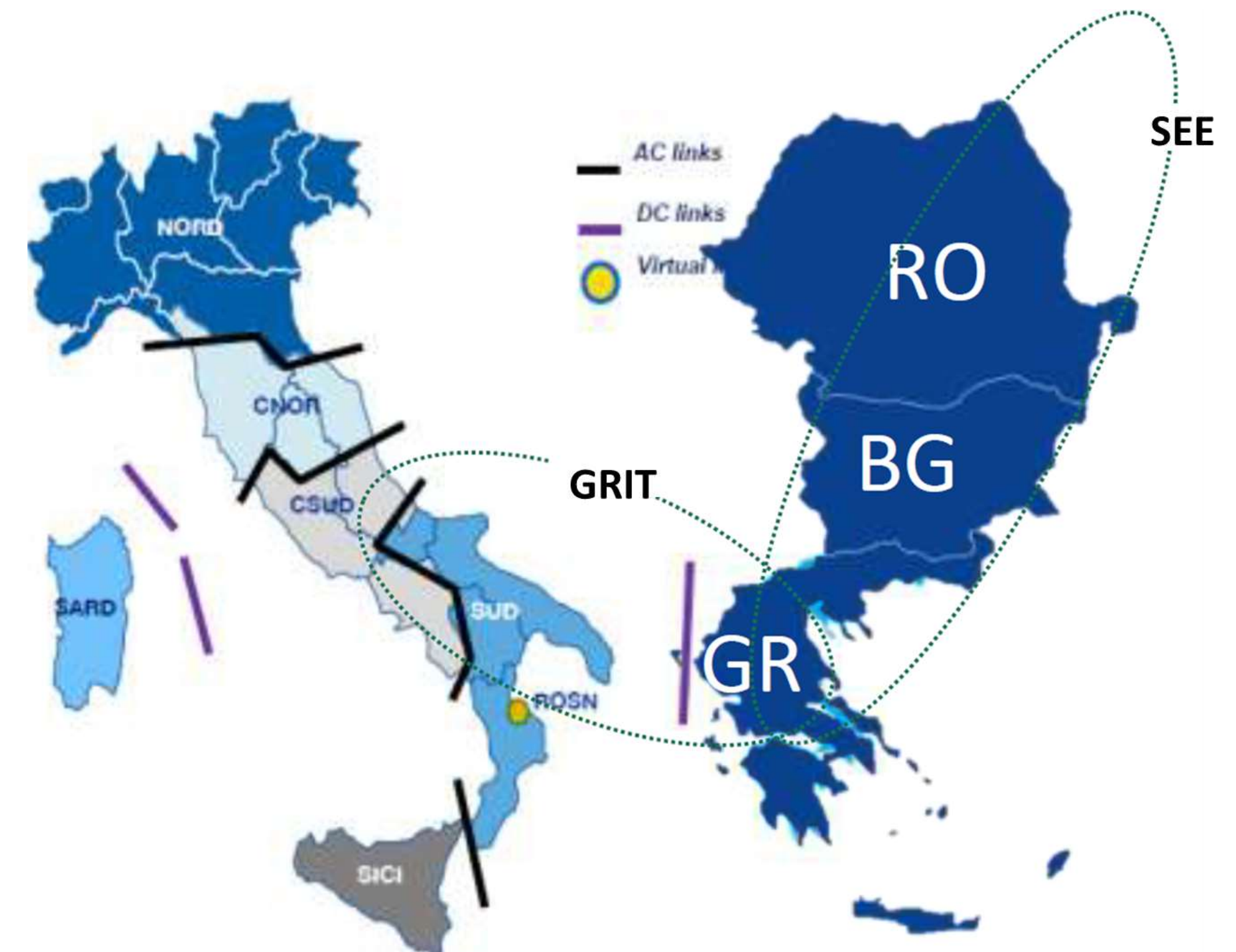
- In South East Europe (SEE) the electricity grids are controlled and managed by 4 TSOs:
  - Bulgaria (ESO)
  - Greece (IPTO)
  - Italy (Terna)
  - Romania (Transelectrica)
- Increased need for regional TSO cooperation, due to the introduction of new equipment (HVDC cables, new tie-lines, etc) and due to the massive integration of renewables



# The Southeast Electricity Network Coordination Center

21

- SEleNe CC was established on the 22<sup>nd</sup> of May 2020
- Independent company owned by the three electricity Transmission System Operators (TSOs) in the SEE region (ESO, IPTO, TERNA)
- Coordinated Security Assessment: For RO, BG, GR
- Coordinated Capacity Calculation: For SEE (RO, BG, GR) and GRIT (GR,IT)
- Outage Planning Coordination: For RO, BG, GR
- Short-term Adequacy Assessment: For BG, GR
- Critical Grid Situation: For RO, BG, GR



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# Implementation of System Operation Regions (SOR) is the basis for security

17

- Nordic
- IU
- Baltic
- Central
- Iberian
- SEE
- Non-EU



5 SORs +1

# Future RCC services | Status

## Status

- 14 of 16 legal RCC tasks to be implemented, 2 remain optional
- For 8 existing ● tasks & obligations knowhow and capabilities are established at RCCs
- Basis for 8 new ● tasks & obligations has to be newly created – feasibility is key
- Complexity of operational tasks can become a challenge for human interaction & business continuity
- Strong focus on transparency & reporting





# A look Into the Future

- Upcoming services (provisions of the “**Clean Energy Package**”):
  - Support the consistency assessment of TSOs’ defense and restoration plans
  - Post event analysis and reporting
  - Regional sizing of reserve capacity and procurement of regional balancing capacity
  - Training and certification of RCC and TSO staff
  - Identification of regional electricity crisis scenarios
  - Identify the needs for new transmission capacity, for upgrade existing transmission capacity
  - Calculate the maximum entry capacity available for the participation of foreign capacity
  - Preparation of seasonal adequacy assessments

# New Services and Problems

30

## Problems arisen

- Small number of TSOs (3), although we achieved to reduce cost compared to other RCCs (minimizing needs in staff etc.)
- Financial issues as only 4 TSOs have to bear the required costs
- Difficulties due to the neighboring with a lot of non-EU TSOs:
  - ✓ 70% target (not applicable)
  - ✓ Application of ROSC methodology
  - ✓ Moving to flow-based methodologies
  - ✓ etc.
- Urgent need for solution: alignment of WB6 with EU legislation in order to enhance security
- Details in previous session

## The most important and challenging new services

- ROSC (**Regional Operational Security Coordination**) methodology is the most challenging one
  - Remedial Actions Optimization (RAO) and cost sharing among benefited TSOs in the SOR
  - Sharing of reserves
- Contribution to Ten Year Network Development Plan (TYNDP) is very much important since RCCs have a broader view of every SOR; gradually creating a database on the transmission needs
- Sharing reserve capacities among TSOs of each SOR
  - Regional sizing of reserve capacity requirements for balancing
  - Facilitation of regional procurement of balancing capacity
- Identification of regional electricity crisis scenarios



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# Thank you for your attention!

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# Thank you very much for your attention!

28

## And Stay Tuned ...



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