

Subsequent use of power plant sites for energy storage, sector coupling and standby power plants

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Abstract

The EU commission recently proposed a more ambitious target for the energy transition in Europe, namely to become carbon neutral in 2050. To reach this target disruptive changes in all sectors have to be undertaken. Industry, mobility, heating and power generation have to change in their use of energy and cooperation as only an optimized way of sector integration can lead to success. When renewable energy sources (RES) becomes the main basis of EU energy supply (besides nuclear in some countries and the improved use of non-recyclable waste in heat and power) only RES electricity (wind, PV, geothermal, solar thermal and hydro) can contribute to the power production and biomass locally can support combined heat and power application. Considering that excess electricity has to be shifted (stored) seasonally and also industry and mobility have to be served a need for synthetic chemical energy carriers (eFuels like hydrogen, synthetic natural gas=SNG, synthetic methanol or its follow-up products) is obvious. On the other hand we still need existing (and renewed) thermal power generation combined with increasing fuel storage capacity to serve electricity needs whenever renewable energies are not available.

The paper will describe ongoing technology options, projects and activities related to changes in thermal power generation technology and ongoing development work for the integration of energy storage and sector coupling in existing power plants to enable maximum flexible operation, reserve power generation as well as synthetic fuel production from excess electricity for storage, for serving other energy sectors or reconversion in electricity. In addition a short overview on the international development of low carbon fuels (thermally upgraded biomass, green and blue hydrogen) will be given, which provides a realistic perspective for the transition pathway.