Level of ambition of Europe in terms of RES integration, electrification, new demands uncertainty, flexibility challenge, innovation strategy for 2030 and beyond

Norela Constantinescu

Head of Innovation, European Network of Transmission System Operators for Electricity

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Reliable Sustainable Connected

The Green transition

~10x wind & solar

Zero target gives radical changes
of the power system in Europe

Much more flexibility needed

Increased integration & cooperation
between countries and sectors

Accelerated innovation is key

New technology and digital solutions makes
the transformation possible

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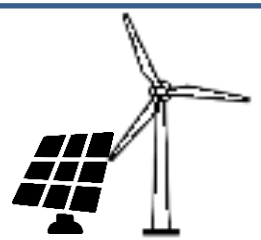
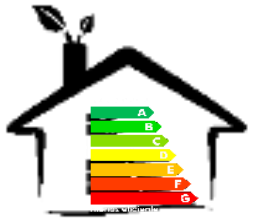
Challenges and actions are for 2020-2030

'Fit for 55' Policy & Guidelines



40% RES by 2030

55% of C02 reduction by 2030



36% improvement in energy efficiency by 2030

Finance & Investment

2.6 Trillion EUR by 2030 required for meeting energy transition targets

ENTSO-E TYNDP Scenarios

118 million electric vehicles by 2030

40 million heat pumps by 2030

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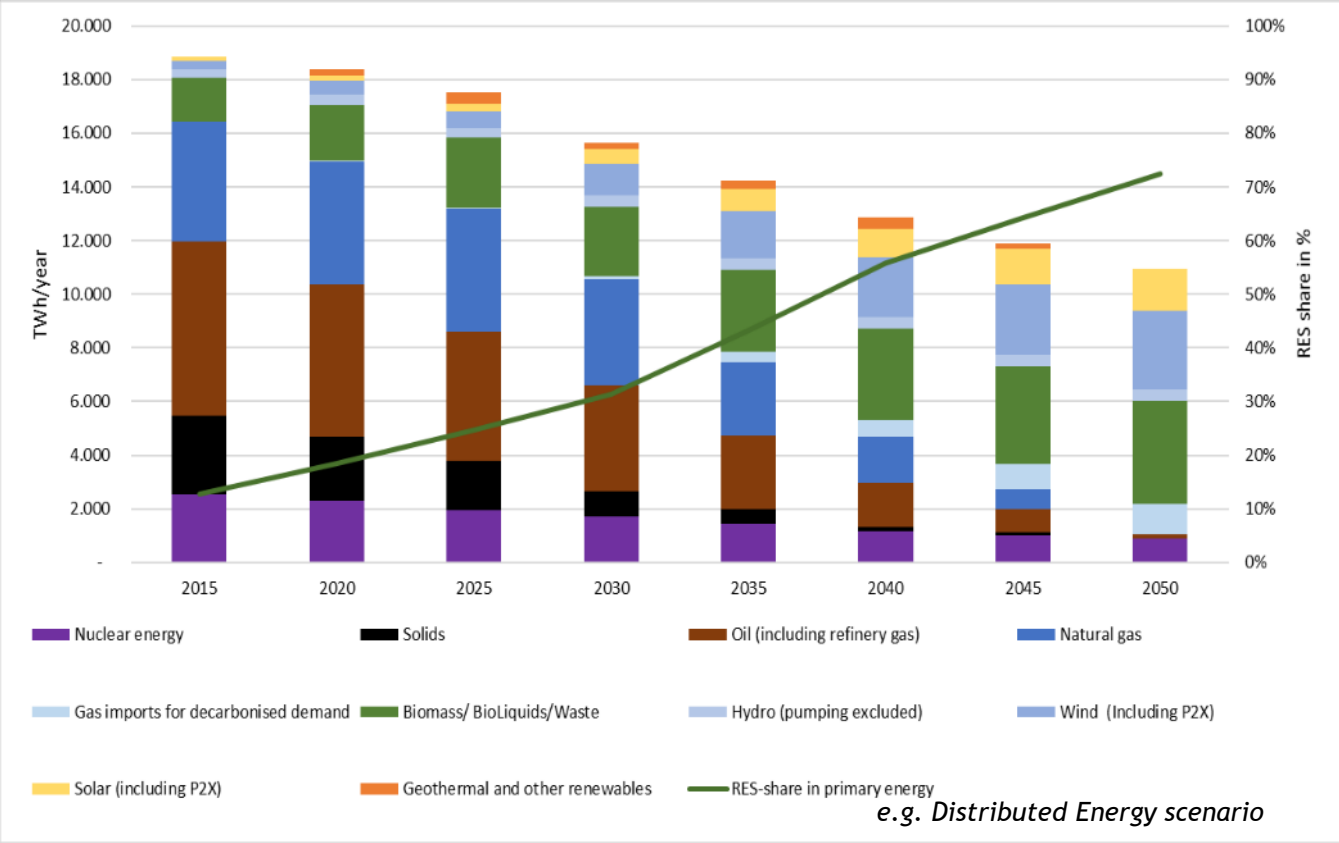
Electricity system: RES, electrification, energy efficiency



e.g. Distributed Energy scenario

Source: TYNDP 2020 Scenario Report

2050	Demand decrease	RES share
Global Ambition	42%	64%
Distributed Energy	43%	80%

2040:

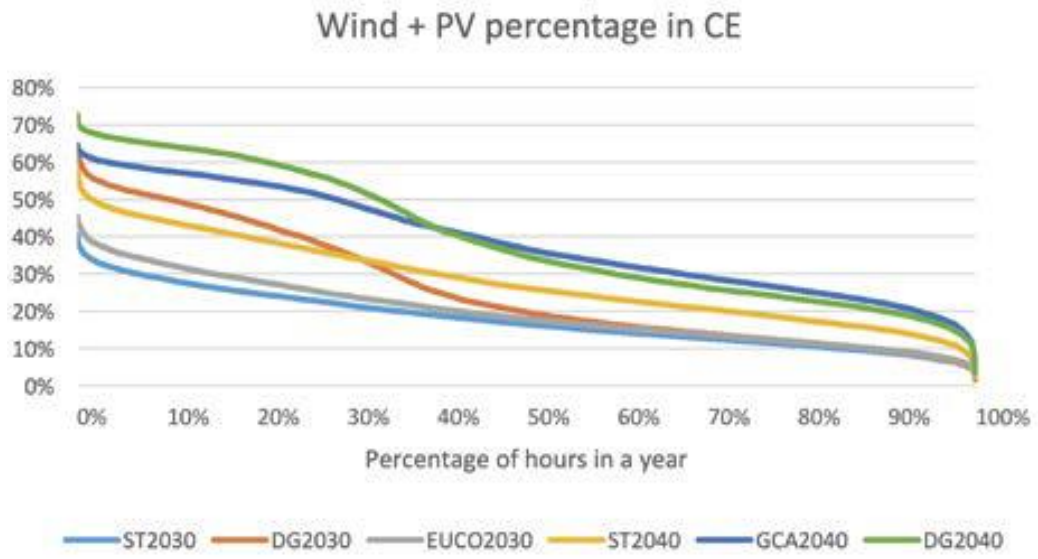
- carbon neutral power sector
- Up to 250Mio electric and plug-in hybrids
- Up to 60Mio Heat Pumps
- Up to 180GW P2G

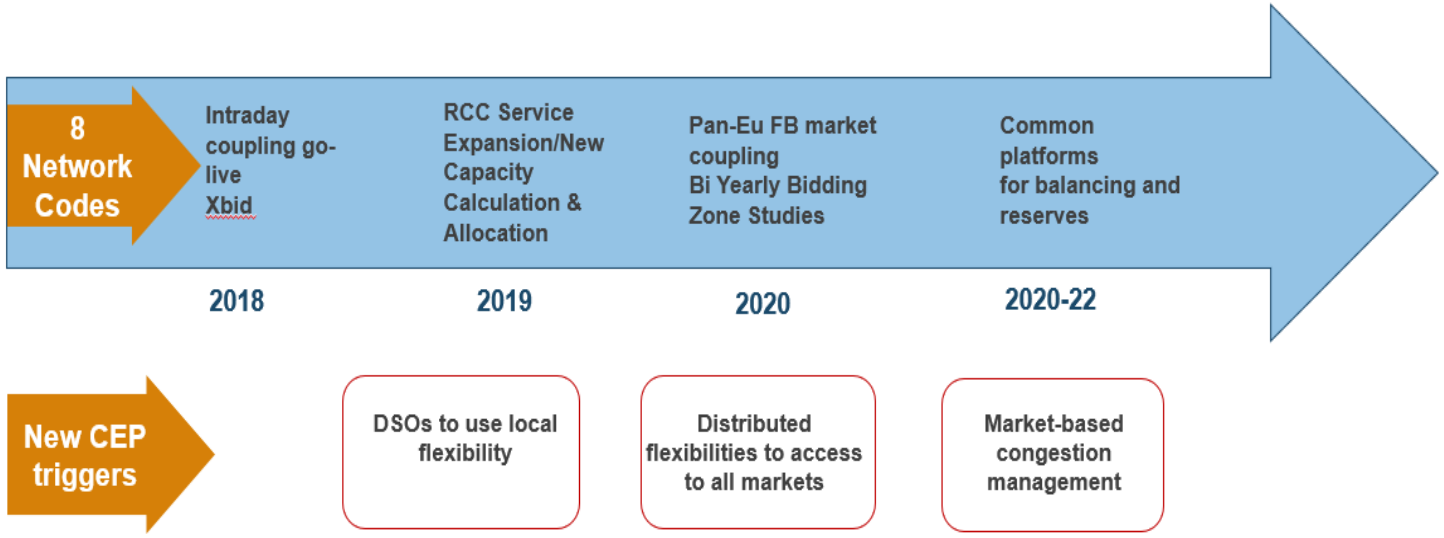
2050:

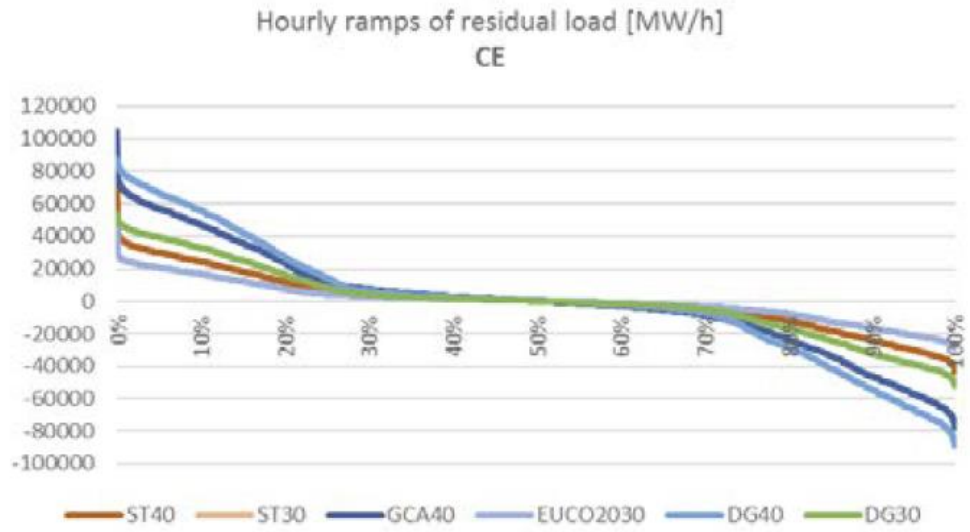
- Up to 300Mio electric and plug-in hybrids
- Up to 100Mio Heat Pumps

System flexibility needs and evolution of regulation, markets and services

- Wind and Solar penetration reaching 60-80% of the electricity generation mix during Renewable Peaks
- Residual Load ramp rates reaching 40-100GW/h





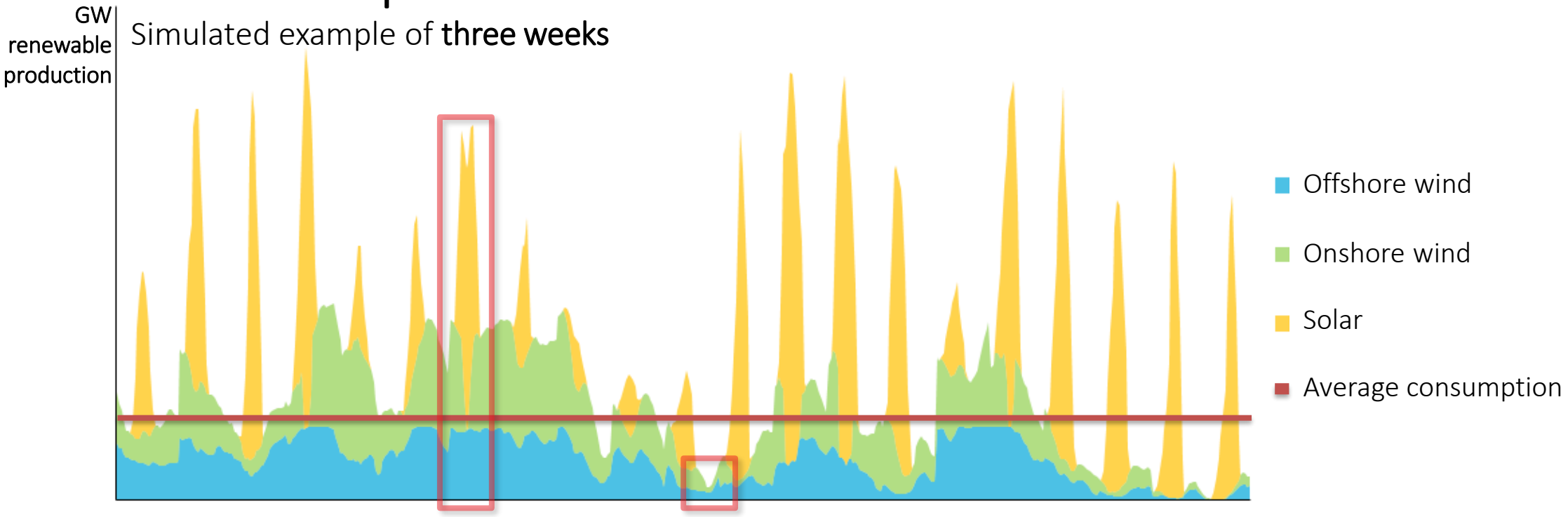


Variation from massive surplus to painful shortages

Building a renewable and resilient energy system is hard – flexibility is key

Intermittent production in 2050

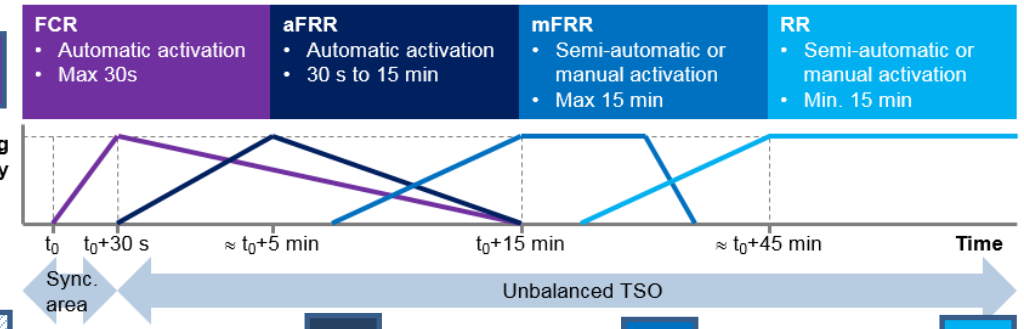
Simulated example of **three weeks**



How to handle jumps of **many 100 GWs** of production?

Balancing platforms per product/process

No Common platform for FCR foreseen in EBGL



Each process has different specifications

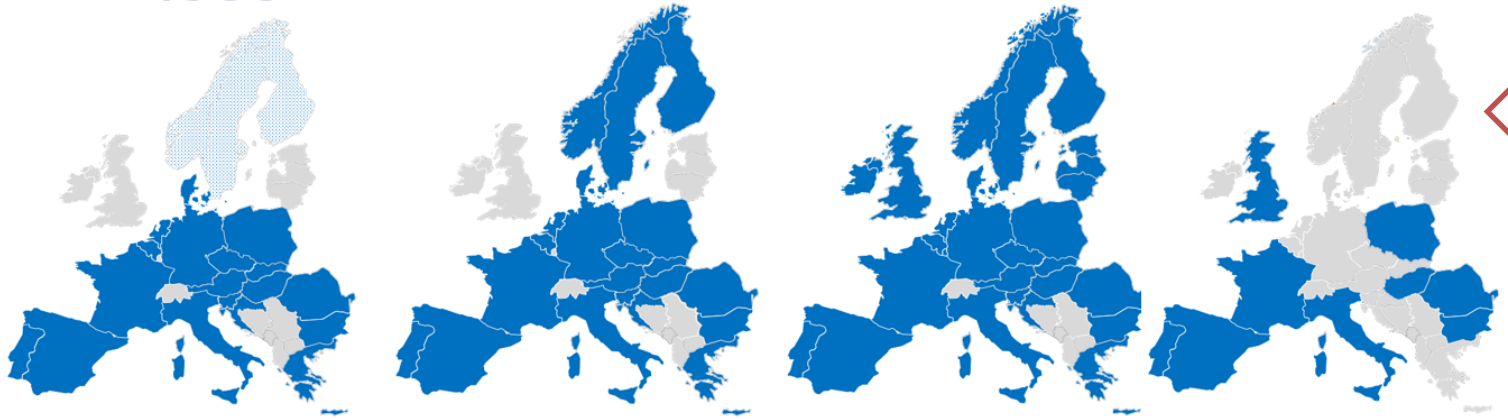
Each process has different timing

Imbalance netting: IGCC **

aFRR: PICASSO*

mFRR: MARI

RR: TERRE



Each process has different geographical scope

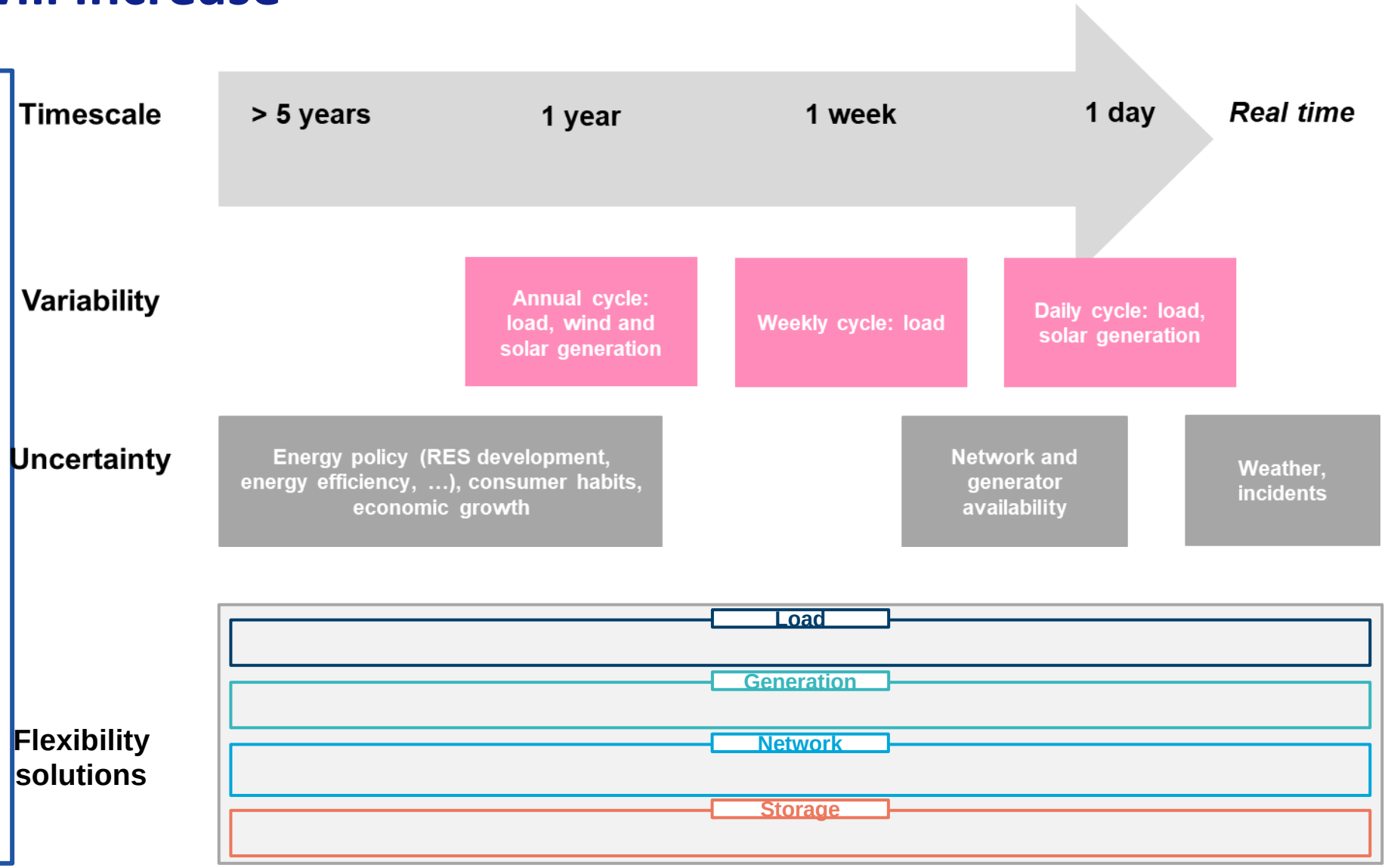
Legal obligation to join the platform (additional TSOs may join the platforms)

All the balancing platforms set common characteristics by defining a standard product per balancing platform

Flexibility needs will increase

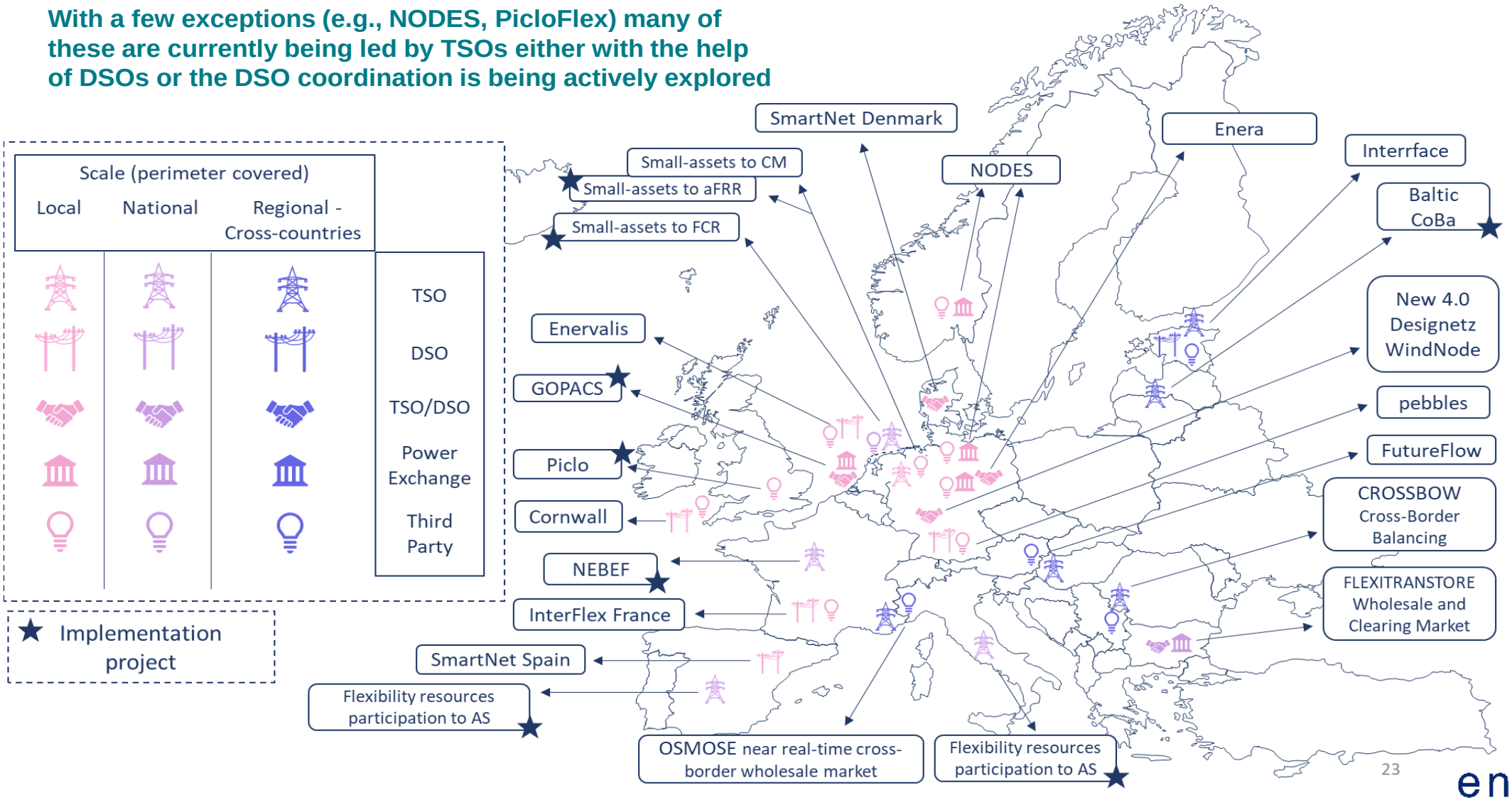
Flexibility needs increase due to variability and uncertainty in:

- **Demand**: electrification of heating, transport and industries
- **Generation**: more VRE and less dispatchable generation
- **Grids**: Power electronics dominance (less predictable flows, lack of inertia)



Wide variety of local flexibility projects piloted by TSOs, DSOs and 3rd Parties

With a few exceptions (e.g., NODES, PicloFlex) many of these are currently being led by TSOs either with the help of DSOs or the DSO coordination is being actively explored



Flexibility Challenges

Challenges to DER integration

- Prequalification requirements
- High entry and transaction costs
- Limited observability and controllability of generation and demand connected at the distribution
- ➢ Asymmetry between the needs of TSOs/DSOs, requiring high assurance for system security, and DERs considering flexibility service revenues as secondary to those from their primary functions

Challenges to TSO/DSO coordination

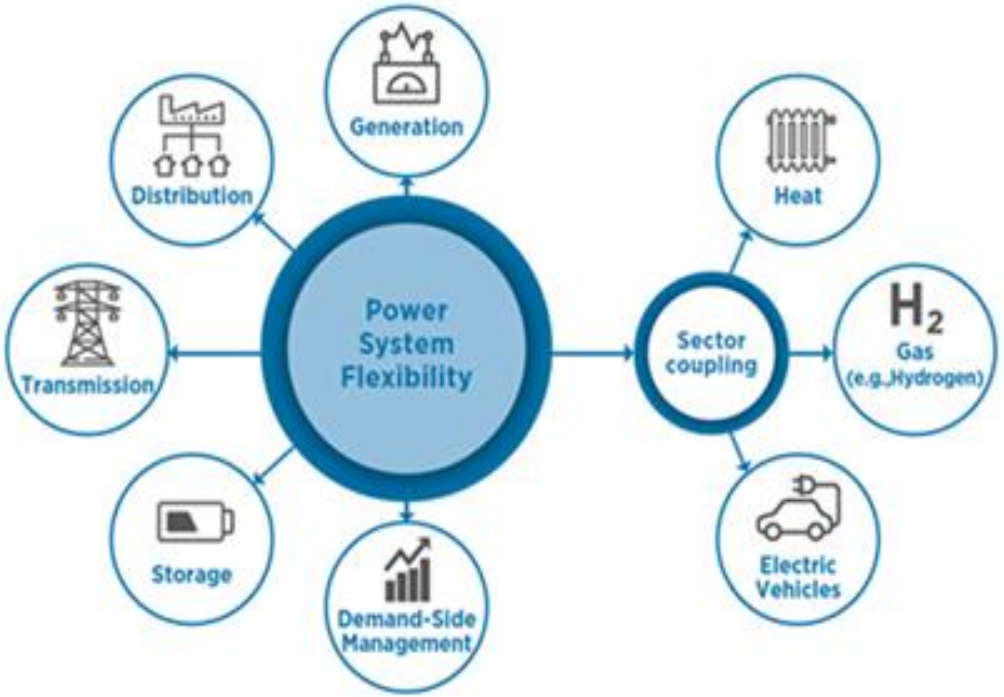
- Activation of DER at distribution should not impact the transmission (operations) – Flexibility Registry
- TSOs as the first-mover have advantage vs DSO in procuring of flexibility services

Challenges to market design

- Different flexibility platform services: designed by different parties (eg intraday market/no integration to the wholesale market)
- No harmonisation of products for congestion management in the EU (eg activation time, availability)
- Possibility for strategic gaming behaviour by FSPs when running in different markets (eg wholesale, balancing and flexibility market)

Sector integration

Sector integration : Flexibility , optimization



Flexibility portfolio (Source: IRENA)

Flexibility:

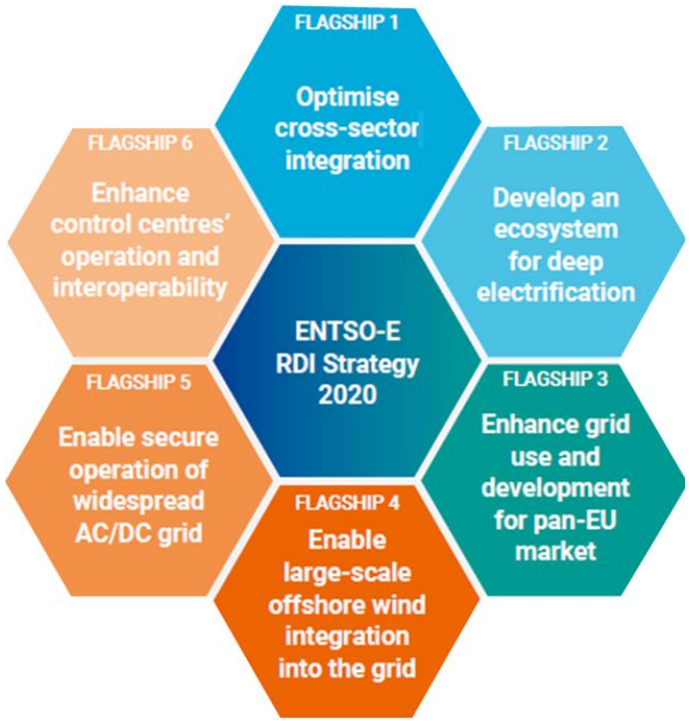
- eVs : smart charging, V2G, V2H : ramping, balancing and congestion management
- Heat (heat pumps, air conditioning) : Ramping and congestion management
- H2 (electrolyzes) : ramping and congestion management , seasonal flexibilities

Optimization of the system and infrastructure

Acceleration of innovation implementation

Crucial to reach decarbonization targets

Knowledge building



- ENTSOE RDI Roadmap 2020-2030
- Implementation Report
- Position papers

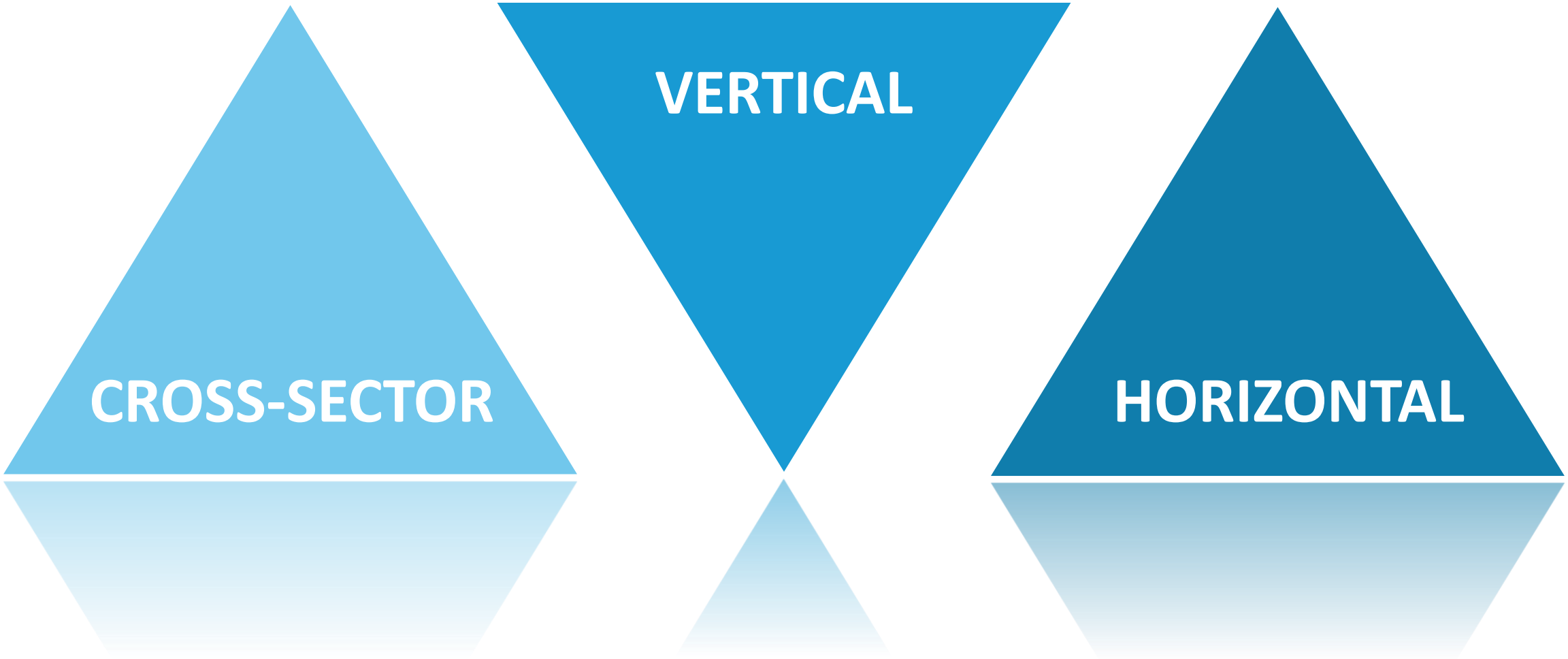
Demonstration

- Focused RDI programs
- Effective Partnerships
- Cross national perspective

Investments

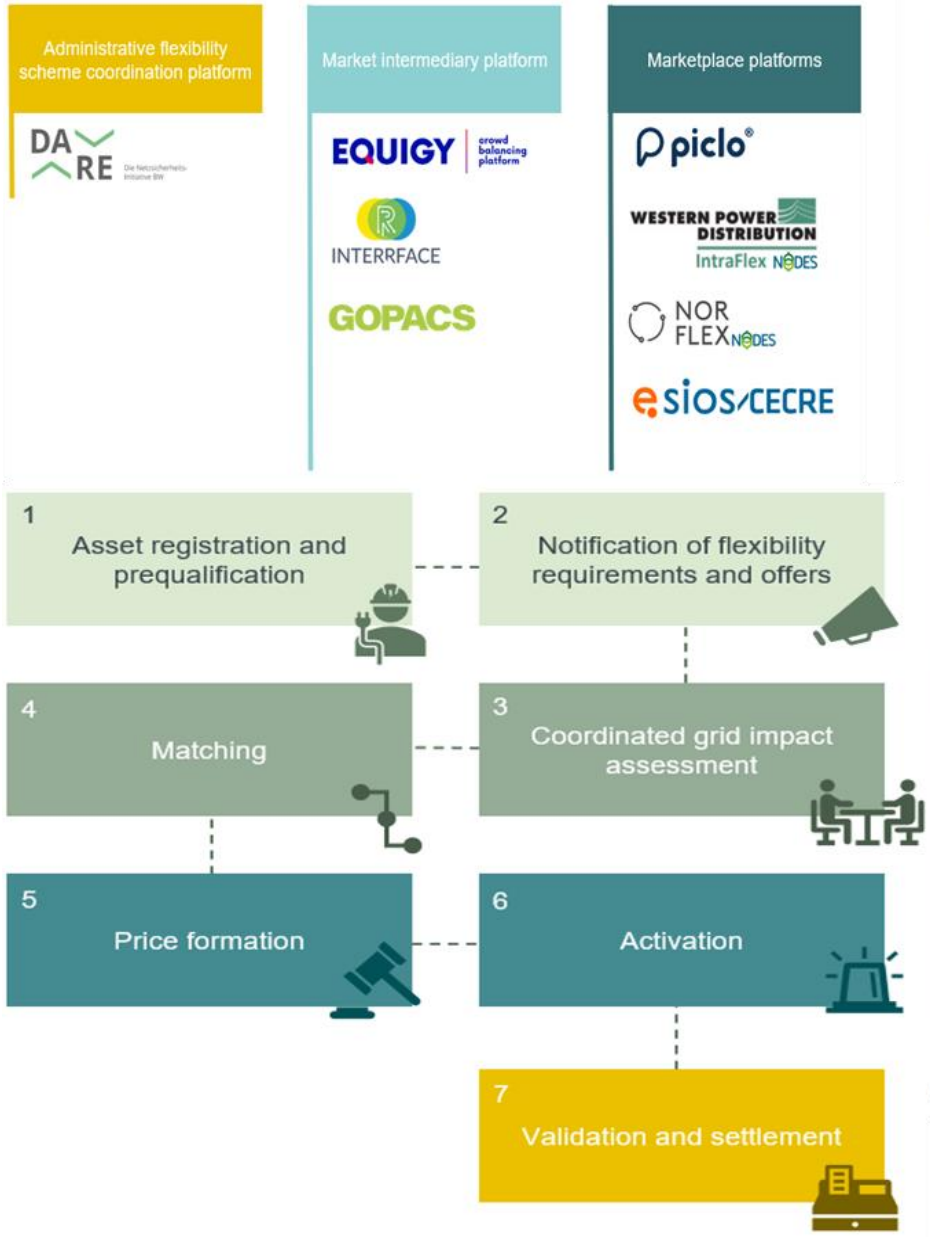
- Natural environment for efficiency investments, Risk taking, Social welfare creation, …

Integration of systems on 3 levels



Thank you

Flexibility platforms and functionalities



Data exchange platforms	Flexibility platforms			Aggregators
	Network operator	Independent operator		
Grid data	Network procurer	Any procurer	Network procurer	
• EDSN • Open Networks Project • SII (Italy) • TDX ASSIST • TSO-DSO communication platform (IO.E) • TSO-DSO Flexhub	• ARGE FNB – 50Hertz • bne Flexmarkt • Baltic CoBa • Coordinet • CROSSBOW: Regional DSM Integration platform, wholesale, and ancillary market toolset • DA/RE • Dynamo Flexmarkt in Nijmegen-Noord • EUniversal (German demo) • EUniversal (Polish demo) • EUniversal (Portuguese demo) • FUSION • GOPACS • IGCC: imbalance netting project • MARI • NEBEF (Block Exchange Notification of Demand Response) • Parity • Participation of distributed flexibilities in the balancing market (RED Electrica) • PICASSO • Platone • ReFlex (Enedis) • TERRE • X-flex Concluded projects: • InterFlex: Dutch pilot • InterFlex: French pilot • InterFlex: Swedish pilot • Flexibility resource participation to Ancillary Services (Terna) • FutureFlow • OSMOSE: WP2, WP6 • Power Potential (TDI 2.0) • SINTEG C/sells • SINTEG C/sells: Comax • SINTEG C/sells: ReFLEX Dillenburg	• pebbles • FEVER: German pilot Concluded projects: • Cornwall Local Energy Market • Enera (from SINTEG)	• NorFlex (NODES) • IntraFlex (NODES) • Sthlmflex (NODES) • PicloFlex • INTERRFACE (IEGSA) • FLEXITRANSTORE: Wholesale and Clearing Market • Orsted – Renewable Balancing Reserve • Orsted – Market Price Optimisation • Equigy • Flexity • eBalance Plus • Merlon Concluded projects • Project TraDER (Orkney) • SINTEG C/sells: Altdorfer Flexmarkt (ALF) • SINTEG DESIGNETZ • SINTEG New 4.0: ENKO • SINTEG WindNODE: Flexibilitätsplattform	• Agregio • AutoGrid • Crowd Charge • e2m • Entelios • ev.energy • Innowatio • Jedlix (VGI) • Kaluza • Limejump • Newmotion • Next Kraftewerke • NextFlex (ENGIE) • NUVVE • Open Energi • Powerhouse • Resilience Energy • REstore • Sonnen • Upside Energy • Urban Chain • Voltalis • Yuso
Market data				
• Atrias • ECCo SP • Elhub (from Statnett) • CROSSBOW: Wide Area Monitoring Awareness System				
Meter data				
• DataHub from Fingrid • Energinet DataHub • EDA Flex • EDSN • Elhub (from Statnett) • Estfeed • MRSO • SIMEL				

Regulated domain — Commercial domain

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Flexibility alone cannot solve all >> we need more grid – a lot will be offshore

Connecting markets and sharing resources benefits all

EU offshore strategy

Capacity goals

In 2021: 12 GW

By 2030: 60 GW

By 2050: 300 GW

Fit for 55

55% reduction in 2030

EU's solution to global warming

- Higher renewables targets
- Higher carbon pricing
- Higher emissions reductions targets
- More green energy pushes sector coupling and digitalization

Needed interconnection capacity for the system by 2030