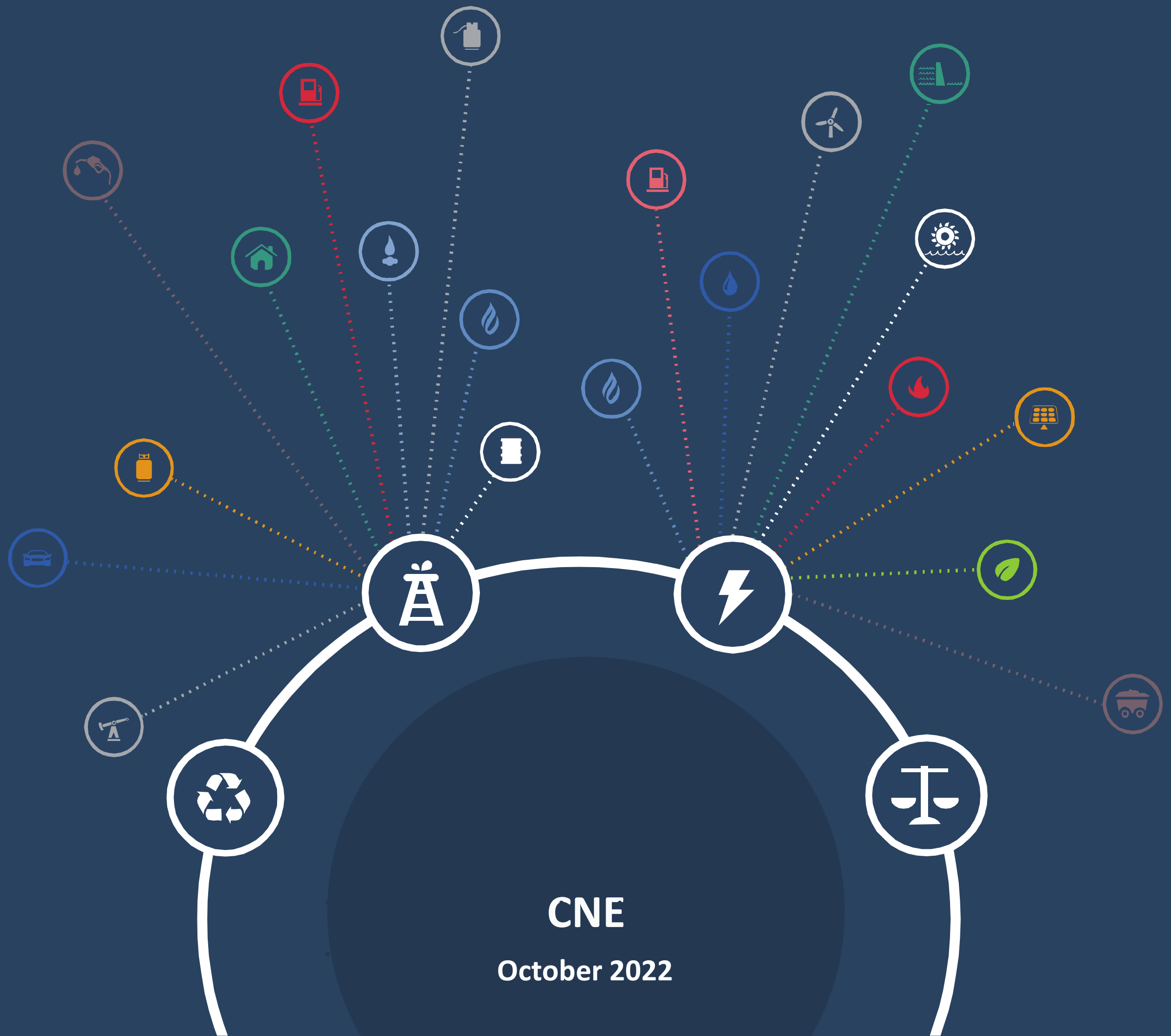
FROM PLANNING TO IMPLEMENTATION

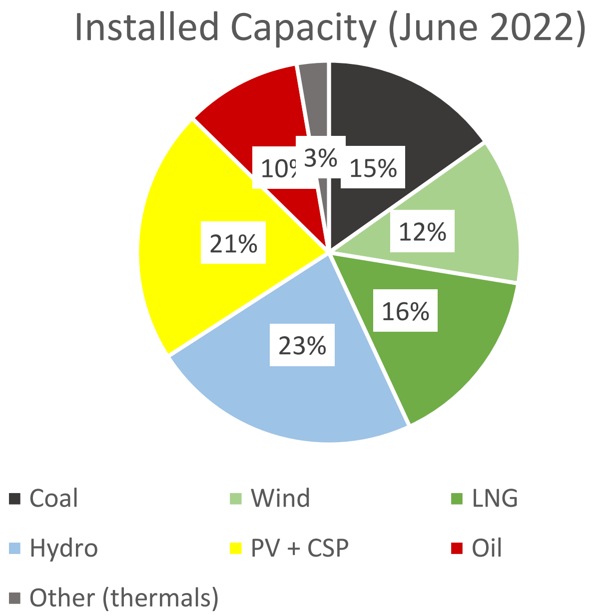
Comisión Nacional de Energía



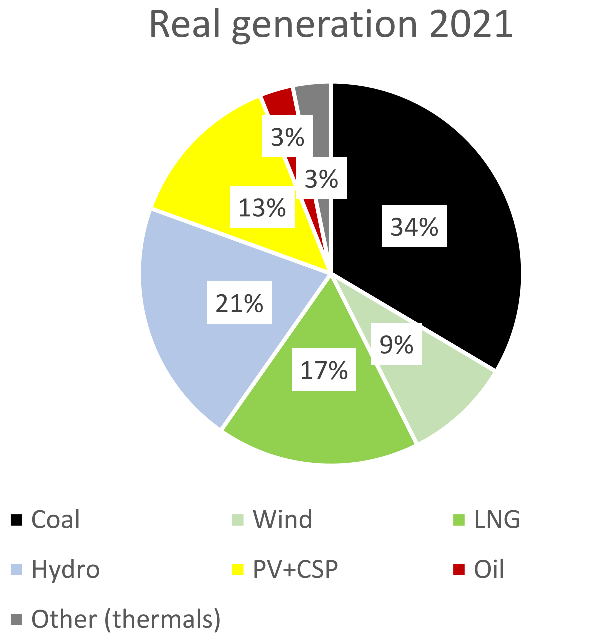
CNE

October 2022

Installed Capacity of National Energy System at Jule 2022 is approximately 32.429 MW, and peak demand around 10.500 – 11.000 MW.



Total capacity: 32,5 GW

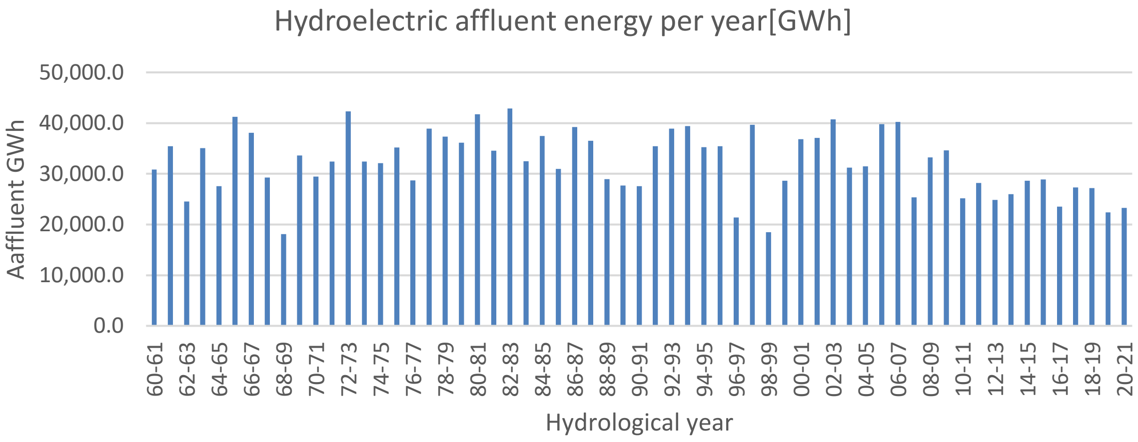


Total generation: 75,1 TWh

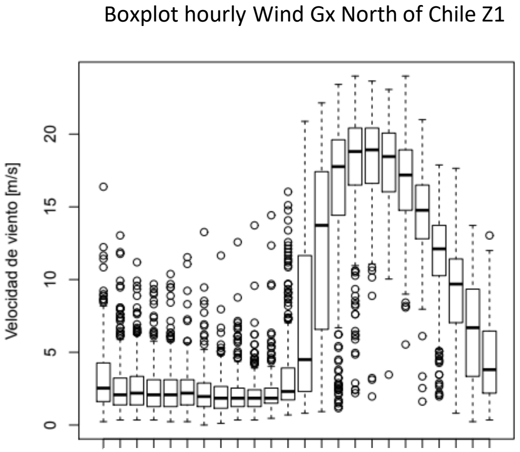
In Chile, the generation segment can participate in three markets:

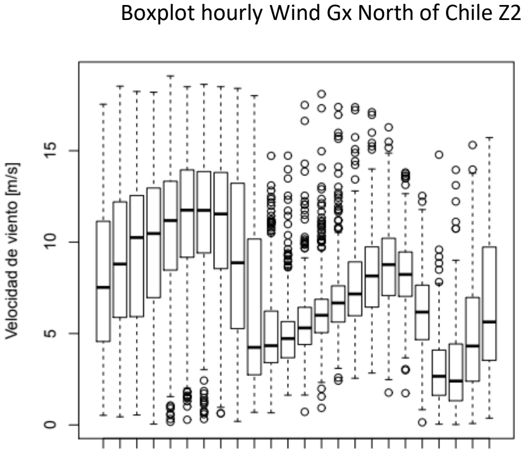
- ❑ Energy: Long term contracts. Short term market based on audited and declared costs.
- ❑ Ancillary services: based in bidding process if the service is competitive (pay as bid).
- ❑ Capacity: based on administrative payments.

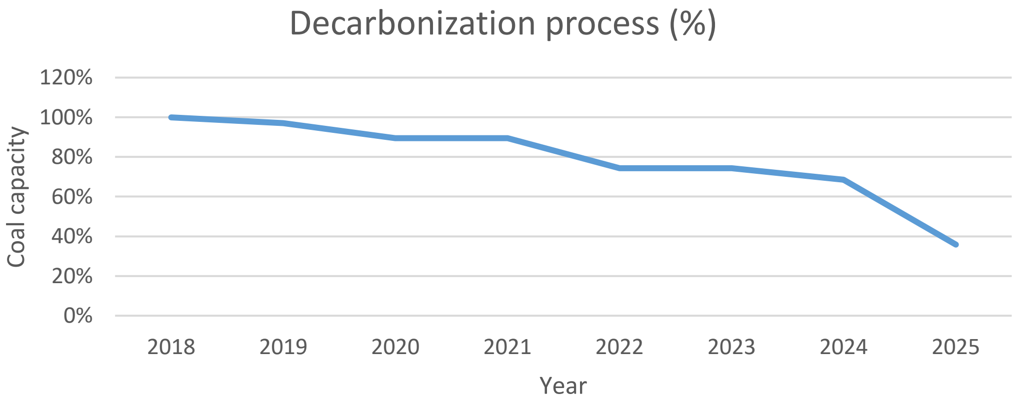
Hydroelectric, PV and Wind Power present variability and uncertainty. Also we are in a decarbonization process



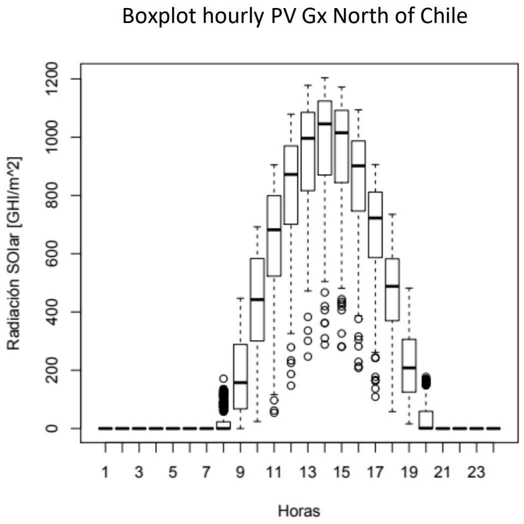
WIND

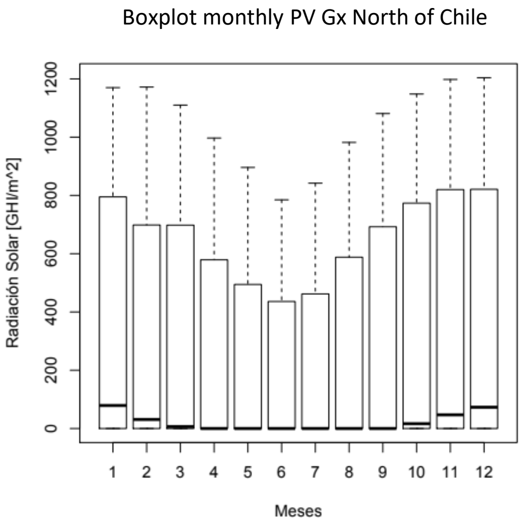




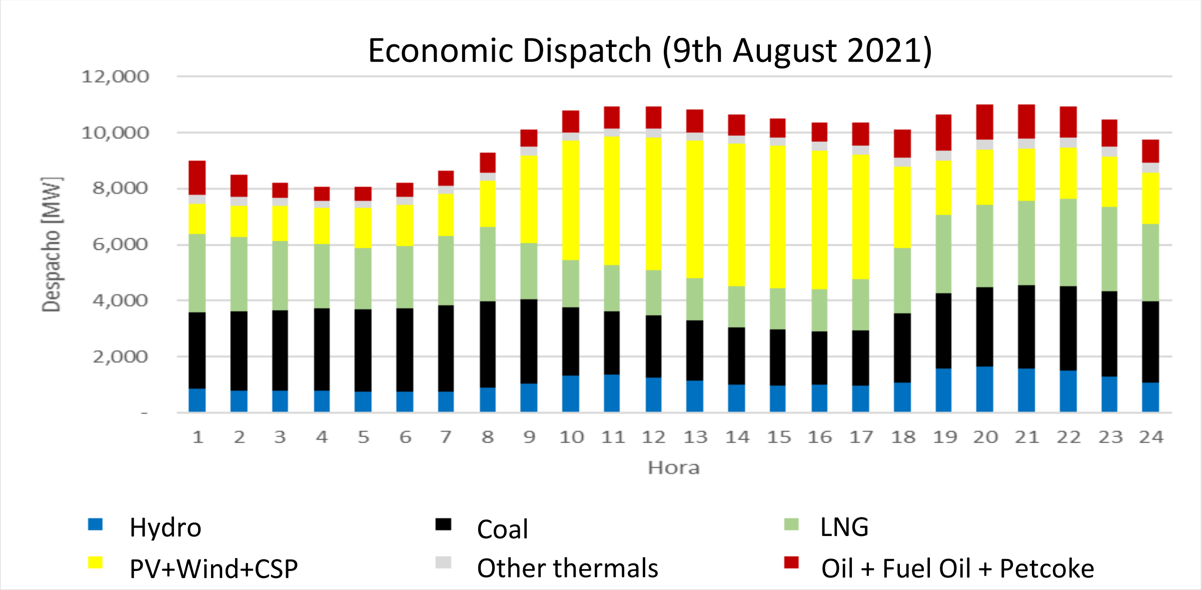


PV





With less hydro power, we have an important dispatch of oil power. In a context of lower supply availability, flexible regulation is required to increase supply available



- ❑ Oil dispatch in morning-afternoon (PV time) around 800 MW. In the night, the dispatch of this technology is around 1300 MW.
- ❑ Demand of 18-22 hours (peak period) is similar that 10-13 hours.

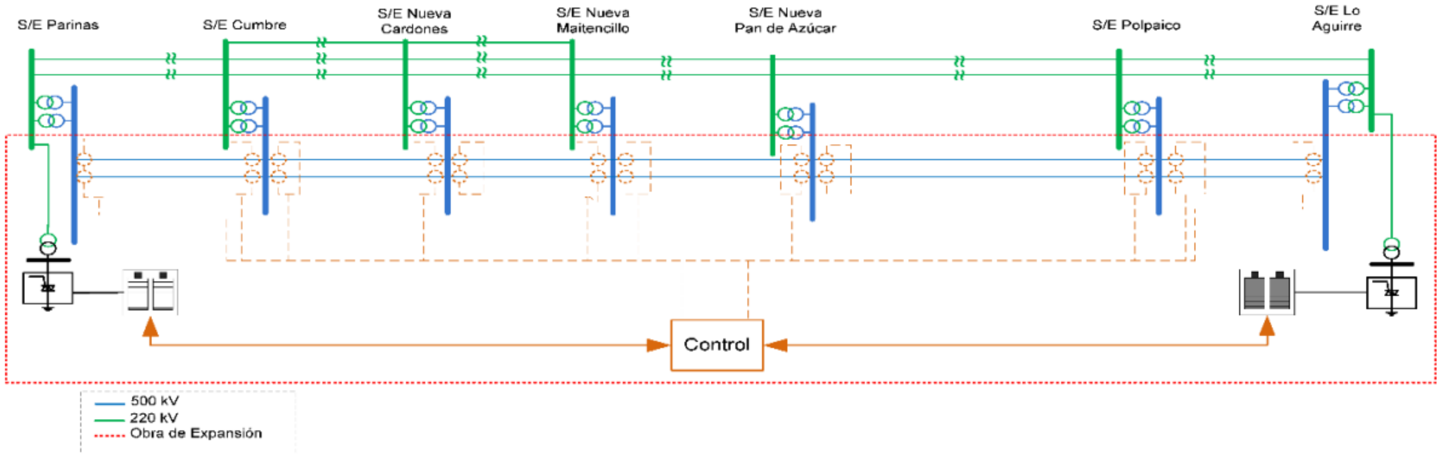
- ❑ We can activate special rules through a rationing decree:
  - ❑ Water reserve
  - ❑ Additional oil capacity
  - ❑ Others.
- ❑ In the way of Energy transition we incorporate the Strategic Reserve state. Some rules:
  - ❑ Units are convocated to operation with 2 months of anticipation.
  - ❑ Units are recognized at 60% of their maximum capacity or equivalent.

Storage systems are important in Energy transition and can participate in different markets

Storage systems are important infrastructure in the path of Transition Energy

Can participate, for example, in generation segment with renewables behind the meter	Participation in centralized transmission planning process (public service infrastructure). Differences between trunk and subtransmission system

Generator	Technology	Year	Capacity MW	Storage MW
Alfalfal	Hydro+BESS	2020	178	10(5hr)
Andes IIB	PV+BESS	2022	180	112(5hr)
Andes IV	PV+BESS	2023	211	130(5hr)
Alfalfal expansión	BESS	2023	-	49.3(5hr)



THANK YOU

JAVIER TORO-CABRERA (JTORO@CNE.CL)

Comisión Nacional de Energía

ISGAN WG 6:
Focus on network planning and decision-making under uncertainty

Joni Rossi – RISE/ISGAN WG6

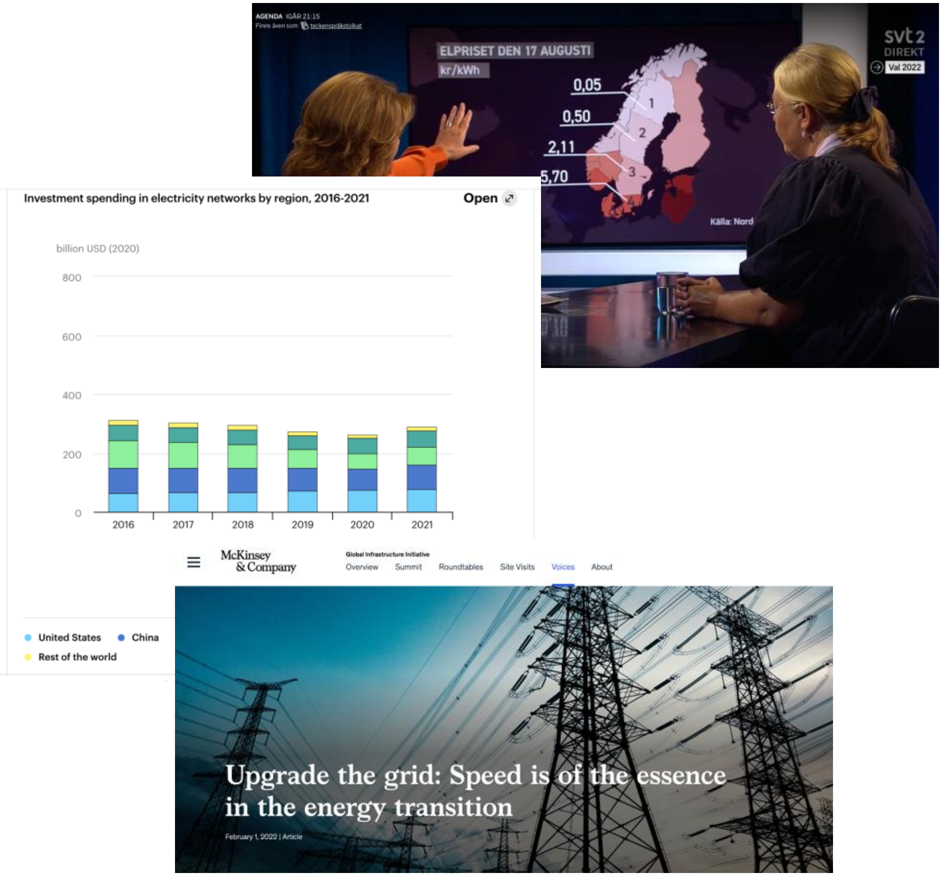
Network Planning and Decision-Making under Uncertainty

How can we best develop adequate power grids that contribute to reaching global the sustainable development goals?

International knowledge sharing project in the current ISGAN program of work.

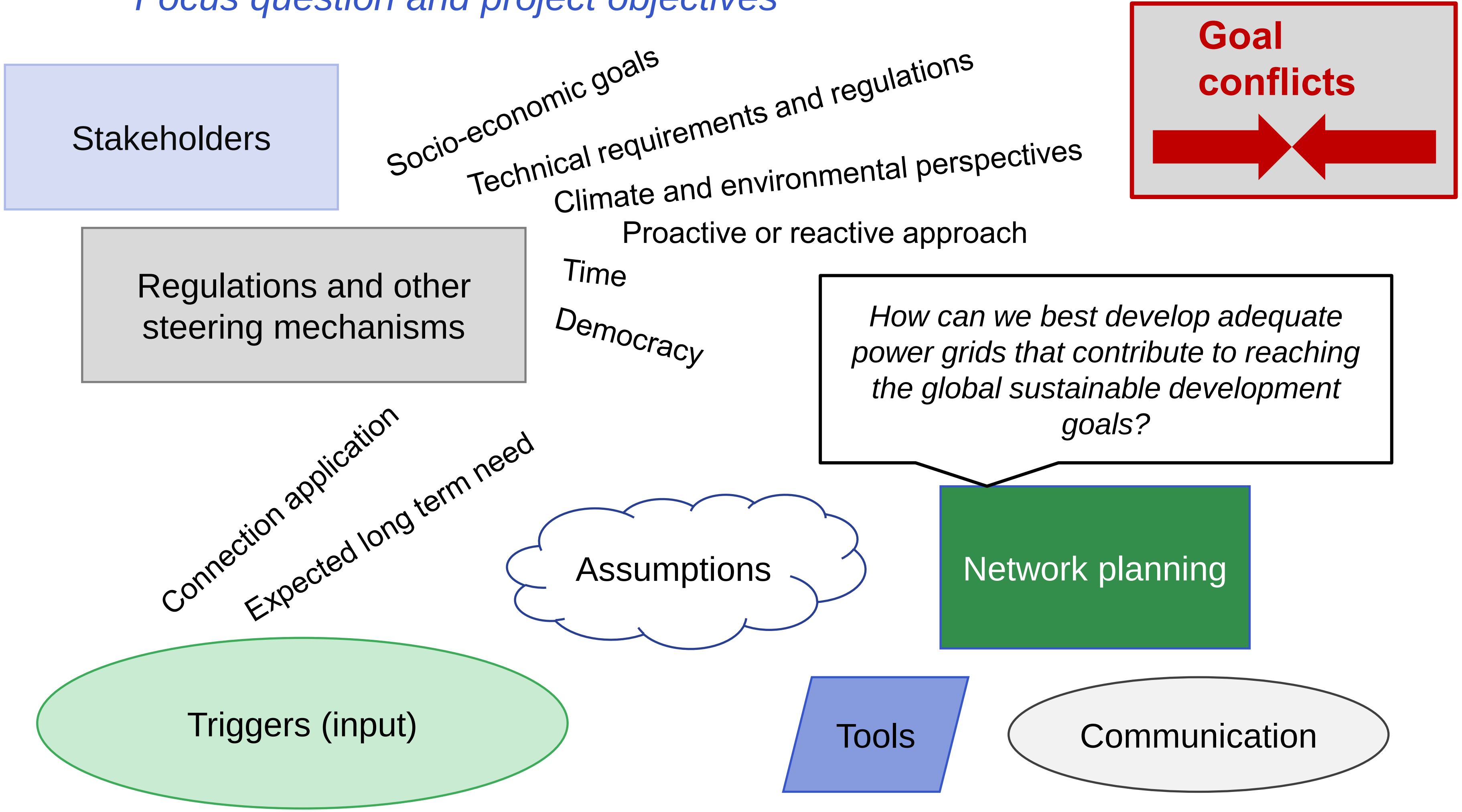
Rationale:

- Grid planning processes are **complex** and involve interaction between a large number of **stakeholders at different levels**.
- Decision making is guided both by high level policies aiming for **socio-economic** goals, as well as more **technical** performance indicators.
- In light of the **urgency** of the energy transition it is critical that these processes are efficient, transparent, legitimate, and based on sound principles and steering mechanisms.



Network Planning and Decision-Making under Uncertainty

Focus question and project objectives



- *Increasing transparency, understanding and acceptance*
  - *Enabling a holistic dialogue*
- *Efficient and constructive stakeholder interaction*
- *Steering mechanisms, that lead to intended outcomes*

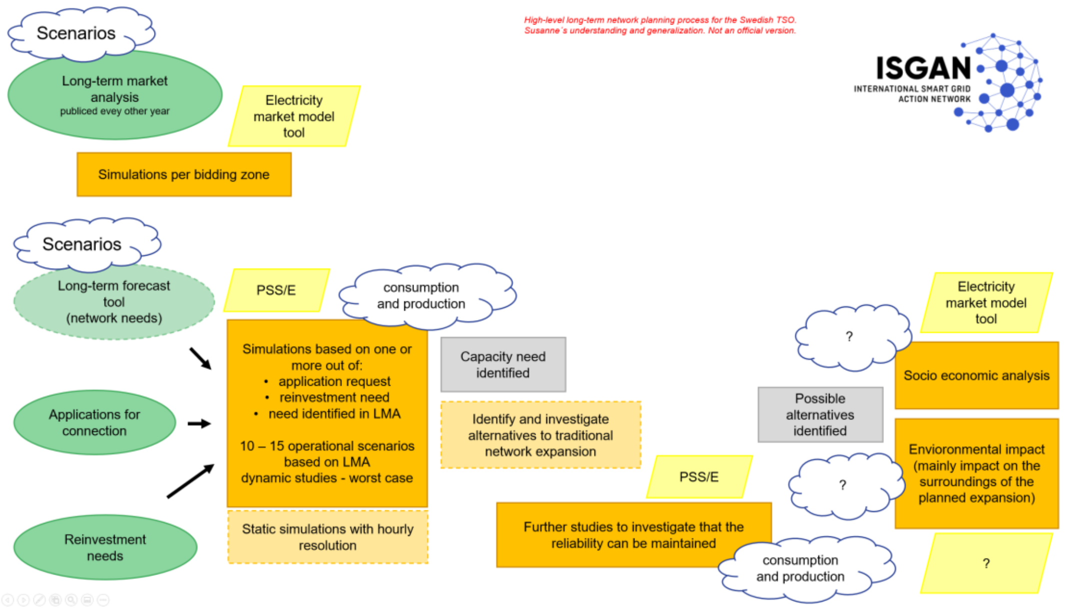
Aim for results with relevance for policy makers and where they have mandate to improve the situation

Network Planning and Decision-Making under Uncertainty

Survey on the planning processes and challenges in different countries worldwide → first outcomes

Planning processes

- Planning processes can include different aspects: network studies, future scenarios, market studies which define the **needs for network-based** solutions.
- The role of **non asset (market-based) solutions** needs to be further highlighted and its potential clarified.
- Sets of **aims and constraints** steer the development of cost-effective, reliable and environmentally sound systems, but they can also be competing and it is hard to define priorities a priori when their **importance is contextual and changing**.
    - ❖ For example shift from traditional TSO responsibilities → decarbonization → energy security and customer affordability.



Network Planning and Decision-Making under Uncertainty

Survey on the planning processes and challenges in different countries worldwide → first outcomes

Assessment and decision-making

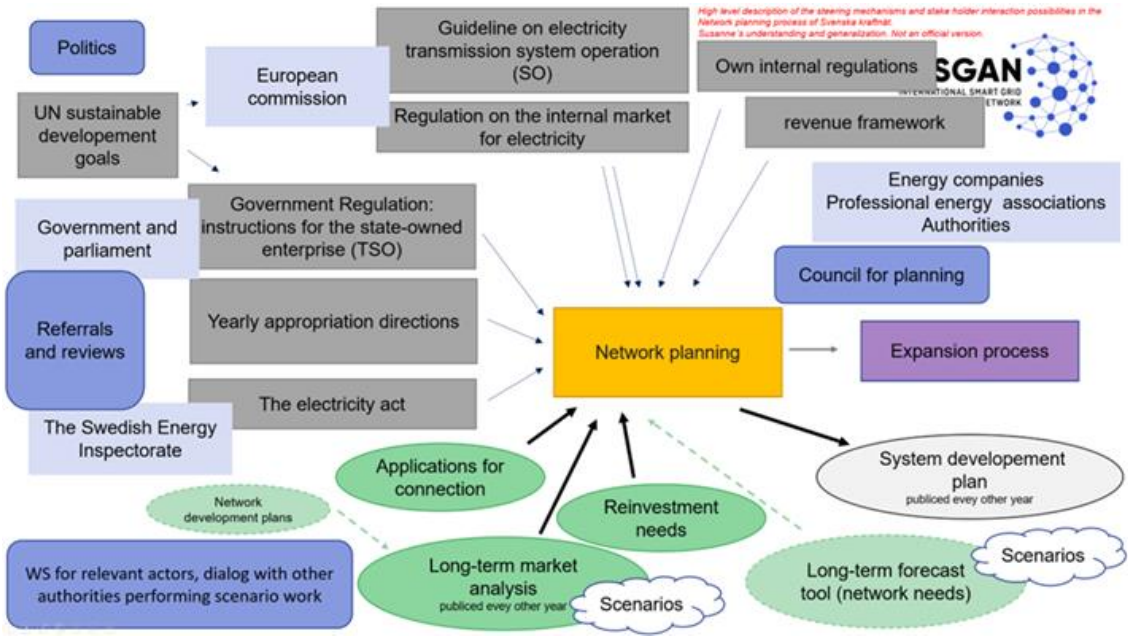
- This process needs updating in order to make multi-stage decisions to quantify the impact of uncertainties, and strike a balance between risks and benefits.
  - ❖ **upgrading of parameters**: changing system conditions, assumptions of load and production, price evolutions …
  - ❖ using more **advanced methodologies**: modelling of uncertainties, considering more heterogeneous connection requests, improving analytical capacity, probabilistic approaches…
  - ❖ expanding **granularity in time and space**
- Also on the **medium and low** voltage levels the lack of data and a clearly defined processes can cause delays.
- Only in a few cases the planning decisions are also **evaluated ex-post to ensure process improvements.**

Network Planning and Decision-Making under Uncertainty

Survey on the planning processes and challenges in different countries worldwide → first outcomes

Stakeholder involvement

- It is a matter of ongoing engagement with **all stakeholders** to balance the competing objectives at all levels of decision-making.
- Need for a better dialogue between political level / regulators and grid operators
    - ❖ If the cost recovery mechanism is regulated, **innovation** can be included in the income framework
    - ❖ Need to set realistic goals and find feasible solutions in order to reach these goals.
- Tighter **DSO/TSO interactions** and **Integrated planning** with other systems and collaboration with cities/municipalities.



Network Planning and Decision-Making under Uncertainty

Survey on the planning processes and challenges in different countries worldwide → first outcomes

Comments and recommendations

- In the current rapidly evolving technological, carbon abatement policy and geopolitical environment, a reactive approach with utilities establishing network expansion plans every couple of years needs to become more **proactive planning** based on scenario analysis. Time should be reduced between planning and realization.
    - ❖ This new approach has still several barriers.
    - ❖ While low-hanging fruits can still be picked in the planning process, the risk of interconnection backlog is increasing.
    - ❖ Some see a need for stronger political or regulatory leadership to create a future-looking process.
    - ❖ Evergreening can help ensure that they remain relevant and do not become stale .
- Several contributors mention the availability of equipment but also **skilled workforce** for placement and operation as critical barriers.

Next steps: ISGAN Knowledge Sharing Process

	SURVEY	WORKSHOP 1	ANALYSIS	WORKSHOP 2	ANALYSIS	WORKSHOP 3	ANALYSIS	DISSEMINATION
		Digital		Digital		In-person		
Process Step	**SURVEY** Background of current national planning processes	**WORKSHOP 1** **Problems:** their root causes and consequences	**ANALYSIS** of results in prioritised focus areas	**WORKSHOP 2** **Problems:** Deepen understanding, involving Key National Stakeholders	**ANALYSIS** of workshop results	**WORKSHOP 3** How can problems be mitigated or solved?	**ANALYSIS** of workshop results + **SUMMARY** of insights from project	**DISSEMINATION of Results**
Involved	Survey: Country representatives + Summary: Organising Team	Country representatives + Organising Team	Organising Team + Country representatives (optional)	Country Represenatives + Key national stakeholders	Organising Team + Country representatives (optional)	Country Representatives + Key national stakeholders	Organising Team (lead) + All workshop contributors (review)	Organising Team + ISGAN Communications Working Group
Outcome	(Internal only) REPORT informing detailed planning of workshops	Interactive knowledge exchange Selection of 1-2 areas for in-depth investigation	Analysis to share with participants in preparation of Workshop 2	Interactive knowledge exchange	Analysis to share with participants in preparation of Workshop 3	Summary of Insights and draft Recommen-dations	Full Project Report + Policy Messages to CEM	ISGAN Academy Webinar + Presentation at CEM (TBC) + Web material National activities in participating countries (if relevant)
	9 September	6 October		24 November		March 2023, TBC (@ ISGAN ExCo?)		

Flexibility as system services – the needs from Statnett perspective

Bjørn H. Bakken

Head of section: Reserves and flexibility

Kjetil O. Uhlen

Special Adviser

The need for flexibility is increasing

- Supporting the green transition of the European power system:
  - Large and rapid changes in power flows and power balance
  - Implementation of the common European rules for markets and system operation
  - More automation of system operation
- Specifically for Norway:
  - Today, balancing, stability and flexibility are mainly provided by dispatchable hydropower plants. May not be sufficient in future!
  - **Thus, demand side flexibility is getting increasingly important!**

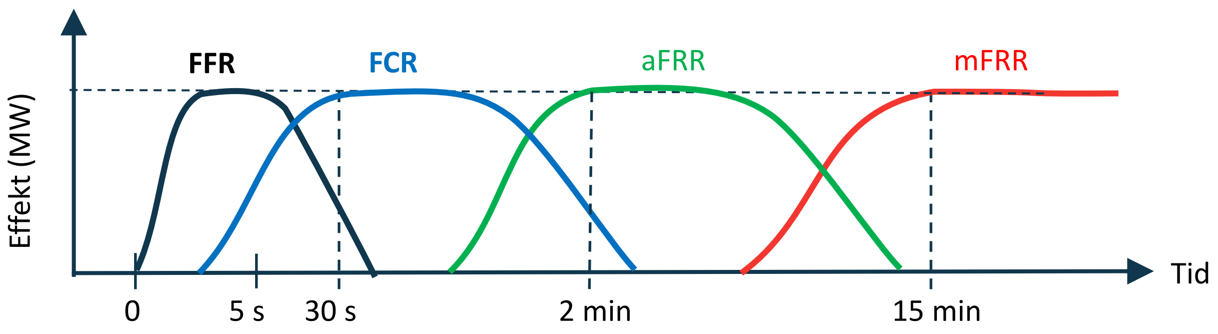
Flexibility is fundamental to the power system of tomorrow

Sufficient flexibility in the power system is important to handle balancing, contingencies and congestion management, to allow further grid connections and to reduce or postpone grid investments.

- *What KIND of flexibility do we need?*
- *HOW are we going to use it?*
- *How can we implement the necessary FUNCTIONALITY?*

Statnett's own balancing products

- **Fast Frequency Reserves** (FFR): 0,7-1,3 sec. response time; 5-30 sec. duration
- **Frequency Containment Reserves** (FCR-N og FCR-D): 30 sec. response time; minimum 15 min duration
- **Automatic Frequency Restoration Reserves** (aFRR): Full response within 2 min; duration according to bid period
- **Manual Frequency Restoration Reserves** (mFRR): Full response within 15 minutes; duration according to bid period



Flexibility categories – the general picture

Explicit flexibility
(procurement of products/services)

Reserve markets
(FFR, FCR, FRR etc)

"Connection on terms"
Bilateral agreements

Short term/
Low energy

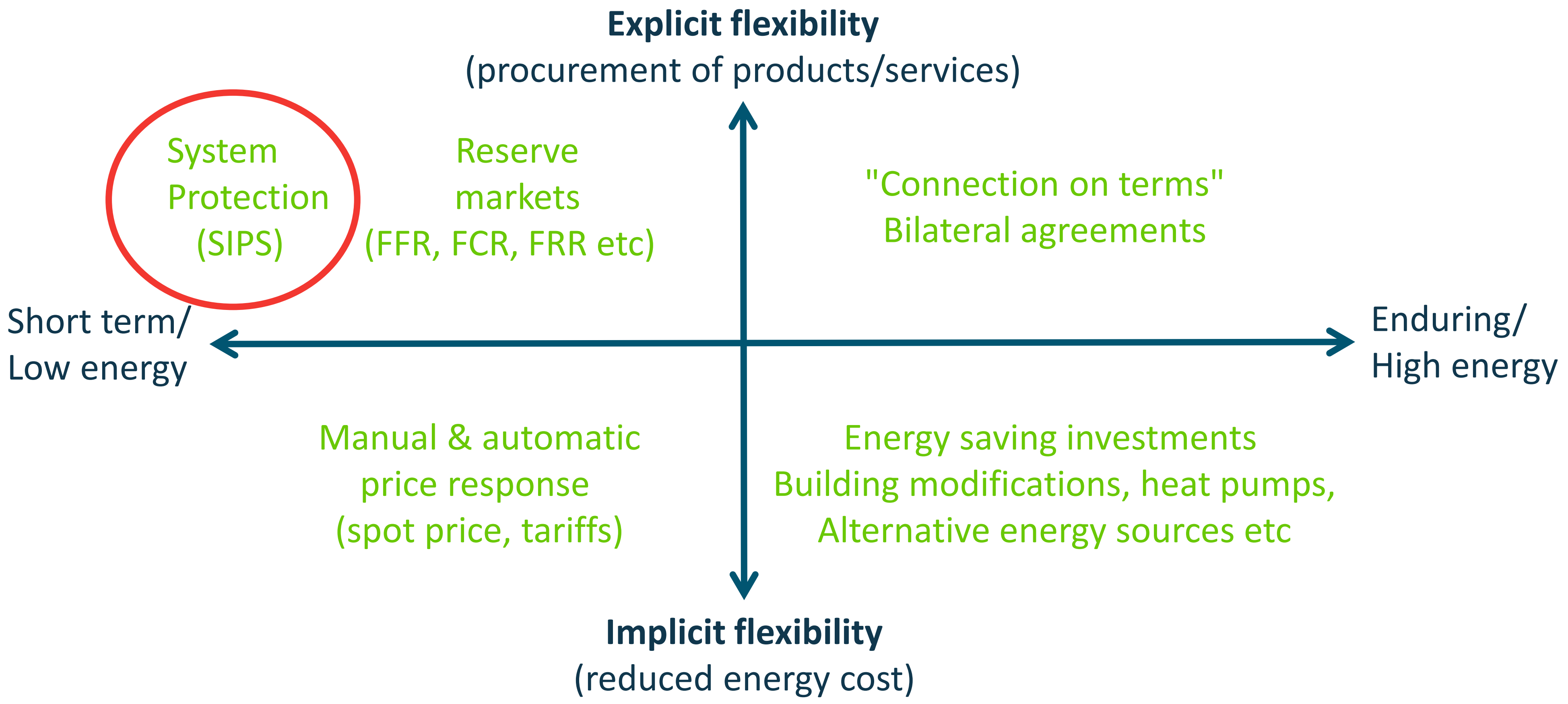
Enduring/
High energy

Manual & automatic
price response
(spot price, tariffs)

Energy saving investments
Building modifications, heat pumps,
Alternative energy sources etc

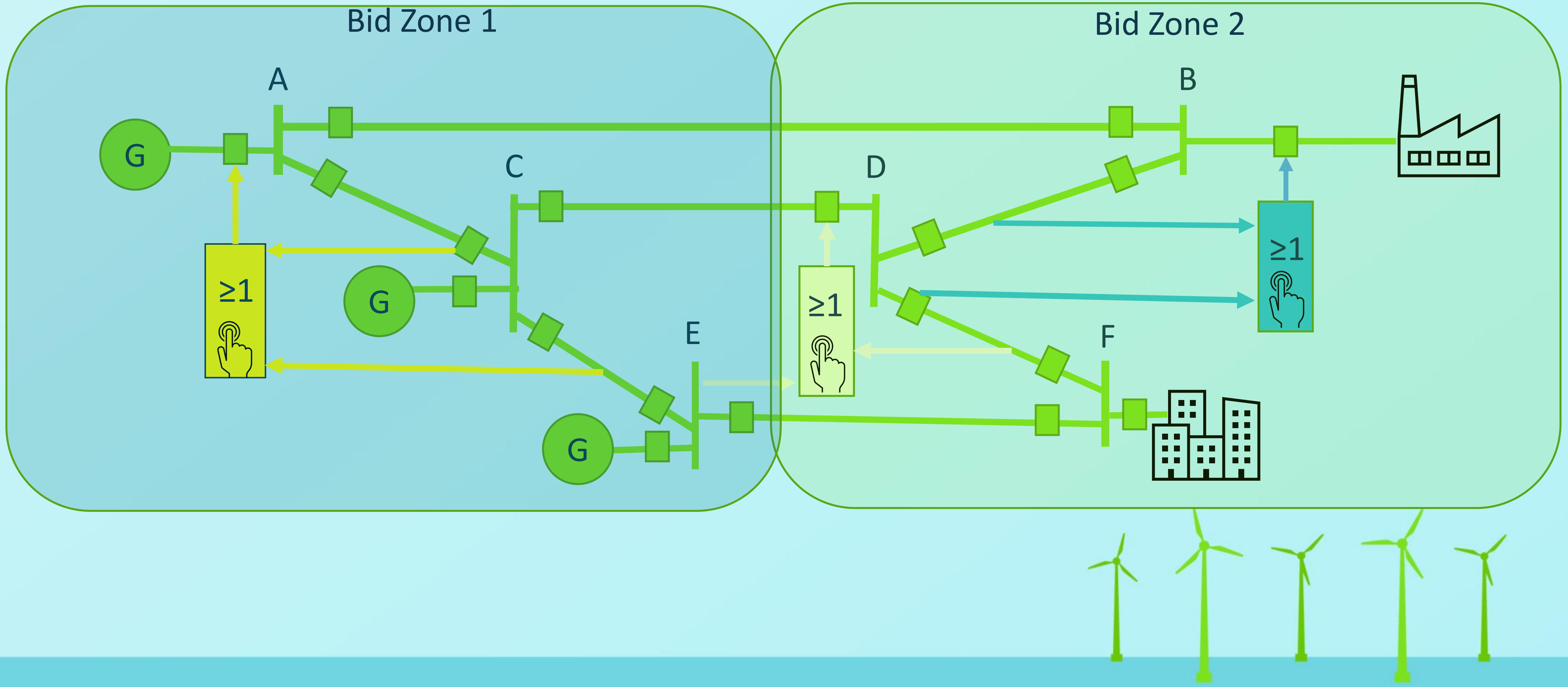
Implicit flexibility
(reduced energy cost)

Flexibility categories – the general picture



System Protection Schemes (SPS)

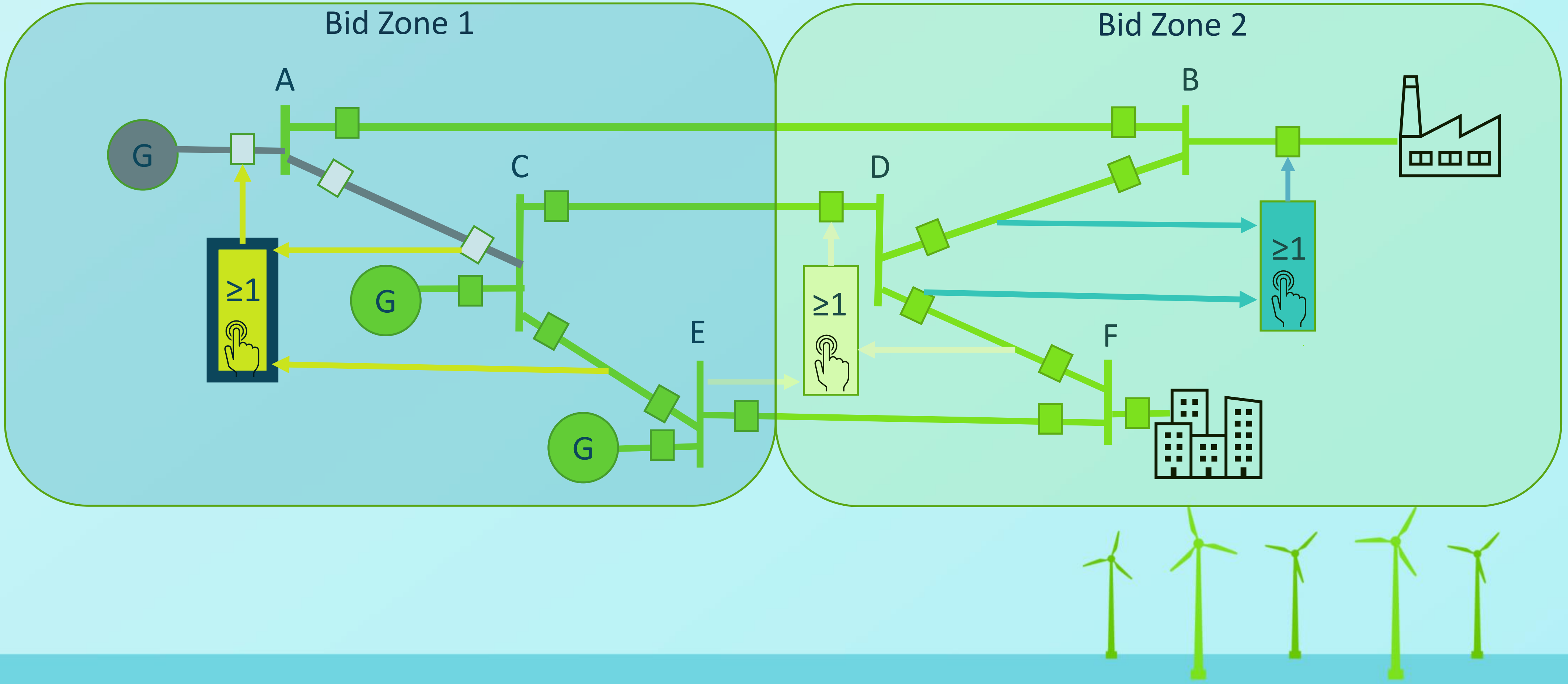
- Event-based or response-based automatic protection solutions



System Protection Schemes (SPS)

Event-based protection solutions

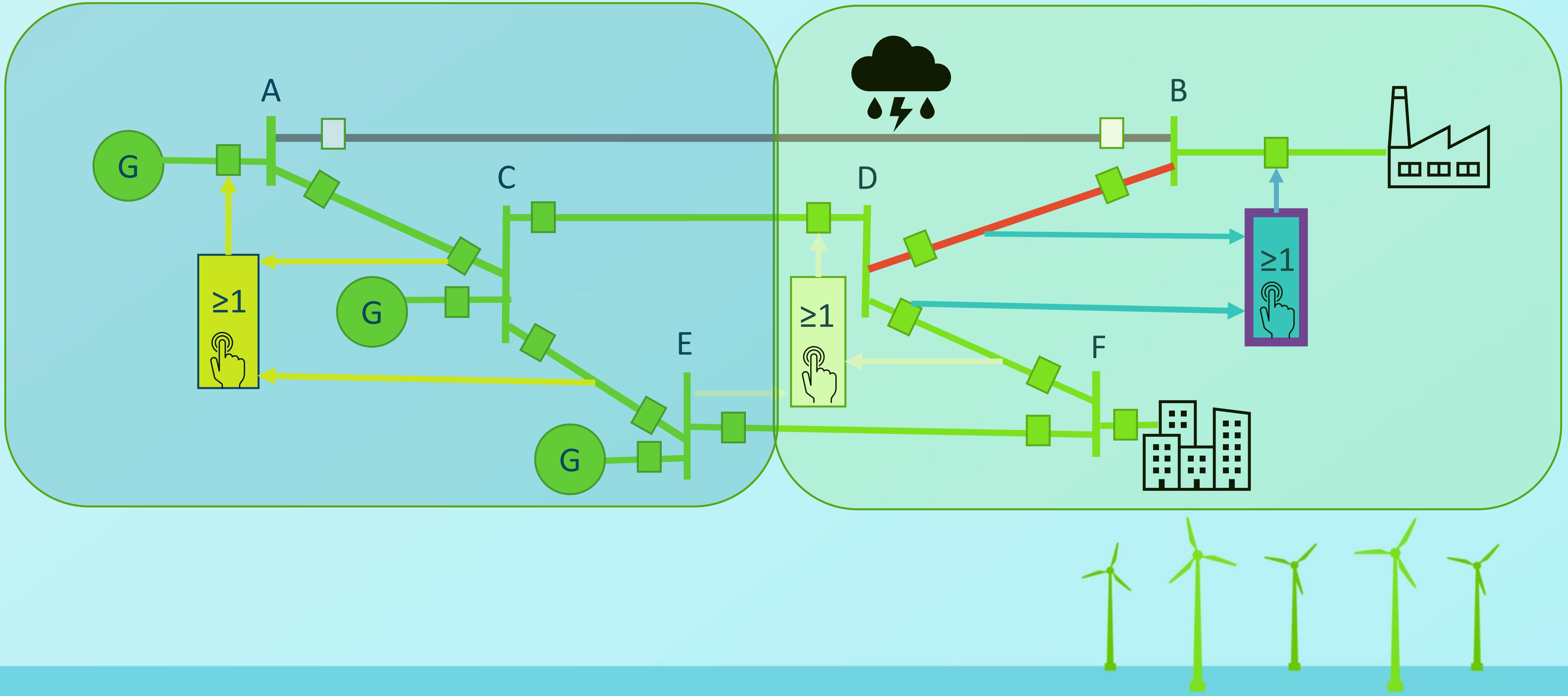
Dissconection of production (PFK)



System Protection Schemes (SPS)

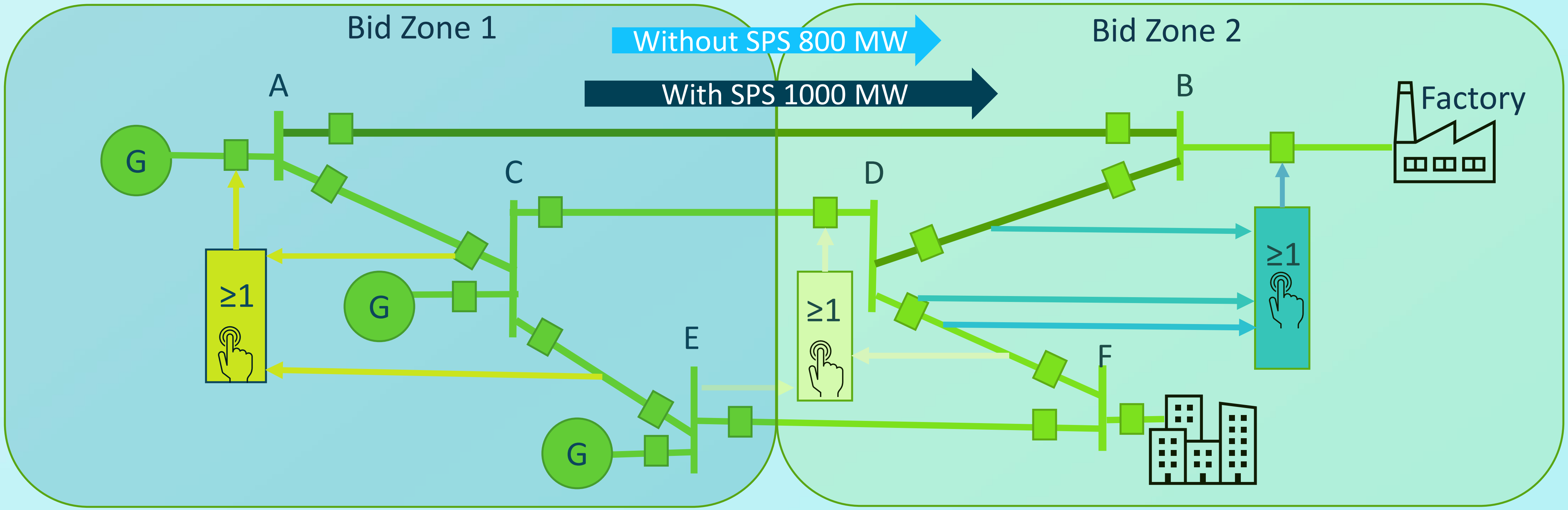
Event-based protection solutions

Dissconection of load (BFK)

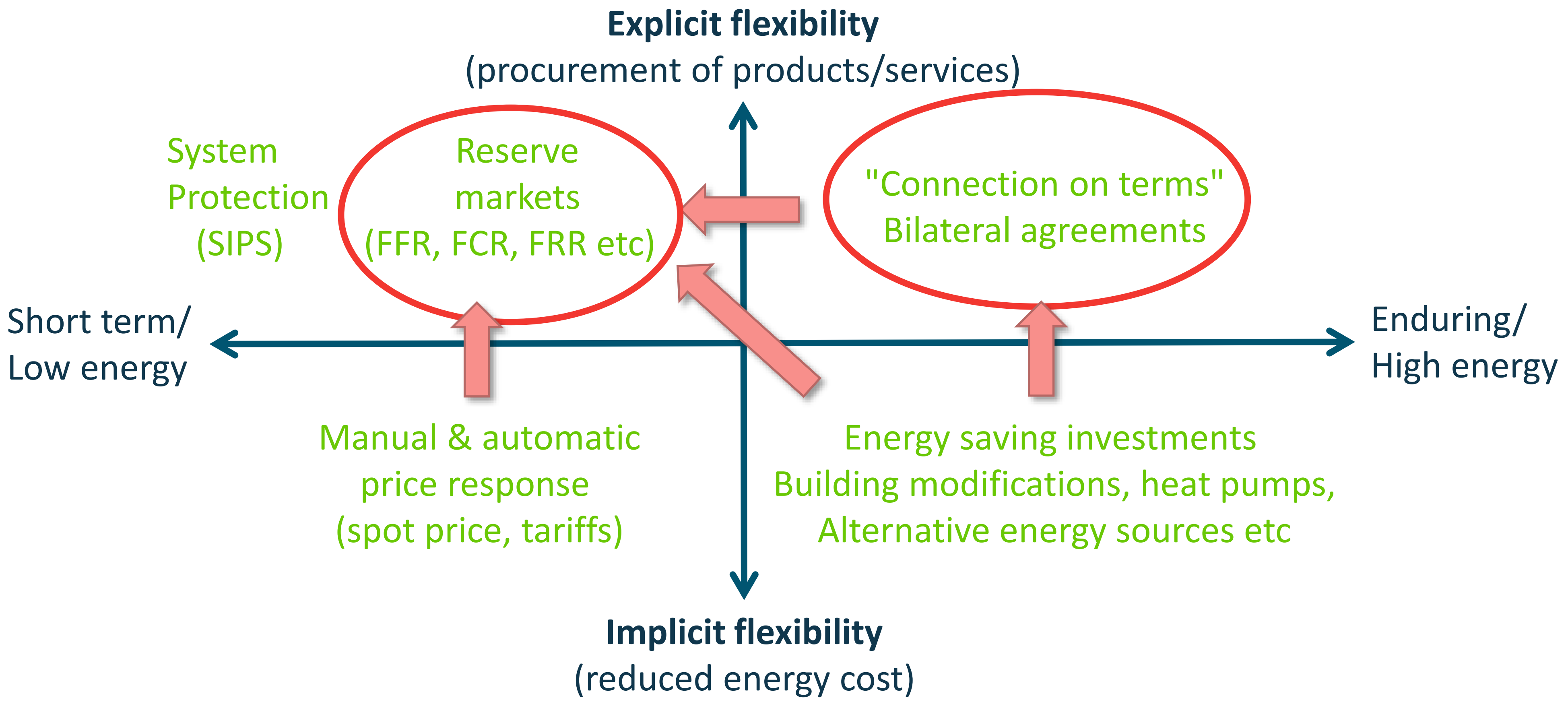


System Protection Schemes (SPS)

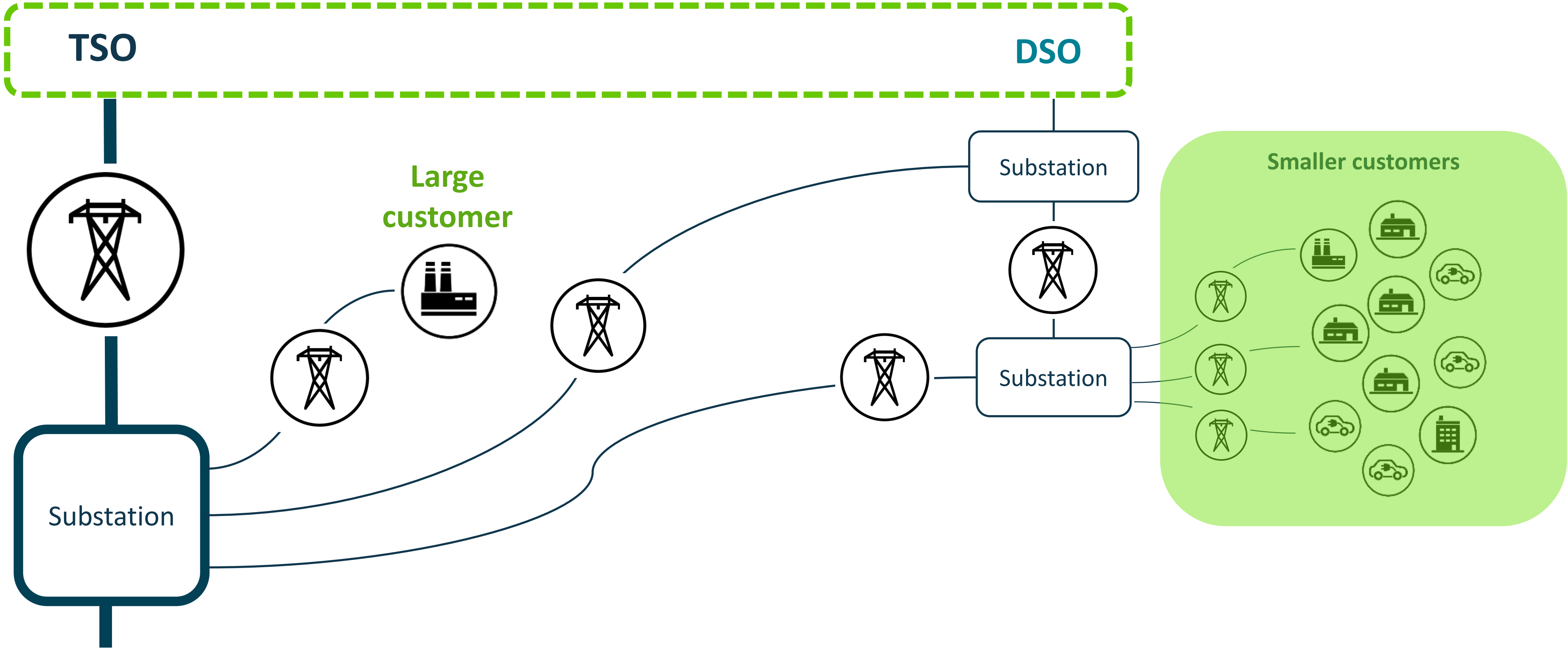
Capacity increase on transfer corridor due to SPS



Flexibility categories – the way forward



Most customers are connected in the distribution grid



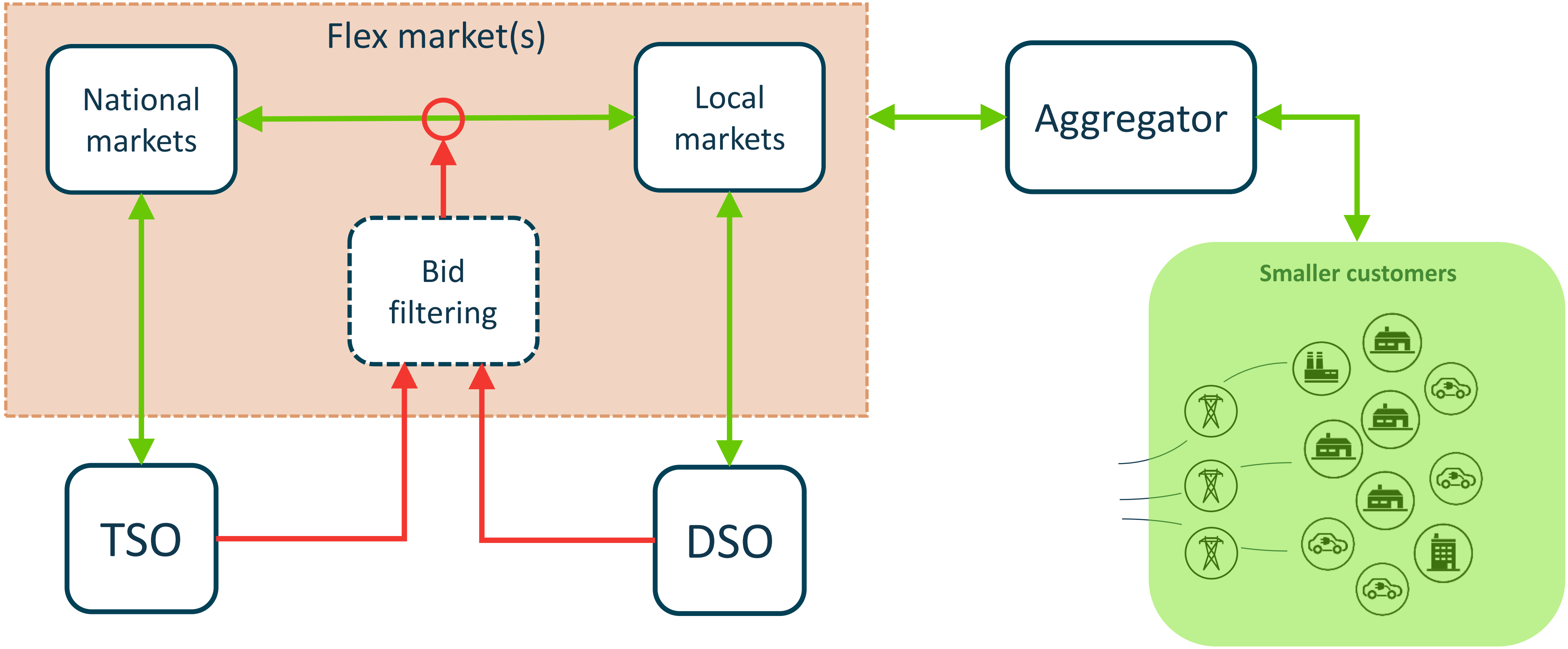
Coordinated activation of flexibility between DSO and TSO is necessary

DSO

TSO

	Needs activation	No impact	Negative impact
Needs activation	OK	OK	NO
No impact	OK	-	-
Negative impact	NO	-	-

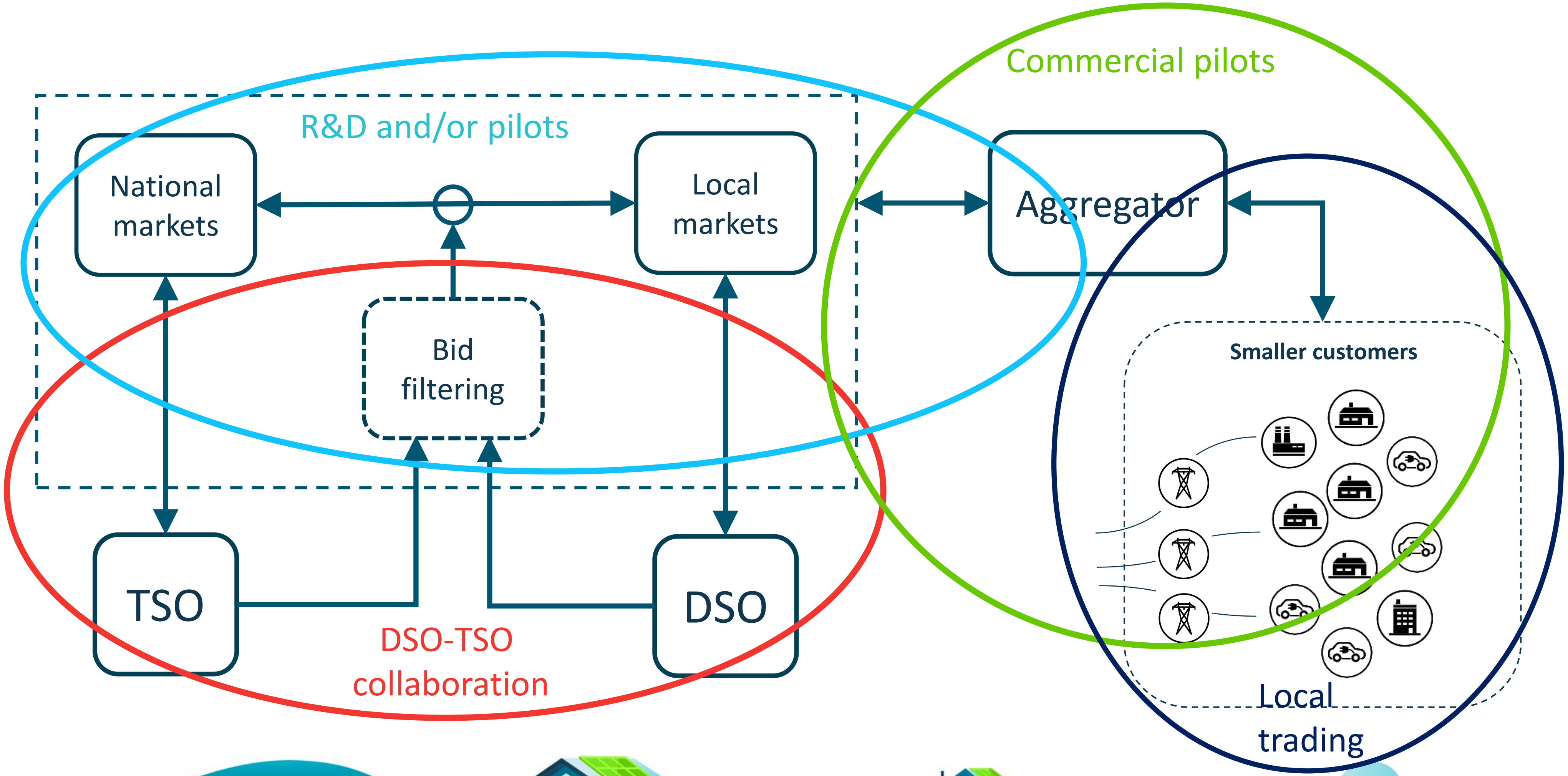
High level concept for flex value chain



Statnett

Det grønne taktskiftet

Coordinated engagement on three arenas



Key messages

- Regulations that enables and motivates (incentivises) local markets and sharing (e.g. trading surplus energylocally)
- R&D on development of modularised flex markets
- TSO-DSO coordination to maximize utilization and resilience (avoiding negative impacts)
    - System protection schemes being a part of this..

Thank you for your attention!