

Switzerland's electricity system is in the midst of the greatest upheaval in its successful history. Energy reform brings with it a paradigm shift from a centralised to a decentralised energy system.

Intelligent grids, so-called smart grids, which are being developed at the Institute of Energy Systems and Fluid Engineering (IEFE), can continue to optimally adapt regionally differing generation and consumption requirements to one another.

Smart grids are integrated systems for regulating fluctuating electricity production from decentralised renewable energy sources and electricity consumption in a safe, efficient and reliable way. The main aim is to reduce the need to expand the electricity network in line with Energy Strategy 2050.

For the vision of a smart home and smart grid to become reality, smart meters and control devices are needed so that both prosumers (end consumers who also generate electricity) and grid operators can view and influence the required data and information on production and consumption at any time.

The following article outlines four potential pathways that could enable Switzerland to meet its increasing power-supply needs by focusing on the role of the electric grid, factoring in the economic and regulatory feasibility and the time required for implementation.

At present, the Swiss power generation portfolio consists of mainly nuclear power (33,5%) and hydropower (59,9%), along with some minor contributions from other renewable energy sources (2.6%; primarily photovoltaic), and some small scale combined heat and power generation infeed and distributed storage (4%).

In the long run, this virtual grid reinforcement can enable AEW to stabilize the voltage, deploy more renewable generators and increase network capacity without having to lay more power cables. This innovative solution yields significantly lower costs and avoids any environmental disruption.

Solar energy has enormous potential to reduce CO₂ emissions from power generation, but the corresponding grid expansion usually comes at a high cost. With the simple, smart automation developed by Lukas Ortmann's team, we can contribute to a grid of the future with decentralized renewable energy generation plants.

The Federal Act on a Secure Electricity Supply from Renewable Energy Sources was approved by Parliament in autumn 2023. The bill lays the foundations for a rapid expansion of Switzerland's energy production from renewable sources such as hydropower, solar, wind and biomass.

The analysis covers both renewable power generation technologies such as hydro power, wind power and

photovoltaics, which are at the core of Switzerland's Energy Strategy 2050, and nuclear and fossil-fuel based technologies that are heavily used in neighbouring countries and are relevant given Switzerland's integration in the European ...

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