

*Security of Supply Coordination Group - 11th
Meeting of Sub-Group for Electricity*

STUDY ON FLEXIBILITY OPTIONS TO SUPPORT DECARBONISATION IN THE ENERGY COMMUNITY

*Task 1 report:
Analysis of technical and non-technical sources of flexibility*

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STUDY EXECUTION: 01.09.2021 - end of April 2022

CONSULTANTS: TRINOMICS & ARTELYS

DELIVERABLES:

Task 1 – Analysis of technical and non-technical sources of flexibility

Task 3 – Evaluation of existing flexibility potential and future needs for additional flexibility in 2030 and in 2040, in each Contracting Party's power system

Task 5 - Recommendations for improvement of the legal, regulatory and institutional frameworks

Task 2 – Evaluation of current flexibility sources utilized in the Contracting Parties

Task 4 - Recommendation of optimal set of solutions

DECARBONISATION PROCESS EXPECTED IN THE EnC CPs

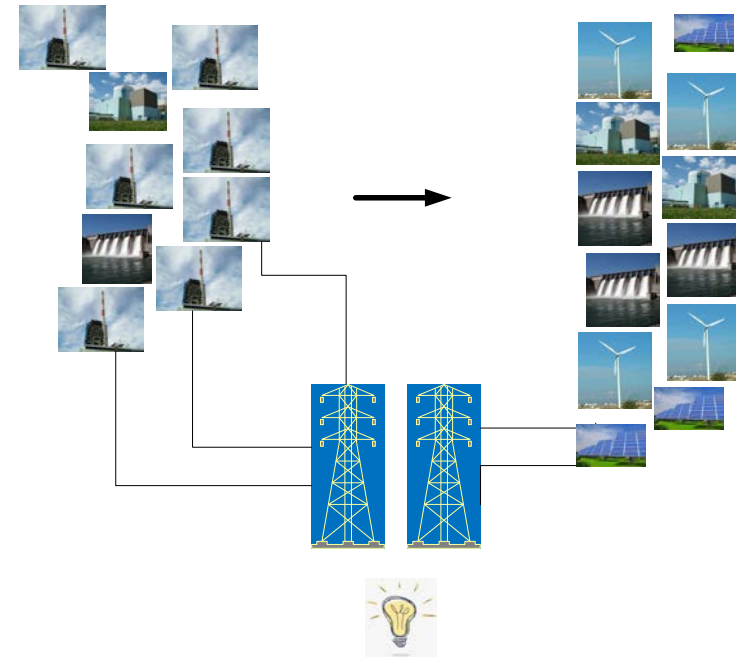
- Political support (Paris agreement, Sofia declaration)
- Ministerial Council adopted Decarbonisation Roadmap with the aim to:
 - support a path towards 2030 energy and climate targets and mid-century climate neutrality for the Energy Community
 - Make a progress in agreeing on carbon pricing
- Clean Energy Package – part of acts adopted for the Energy Community
- Carbon border tax adjustment mechanism (CBAM)

COAL FIRED POWER PLANTS PHASE-OUT

- EnC legal obligation (LCPD and IED)
- High carbon price (reached 80 EUR/t)

INTEGRATION OF VARIABLE RENEWABLES (wind, solar)

BALANCING NEEDS WILL INCREASE IN THE FUTURE



ANALYSE ALL AVAILABLE TECHNICAL AND NON-TECHNICAL SOURCES OF FLEXIBILITY

EVALUATE CURRENT FLEXIBILITY SOURCES UTILISED, NEEDS, POSSIBLE GAPS AND COSTS OF PROCUREMENT

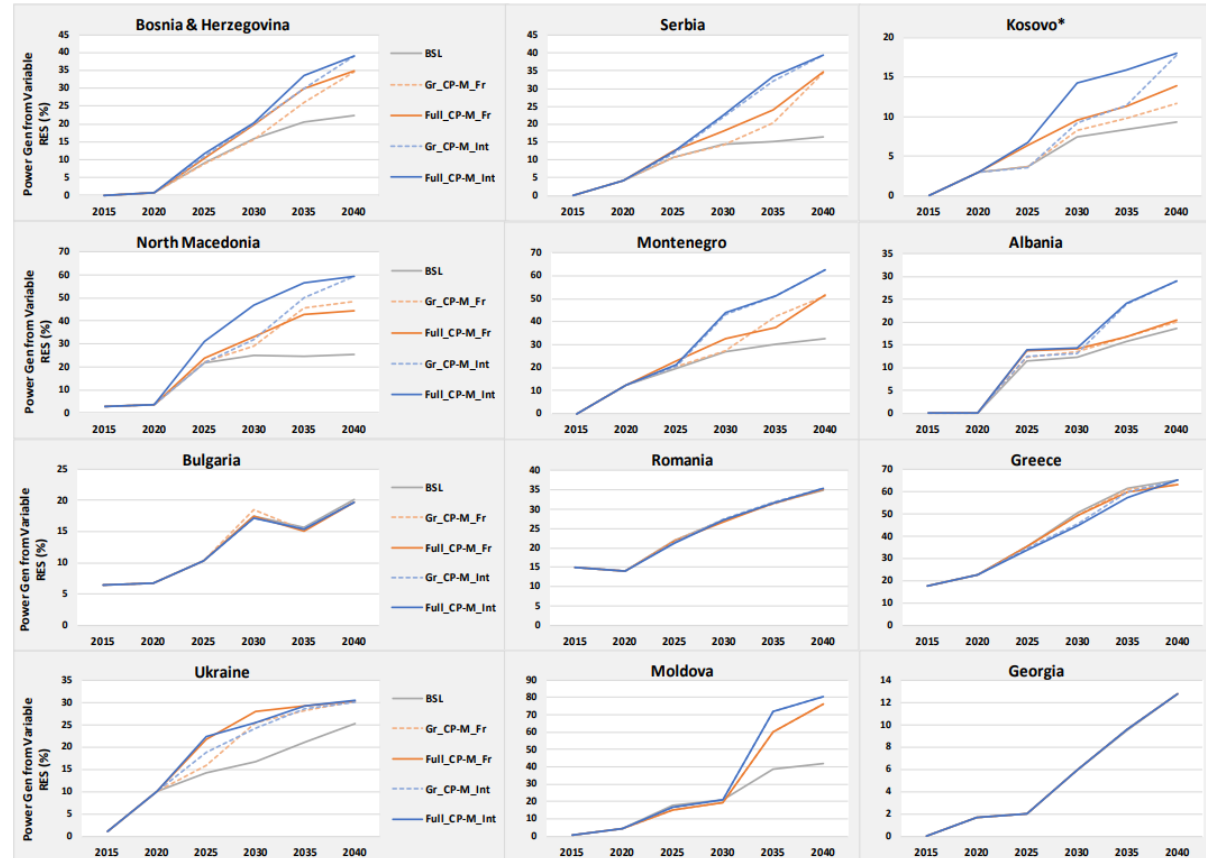
EVALUATE THE EXISTING FLEXIBILITY POTENTIAL AND FUTURE NEEDS FOR ADDITIONAL FLEXIBILITY IN 2030 AND IN 2040 IN EACH CP

RECOMMEND AN OPTIMAL SET OF SOLUTIONS, INCLUDING TECHNOLOGIES, POLICY INSTRUMENTS AND REGULATORY MEASURES

RECOMMEND IMPROVEMENTS OF THE LEGAL, REGULATORY AND INSTITUTIONAL FRAMEWORK, IN PARTICULAR RELATED TO THE MARKET DESIGN, NECESSARY FOR THE IMPLEMENTATION OF THE OPTIMAL FLEXIBILITY SCENARIO, FOR EACH CP

Drivers of flexibility needs in the Energy Community

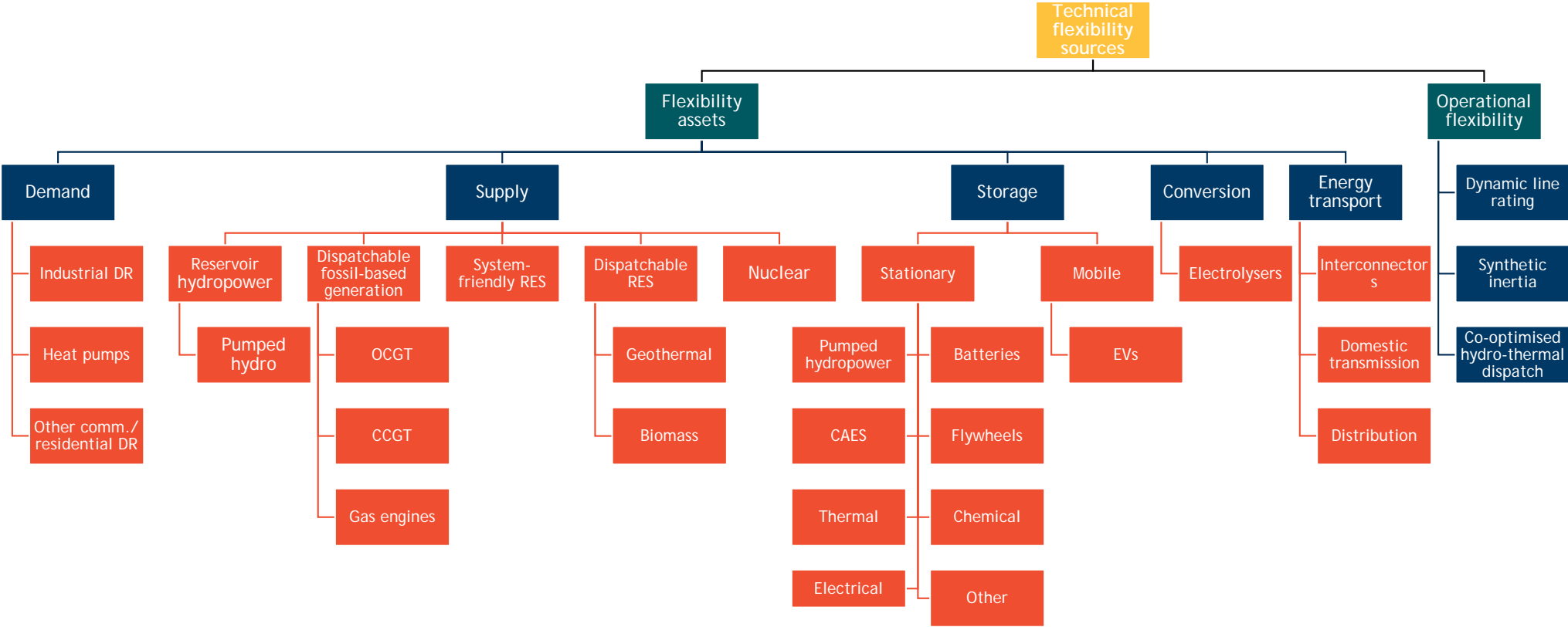
1. Increased penetration of intermittent renewable energy sources
2. Phase-out of coal-based power (and heat) generation including lignite
 1. Carbon pricing and decarbonisation targets
 2. Implementation of LCPD (Large Combustion Plant Directive) and IED directives
 3. Carbon border adjustment mechanism (CBAM)
3. Need for increased resilience of the energy system



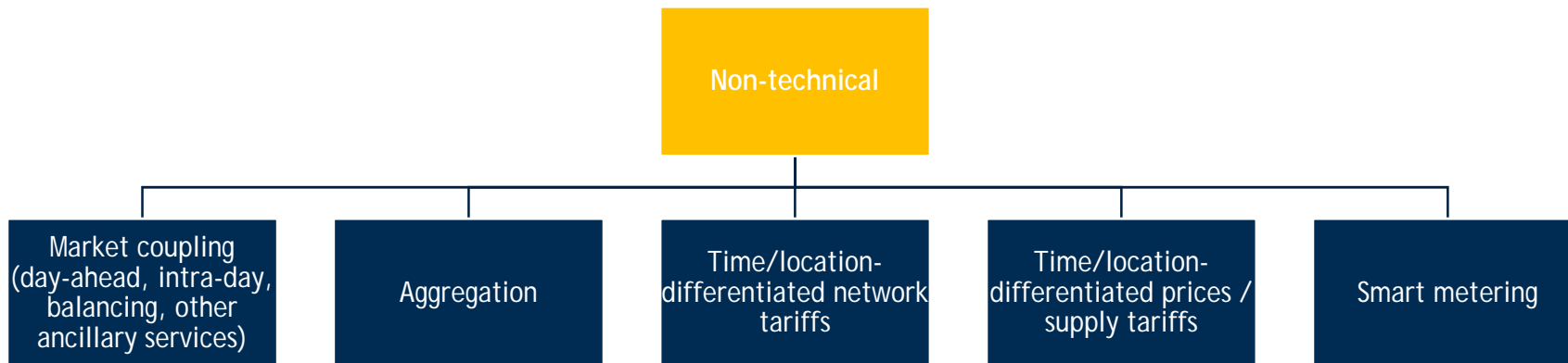
Source: Kantor & E3M, A Carbon pricing design for the Energy Community (2021)

TASK 1 REPORT

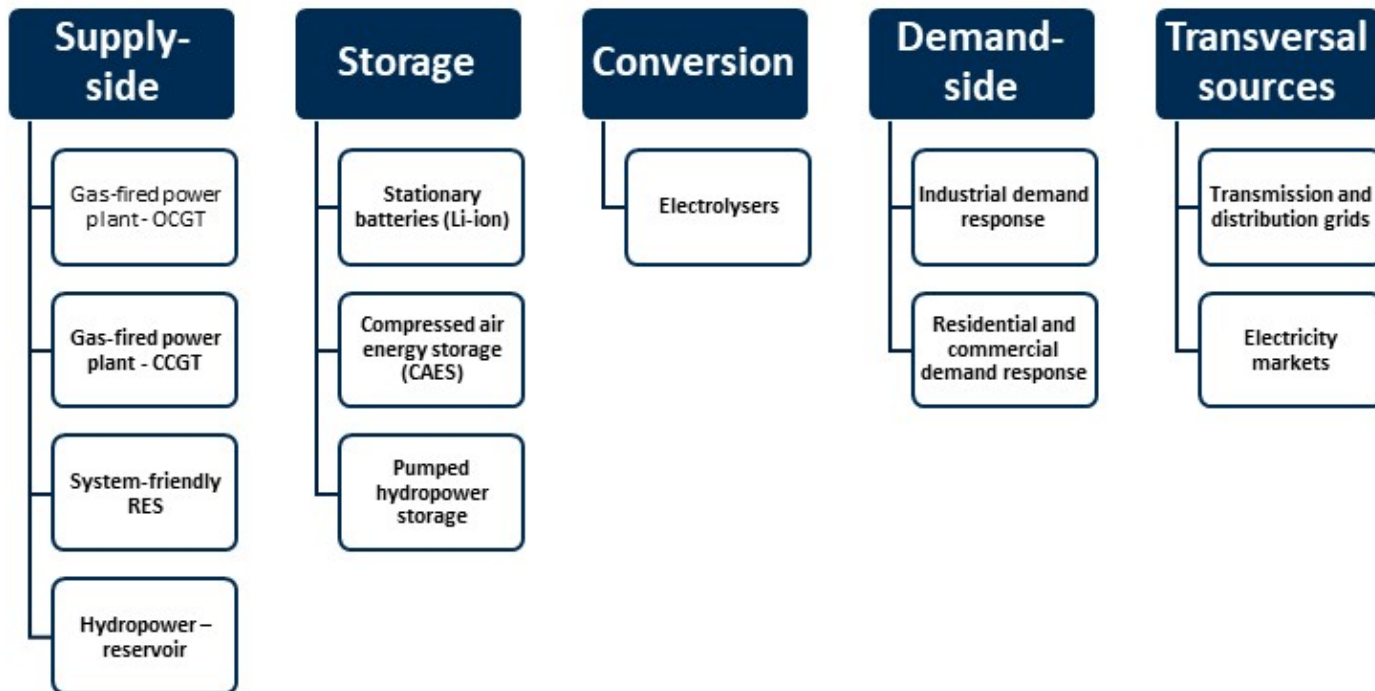
TECHNICAL FLEXIBILITY SOURCES physical flexibility assets (such as power plants, demand-response and storage) and *operational flexibility* actions that increase the flexibility of these physical assets



NON-TECHNICAL FLEXIBILITY SOURCES policies and measures which incentivise the technical flexibility sources



FLEXIBILITY SOURCES FOR DETAIL ANALYSIS



Criteria for selection:

- to cover all timeframes
- potentially economically viable
- high technological maturity
- applicability in the CPs

THE CONSULTANT PREPARED EXCEL FILES WITH DATA TO BE FILLED IN

DATA COLLECTION STARTED (INCOMPLETE DATA SETS SUBMITTED BY MOST OF CPs)

DATA COLLECTION PROCESS CONTINUES UNTIL COMPLETE DATA FOR MODELLING IS COLLECTED (GENERATION MIX, TIME SERIES OF DEMAND, HPPs, RES etc.)

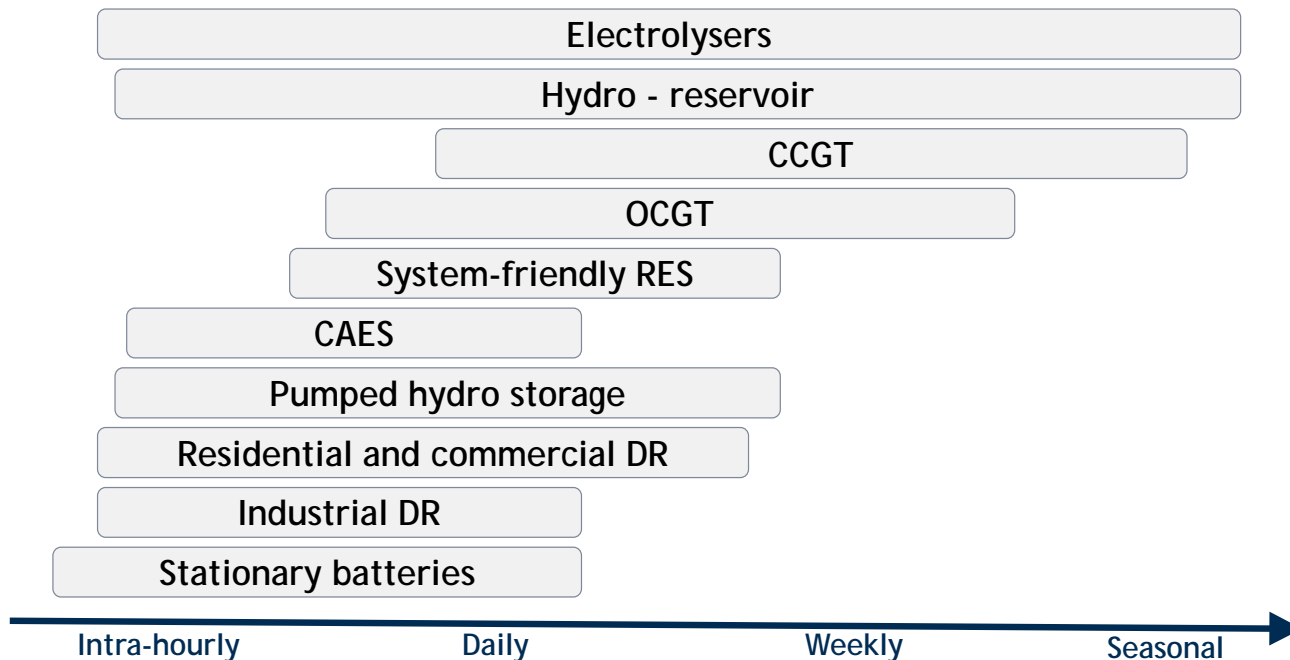
Additional clarifications

Consultations

Data collection

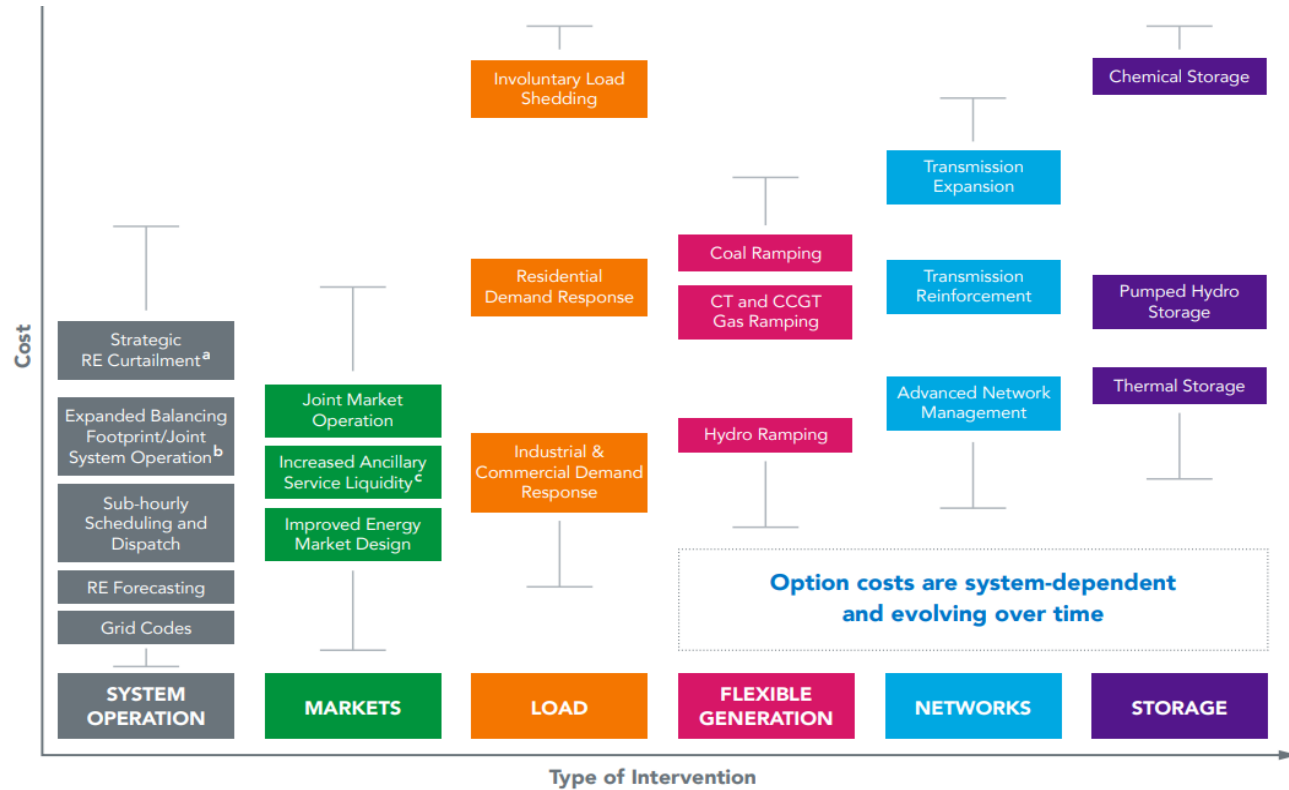
		Unit	Comment	Source	Current	Baseline Scenario		Comment from the CP
						2030	2040	
Installed Capacities	Lignite, coal and manufactured gas	MW	disaggregated by type of	EnC-Carbon Price Study	225	225	225	
	Lignite	MW		ENTSOE Transparency Platform	210			
	Coal	MW		ENTSOE Transparency Platform	0			
	Manufactured gas	MW		ENTSOE Transparency Platform	0			
	Gas OCGT	MW		EnC-Carbon Price Study	0	0	0	
	Gas CCGT	MW		EnC-Carbon Price Study	0	0	0	
	Nuclear	MW		EnC-Carbon Price Study	0	0	0	
	Hydro	MW	disaggregated by type of	EnC-Carbon Price Study	649	683	683	
	Hydro Run-of-river	MW		ENTSOE Transparency Platform	307			
	Hydro Reservoir	MW		ENTSOE Transparency Platform	342			
	Hydro Pumped Storage	MW		ENTSOE Transparency Platform	0			
	Batteries & CAES	MW			0			
	Electrolysers	MW			0			
	Biomass	MW		EnC-Carbon Price Study	10	10	10	
	Wind onshore	MW		EnC-Carbon Price Study	118	338	373	
Wind offshore	MW		EnC-Carbon Price Study	0	0	0		
PV	MW		EnC-Carbon Price Study	7	263	466		
Technical characteristics	Pump hydro storage potential	MW						
	Hydro reservoir storage capacity	GWh		ME NDP 2018-2027	460			
	Initial hydro reservoir storage level	%	at the beginning of the year					
Annual parameter	Final electricity demand	GWh		EnC-Carbon Price Study	3067	3468	3754	
	National losses on the transport and distribution network	GWh		EnC-Carbon Price Study	518	569	597	
	EV electricity demand	GWh	Or number of Evs					
	Share of smart charging in EV fleet	%		EnC-Carbon Price Study	0	0.3	0.7	
	Electrolytic hydrogen demand	GWh						
Heat pump electricity demand	GWh	Or number of HPs						

Flexibility timeframe for selected sources



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Relative economics of the deployment of flexibility options



Flexibility sources now in the CPs

Reservoir HPPs (significant)

Pumped-storage HPPs (moderate)

Other storage (no)

OCGT (low to moderate)

CCGT (low)

Supply-side flexibility (low)

Demand-response (low)

Electric vehicles (no)

Interconnections (significant but moderately used)



PSHPP Velebit in Croatia (source: internet)



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FOR YOUR ATTENTION

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