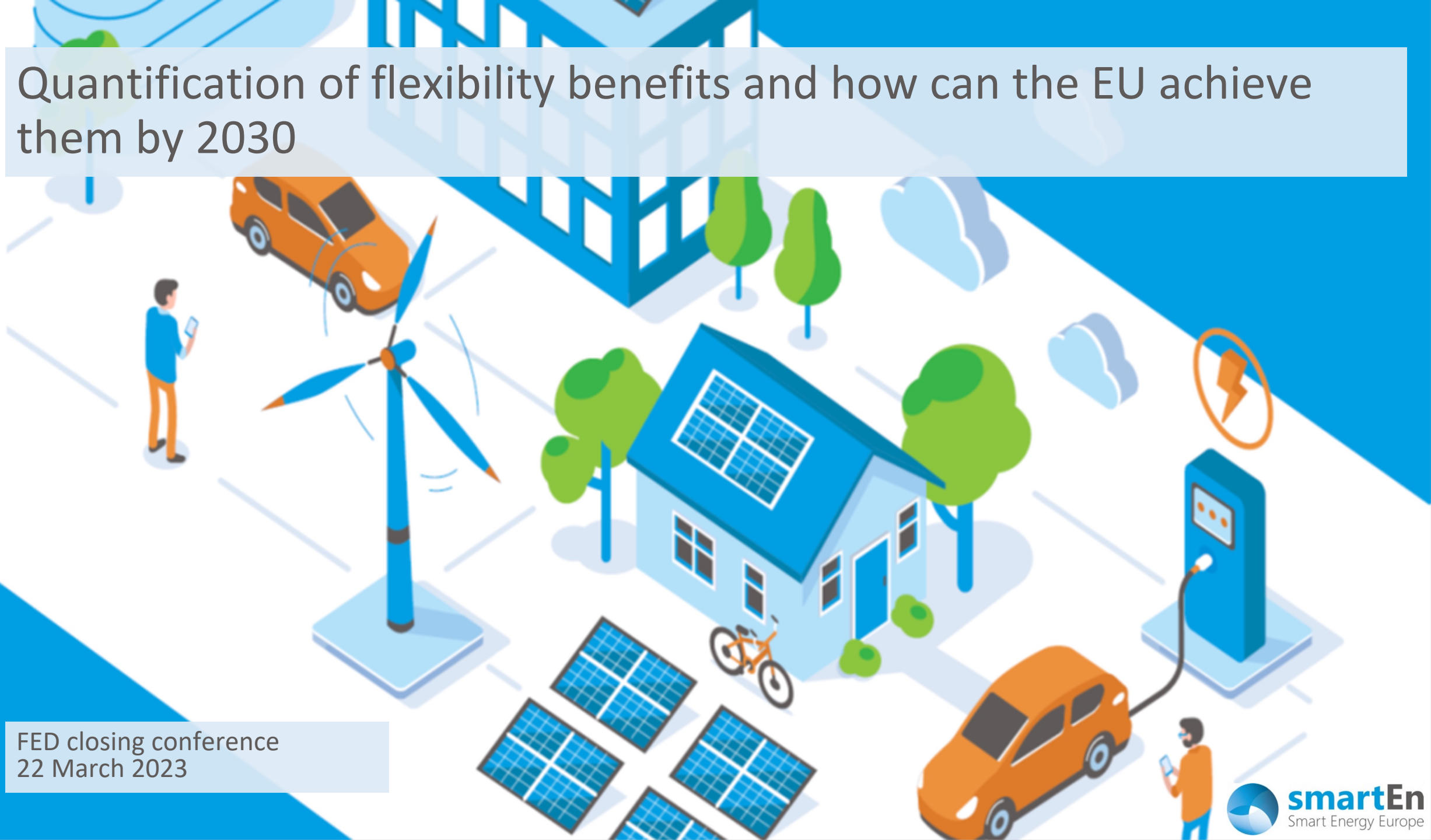
Quantification of flexibility benefits and how can the EU achieve them by 2030



FED closing conference
22 March 2023

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13GW of flexible demand in 15 European countries

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2030 DSF Quantification of Benefits study

Why this study?

Demand-side flexibility (DSF)…

- is a frequently overlooked solution in policy decisions
- lacks visibility as a reliable, efficient and climate-friendly solution
- has unclear potential as it has never been systematically quantified
- still faces regulatory barriers due to a slow implementation of the electricity market directive

Scope

In this study, DSF:

- includes flexibility from buildings, electric vehicles and industry
- includes demand management, energy storage and distributed generation
- excludes large-scale batteries, electrolysers and central generation assets

Objectives

- Quantify the potential benefits of a full deployment of DSF in the EU by 2030
- Identify the role of DSF against the Fit for 55 and REPowerEU objectives
- Examine all relevant markets

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DSF improves efficiency, reliability and sustainability

- EU's 55% GHG reduction target by 2030, will be achieved and exceeded by a full deployment of the DSF potential, but would not be met without DSF
- In 2030, the power system can serve all demand all year long, when the DSF potential is fully deployed. This is not the case without DSF deployment
- Main value of DSF is created in wholesale markets, yet the value for adequacy, balancing and grid infrastructure is still relevant

Focus on wholesale benefits

- DNV has used a fundamental market model that simulates the day-ahead spot price by optimizing the unit commit-ment and economic dispatch of electricity generation
- It contains a representation of generation, commodity prices, demand and interconnectivity for all bidding zones in EU 27

- Based on Fit-for-55 and REPower policy targets
- Assets such as EV chargers, heat pumps, industrial load, batteries are fully exposed to the market, within technical and user's constraints.

- In the "no-DSF" scenario, all DSF has been regarded as fully price-inelastic
- With some DSF already participating in markets, this reference scenario should not be considered as "BaU"
- The results provide an indication of the missed opportunity when DSF is not fully deployed

- Benefits have been calculated outside the market model.
- Calculations are based on market model data and results, as well as on literature.

Quantitative results for 2030

Wholesale benefits

€301,5 billion in indirect annual benefits from reductions in energy prices

€4.6 billion (5%) savings due to lower costs to generate electricity

Renewable energy curtailment reduces by **15.5 TWh** (61%)

37.5 million tonnes (8%) saved in annual GHG emission

System benefits

Avoidance of at least **60 GW of generation capacity**

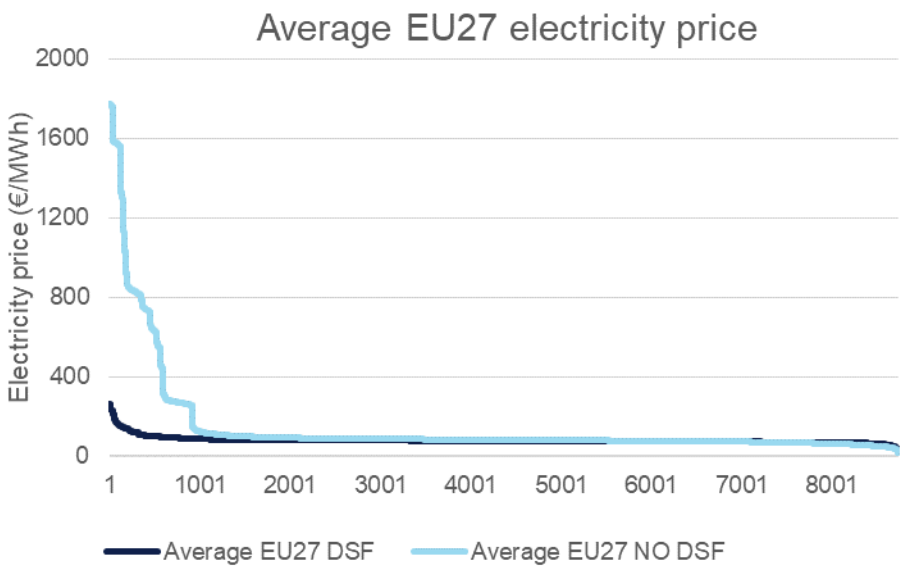
Savings in European **balancing** markets of **€262–690 million**

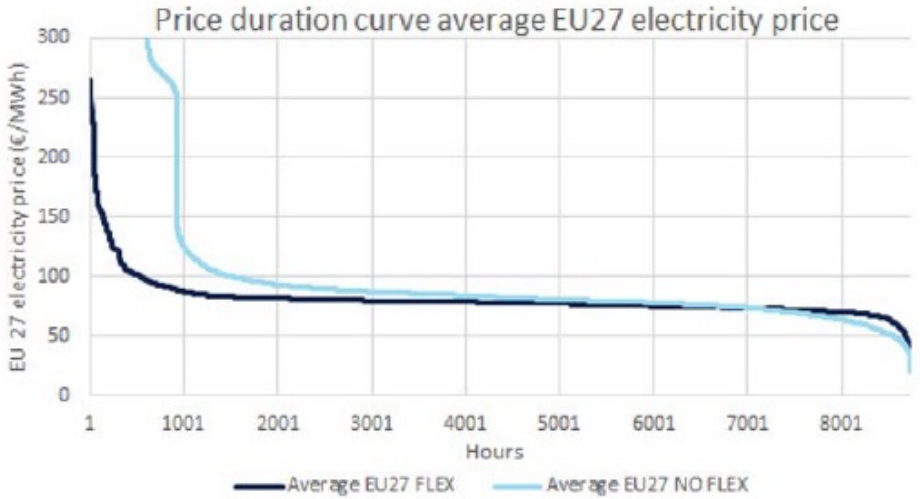
€11.1–29.1 billion saved in **grid investment** needs annually

In summary, benefits for consumers

Customers with flexible assets benefit directly (more than **€71 billion** per year)

All customers benefit from lower wholesale prices and system costs (over **€300 billion per year**)





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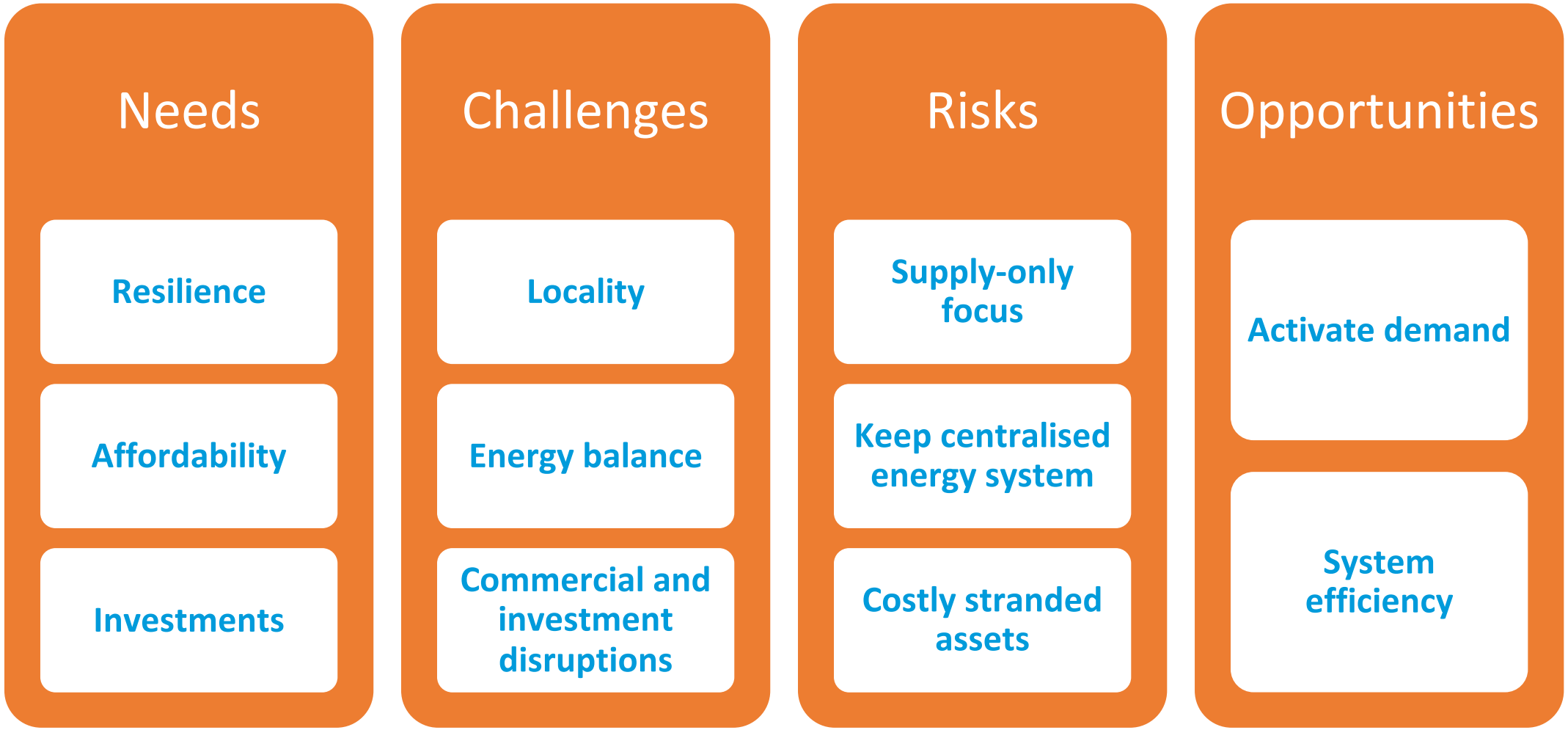
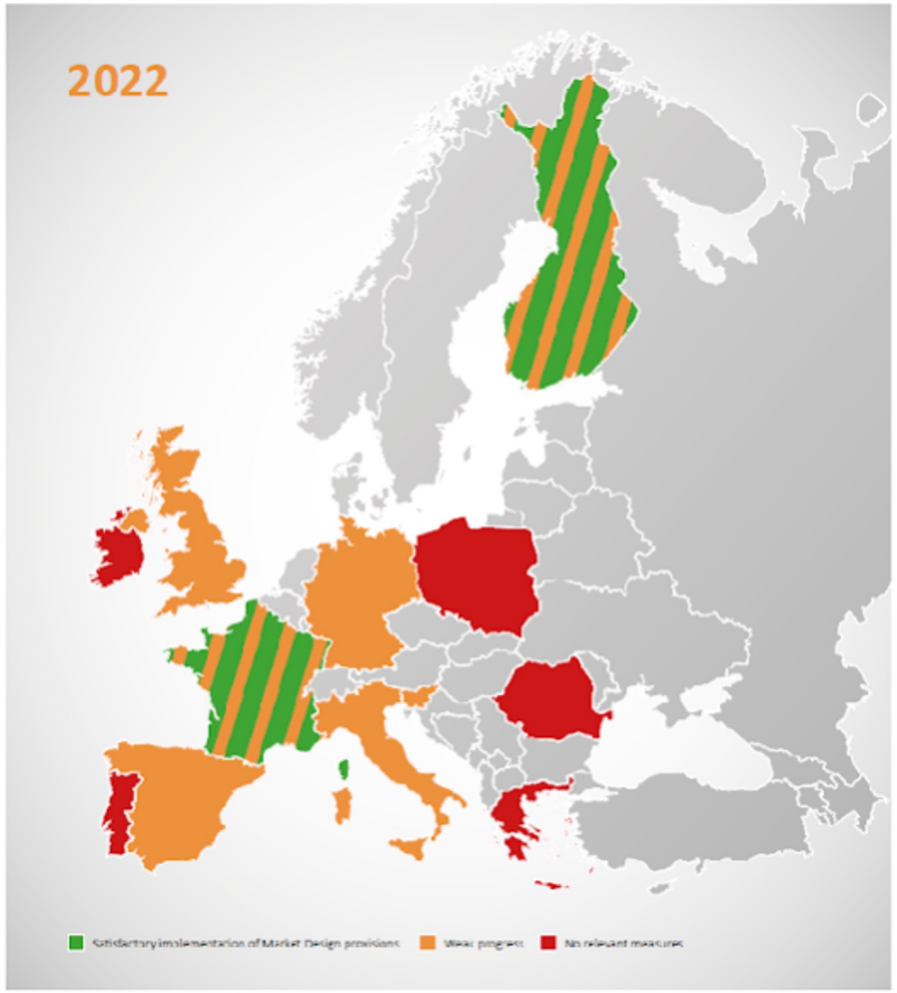
Towards a revised Electricity Market Design



7 Recommendations for a consumer-centric EMD revision

Available on www.smarten.eu

Why is Demand-side Flexibility still unlocked?

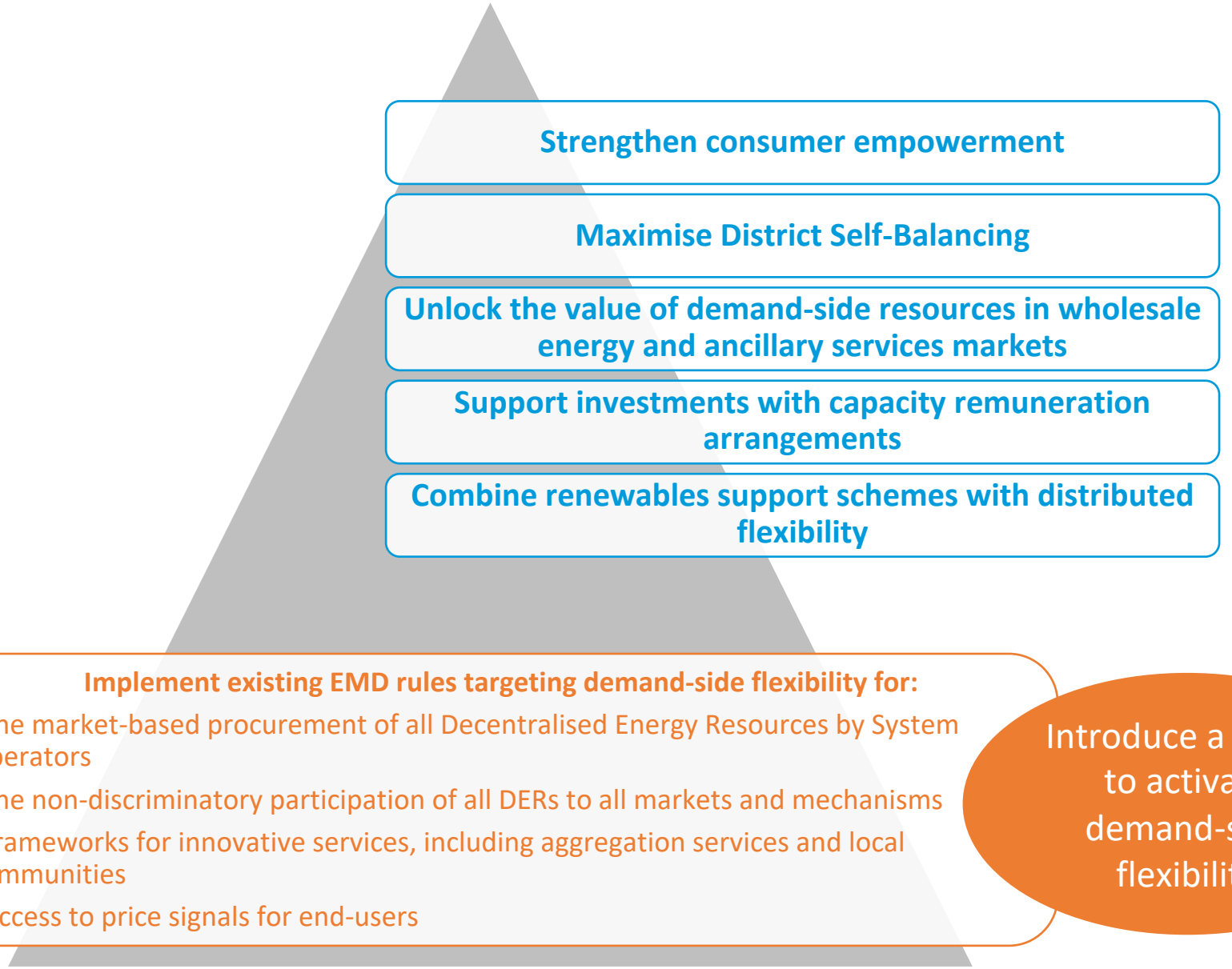


20 articles relevant for demand-side flexibility in both the 2019 EU Electricity Regulation and Electricity Directive not fully implemented yet

- Market-based procurement of all Decentralised Energy Resources (DER) by System Operators
- Non-discriminatory participation of all DER to all markets and mechanisms
- Frameworks for innovative services
- Access to price signals for end-users

Most consumers do not have the possibility to (automatically) adjust their consumption and generation patterns, and are not rewarded for that

How can the EMD revision improve the stalemate?



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Preliminary assessment of EMD proposal

Peak shaving product

- Market-based, TSO-only product after closure of DAM and before balancing markets
- Limited to demand assets
- Contracted within 2 days and not beyond 1 day from activation
- Measurement based on baseline defined by TSO with market parties, approved by NRA

Dedicated metering device

- Embedded in an assets for flexibility
- For observability and settlement
- National data validation requirements

Wholesale markets

- IDM gate closure at the earliest 30min from 2028
- DAM and IDM min bid size reduced to 100kW or less (from 500)

Network tariffs

- Consider both CAPEX and OPEX to support use of flex services and optimise existing grid
- TSO/DSO shall introduce performance targets, incl. the use of flex services

National assessment of flexibility needs

- Specific focus on DR and storage to support integration of vRES
- NRA report every 2 years for 5 years timeframe
- TSOs and DSOs are data source providers
- ENTSO-E and EU DSO Entity to define methodology, to be approved by ACER

National objective for DR and storage

- Indicative and integrated in NECPs
- Report on progress towards its achievement
- Achievement to be supported via:
  - existing CRM open to DR/storage
  - ad hoc DR/storage "flexibility support schemes" market-based, with locational criteria and min level of flex activation in markets (otherwise penalised)

Contracts

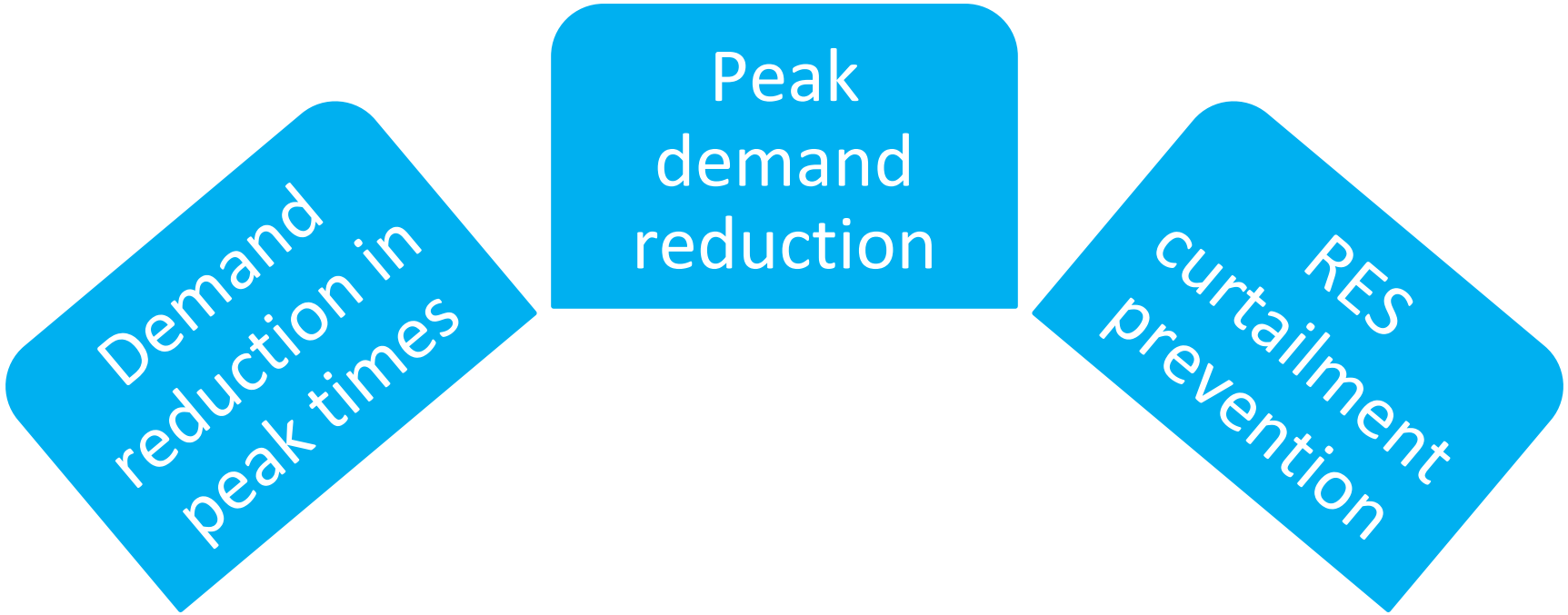
- Fixed along with dynamic

Energy sharing

- Households, SMEs, public bodies
- Sharing capacity up to 10.8 kW for households & 50 kW for multi-family buildings
- Private agreements or legal entity (third party)
- Energy shared netted from total metered consumption
- Taxes and network charges applicable
- TSOs/DSOs collect and share data with final customers and market parties every month and are responsible for registrations
- Appropriate national measures for energy poor

For questions please reach out to andres.pintobello@smarten.eu

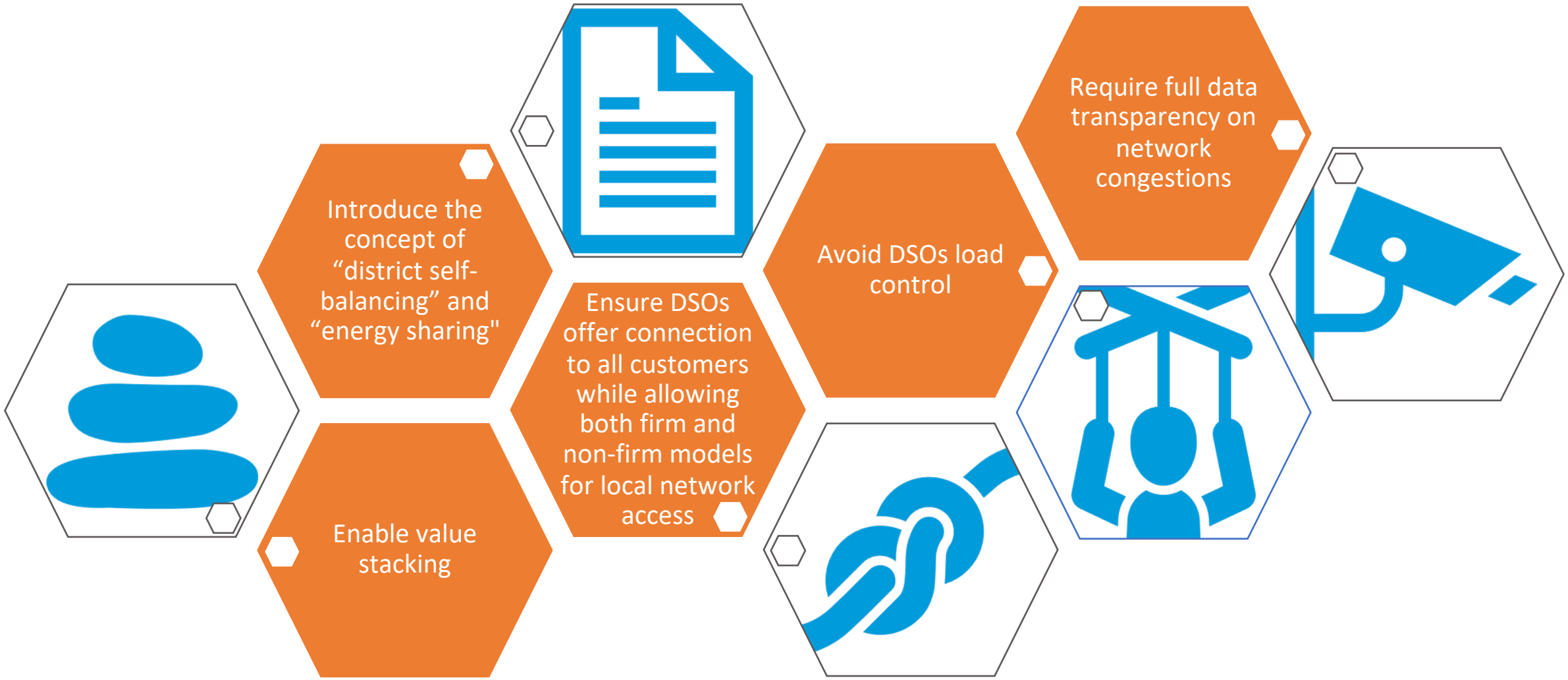
2. Introduce a target to activate Demand-side flexibility



It can take the form of a national obligation to reduce electricity demand in peak hours, as introduced among the 2022 emergency measures, or other alternatives to quantify, measure and track progress on the flexible contribution of all end-use sectors (i.e. peak demand reduction and RES curtailment prevention targets)

3. Strengthen consumer empowerment

4. Maximise District Self-Balancing



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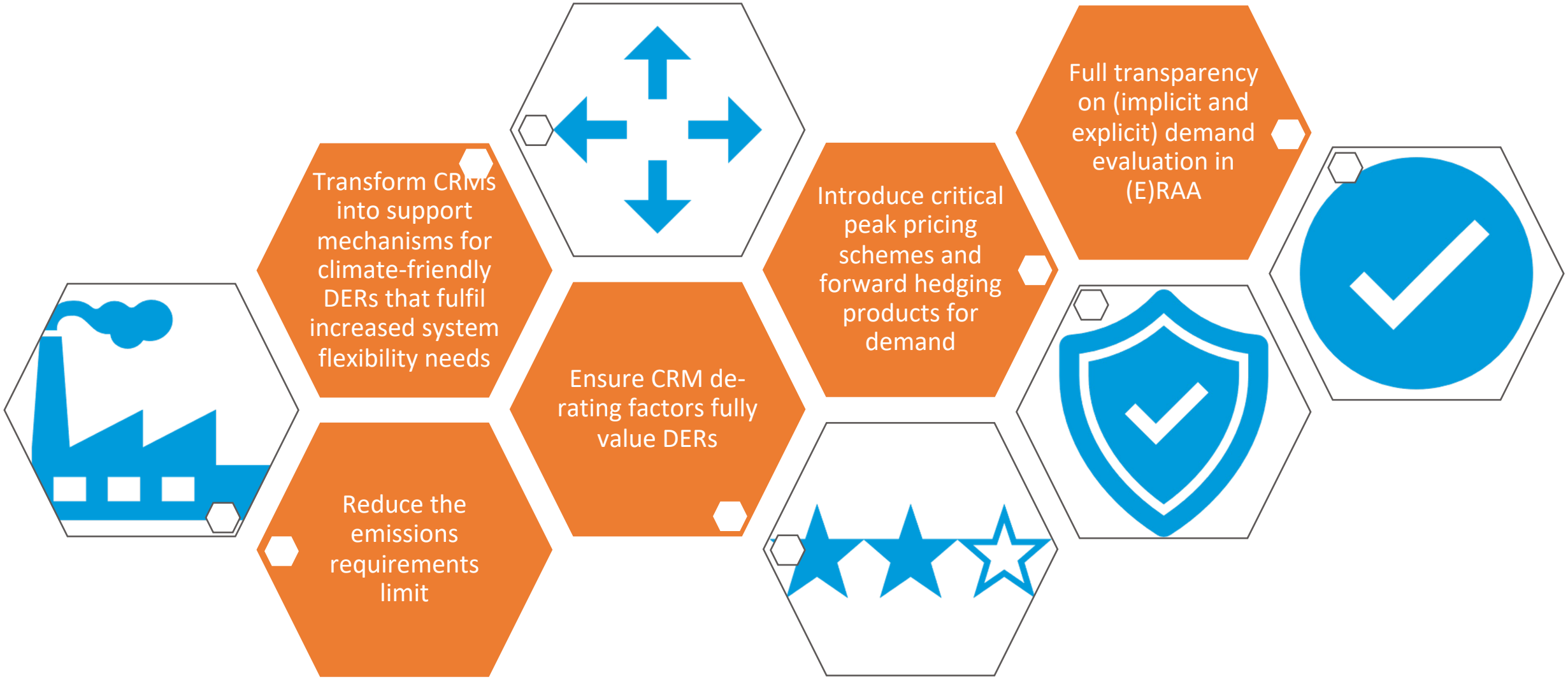
5. Unlock DERs value in wholesale markets & ancillary services

6. Support investments with capacity remuneration arrangements



7. Combine renewables support schemes with distributed flexibility[19]

Require vRES support schemes to procure flexible demand via GO 24/7

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