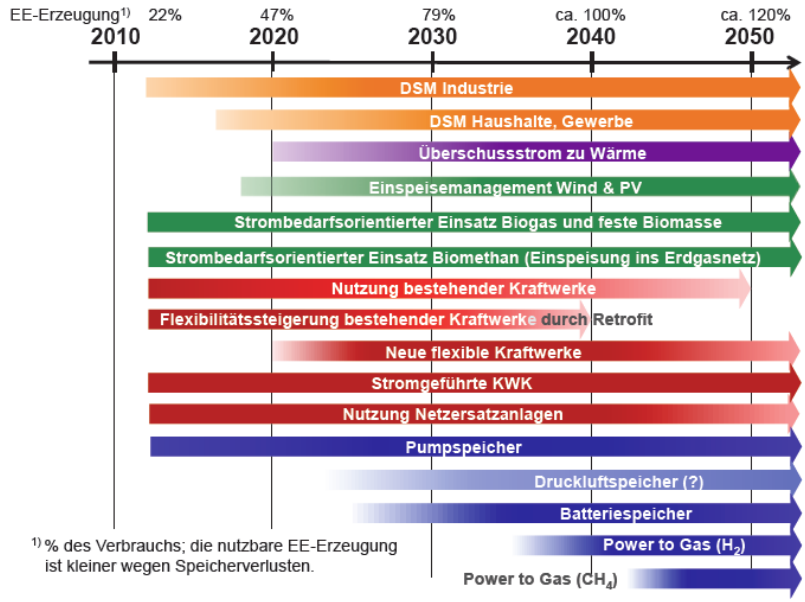
Summary of the study „Ways to balance variable renewable energy“ (Dr.-Ing. Norbert Krzikalla, Siggi Achner, Stefan Brühl)

Results of the study

- Presentation and evaluation of ways to balance the increase in variable electricity generation using renewables according to significance and chronology.
- It is fundamentally important to keep in mind that BEE’s scenario, although ambitious, is completely realisable and can mobilise sufficient flexibility to guarantee system stability, even using large shares of renewables.
- Without balancing measures, emerging surpluses in renewables will remain low until 2020, but then increase in frequency from 2030 and over longer periods.

Timeline of the implementation of flexibility options according to demand and cost efficiency (not taking network restrictions into consideration)



- The lack of economic incentives in terms of market design (day-ahead, balancing market) is problematic.
- Considering the time it takes to implement these measures, some should be introduced now at affordable costs.

Conclusion and recommendations

- Electricity-driven modes of operation for CHP and biomass plants should receive more substantial funding so that required additional investments can be refinanced, such as by increasing flexibility premiums or through differentiated CHP or EEG support correlated to the spot market price.
- Developing the potential for load management within industry should be supported so that this can be quickly implemented when required and indicated by appropriate price signals.
- Smart meter rollout only for households that have a high electricity demand and electric heat pumps.
- Because of the long lead times required for the planning and erecting of power plants and energy storage units, mechanisms should be developed that incentivise investment in a timely fashion so that power is available.
- Environmental regulations within water law acts should be reviewed in sight of the use of existent hydropower potential, as should the actual ecological consequences of limited fluctuating water reserves.
- The purpose and sense of regulations that significantly impede implementation of these measures should be reviewed. This might include:
  - Exemption from paying network charges in cases of high consumption and high full load hours (§19 NEV)
  - The burden of paying network charges and levies when using excess power
  - Insufficient access to the balancing market for renewables and DSM (must-run reduction)