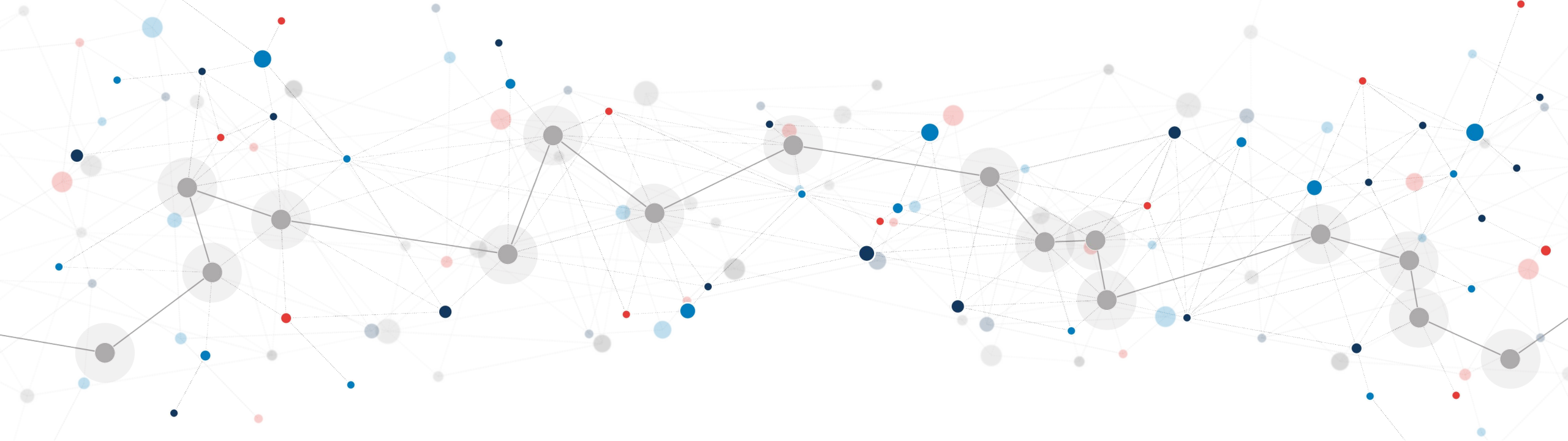

EMI conference - From Fuels to Systems: The New Concept of Energy Security in Europe

The need for investment in stable and flexible capacity and the "missing money" problem

Fabien Roques

Thursday 19 February 2026, Sofia, Bulgaria

NON-CONFIDENTIAL

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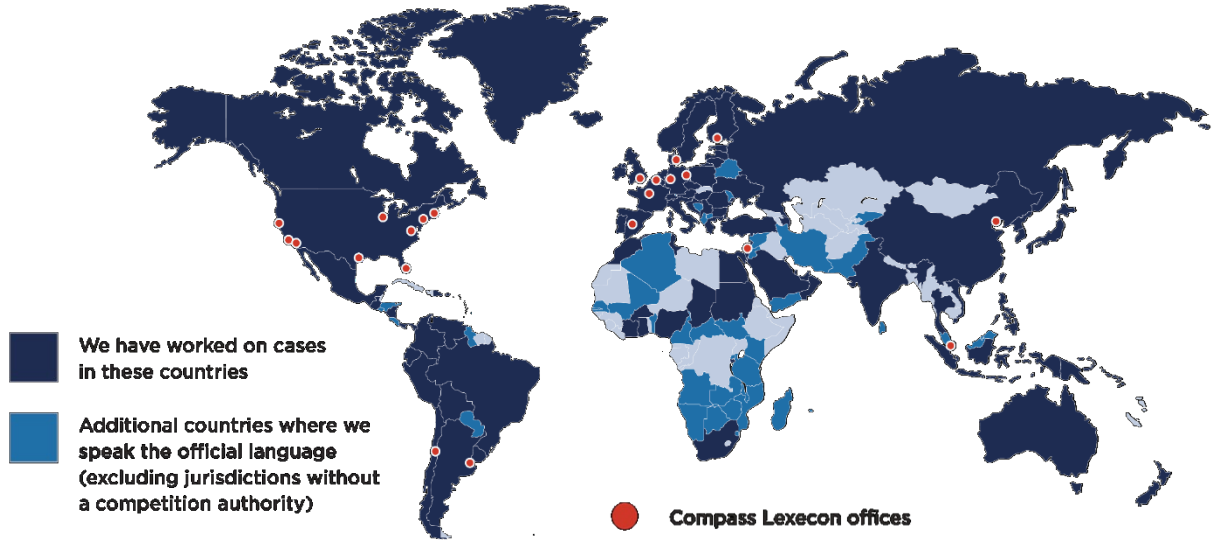

Source: Compass Lexecon

Compass Lexecon's EMEA Energy Practice Expertise – Overview

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Electricity	■ Market price projections ■ Tailor made modelling ■ Market analysis ■ Valuation of market assets ■ Policy impact assessment	■ Network regulation & incentives ■ Renewable support ■ Market design for power and gas markets ■ Regulatory review and impact assessment ■ Third party exemptions for electricity and gas infrastructure ■ Gas storage regulation	■ Policy action recommendations ■ Strategy in regulated industries ■ New technologies ■ Strategy review ■ Transition management	■ Regulatory & commercial due diligences ■ Deal valuation ■ M & A support ■ Expert reports for financing	■ Zero emission scenarios ■ Carbon market expertise ■ Power-to-gas and hydrogen	■ State Aid ■ Investigations of market abuse and competitive behavior ■ Mergers and acquisitions ■ Competition issues for natural gas storage and LNG terminals	■ Contract valuation ■ PPA negotiation ■ Long-term contract renegotiation ■ Procurement review	■ Gas supply contract arbitration ■ RES support revisions ■ Damage quantum analysis ■ Power Purchase Agreement (PPA) arbitration ■ Energy charter treaty and investor-state arbitration
Gas								
Emissions								
District Heating & Cogeneration (CHP)								

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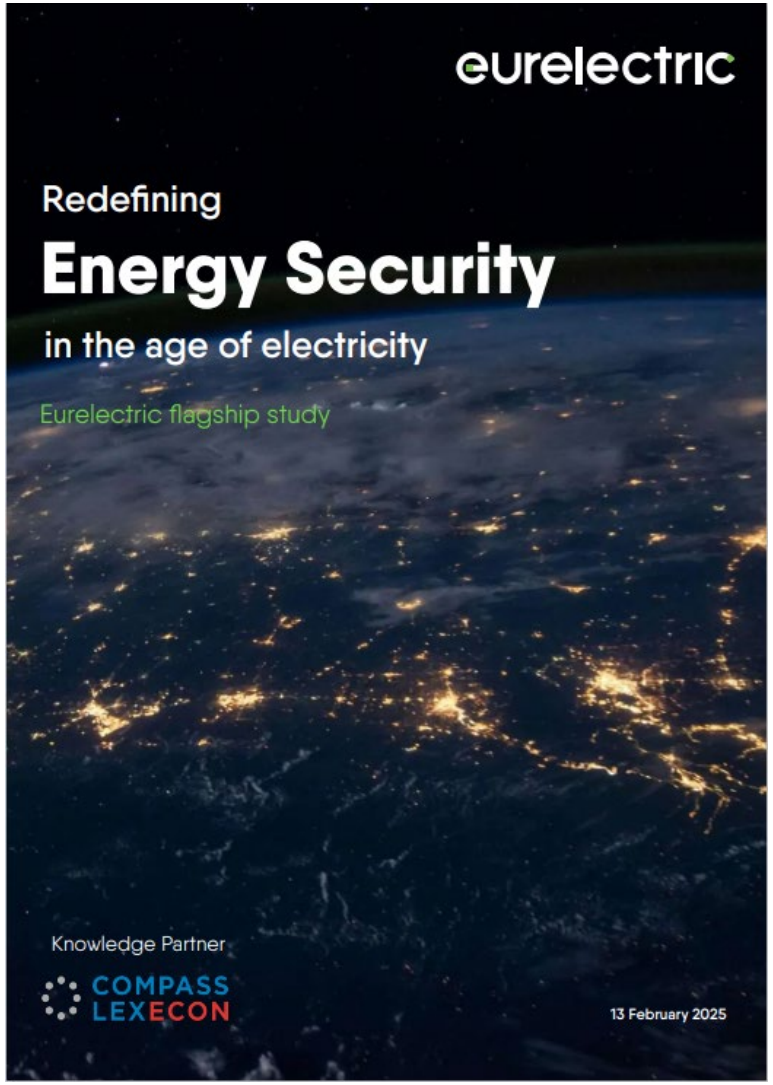
0 Security of Supply 2.0 in the electricity sector: Study for Eurelectric



https://www.compasslexecon.com/cases/electricity-market-design-to-ensure-security-of-supply

0 SoS 2.0: The transformation of the energy system and context call for a new holistic view of security of supply

Geopolitical tensions are posing direct **physical** (e.g. sabotage, warfare) or **cyber threats** – so-called hybrid threats – to the energy system

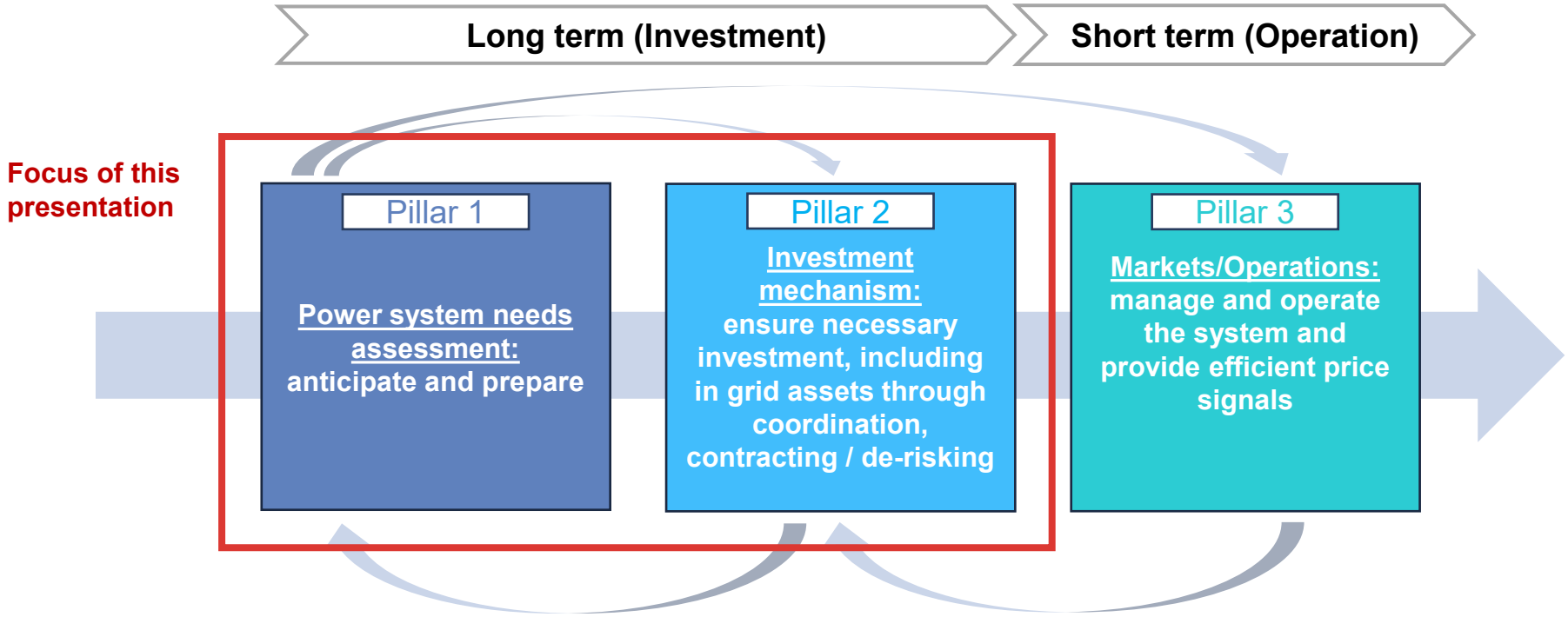
Climate change is already happening and also poses threats to the energy system with extreme heat, fires, flooding, drought and severe storms

Global trade relationships and procurement are also increasingly under strain, with **access to raw materials** and **long and complex supply chains** challenges

https://www.compasslexecon.com/cases/electricity-market-design-to-ensure-security-of-supply

0 SoS 2.0 in the electricity sector: Three key pillars

To deliver a decarbonised, affordable and secure electricity system, several key principles across three key pillars are needed:



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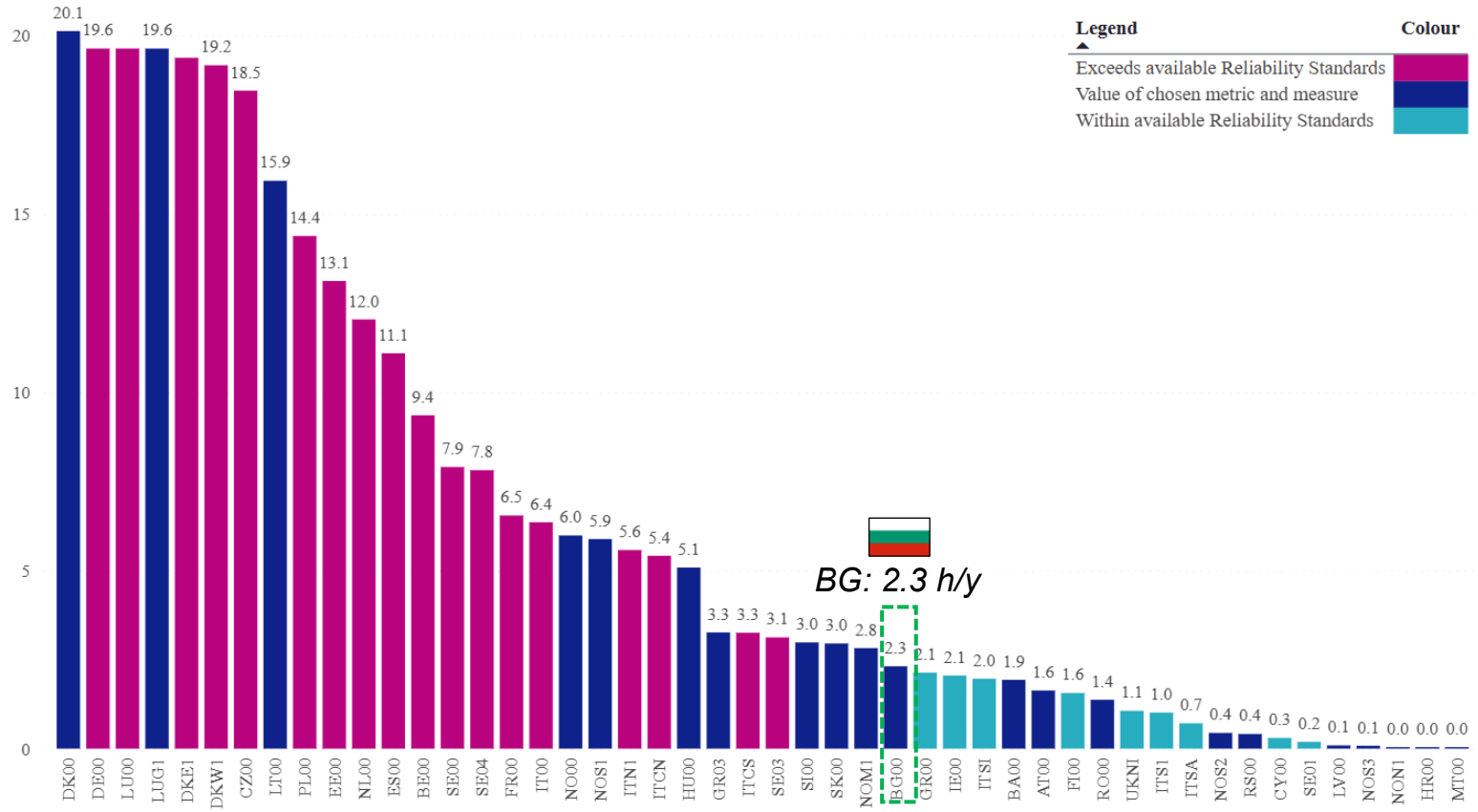
1 Pillar 1: ERAA 2025 expects tight margins in several countries over the coming years

- In its latest adequacy study (ERAA 2025), ENTSOE highlights that:
  1. Adequacy risks appear in several EU countries and margins are tight
  2. Significant volumes of fossil fuel capacity are at risk of economic decommissioning

Average LOLE expectation in ERAA 2025 for 2028 (hour/year)[1]



Source : [1] ERAA25 data

1 Pillar 1: Published in January 2026, the Bulgarian adequacy study suggest limited adequacy issues but with strong uncertainties

- While ERAA 2025[1] showcased an expected LOLE above 3 hours per year for Bulgaria, the latest adequacy study published by the ESO in January 2026 shows no expected LOLE.
- The Bulgarian adequacy report describes 3 scenarios:
  - **BGINECP** : central scenario based on the Bulgarian Integrated National Energy and Climate Plan (with additional assumptions of higher PV penetration and BESS installation)
  - **SiOW (Solar instead of Offshore Wind)** : scenario reflecting the lack of offshore wind capacity development
  - **WoB (Without BESS)** : sensitivity scenario intended to check regional BESS contribution to adequacy issues (no BESS scenario)
- Assumptions across all scenarios include:
  - Decommissioning of the lignite fleet by 2038, without commissioning of new CCGTs
  - No unplanned maintenance of nuclear units

Projected LOLE in Bulgaria (h/year) [1]

	2028	2030	2035
BGRAA26 (all scenarios)	0	0	0
ERAA25	9 -15	2 - 4	1 - 3

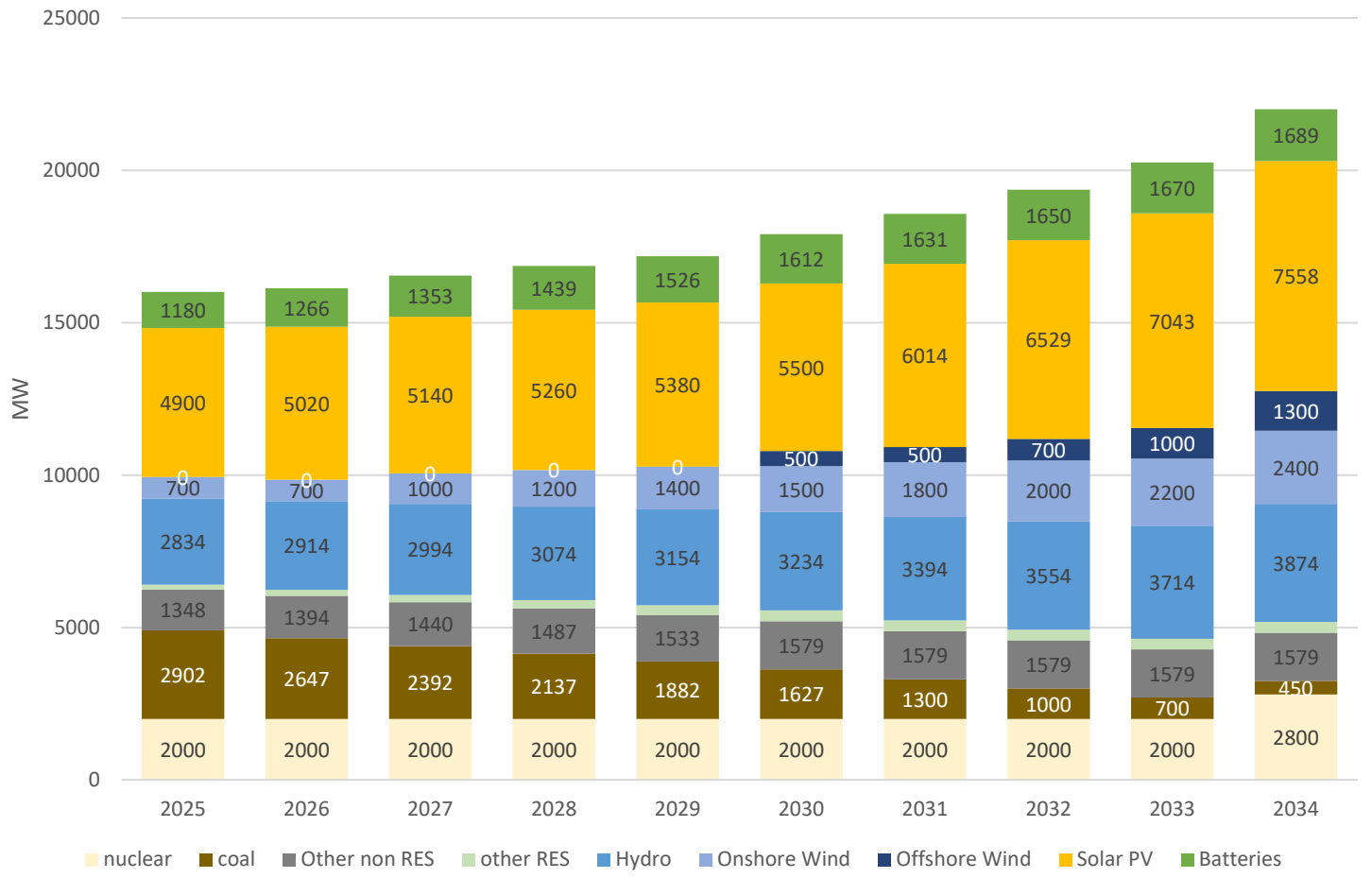
Sources : [1] Bulgarian Flexibility System Needs Assessment - 2026 Edition, ERAA 2025,

Notes: 1. Following the completion of the ERAA 2025 data submission, the Bulgarian Ministry of Economy released a revised version of the national NECP. This updated plan will be integrated into the ERAA 2026 data collection, ensuring that future assessments reflect the most current national policy framework and updated sectoral trajectories.

1 Pillar 1: The latest Bulgarian TYNDP 2025-2035 published in November 2025 underlines the role of conventional thermal units to maintain system stability

- **The Nov 2025 Bulgarian TYNDP shows that consumption is expected to be increasingly met by imports** due to a lack of competitiveness of coal-fired power plants (expected to produce c.3TWh in 2026 and 0 TWh by 2030)
- **However, ESO underlines that this could create difficulties with respect to system stability**. With increasing RES penetration and the decommissioning of existing lignite power plants, the volume of balancing services will increase.
- **Beyond frequency issues, the ESO also highlights voltage and inertia issues** as rotating masses exit the system. In particular, coal plants are seen as essential to start the system back due to the limited energy storage capacity.
- **Among potential solutions identified, the ESO puts forwards :**
  - building new assets (CCGT, Hydro, Nuclear, Batteries, H2)
  - DSR participation to balancing
  - New market mechanisms to ensure a minimum of synchronous generation in the system

Installed capacity in BG TYNDP 2025-2035[1]



Source : [1] Bulgarian TYNDP 2025-2034

1 Pillar 1: The needs - Bulgaria flexibility outlook

Managing the curtailment of RES during ramping periods is critical

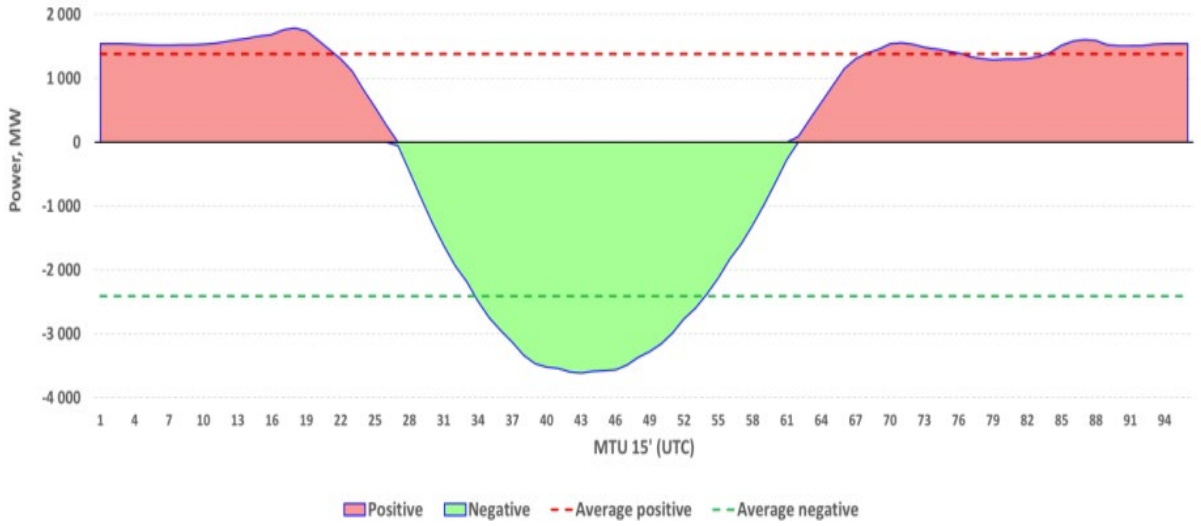
The growth of variable renewables, especially solar PV, could lead to ramping & incompressibility issues

- BGFNA26: RES growth (esp. PV) leads to **strongly negative residual load ("duck curve")** during the daytime and brighter days of the year
- **Curtailment could reach up to 7 GW**, despite planned development of batteries and other flexible assets, and cross-border contributions

The decline of conventional generation capacity could create a need for inertia / synchronous generation, and other issues

- BGRAA26 does **not anticipate the commissioning of additional gas capacities** to compensate for the lignite decommissioning.
- In parallel, **significant non-synchronous capacity (PV, wind) will gradually connect to the grid** → inertia levels decrease
- **Voltage and congestion management issues** could also arise

Projected residual load curve in 2030[1]



Sources : [1] Bulgarian Flexibility System Needs Assessment - 2026 Edition

1 Pillar 1: Power system needs - Bulgaria flexibility outlook

Managing the impact of negative prices is a new challenge

The increasing frequency of negative prices raises new concerns

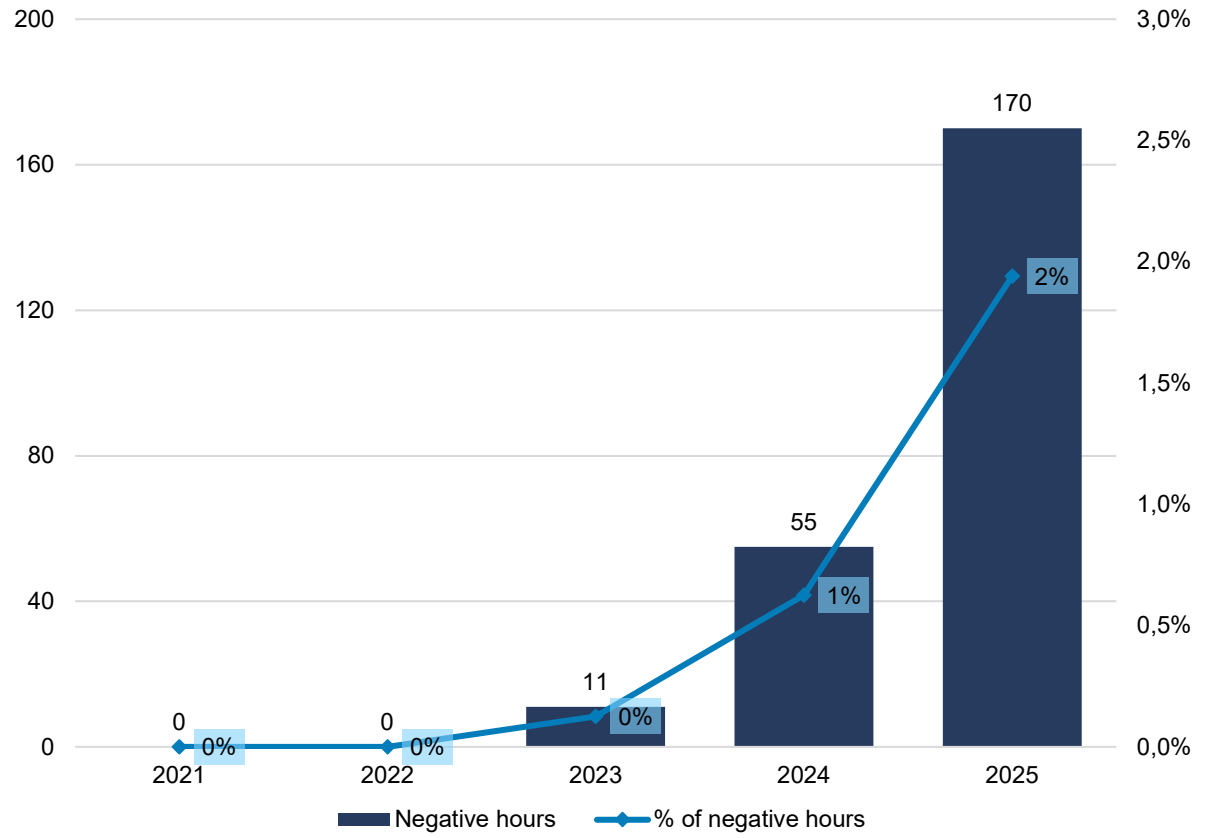
- Negative day-ahead electricity market prices first recorded in Bulgaria in 2023, have increased to 170 hours in 2025 (~2% of hours)
- Negative prices will affect (i) business case of conventional generation, (ii) RES curtailment due to contract causing system operations issues

➢ Are (i) RES contracts and (ii) system management rules well adapted?

➢ How is the PV managed at a regional level (in part. RES mechanisms not incentivising curtailment during negative price hours) ?

➢ Is the battery development sufficient to tackle the growing variable RES penetration ?

Number and share of hours with negative prices on the day-ahead market in BG[1]

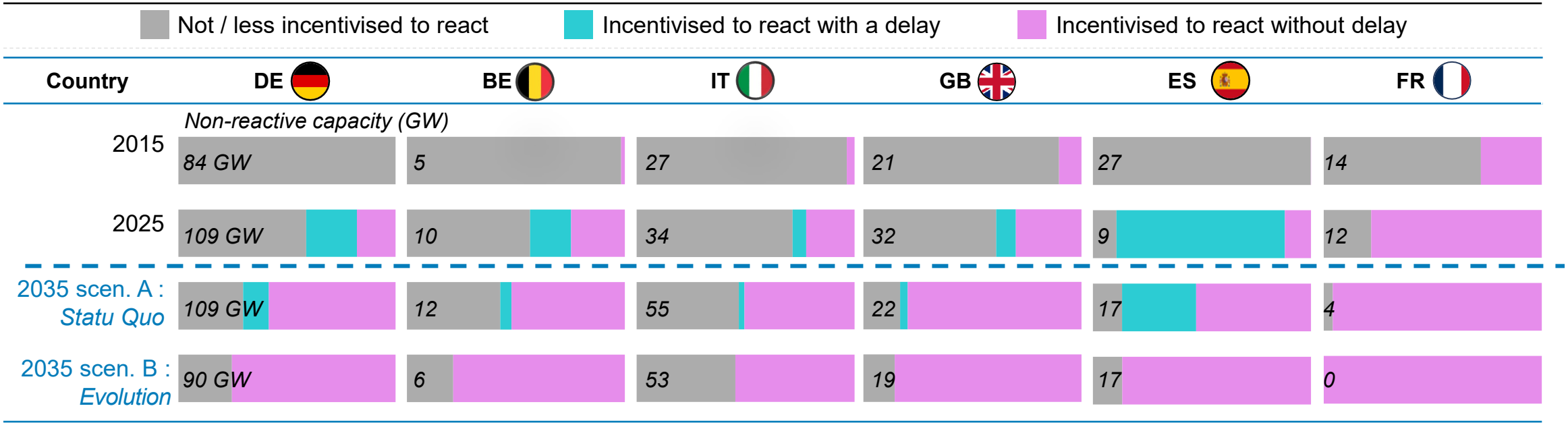


Sources : [1] Compass Lexecon analysis based on Energy Market Price data

1 Pillar 1: Power system needs – managing RES curtailment during negative power prices

The design of RES support contracts is key to provide incentives to curtail production – EU examples

Illustration: stock of renewable support contracts according to their incentives to react (curtail production) during negative power price episodes



- **Significant inertia** in the **stock of legacy non-reactive contracts** → a large share may **remain in place until 2035**
- The **ongoing harmonisation** of new contracts' incentives to curtail during negative prices may lead to **all-or-nothing situations**, i.e., large **simultaneous curtailments** (incl. potentially across borders)→ **need to coordinate curtailments / ramps** to support system management

Source : Compass Lexecon Analysis

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Pillar 2 – Investment framework: Over the past decade, CRMs in the EU have evolved from managing capacity exit, to supporting new firm capacity

A brief history of capacity mechanism design trends

Early 2000s and 2010s: overcapacity situation in Europe, leading to economic viability issues and a risk of uncoordinated exit of ageing thermal plants.

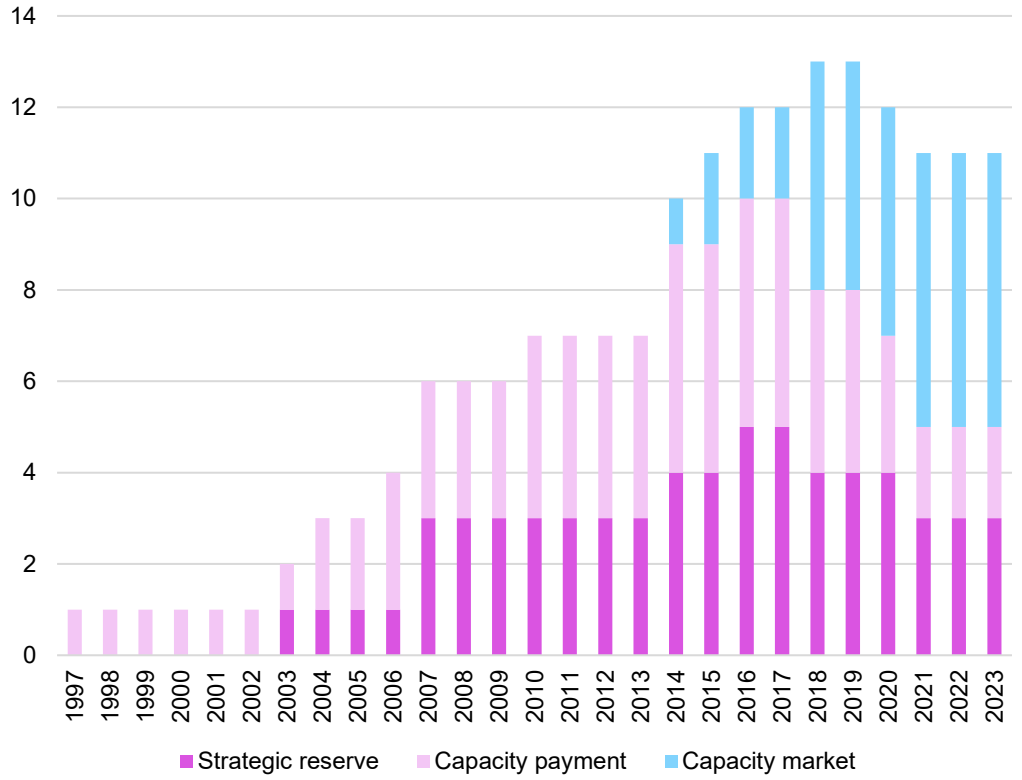
→ implementation of **strategic reserves in some countries** (e.g. Germany, Belgium) made it possible to manage the exit of old thermal plants while maintaining security of supply.

From 2010 to today: revived need for investment in new capacity, but missing money issue due massive subsidised RES additions, among others

→ introduction of **capacity markets** in an increasing number of European countries to address "energy-only" markets failures and missing money issue

Future: in addition to triggering investment in new (decarbonised) firm capacity, growing intermittent RES create a challenge for addressing other system needs (flexibility, ramping, congestion, inertia, etc.). Avoiding overcompensation and overcapacity resulting from CRM cumulation with upcoming schemes dedicated to DSR, storage and flexible assets is also key.

Growth in the number of capacity remuneration mechanisms in the EU + GB (1997-2023)



Source : Compass Lexecon Analysis

2 Pillar 2 – Investment framework : Many EU countries have implemented or reformed existing adequacy / flexibility contracting mechanisms

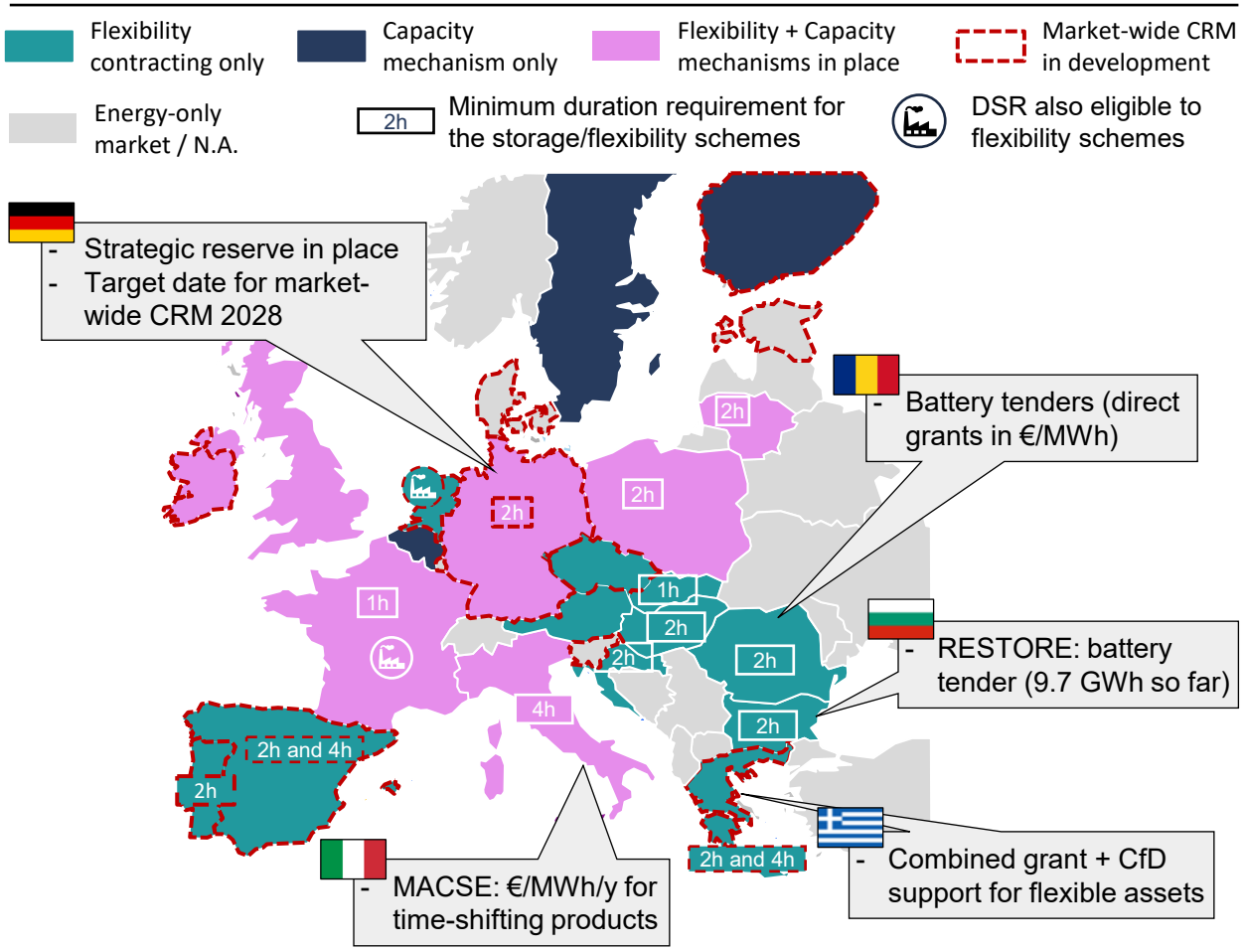
Capacity and flexibility mechanisms benefit from a strong momentum in the EU as recent reforms streamline their approval.

- Evolution from strategic reserves managing exits, to capacity markets supporting **new firm and/or flexible capacity**
- Recent **European Market Design (EMD)** reform and **CISAF** streamline CRM approval (no longer last-resort)
- EMD & CISAF also foster **flexible** capacity contracting (as separate scheme, or joint / subordinated into CRM)
- **Decarbonisation** of firm/flexible capacity is also encouraged
- Thus, a **toolkit** is available depending on system needs & policy goals
- This opens a **window of opportunity** for member states.

Many countries already rely on/consider introducing such contracting mechanisms to secure investments.

- Many EU countries have already implemented capacity markets (e.g. IT, IE, PL, FR, BE) or are considering it (e.g. DE, ES, GR).
- Storage tenders and flexibility schemes saw many recent additions (BG with RESTORE, RO, LI …) and more to come → articulation with CRMs will be key

Illustration of CRM and flexibility scheme development in EU27+UK



Source : Compass Lexecon Analysis

2 Capacity mechanisms – recent EU reforms introduced some degree of harmonisation and State Aid approval fast-track

The EMD reform of 2024 and ensuing CISAF (2025) set directions for the introduction of a new CRM in Bulgaria:

- **Streamlining the procedure** for **state aid approval** of CRMs with new target models (CISAF)
- **Permanent market component** – CRMs no longer last-resort
- Member States could set more stringent **CO2 emission limits**
- Finally, it opens a door for **valuing flexibility** within the CRMs or as a separate mechanism (see next slide)

However, leeway remains on CRM design:

- **Within the CISAF design**: de-rating factors, calibration of demand (based on ERAA/NRAA), articulation with flexibility
- **The B-road**: Member States **can still notify a non-CISAF CRM design** for EC approval

Target model for a CISAF-compliant CRM design (the A-road)

Characteristic	Design option
Scope	- Open to all technologies - Thresholds: > 1 MW, > 1 hour duration, < 550 gCO2/kWh
Procurement	- 1 main auction 4-6 years ahead - Residual auctions up to 1 year ahead
Auction rules & calibration	- Pay-as-clear competitive auctions - Price / bid caps set w.r.t. Cost Of New Entry
Contract length & CAPEX threshold	- Default: 1 delivery period (year) - Add 1 year per 25€/kW CAPEX, up to 15 years for fossil fuel gen.
De-rating factor methodology	- Reset de-rating factors every 2 years - Default: ERAA; can deviate <15% without penalties
Cross-border participation	- Enable direct cross-border participation - Set Maximum [foreign] Entry Capacity accord. to ACER rules
Articulation with coexisting flexibility scheme	MS must choose either: - **Joint procurement in a single auction:** selection algorithm minimises the cost of meeting both CRM & flexibility needs - **Include non-fossil flexibility requirement**, e.g. min volume of fast-ramping flexible capacity in the CRM demand curve - **Mutually exclusive participation** – to be reflected in demand curves

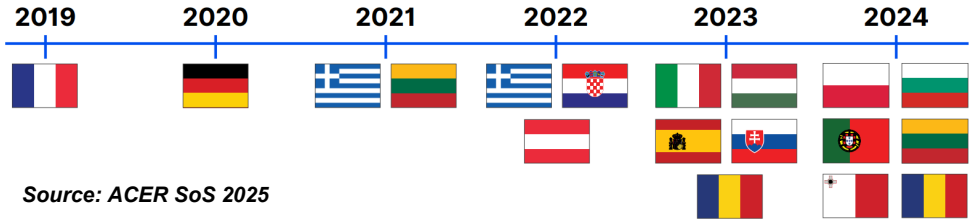
Sources: Compass Lexecon analysis based on EC, 2024.

2 Flexibility schemes – Flexibility/joint mechanisms are developing across Europe, with a range of approaches

Storage/flexibility schemes are being deployed in a growing number of countries to support investment.

- Most flexibility schemes were **set up recently**: less experience vs CRMs so less framed at EU level for now
- The first schemes are setting a direction for others

Timeline of introduction of flexibility measures:



Source: ACER SoS 2025

Likewise, the EMD reform and CISAF developed loose guidelines for harmonising and streamlining schemes:

- A new EU-wide and national flexibility needs assessment
- A new national indicative flexibility objective on which to anchor non-fossil flexibility contracting measures
- New **guidelines for non-fossil flexibility contracting** design that leave margin to experiment & tailor to country needs

Key design features of a non-fossil flexibility scheme according to CISAF 4.3

Characteristic	Design option
Scope	- Open to new investments in non-fossil flexibility - Thresholds: > 1 MW, > 1 hour duration, non-fossil (DSR, battery…)
Form of aid	- Direct grant in exchange for available flexible capacity
Auction rules	- Pay-as-clear competitive auctions - Can consider locational criteria / incentives
Contract length & CAPEX threshold	- Must be proportional to CAPEX - Max. length < amortisation period of the investment
Cross-border participation	- Must be encouraged if technically and economically viable
Articulation with coexisting CRM	Either: - **Joint procurement in a single auction** - **Include non-fossil flexibility requirement** - **Mutually exclusive participation**

Source : Compass Lexecon Analysis

2 Conclusion: Designing an investment framework tailored to the evolting system needs in Bulgaria

Capacity and flexibility mechanisms framework allows fast-track EU approval

- Recent reforms: target models for streamlining
- Push for decarbonised capacity
- EU toolkit and planning framework

Many countries have already deployed such schemes, and Bulgaria can learn best practices

- CRMs are widespread, designs vary
- Flexibility schemes are the next frontier, with even more design leeway

The Bulgarian electricity system is undergoing deep transformation and needs to anticipate system needs evolution

- Coal phase out, RES and BESS growth
- New issues: ramping, inertia, voltage and congestion management

Need (1) to develop a comprehensive planning framework describing firm and flexible capacity needs

- Forward-looking, combining the BGRAA, BGFNA, and BG TYNDP
- This will help determine the most appropriate approach from a holistic perspective

Need (2) to develop a tailored investment framework for the needed firm & flexible capacity

- Options: CRM, flexibility scheme, or both (joint/separate)
- Scheme(s) must fall within good practices and EU guidelines / rules

Models from other EU countries are available but work remains to tailor the tools to Bulgaria's needs and specificities

- Devil is in the details: scheme design, implementation, articulation
- No off-the-shelf solution: need to reflect Bulgarian specific need and issues

Get in touch

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