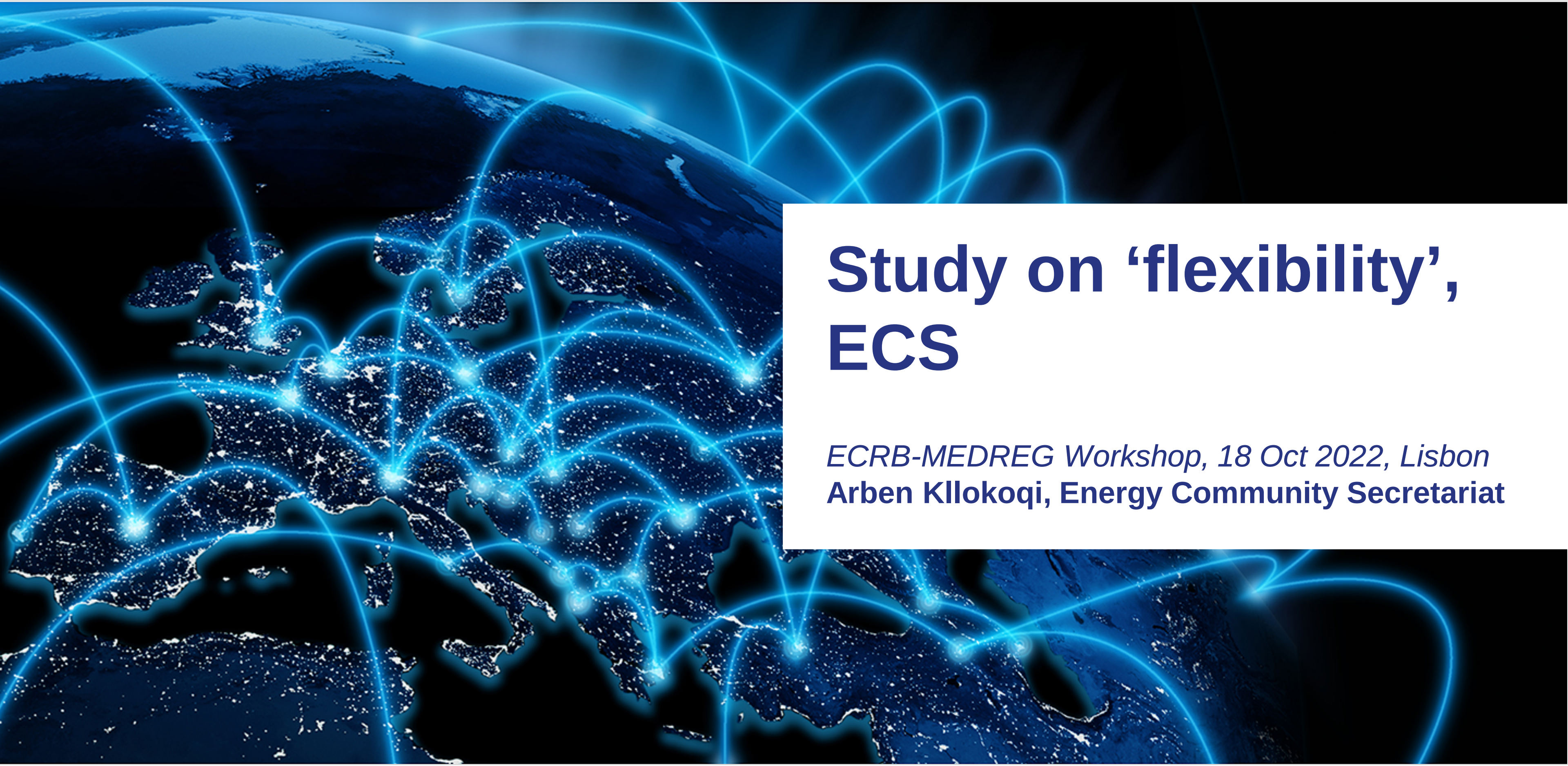


Study on ‘flexibility’, ECS

ECRB-MEDREG Workshop, 18 Oct 2022, Lisbon

Arben Kllokoqi, Energy Community Secretariat

Aggression 1.0

Energy Community

Aggression 2.0

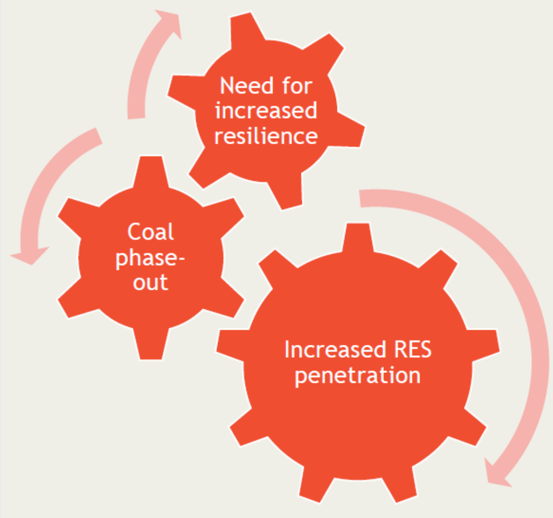
ECS study on flexibility

Objective of the study:

- Identify and analyse **technical and non-technical sources** of flexibility in CPs'
- Evaluate their **existing and future potential** in different scenarios
- Formulate **recommendations on flexibility sources** and associated legal, regulatory and institutional framework in each CP for enabling their deployment and use according to the most cost-optimal scenarios.

Scope of the modelling:

- Each CP separately assessed
- Neighbouring markets taken into account in modelling
- 2030 and 2040 time horizons



Consultants: Trinomics, Artelys OPTIMIZATION SOLUTIONS

Project tasks

5 tasks + 3 workshops

1. Analyse flexibility sources
2. Evaluate existing flex sources
3. Evaluate flex potential and future needs
4. Recommendation optimal set of solutions
5. Improve legal, regulatory and institutional frameworks

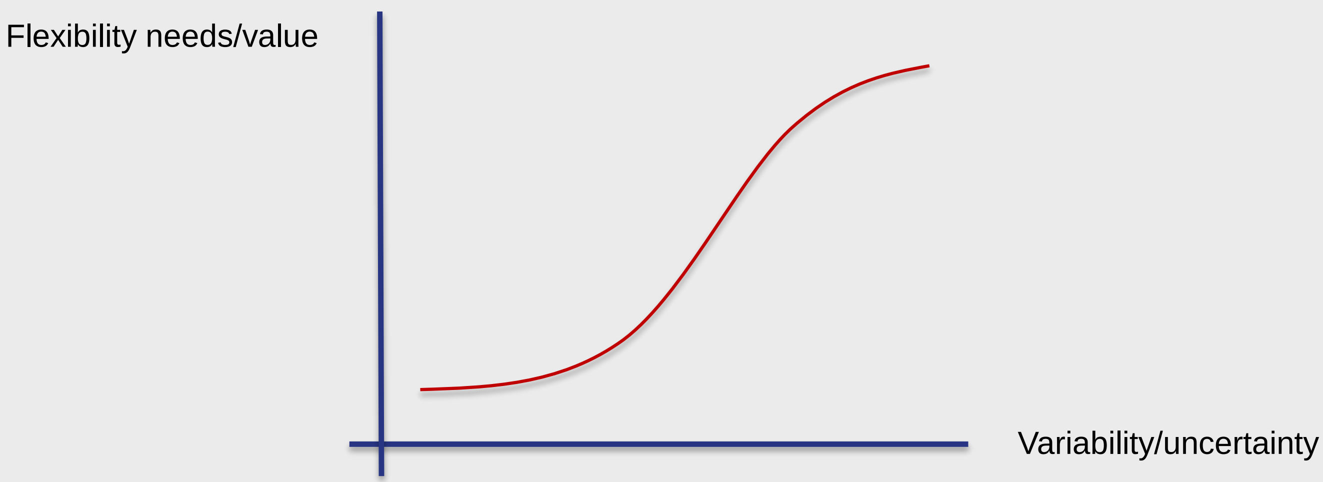
Tasks involve modelling on different scenarios and exchange of data with CP/TSOs

Stakeholders: CPs, NRA, TSOs, associations

- *Few workshops held in H1 2022 – study finalised and published!*

What is ‘flexibility’

… ability of a power system to reliably and cost effectively manage the variability and uncertainty of supply and demand, including transportation constrains, across all relevant timescales…



Drivers of variability/ uncertainty

Drivers linked with policy and strategic decisions

1. Continues surge on renewable sources
2. Coal [gas in future!] phase out / environmental / carbon price

Consequential

3. Climate change and potential disruption

Flexibility sources

Sources:

- Technical: flex assets and operational flexibility
- Non-technical: policy and measures that incentivise efficient use of technical flex sources

Selected in the assessment (best practice):

1. **Supply-side**: gas fired plants (OCGT and CCGT); system-friendly RES
2. **Storage:** batteries and CAES; hydro reservoir and pumped
3. **Conversion:** electrolysers
4. **Demand-side:** industrial, residential and commercial DSR
5. **Transversal:** transmission & distribution network, interconnector; electricity market

Key characteristics …

Timeframe:

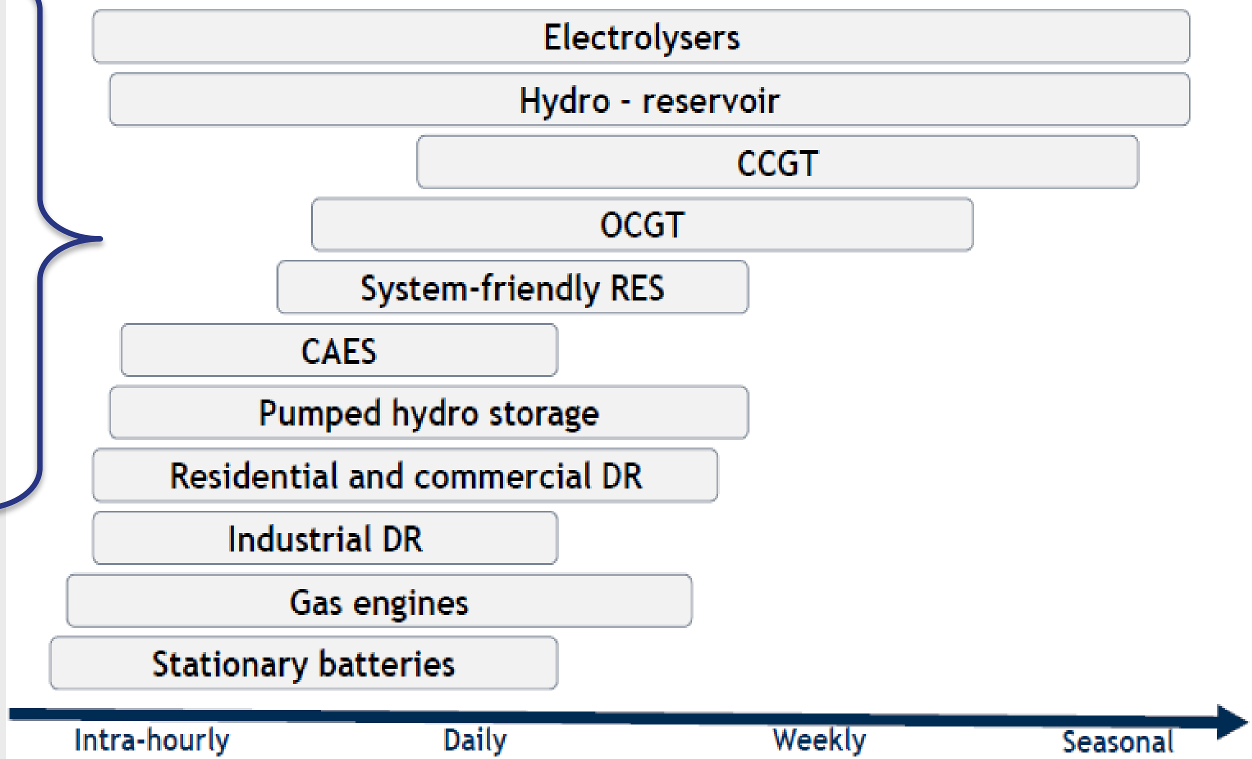
intra-hourly, daily, weekly and seasonal

Technical characteristics:

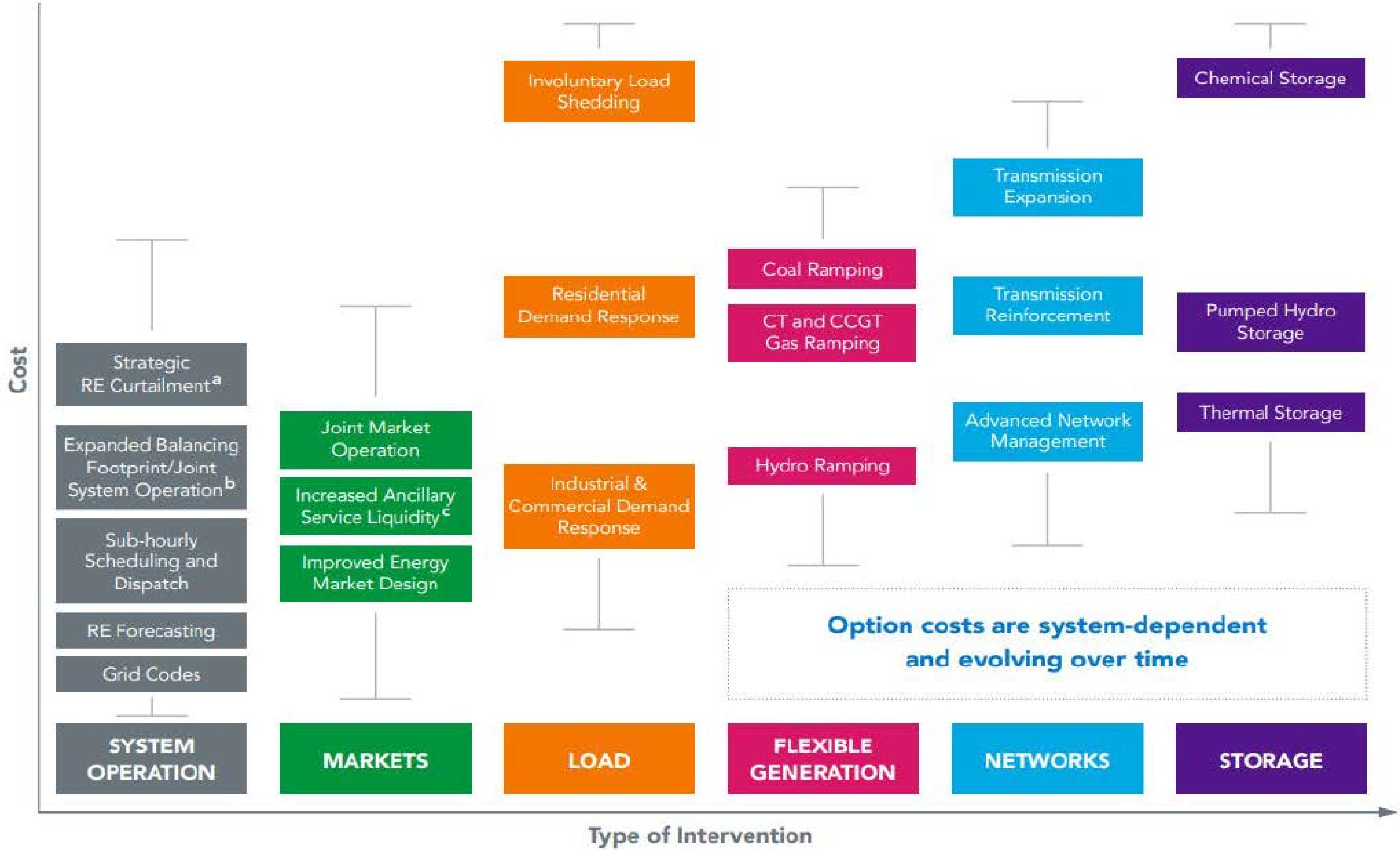
energy and power capacity, conversion and ramping

Costs:

variable & fixed



Note: Transmission and distribution as well as electricity markets not shown given their transversal nature



Source: 21st Century power (2014)[47]

Methodology

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Input parameters	Computation	Key results

Input parameters

- Installed capacities for RES, nuclear, hydropower, etc.
- Electricity demand
- Catalogue of investment options
  - **Electricity** interconnectors
  - **Flexible** generation assets
  - **Storage** assets (e.g. batteries, pumped-hydro storage, CAES)
  - **Conversion** assets (electrolysers) if relevant
- Security of supply constraint
- Technical and economic characteristics
- CO_2 price and commodity prices

Computation

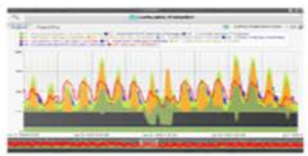
Artelys Crystal SuperGrid

Objective

Jointly optimise investments and operations for a given scenario using an hourly time resolution

Key results

- Optimal portfolio of flexibility solutions and associated costs
  - Per Contracting Party
  - In 2030 and 2040
  - For 3 RES levels
  - For 2 integration approaches (for the moderate and high RES deployment levels)
- Operational management of the power system (hourly dispatch, CO2 emissions, curtailment, etc.)



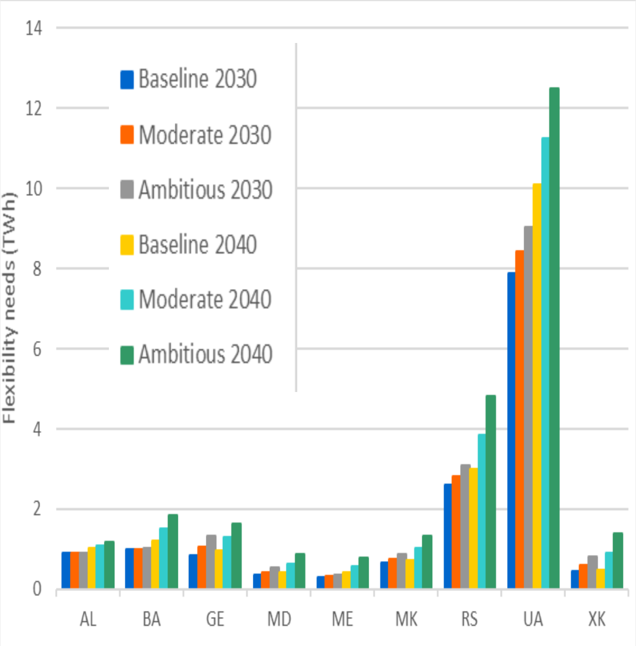
Trinomics Artelys

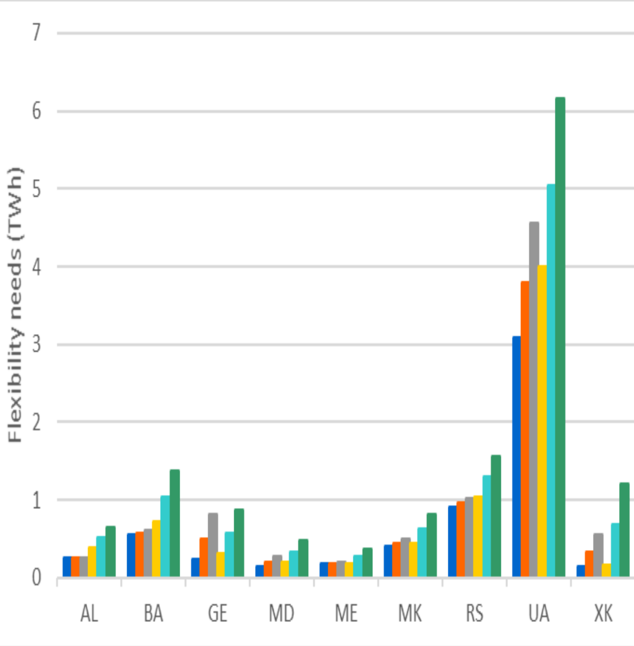
EnC flexibility needs [2030, 2040]

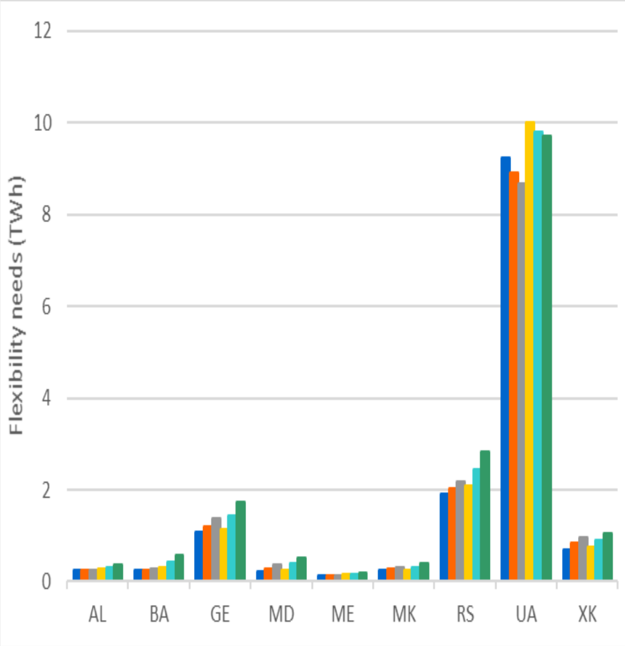
Daily:
PV production
Day-night variation

Weekly:
Wind production
Work-day WE variation

Annual:
Seasonal wind, PV & consumption pattern
Wind correlates with seasonal consumption



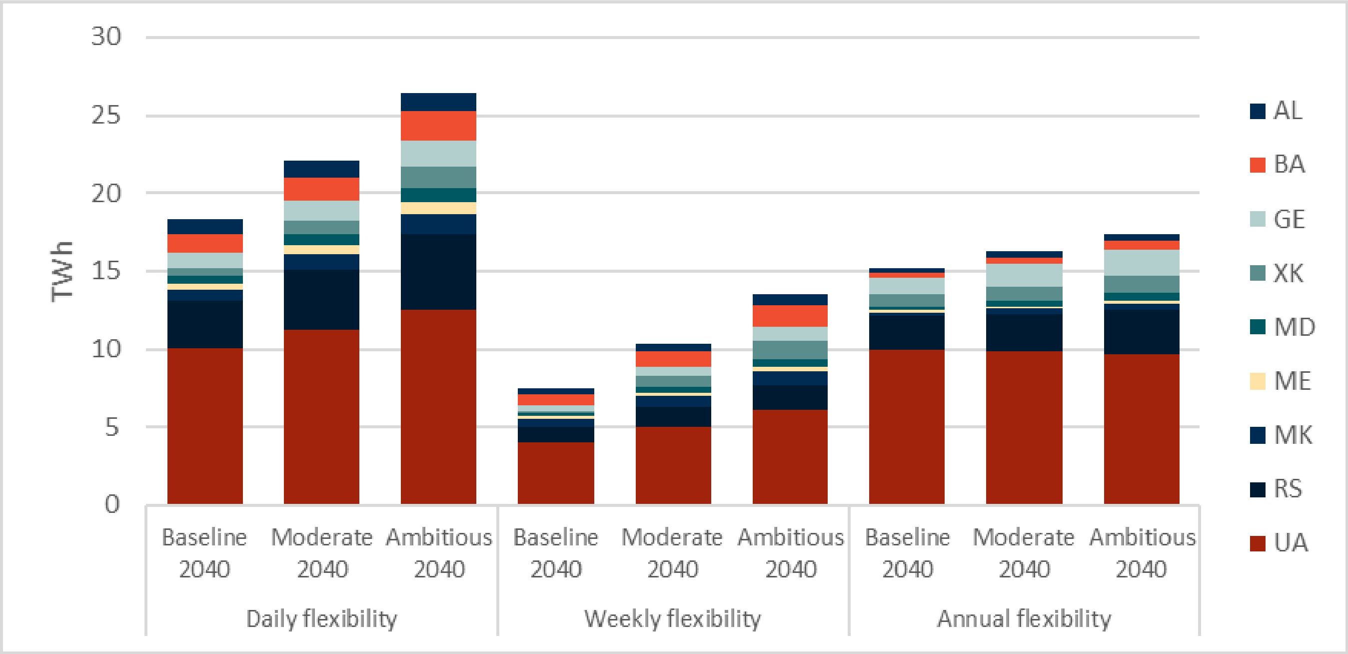




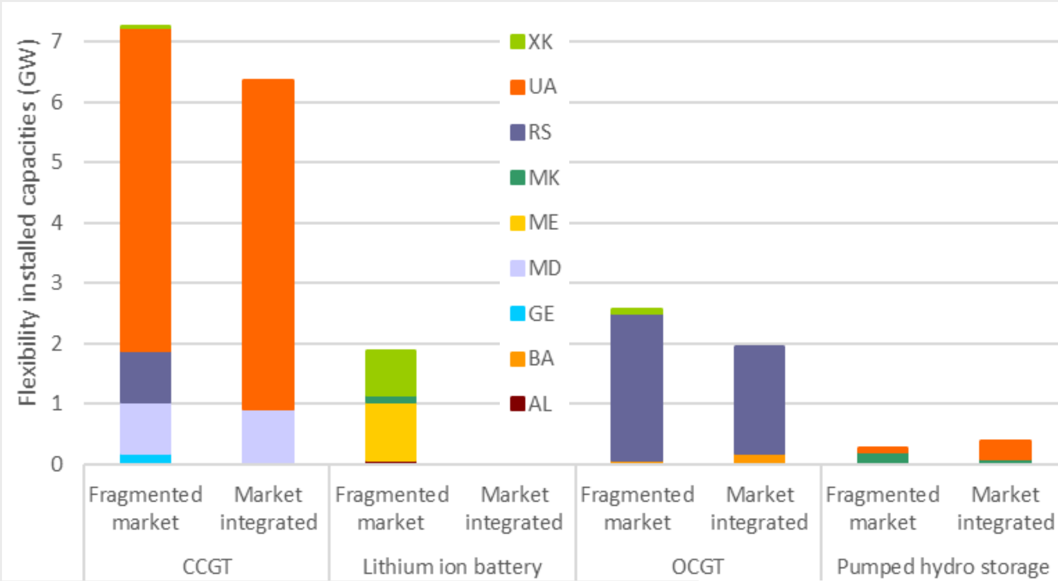
EnC investment on flexibility needs [2030, 2040]

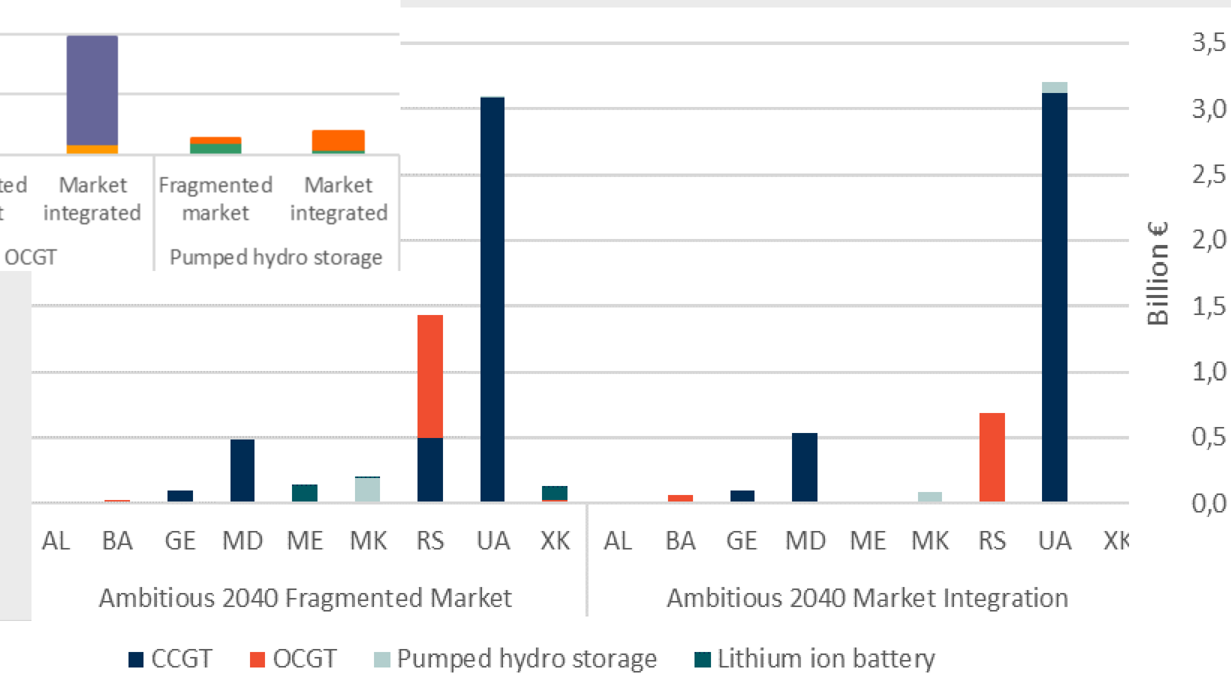
2030: Efficient use of existing cross-border capacity crucial for addressing flexibility needs in CPs, including also available flexibility assets

2040: with coal phase out additional flexibility investment needed (in particular ambitious scenario)



Impact of market integration [2040]





Regulatory recommendation toolbox

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- Governance: Plan the energy transition and the deployment of flexibility
- Improve unbundling of network operators
- Improve regional and national system planning
- Develop network capacities (cross-border and internal) if needed
- Develop liquid spot and balancing markets acessible to all flexibility sources
- Integrate markets within WB6 and with EU markets
- Integrate markets of MD+UA with EU
- Implement effective market monitoring and case investigation
- Increase interconnector availability to trade
- Adress market structure issues where needed
- Remove wholesale and retail blanket price regulation
- Enable demand side flexibility
- Support flexibility markets and platforms
- Increase RES market exposure
- Phase-out subsidies to fossil-based generators
- Gradually introduce carbon pricing to improve level playing field

Conclusions

RES deployment and coal phase-out - uncertainty remains

- CEP / EnC Decarbonisation Roadmap
- Energy transition plans (and NECPs) - uncertainty regarding the direction and speed of the transition

Lack of liquid, integrated spot and balancing markets hinders cost-efficient use of flexibility sources

Highly concentrated retail markets (with regulated prices and network tariffs that do not provide adequate incentives for development of distributed flexibility)

- No demand response mechanisms (also no smart metering in the low voltage market segment)

Other barriers, particularly coal subsidies and administratively-set (i.e. not market-based) renewables support further reduce the competitiveness of flexibility sources

Energy Community

Thank you!

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