

Current & Potential Values of Storage and of their Competitors on the Grid

Pavla Mandatova, Advisor, EURELECTRIC

*EASAC Workshop
14 October 2015, Brussels*

What value & market design for services provided by different types of storage?



‘Classical’ large *centralised* HV connected hydropower plants complemented with...



...smaller-scale *decentralised* electricity storage solutions connected to MV and LV grid

Electricity storage can be of utmost importance in two broad functional areas

Energy Management

Decoupling the generation of electricity from its instantaneous consumption.
(**Arbitrage of energy**)

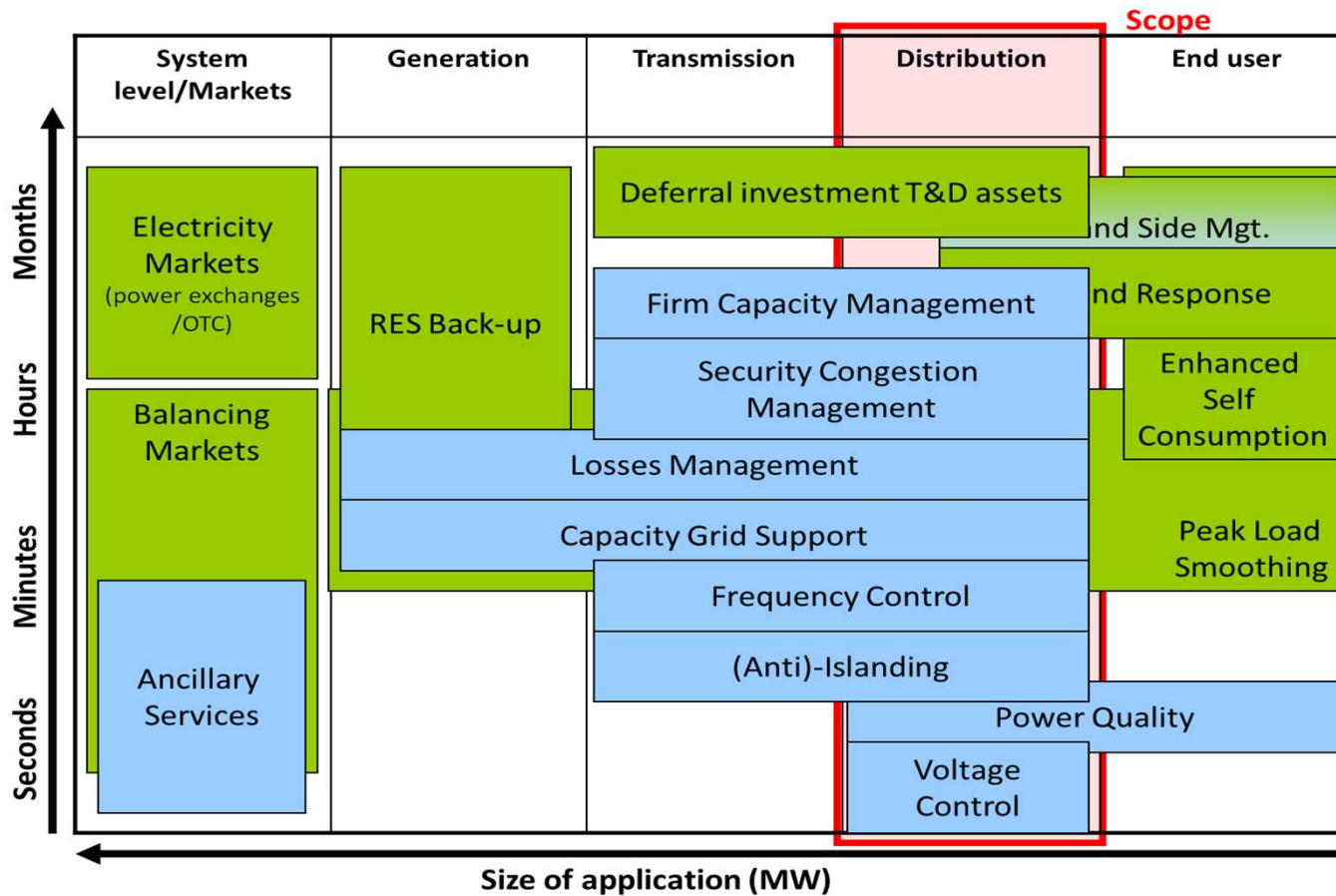
- Compensation for intermittency on the generation side
- Increase the utilization factor of the network
- Shift demand from peak to off-peak times

System Services

Any service that is able to improve and support the **quality of service** and the **security of supply** in the electric power system

- Cost-effectively reduce the variations in the power flow that RES generation can introduce

... throughout the electricity value chain



Source: EURELECTRIC report on Decentralised Storage (2012)

Need for a level playing field with other flexibility sources

Flexible and back-up generation capacity

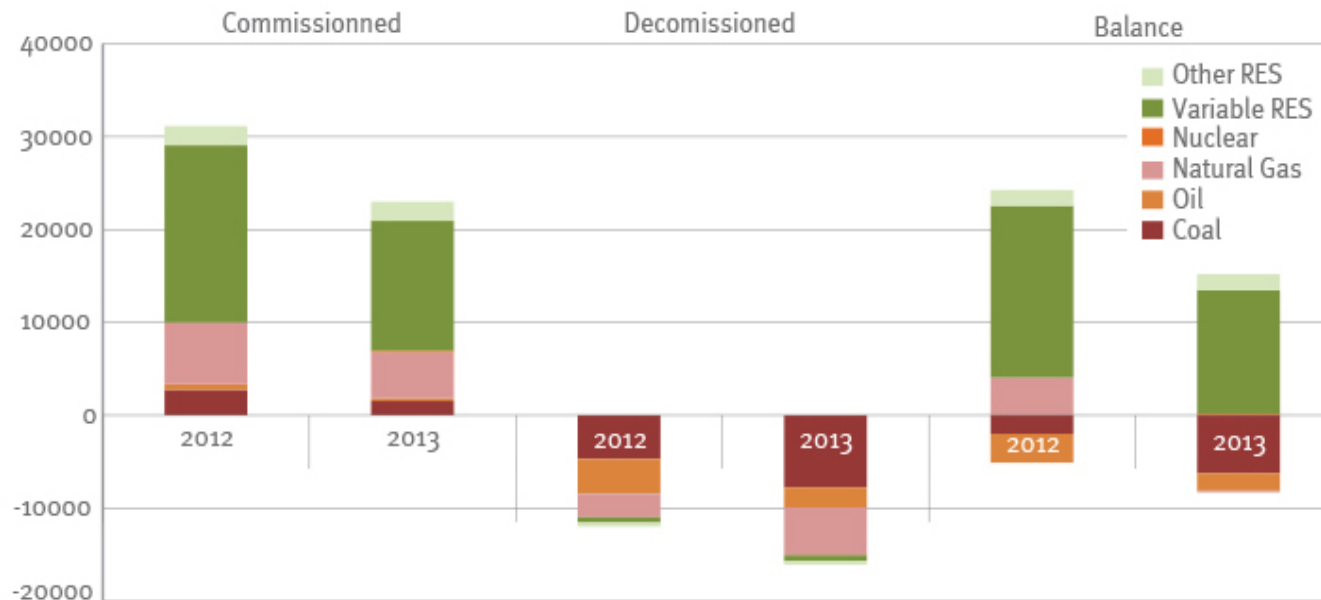
Demand side management and Demand Response

Integrated wholesale markets

Extensive new infrastructure at transmission and distribution level

Centralised and decentralised storage systems

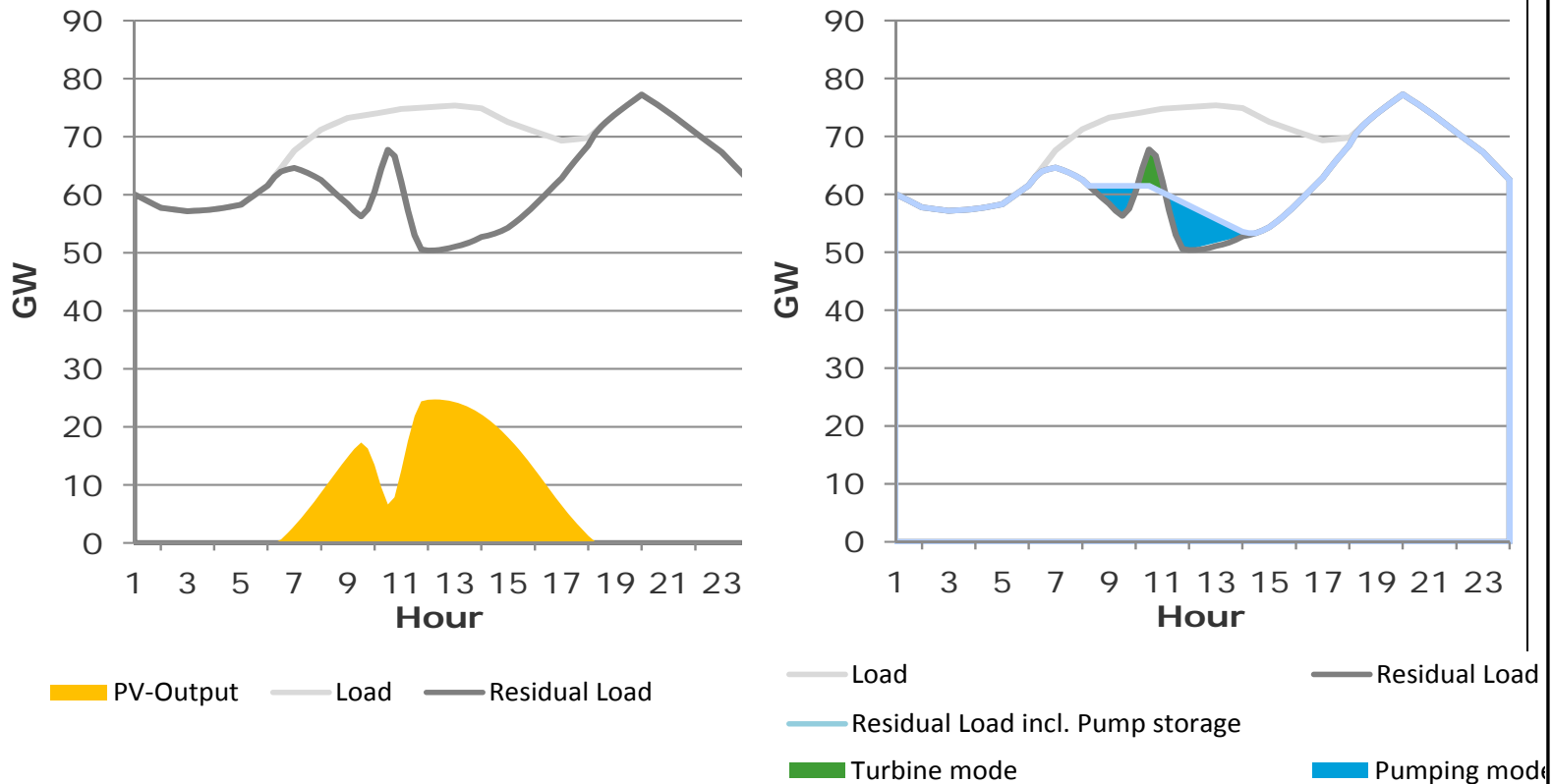
Variable RES displace traditional flexibility resources



- In 2013, a total of 25,4 GW of RES power capacity was installed. An additional 740 GW capacity has to be built by 2035 (IEA)
- Fossil fuel fired capacity saw a net decrease (6,768 MW). Existing capacity is being mothballed/closed down – influencing the available firm and flexible capacity.
- Today's price levels do not allow investing in most of the existing technologies .

Compensation of PV ramp rates by pump storage plants during solar eclipse in Germany

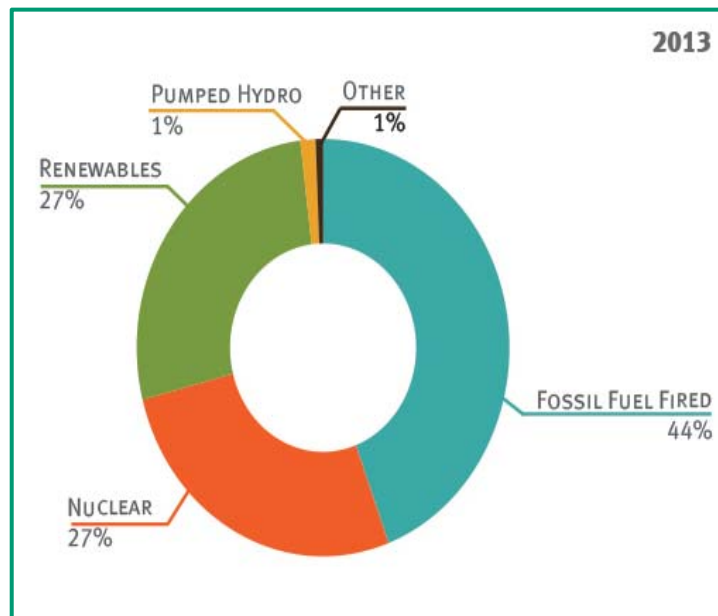
Flexible use of pump storage plants can help to mitigate the impact of increasing volatility from variable RES even during extreme events



Source: EURELECTRIC report on Hydropower (2015)

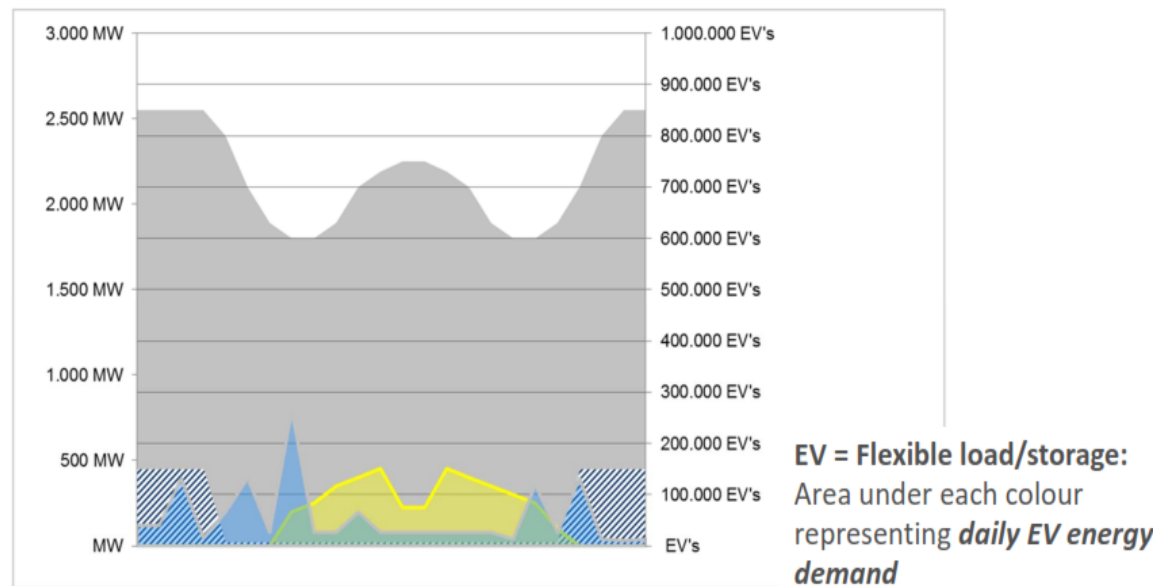
Decentralized storage: Electrification including smart EV charging

EV charging can coincide with surplus power available (solar at noon, wind at night). In the long-term, EVs will act as distributed storage resource



EURELECTRIC Power Choices

Flexibility for: Night charging, Wind and Photovoltaic



GridTech project

More than half of the electricity generated in Europe in 2013 comes from low-carbon facilities.

Decentralised storage: Rising self-consumption and self-generation

Country	LCOE Today			Solar + Storage	
	Today	2017	2020	Today	Future (2020)
United States	\$0.19	\$0.13	\$0.11	\$0.33	\$0.13
China	\$0.11	\$0.10	\$0.09	\$0.25	\$0.11
Japan	\$0.14	\$0.13	\$0.11	\$0.28	\$0.13
India	\$0.10	\$0.08	\$0.08	\$0.24	\$0.09
Germany	\$0.19	\$0.17	\$0.15	\$0.33	\$0.17
UK	\$0.23	\$0.20	\$0.18	\$0.37	\$0.20
Mexico	\$0.13	\$0.10	\$0.09	\$0.27	\$0.11
Philippines	\$0.10	\$0.09	\$0.08	\$0.24	\$0.10
France	\$0.16	\$0.15	\$0.13	\$0.31	\$0.15
Chile	\$0.12	\$0.10	\$0.09	\$0.26	\$0.11
South Africa	\$0.13	\$0.11	\$0.09	\$0.27	\$0.11
Australia	\$0.15	\$0.13	\$0.11	\$0.29	\$0.13
Brazil	\$0.18	\$0.14	\$0.12	\$0.32	\$0.14
Canada	\$0.18	\$0.16	\$0.14	\$0.32	\$0.16
Thailand	\$0.13	\$0.13	\$0.13	\$0.27	\$0.14
Saudi Arabia	\$0.11	\$0.10	\$0.09	\$0.25	\$0.11
Italy	\$0.14	\$0.12	\$0.11	\$0.28	\$0.13
UAE	\$0.12	\$0.10	\$0.09	\$0.26	\$0.11
Jordan	\$0.13	\$0.11	\$0.10	\$0.27	\$0.12

*LCOE based on 5% yoy system cost reduction

*US Est based on our cost curve through 2017 then 5% declines to 2020

*Highlighted = grid parity with storage vs electricity price today. We est storage costs at ~14 cents/kWh today and ~2 Cents in ~5 years

Key Policy Measures for Improving the Value of Storage

- 1. Move towards an internal electricity market that properly values energy and flexibility, in particular improved design of ID and balancing markets to value sophisticated and short-term products**
- 2. Create a level playing field for different technologies, with a special focus on the value of providing flexibility to the electricity system**
 - **Remove double grid fees for pumped storage power plants**
- 3. Reaffirm that storage is a competitive and not a regulated business**
 - **Exceptions to this general rule may be required only for specific small-scale storage applications which cannot be provided by the market**

THANK YOU!

