

Pilot region for the energy transition

FLEXIBILISATION AND ORGANISATION IN THE ENERGY SYSTEM OF THE FUTURE



Generation and grids

Regionalisation and transmission

Combined-power-plants can help balance the decentralised supply of power from renewable sources with the regional energy demand as a first step to relieve the grids. Transmission and distribution systems create flexibility if the load and generation centres of different regions can be interconnected. To this end, the secure, efficient and ICT-supported grid infrastructure and its interfaces, for instance between the distribution and transmission system operators as well as to the customers and market players, have to be developed further so that they can meet the challenges and demands of the future.



Applications

Load shifting

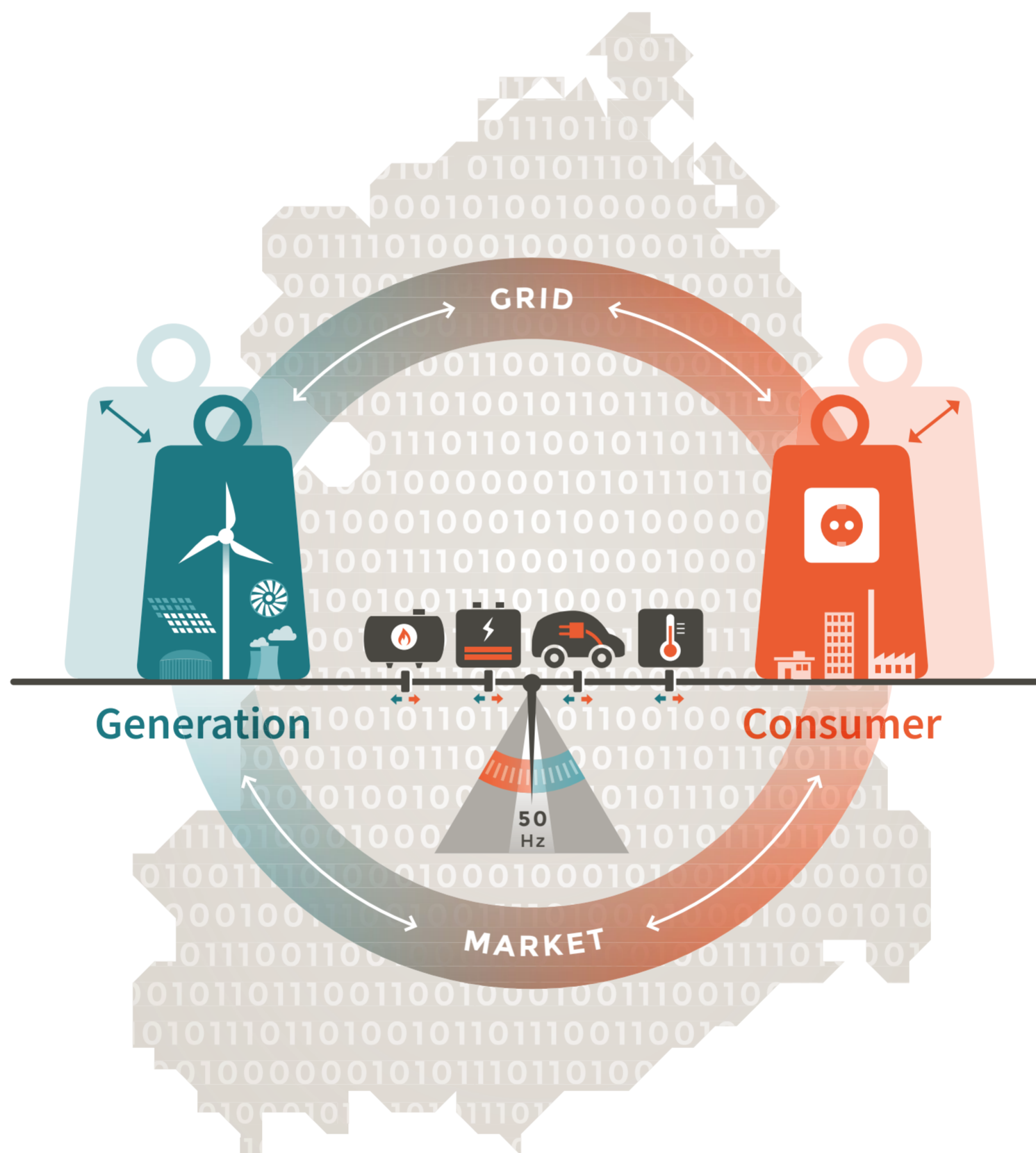
One possibility to react to the fluctuating feed-in of renewable energy is to selectively shift electricity demand in time. We systematically describe the approach to locate flexibility options with various model users and in this regard consider load shifting as well as battery storage and sector coupling. Our industrial, commercial and residential partners identify flexibility potentials and test their usefulness for grids, systems and markets.



Information and Communications Technology (ICT)

Use of data

Germany is leading the way by already having almost two million renewable generating units. The efficient system integration of these installations will require new ICT solutions and give rise to a growing data volume. This leads to far-reaching questions: how can data security be guaranteed? What standards do we need? Which new stakeholders, roles and services will arise in the field of ICT? And not in the least: what can we gain from the data? WindNODE seeks to answer these questions, also by gathering a wide range of creative input through 'Energy Hackdays' and the 'WindNODE Challenge'.



Sector coupling

New flexibility options

The energy transition is more than just an 'electricity transition'. There is enormous potential for flexibilisation and decarbonisation in the heating and mobility sector. The increased interconnection of these sectors with the electricity system can help balance the generation and consumption of electrical energy. Using the image of beam scales (see illustration), the sector coupling symbolizes, as it were, shifting weights for balancing. The idea of sector coupling is not new. Nevertheless, it faces at least as great regulatory and economic challenges as technical development needs. For Power-to-Heat (PtH) and Power-to-Cold (PtC), WindNODE demonstrates a wide range of model solutions, from small, decentralised installations to the 100 megawatts category. Furthermore, various approaches are tested within WindNODE for the system integration of electric vehicle fleets.



Market and regulation

Market roles and business models

As a living lab, WindNODE wants not only to demonstrate technical solutions that provide flexibility, but also to develop and test the necessary 'rules of the game'. After all, the efficient system integration of renewable energy has consequences for business models and the current distribution of roles between market participants. We are particularly interested in the 'amber light phase' of the grid traffic light concept of the German Energy and Water Association (BDEW), i.e. the transition between the free play of the electricity markets and the physical limitations of the power grids. Using the flexibility platform, we are working on an innovative approach for efficient grid congestion management.