Electric energy storage
Elia Group Approach

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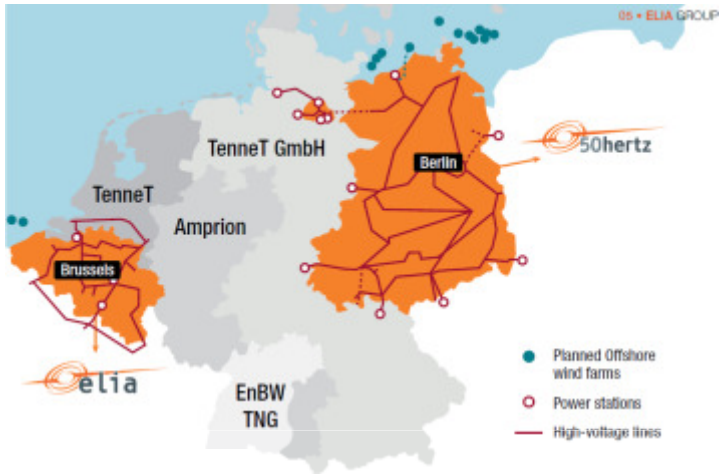
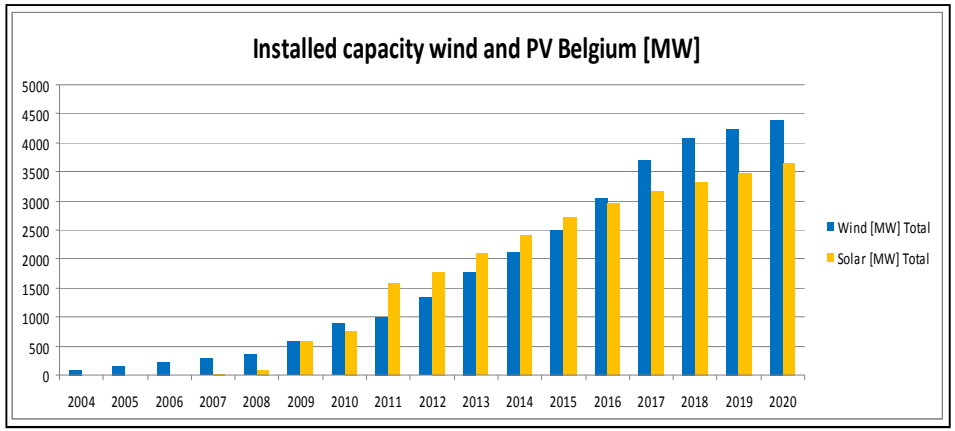
Elia Group's operational challenges



- **Larger and larger transit flows**
- **Generation assets without much flexibility**
- **Reliable electricity transmission from North to South**
- **Generation exceeding consumption and becoming highly variable**

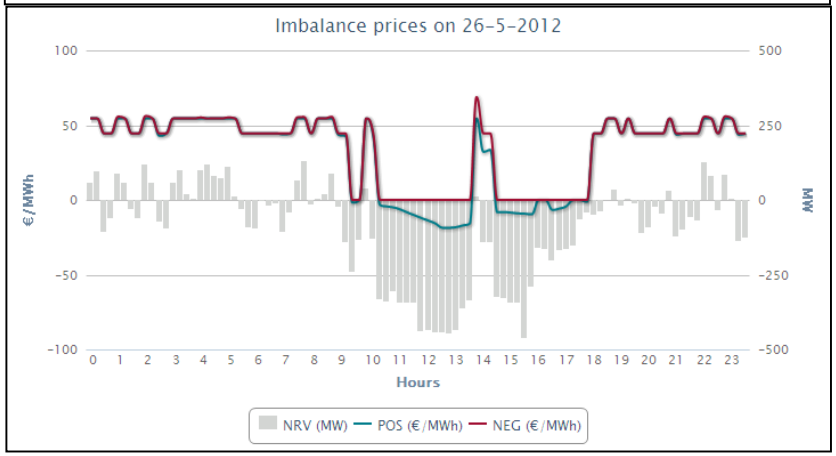
“The” balancing challenge

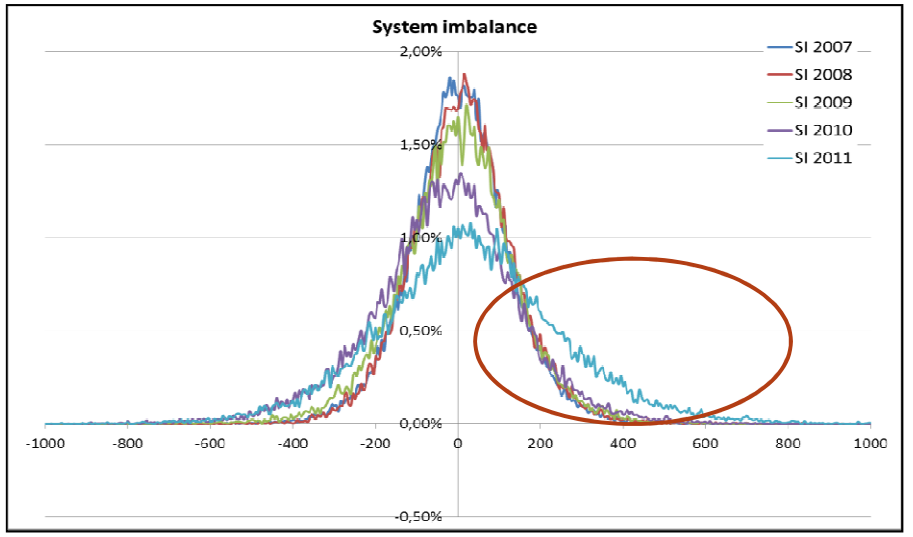


- Capacity Wind ‘12 = 1406 MW
- Capacity Solar ‘12 = 2690 MW
- Average consumption ≅ 9.400 MW
- Record = 14,040 MW (17/12/2007)

Generation units were built to follow consumption,
… tomorrow, the load will have to follow (variable) generation.

Negative prices on 26 May 2012



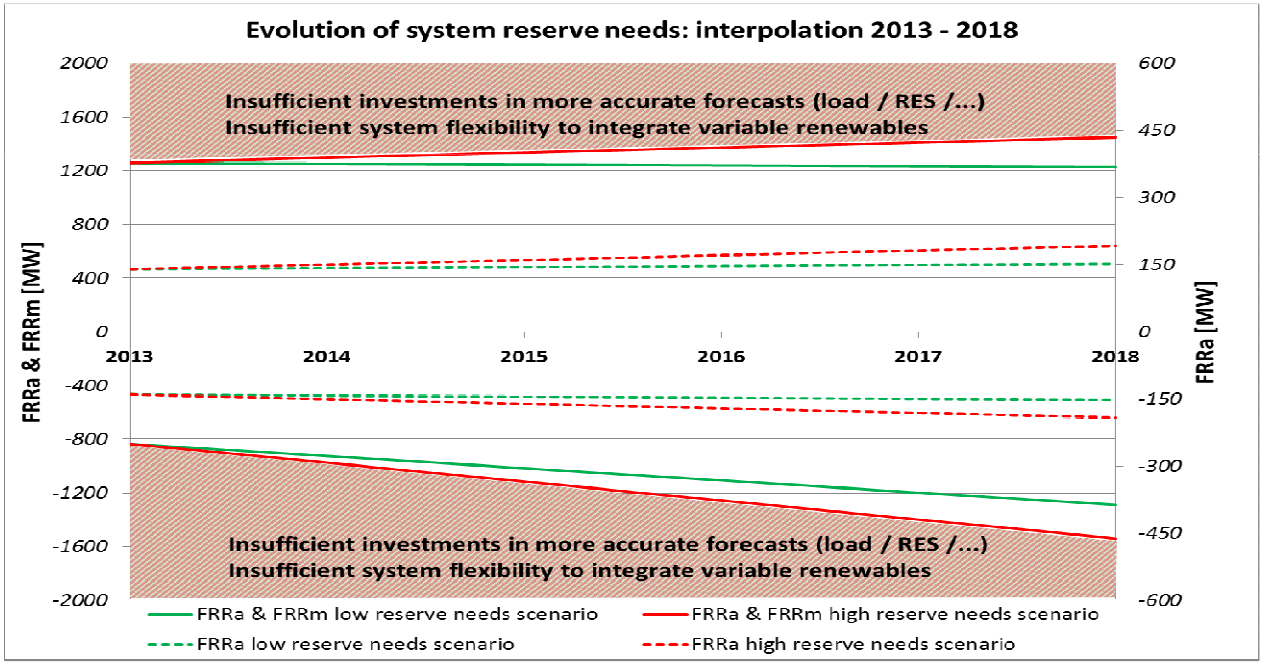


The quest for Ancillary Services

Limited (flexible) fossil plants

- *5500MW inflexible Nuclear (biggest 1076 MW);*
- *3700MW CCGTs (non-spinning)*
- *RES poorly inflexible due to support schemes (€/MWh)*

- 1 big actor (65% prod. capacity)
- few providers of AS
- decreasing running hours of CCGT's
- **Increasing costs of AS**



✓ *Efficient integration of 8 GW RES with limited reserve requires major effort from all market parties (BRPs, BSPs, TSO, DSO, consumers, generators, etc.)*

Possible solutions = Toolbox

System Imbalances at the source (BRP):

- Single marginal imbalance tariff since 01/01/2012
- Enhanced balancing publications: e.g. wind and solar forecastings
- Further market integration (NWE intraday, etc.)
- Etc.

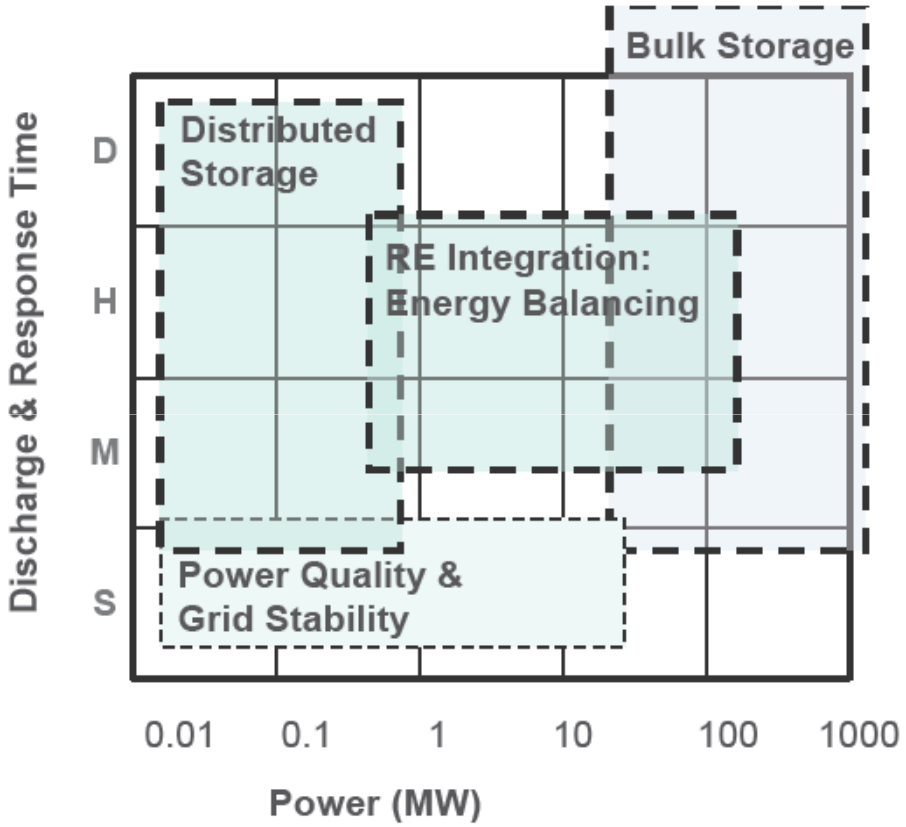
Diversify assets providing balancing services:

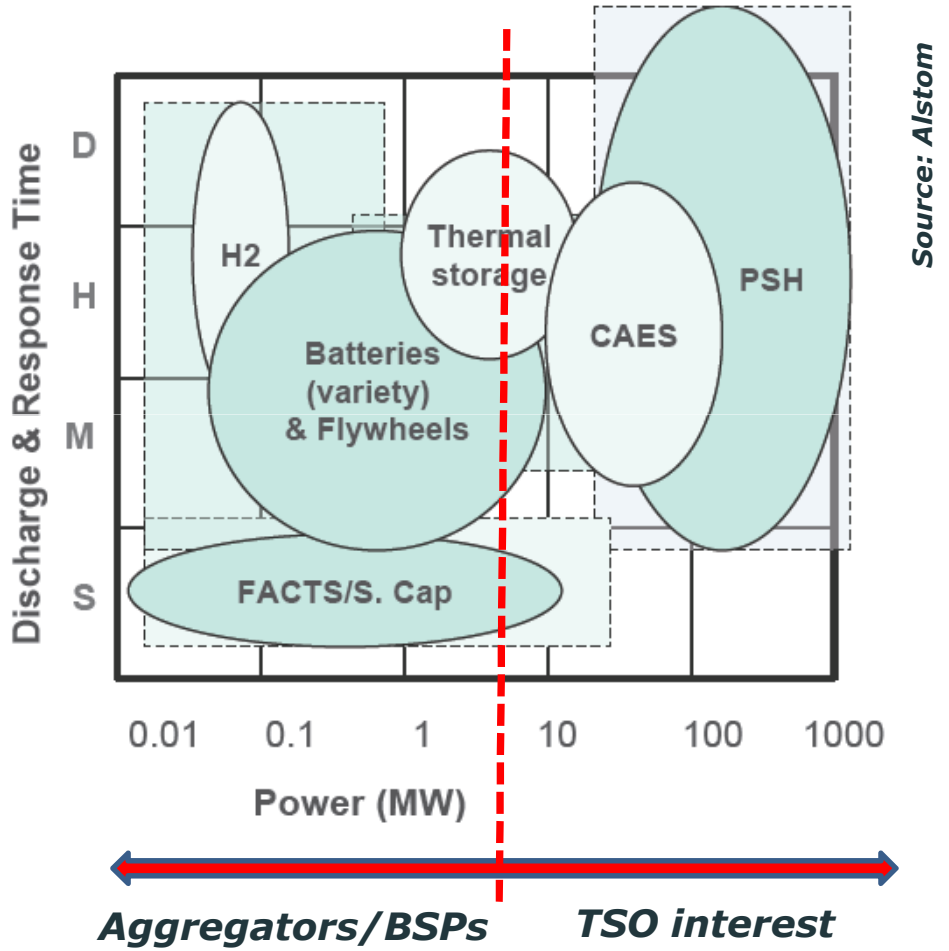
- In 2013 - R1/R2 contracts revised to allow a variety of assets
- Load participating in supply of primary control (2013)
- Participation of aggregators in the supply of interruptible load (2013)
- RES as well as Storage

XB-synergies:

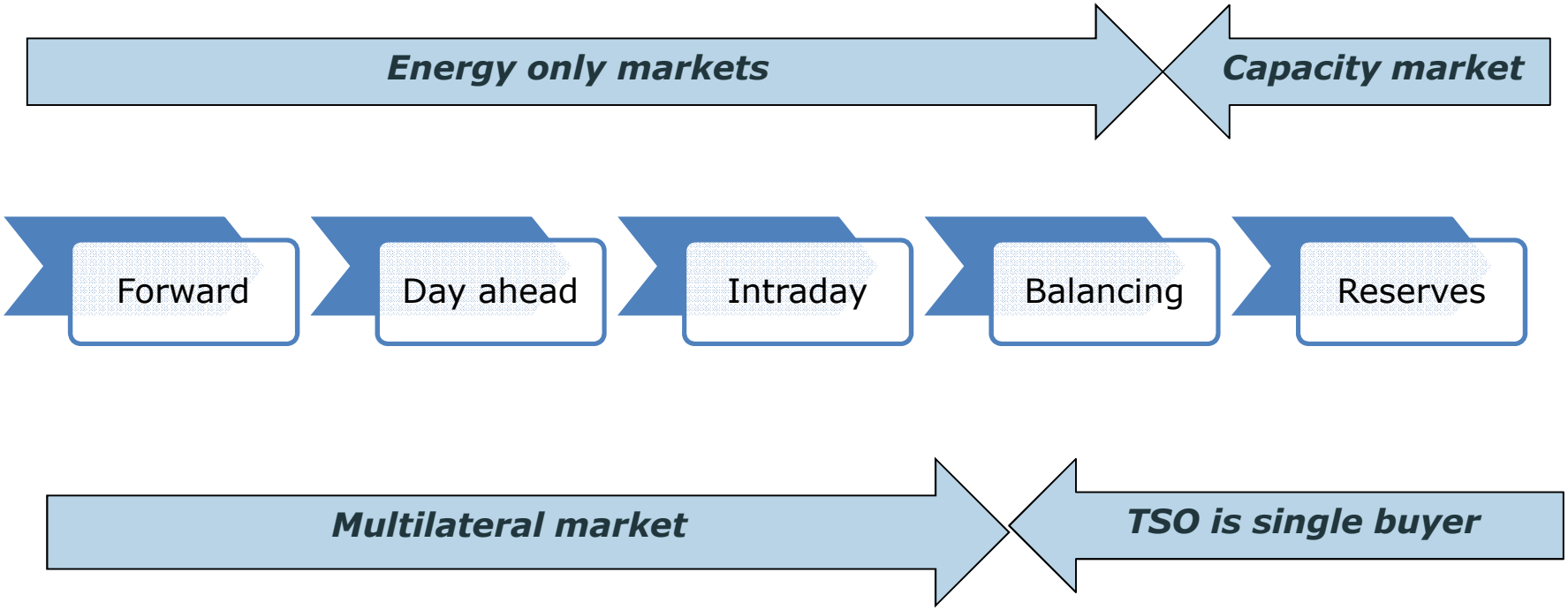
- BE participation to iGCC (imbalance netting with 6 countries incl. DE)
- Potential BE-NL XB synergies (with Tennet NL)
- Further investigations for iGCC evolutions
- Etc.

Applications vs. technologies



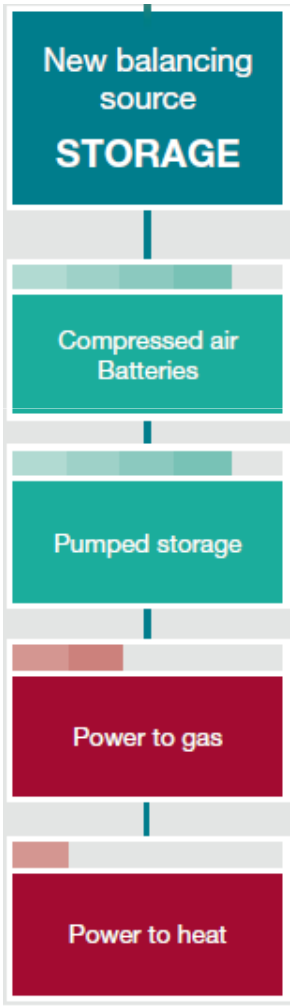


Storage and Power markets



Different storage technologies = different role

Elia Group I&K priorities
STORAGE Programme



Storage technologies: a solution to deliver more ancillary services

- Study adequate business models to deliver Ancillary Services (R1, R2,…) and to relieve congestions
- Study of favourable market mechanisms
- Provision of regulatory & policy recommendations to Belgian, German & European decision-makers

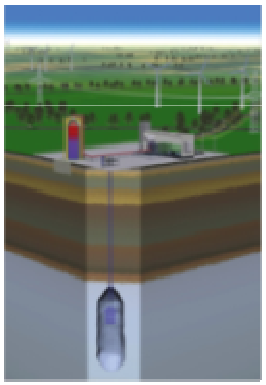
Elia Group I&K Priorities
R&D projects on Storage

eStorage *(FP7 programme)*

- Technical & economic feasibility of re-engineering 270 MW pump-hydro storage (PHS) to variable-speed in T- & P-mode
- Evaluate & propose new market mechanisms & regulatory/policy recommendations for integration of storage

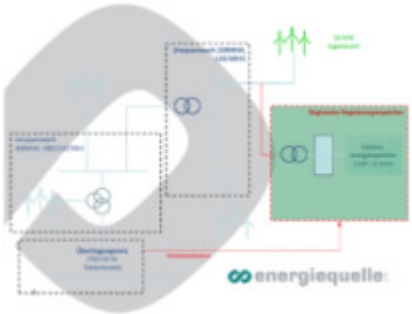
ADELE-ING

- Construction of first adiabatic compressed air energy storage (CAES) technology demonstration plan in Germany
- Assess relevance for the German electricity system (optimal market and grid integration)



SDL-Batt

- Demonstration of 10 MW battery storage, and assessment of economic participation in AS: today, in 2020 and 2050
- Investigate to what extend batteries could contribute to maintain system stability.



Belgian electricity system
Business cases

Energy Island (Offshore – Belgian Coast)

- 2,5 km diameter
- 10 m above sea level
- 300 MW

http://gtms1303.wordpress.com/2013/01/28/an-artificial-energy-atoll-at-the-belgian-coast/

- Potential services:
  - Reserves and/or Arbitrage
  - Bulk storage for reliable integration of off-shore wind

Storage in Europe
EC current position

DG ENER Working Paper: 'Future role & challenge of Energy Storage '

- ✓ bridging the gap between RES and back-up power
- ✓ will be needed to manage >20% RES
- ✓ integration in different locations with adequate (regulated) incentives
- ✓ need appropriate market signals & EU-level market
- ✓ Connection & harmonisation of EU level ID & balancing market is a pre-condition for energy storage development → needs to be addressed urgently
- ✓ High priority: reflect on ownership of storage (regulated vs. deregulated)

***P. Lowe** (EC):*

- ⇨ *Storage is by definition, not generation: storage has a negative efficiency and costs, irrespective of technology.*
- ⇨ *Storage cannot be classified as generation, irrespective of its technology, size or location.*
- ⇨ *Therefore, storage may be <u>used</u> by all market actors, including TSO's, provided they do not compete in the generation market with the stored electricity.*

Thank you for your attention