Federal Ministry
for Economic Affairs
and Energy

Flexibility demands of a variable-RE-based electricity supply

Germany's program for decentralized battery storage systems

IRENA "International Energy Storage Policy and Regulation Workshop"

November 7, 2014

Tokyo

German Federal Ministry for Economic Affairs and Energy (BMWi)

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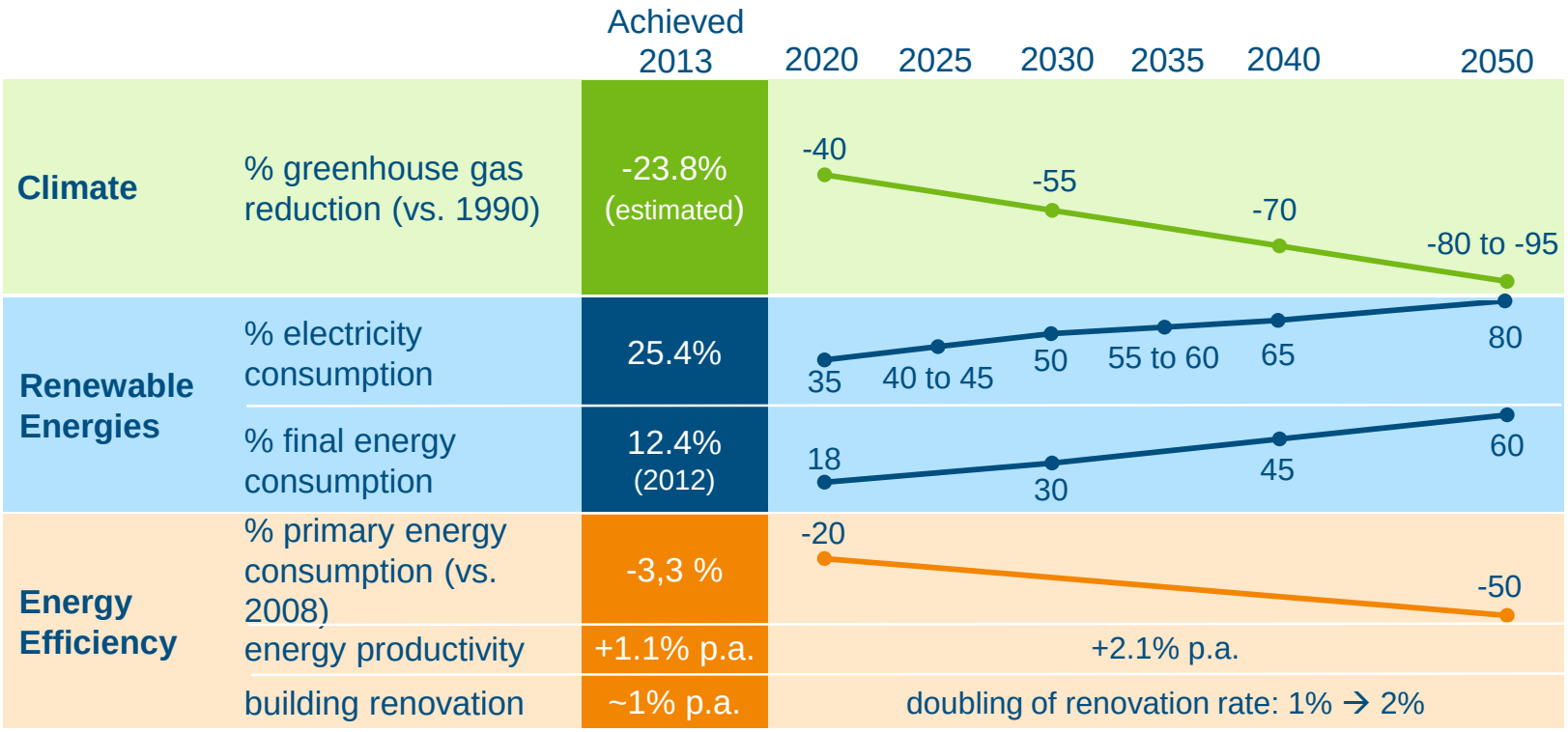
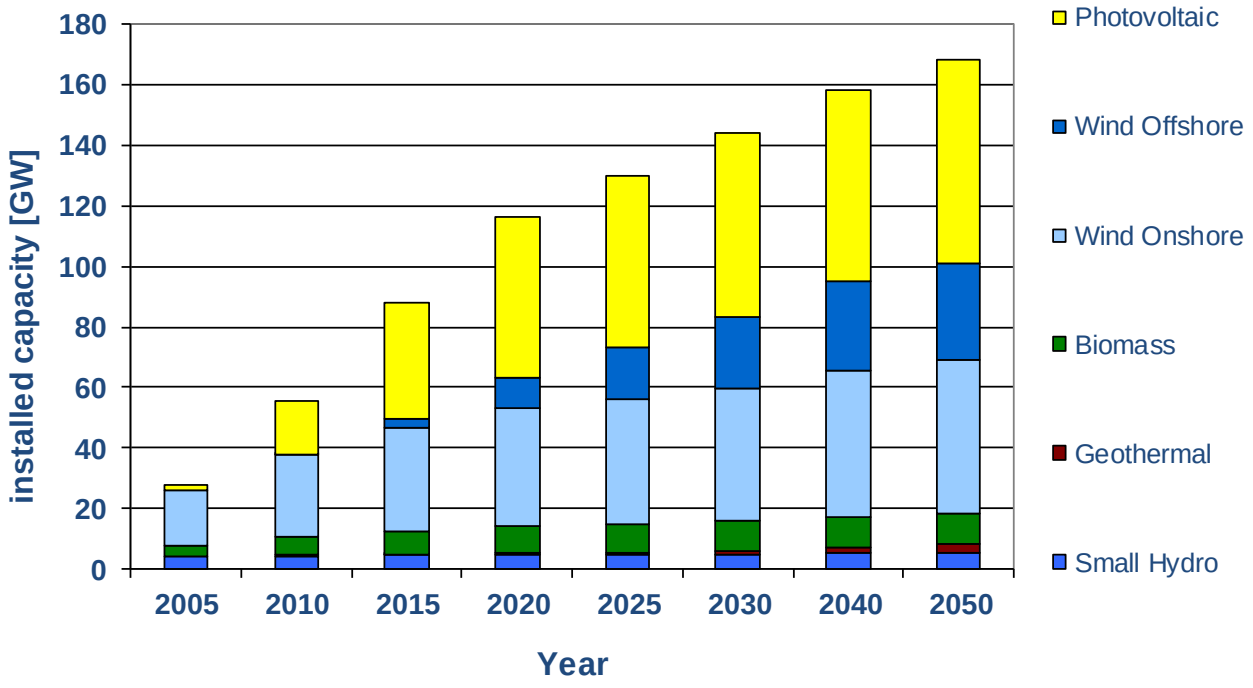
Energiewende targets until 2050



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

Germany has set ambitious targets in all sectors and is on track.

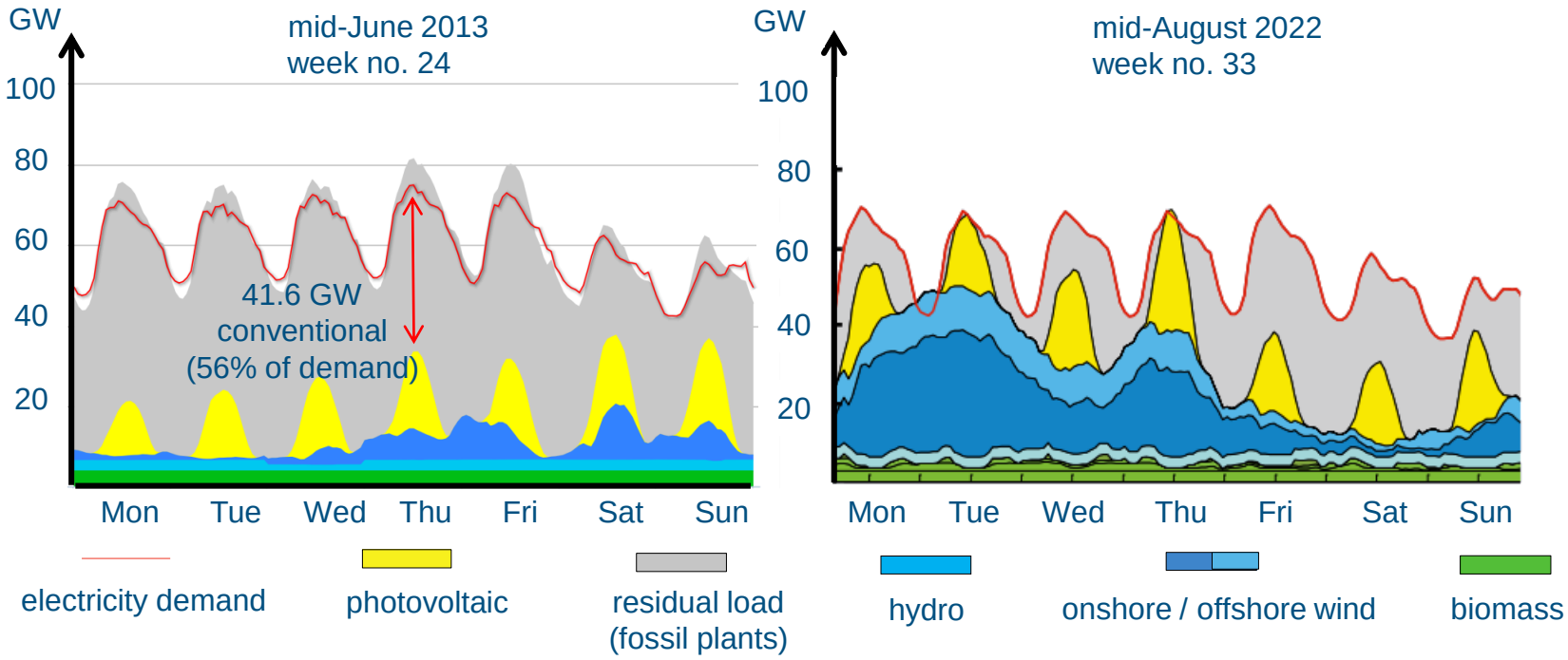
Development of installed RE capacity in Germany



Source: BMU-Leitstudie 2011, S. 116

The share of variable renewable energy will continue to increase.

German electricity-system volatility today and in 2022



Source: Agora Energiewende 2013

Conventional power plants need to adapt to higher flexibility needs.

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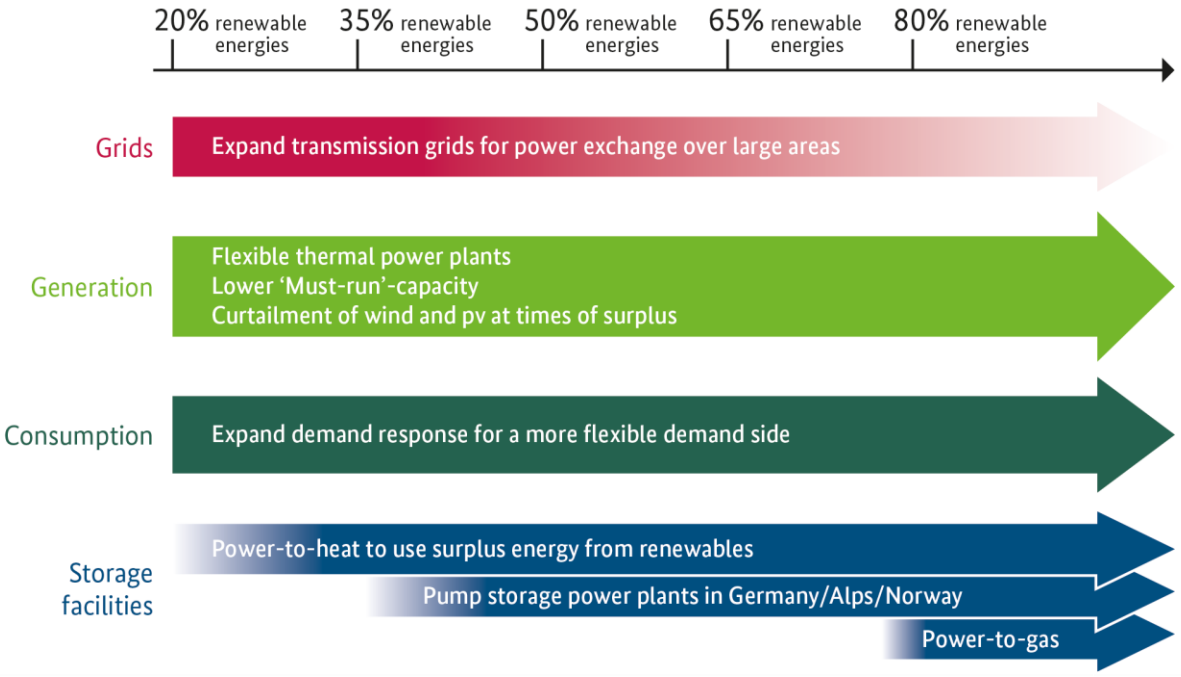
Flexibility measures depending on renewables share



Source: BMU 2012

Flexibility needs can mainly be covered by market mechanisms. New storage capacities are only needed for high renewable shares.

Storage demand in the short-medium and long term

short-medium term

- Mostly short-term demand for flexibility
- From system point of view no significant storage demand
- More competitive flexibility options available
- Decreasing electricity prices and –spreads at spot market
- Potential drivers: self-consumption and e-mobility

long term

- Storage demand for security of supply reasons as well as flexibility reasons
- Increasing demand for flexibility
- Higher fluctuations of spot market prices
- Demand for long-term storage
- Times of significant electricity overproduction

Currently difficult market environment for storage solutions, focus on R&D. Storage competes with other flexibility options.

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Market Incentive Programme / KfW-Programme for decentralized PV storage

- **Parliamentary assignment**
  - Bundestag assigned Fed. Government to introduce programme
- **Objectives**
  - Support of decentralized storage solutions
  - Contribution to grid stabilization
  - Technology-neutral
  - Market Incentive Programme: Incentivizing technology development, driving cost reductions

Scope / cornerstones of the programme

- Start 05/2013
- KfW programme (#275): low-interest loan plus repayment bonus
- Support for investment in battery storage systems that are combined with PV systems (PV systems from 01/2013 on with max. 30 kW)
- Repayment bonus max. 30% of the battery storage system cost, but max. 600 €/$kW_{PV\ (!)}$ (reference value is PV system)

→ Technology neutral

- Max. feed-in power 60% $P_{inst,PV}$ → grid relief / stabilization
- Interface technology for remote parameterization and remote control
- Open Interface of battery system (→ replacement batteries possible)
- Fair value replacement guarantee for battery for 7 years

Current status of the programme (as of 07/2014)

- Since the programme started in 05/2013, KfW has granted 5200 loans with a total volume of 85 Mio. €
- Average repayment bonus of approx. 3000 € granted

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Technology Development: „Support Initiative Electricity Storage“ („Förderinitiative Energiespeicher“)

- Shared programme of Ministry for Economic Affairs and Energy and Ministry for Education and Research
- Volume of 200 Mio. EUR
- > 400 project proposals of volume of > 1 Mrd. EUR received
- More than 250 projects accepted
- Focus areas:
  - Wind-Hydrogen-Coupling
  - Batteries in the distribution grid
  - Thermal storage
- Further projects on alternative pumped storage plants, compressed air storage

Conclusions

- Storage solutions are important for energy systems primarily based on renewable sources
- Storage solutions will be needed in perspective, however:
- Today still mostly expensive and – partly - in development stage
- More cost competitive options to be used first
- R&D necessary to realize the needed technology development and cost reductions
- Focus on creating a level playing field for competition of different flexibility options (flexible supply and demand, grids, storage, …)
- Ensure storage solutions are employed in grid stabilizing manner