



Federal Ministry
for Economic Affairs
and Energy

Storage in context of the German “Energiewende“

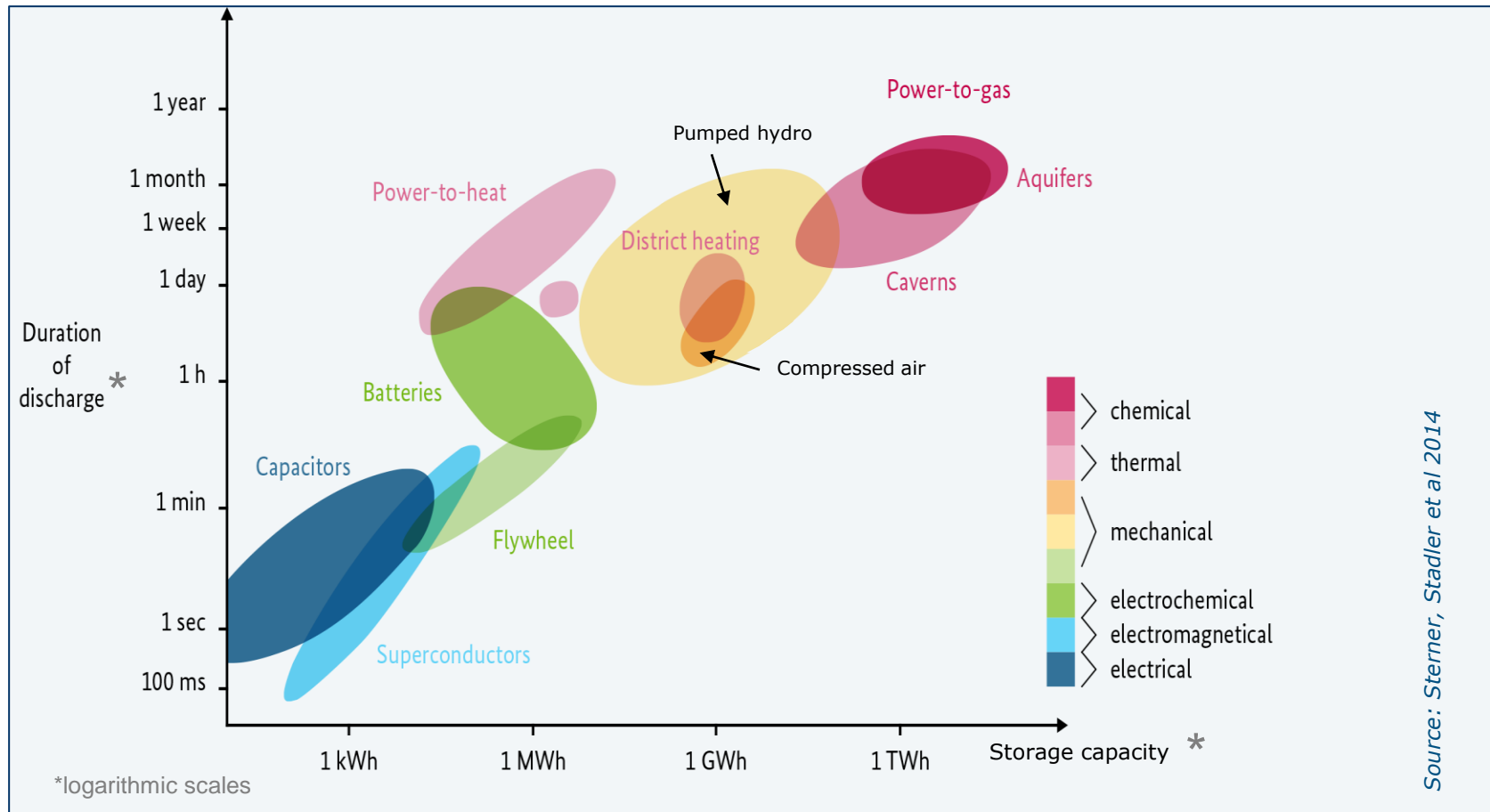
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Content

1. Role of energy storage
2. Need, market environment, perspective
3. Public support, regulation framework

Characteristics of energy storage technologies



- *Variety of technologies but no “all-rounder”*
- *Whole range of different use cases technically covered (short-term to long-term)*

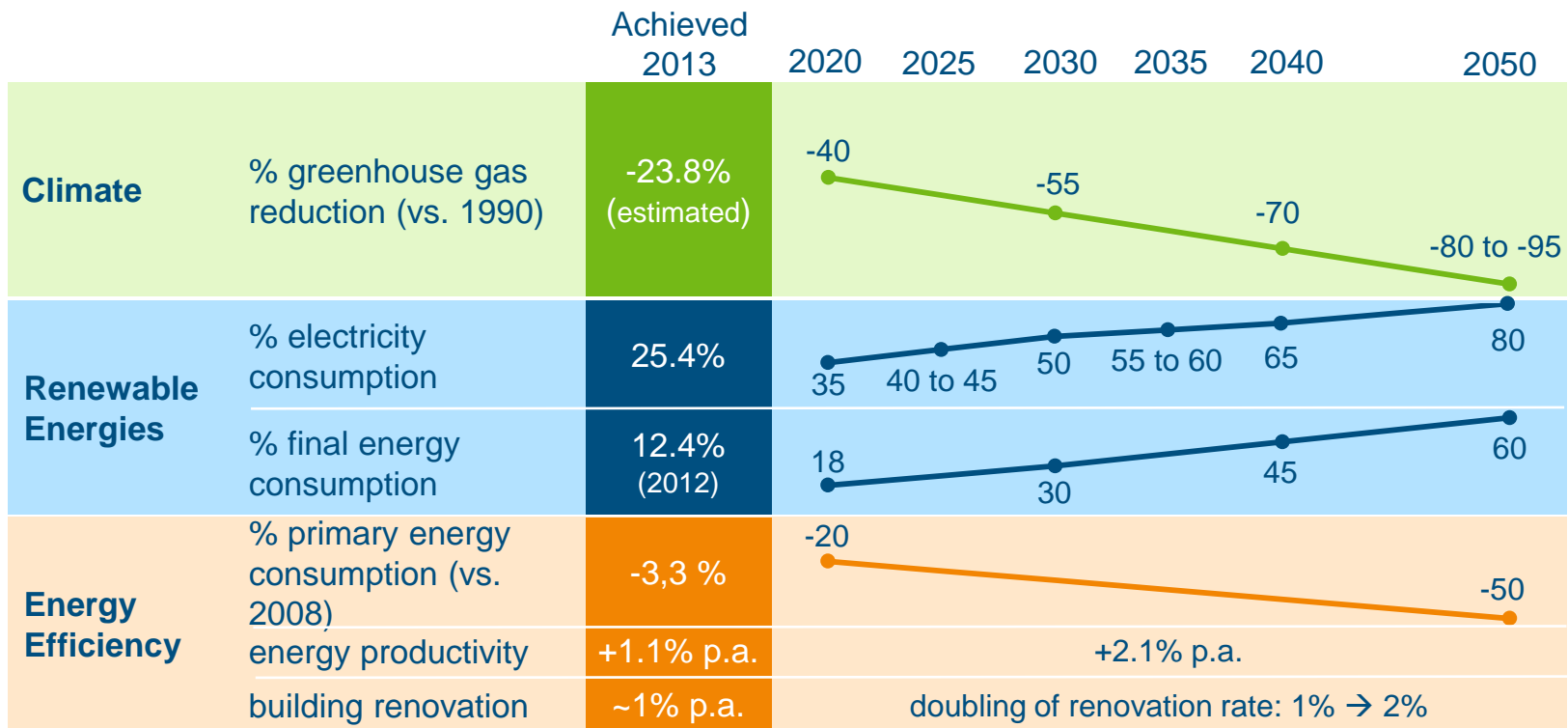
Possible use cases for energy storage

Energy storage offers potential for flexibility

- Compensation of generation peaks and valleys
- Ancillary services (frequency control, voltage control, black start capability)
- Reduce curbing of RE in-feed due to local grid congestion,
- Facilitate direct marketing of RES-E
- Provide capacities for seasonal variability of RE (long-term storage, back-up)

→ Storage can support RE integration and system transition

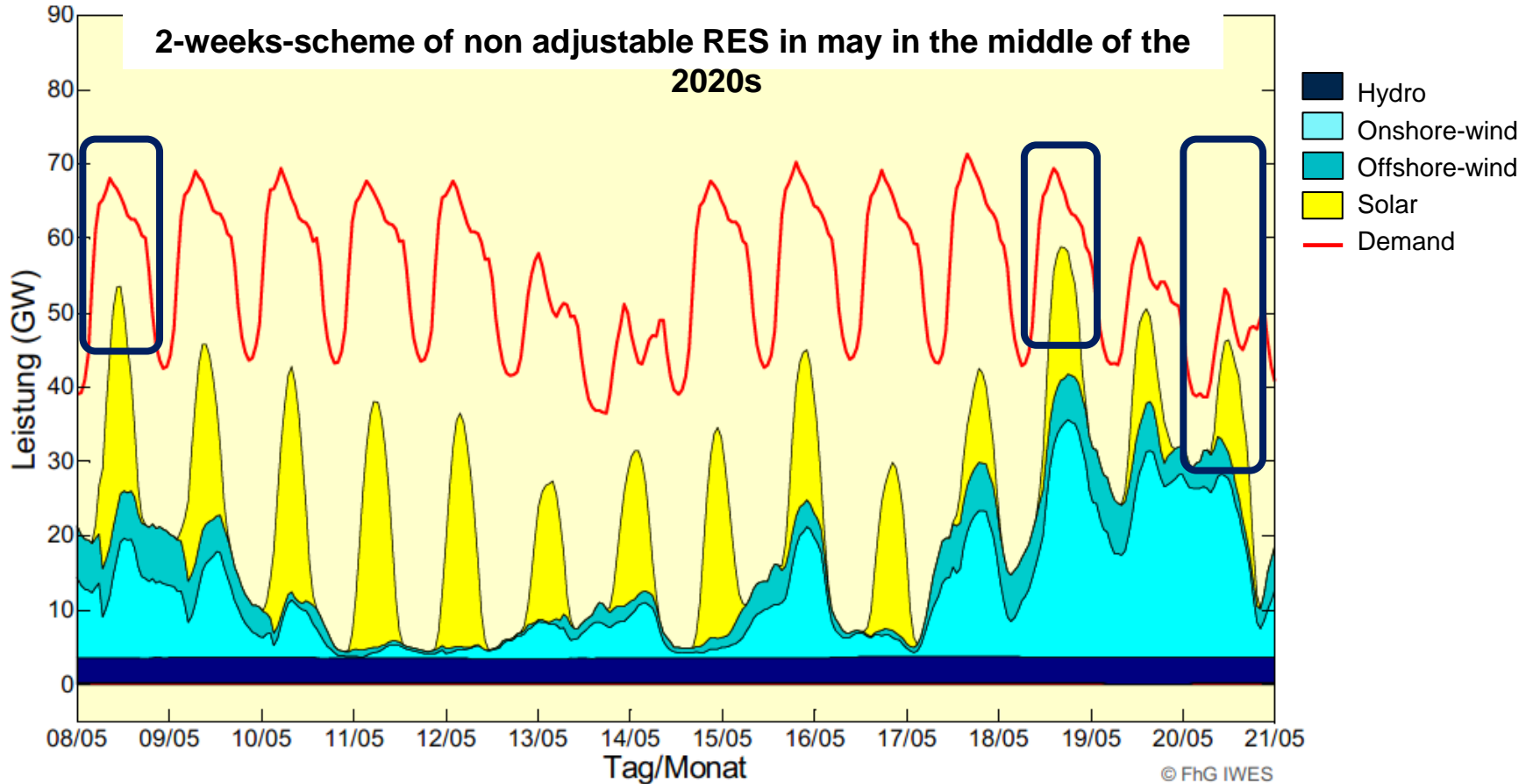
“Energiewende” targets until 2050



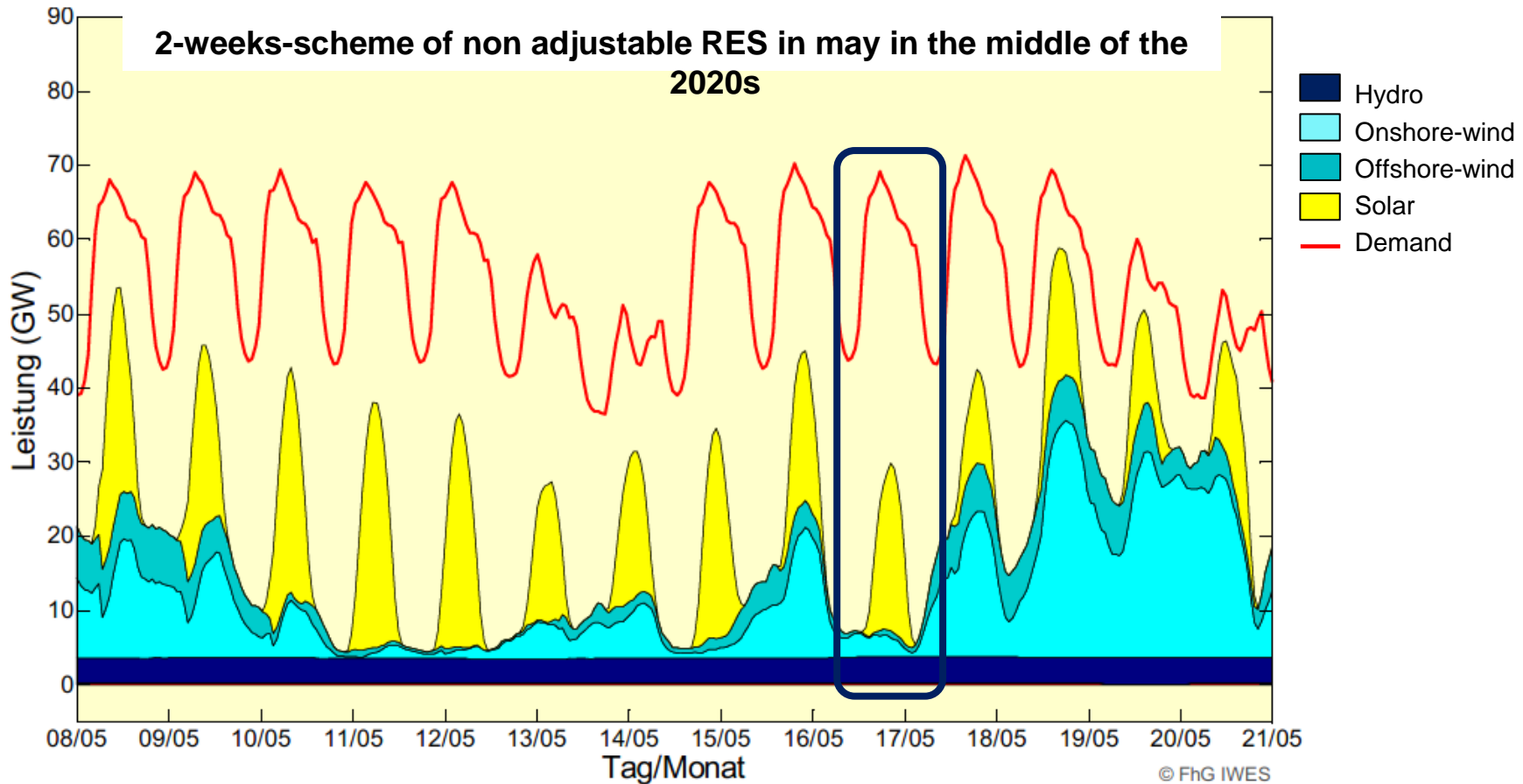
- Germany has set ambitious targets in all sectors and is on track.
2015: RES-E: ~ 30 % of electricity consumption

Source: Federal Government 2010, BMU/BMWi 2014, AGEE-Stat 2014

Increasing need for flexibility



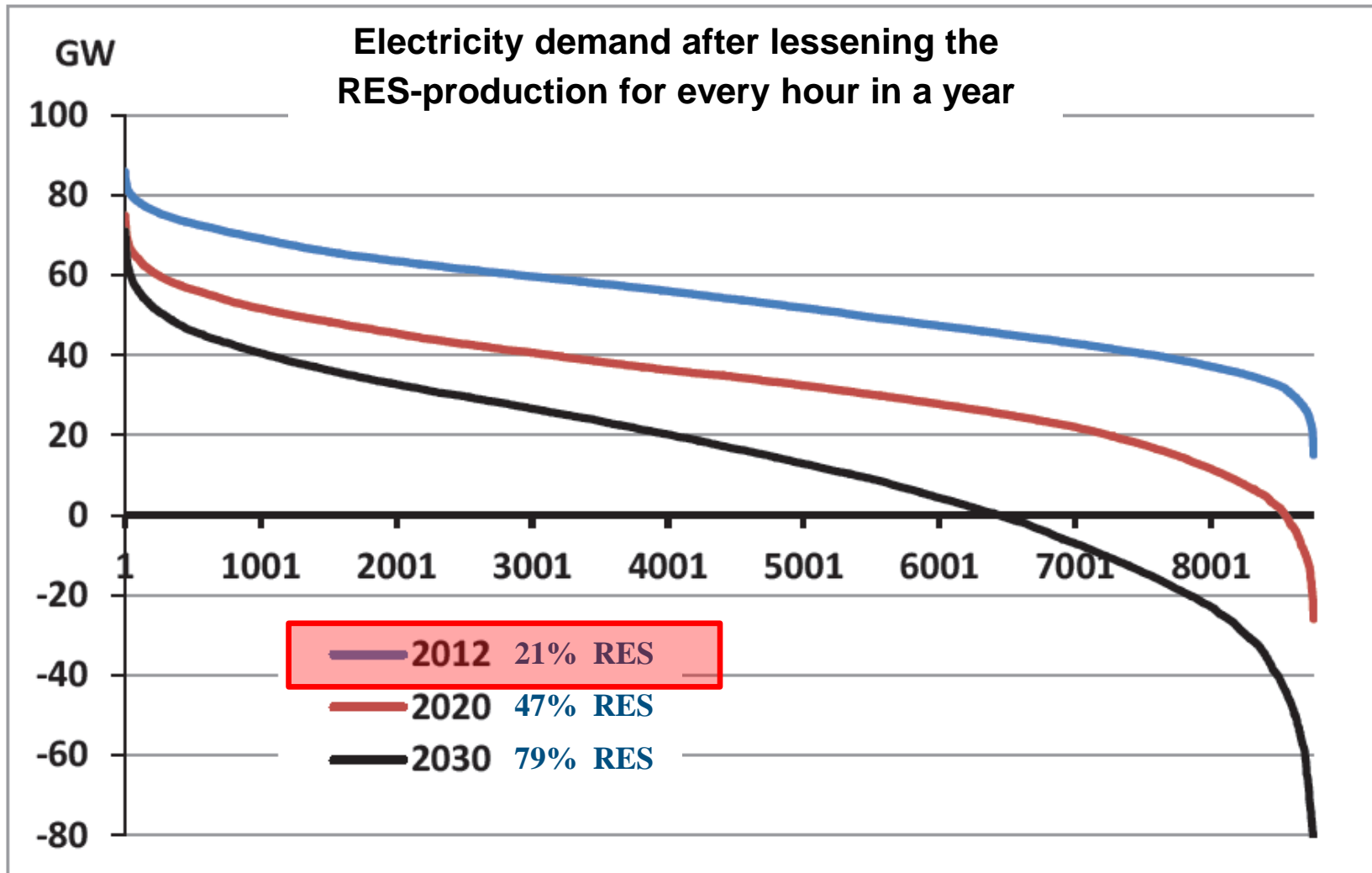
Increasing need for flexibility



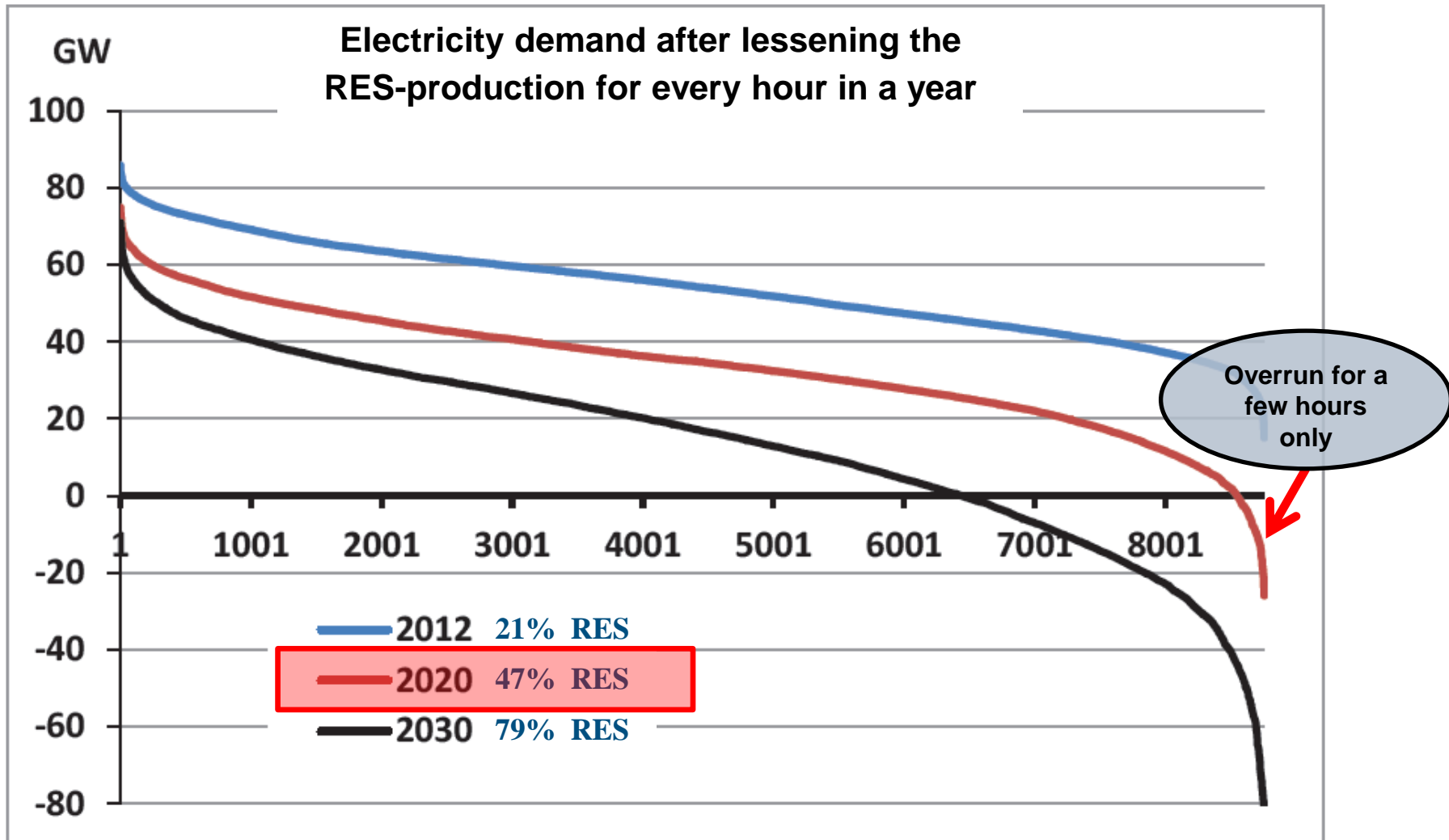
Challenge

- **Comprehensive survey of all flexibility options necessary**
→ optimisation of overall system
- **Future need for storage highly depends on**
 - **Grid extension** (national and EU) and optimisation (e.g. smart grids)
 - **Flexible generation**: structure of generation system (share fluctuating RE, flexible conventional power plants), extent of RE curbing
 - **Flexible demand/ DSM**
- **Electricity storage competes against other flexibility options**
- **Politics supports research and development**

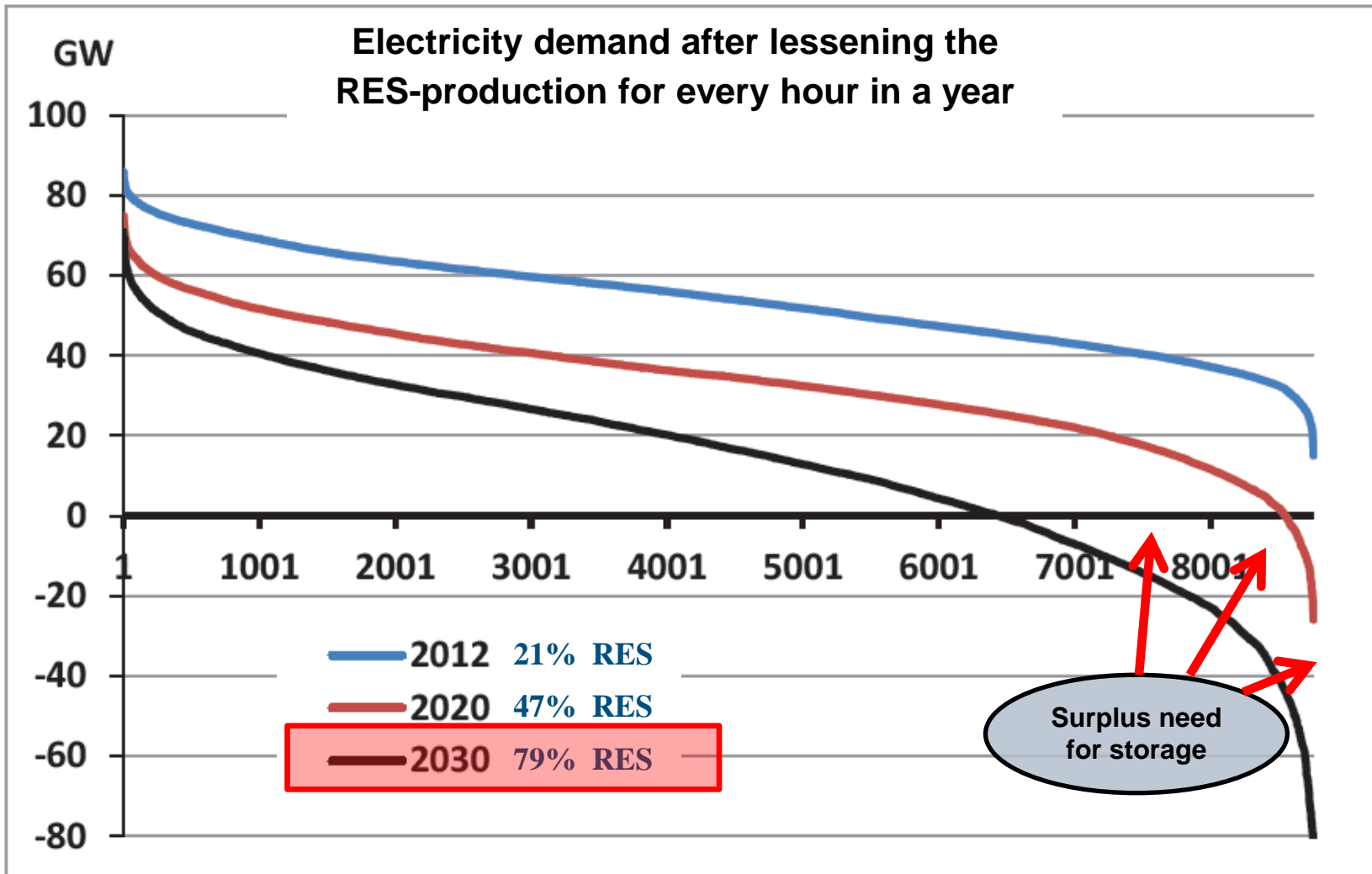
Need for storage - electricity production overrun



Need for storage - electricity production overrun

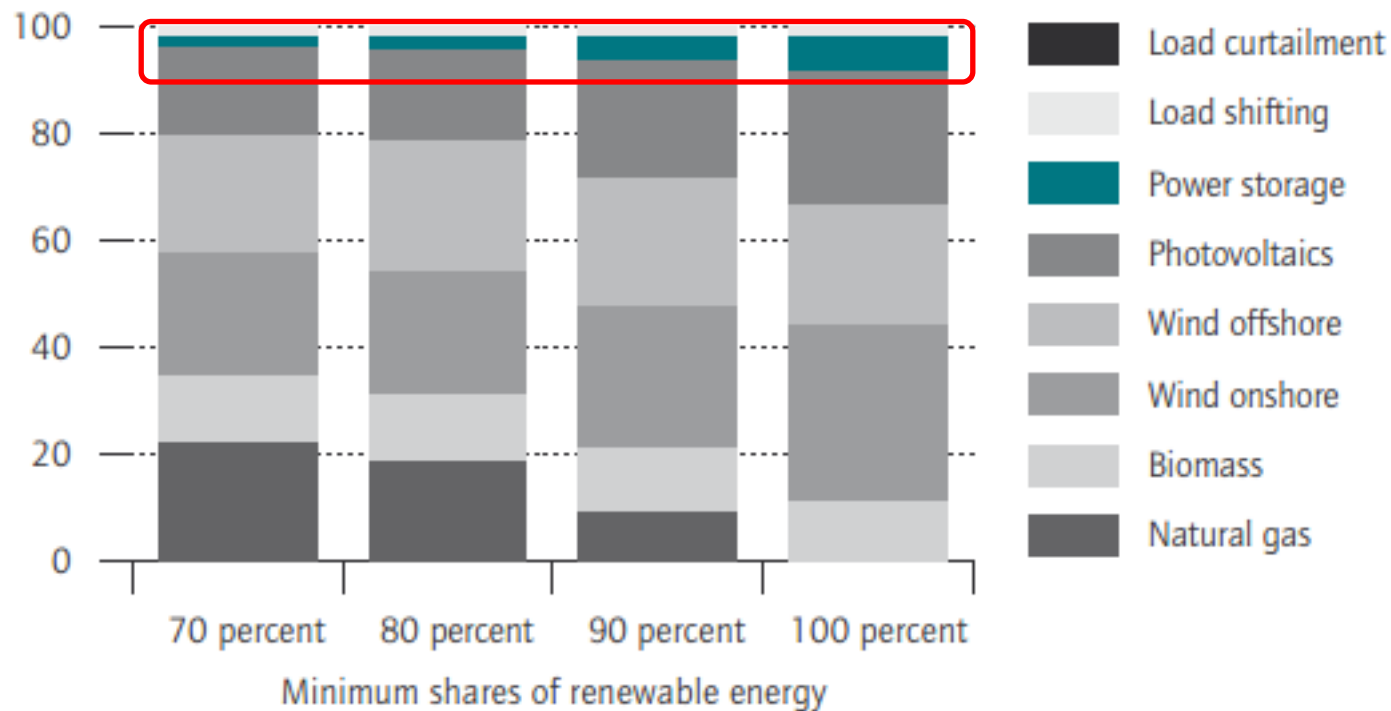


Need for storage - electricity production overrun



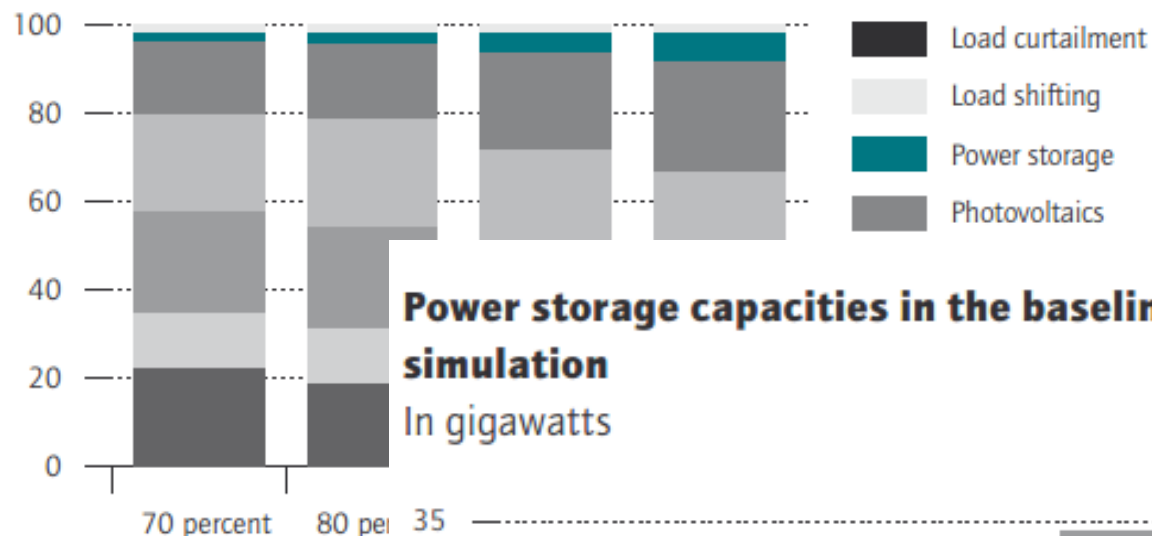
Power supply in the baseline scenario of the long-term simulation

Shares in percent



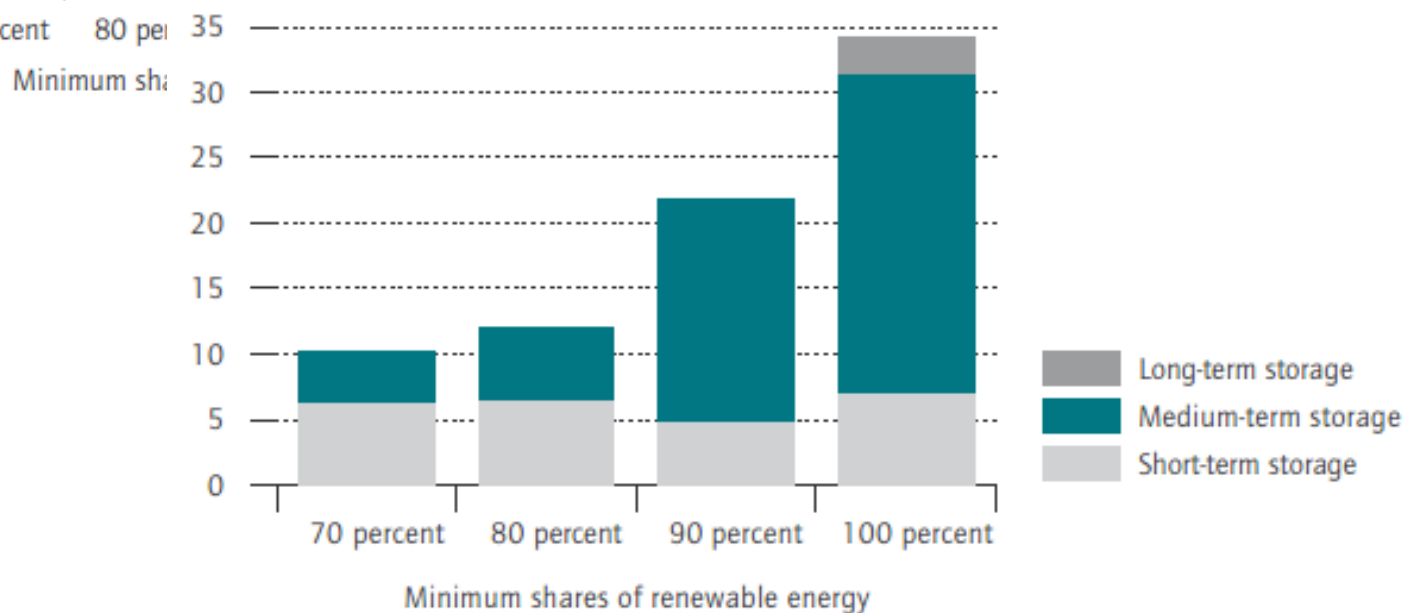
Power supply in the baseline scenario of the long-term simulation

Shares in percent



Power storage capacities in the baseline scenario of the long-term simulation

In gigawatts



Need for storage, market environment in DE (I)

- **Short and medium term**

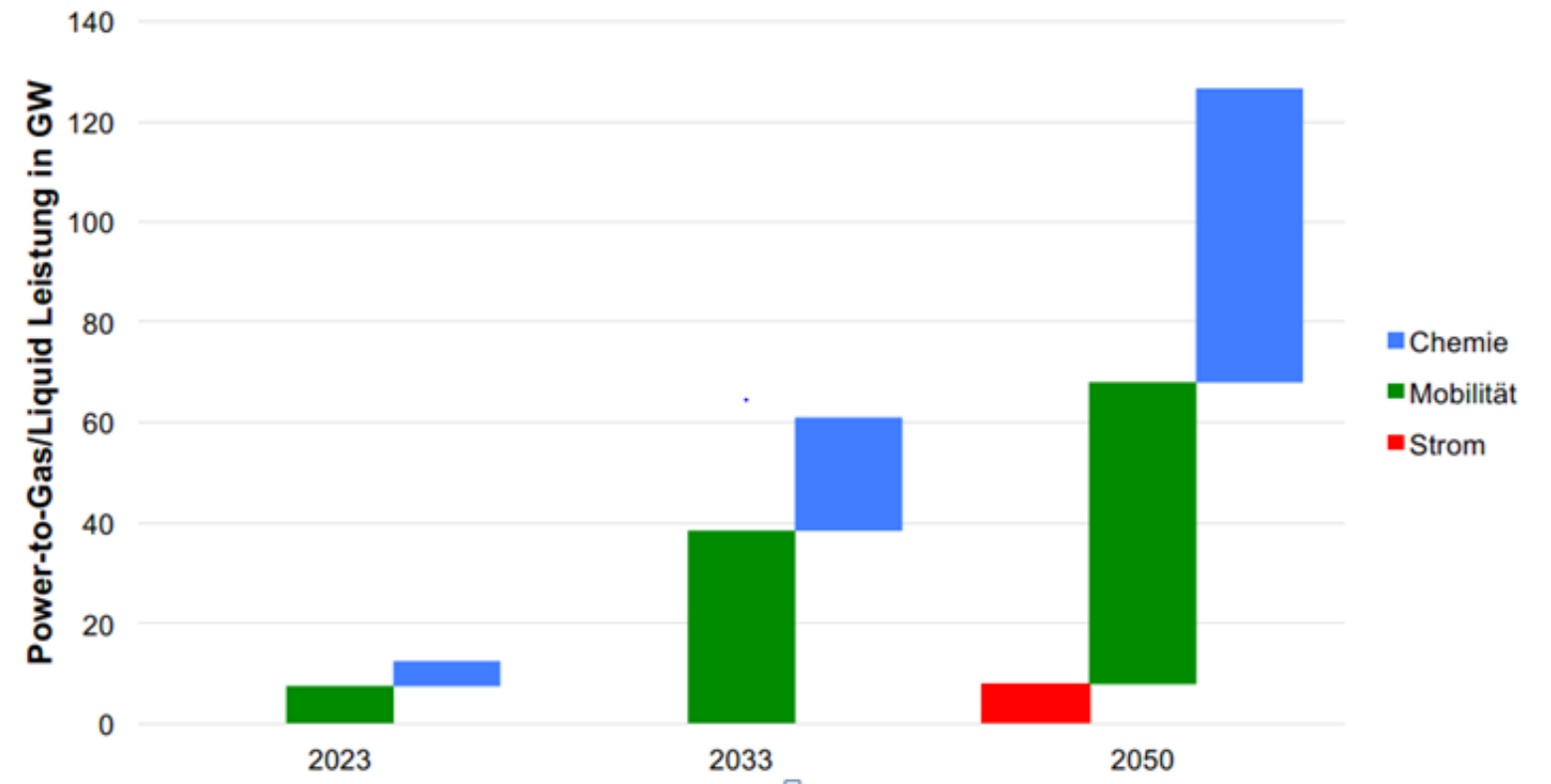
- Need for storage is mainly need for short-term flexibility
- No need for additional electricity storage from a system point of view
- Other more cost-efficient flexibility options available
- Decreasing spot market price spreads due to overcapacity of power plants and RE extension (e.g. cutting of price peak at noon by PV).
- Electricity storage at first probably mainly for ancillary services (especially frequency control)
- Possible drivers for electricity storage: own consumption of PV, electromobility

→ **Difficult market environment for energy storage**

→ **Research and development essential (esp. to decrease costs)**

Need for storage, market environment in DE (II)

First impulses probably by sector coupling: Power-to-X



Need for storage, market environment in DE (III)

- **Long-term/ very high shares of RES-E**
 - Need for storage not only to provide flexibility but also security of supply
 - Growing need for flexibility
 - More volatile prices
 - Need for long-term storage (e.g. to compensate low wind for several days or weeks)
 - Significant excess electricity
- **Positive economic environment for storage**
- **In the end, all energy storage technologies have to compete with other flexibility options**

Research and development: Funding Initiative for Energy Storage

- 2 ministries (BMWi + BMBF)
- 200 Mio. EUR funding budget
- More than 250 projects
- Main goals: **technological development and cost reduction**
- **Main topics:**
 - **wind-to-hydrogen storage systems**
 - **batteries in distribution grids**
 - **thermal storage systems**
- Further topics: e.g. alternative pumped-storage plants, CAES

Funding Programme for Decentralised Battery Storage Systems

- **Funding of battery storage in combination with (small) photovoltaic systems** (PV max. 30 kW)
- Reduced interest loans plus repayment bonus
- Funding/ repayment bonus: max. 30 % of battery storage cost but max. 600 €/kW_{PV (l)} (reference value is PV power plant)
→ **technology neutral**
- Max. feed-in 60% $P_{inst,PV}$ → **support the grid**
- Interfaces for remote parametrisation and remote control
- About 17.000 systems supported

Regulatory framework/ energy law

- No special category for energy storage; regarded either as generation or demand
- Storage technologies in many regulations privileged to normal end consumers
 - No grid-use fees for electricity storage and PtG (EnWG)
 - No Renewable Energy Sources Act surcharge for electricity storage (EEG)
 - Partly no electricity tax

Regulatory framework

Coalition treaty:

- In future mix of different electricity storage technologies necessary
- Provide technology-neutral framework

→ Aim:

- Technology-neutral framework
- Non-discriminating competition of flexibility options

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Conclusion

- Energy storage is an important topic for a mainly RE based energy system
 - Electricity storage will be important in the future, in the short term no need for additional storage capacities in Germany from a system point of view
 - At first use of more cost-efficient options
 - R&D important to realise necessary cost reduction and technological development
 - Cost of storage and competing flexibility options decisive
- **Non-discriminating competition of flexibility options**

Thank you
for
your attention!