

Summary

In 2016, *The Long-Term Balance between Electricity and Gas Supply and Demand* was prepared in variants, which differ in terms of the energy industry's decentralization measure; two extreme development variants were compared: Centralized, which assumes a continuation of the energy industry decentralization at a low level, and Distributed, which presents a state of the highest possible exploitation of the small, decentralized sources. The third variant, Conceptual, models the development in accordance with current State Energy Policy (SEP). None of the variants are predictions, but **case studies**, which answer the question: what would happen if the development took a certain direction.

The most important findings are following:

1. Decommissioned large production sources cannot be replaced by small-scale energy industry development. This concerns particularly the nuclear power plant in Dukovany and some of the large brown coal-fired power stations. New blocs of nuclear power plant are necessary to ensure self-sufficiency of the Czech Republic in meeting its demand. The only alternative is to construct several gas-fired units, which will affect negatively the Czech primary sources import dependence and GHG emissions and other pollutants. There is a risk that the power system will not be serviceable without the imports from abroad in the period from 2028 to 2030.
2. In 2050, the decentralized energy industry (sources connected to low or high voltage grids) might cover up to 50% of demand for electricity at most in the Czech Republic. This includes the extreme increase in the number of RES and gas-fired sources.
3. The centralized energy industry requires the least changes and investments and provides the most secure operation with the maximum availability of reserve and ancillary capacity. However, it also allows for less significant reduction in pollutant emissions and greenhouse gases. Total power demand will grow up with the increasing level of decentralization, which would bring about a partial transfer from centralized heat supply. Thus, the electricity demand can rise by 3 TWh (3,5%).
4. The share of consumption covered by small decentralized sources at the lowest distribution level can reach up to 20% of the total consumption.
5. Thanks to the high share of small-scale RES, the decentralized energy industry allows the most significant reduction in pollutant and greenhouse gas emissions.
6. The power system stability and reliability cannot be ensured by conventional measures in case of wide decentralization; neither higher usage of regulated demand and supply can safeguard reliable operation. That is why the decentralization of the energy industry requires high amounts of daily accumulation (especially batteries installed on high and low voltage levels) and seasonal accumulation too, which will transfer part of the production from summer to winter.
7. Decentralized power sector will be always more expensive solution; mostly due to the significantly lower utilization of the installed capacity of the small-scale decentralized units.
8. Decentralized power sector would need slightly less investment into the transmission grid, but very high investment into the low and high voltage grid. From a certain level of decentralization the need to apply measures grows nonlinearly.
9. Decrease in amount of electricity supplied through grids together with an increase of investments in technical equipment providing system operation, with a large number of renewable and decentralized sources, will lead to a significant increase in the specific cost of electricity transmission and distribution and will require major changes in the calculation of payments for electricity supply.; consumer electricity prices would be 40% higher in the Distributed variant than in the Conceptual.
10. The prediction of gas demand is noticeably dependent on electricity industry source base in the Czech Republic. The outlook of the development was dealt as a case study. The estimation of that increment between 2015 and 2050 lies within 15% (the Low-carbon variant mentioned in the study from 2015) and 77% (Distributed variant). No variant can be described as more probable; policy trends will influence mainly the development.
11. According to outcomes of made analyses, 1.1 GW of small-scale CHP and 1.8 GW of micro-CHP are the limits for decentralized gas-fired units. Total annual gas consumption of these units would make 12.4 TWh of electricity production and 19 TWh to produce distributed heat.

12. In case of the highest gas consumption growth corresponding to the Distributed variant, it would be necessary to install approx. 2 billion m³ of new gas storage capacity by 2050 in order to maintain GSF capacity/total gas consumption ratio on the level required by SEP. The market with gas storage capacity is currently not flourishing.
13. Energy industry decentralization would cause proportional reduction in the specific costs of transmission and distribution due to the higher utilization of the gas system.

You can find more here:

<http://www.ote-cr.cz/statistics/long-term-balance-electricity/introduction>

and <http://www.ote-cr.cz/statistics/long-term-balance-gas/introduction>