PV as a Main Source of Electricity in the “Energy Strategy 2050” Switzerland

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The transition to a predominantly renewable energy economy may offer considerable opportunities. For a country like Switzerland, savings in the order of 13-15 billion USD / year are realistic. To give room for electricity produced mainly from photovoltaics, the existing old nuclear power plants in Switzerland need to be shut down. This is the aim of the Swiss Governmental “Energy Strategy 2050”. A political agreement yet to be democratically reached.

The Swiss “Energy Strategy 2050”

In 2013, the consumption of electric energy in Switzerland was 59.3 TWh. In 2050, the anticipated electricity consumption will be around 65-70TWh/y.

After the Fukushima accident, the Swiss Government decided to move out of nuclear energy (“Energy Strategy 2050”).

PV will be by far the most important (12 TWh) new electric energy source for Switzerland by 2050 (Fig. 1). Wind and deep geothermal are then both expected to contribute with about 4 TWh each.

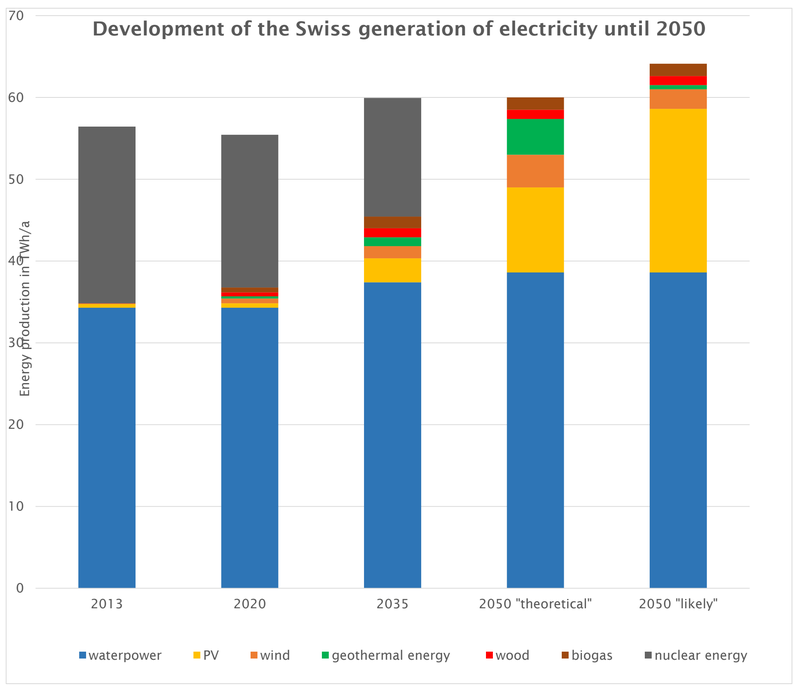

Figure 1: Evolvement of the Swiss electricity production over time and projections till 2050.

Simulation of Self-Sufficiency

A reliable electricity supply over the whole year is essential. Experiences show that homes generally only produce as much electric energy as they need. In the future, owners of PV-installations may be able to stabilize the grid when producing excess electricity and heat (Fig. 2).

The PV LAB at Bern University of Applied Sciences BFH has simulated different consumer options, being:

- Use the excess energy for oneself
- Increase the internal consumption
- Reduce the network supply

Several models with different household appliances were compared. The integration of an electric car and a stationary battery were also simulated.

Results

Because the consumers haven’t got enough electric power input, optimizing the internal consumption in a single-family house is only partially possible.

Part of the solution of this problem might be a grid that is able to communicate and enables a transfer of the produced electric energy to the neighborhood.

It is also possible to save energy and money in a single-family house with other efficiency methods, among them being a sound isolation of the house.

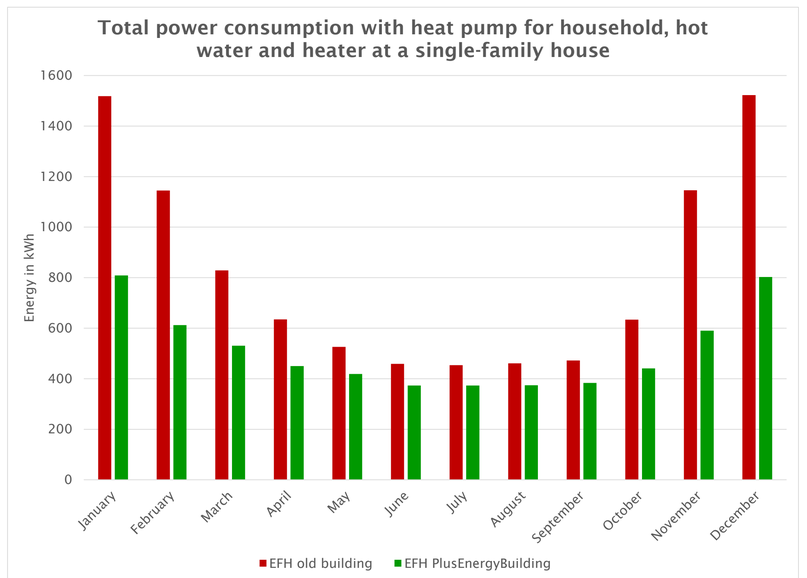

Figure 2: Total power consumption in a single-family house (difference between an old building and PlusEnergyBuilding).

A heat pump is the best solution to complement a PV-installation as it provides the thermal energy both for the heater and hot water (Fig. 3).

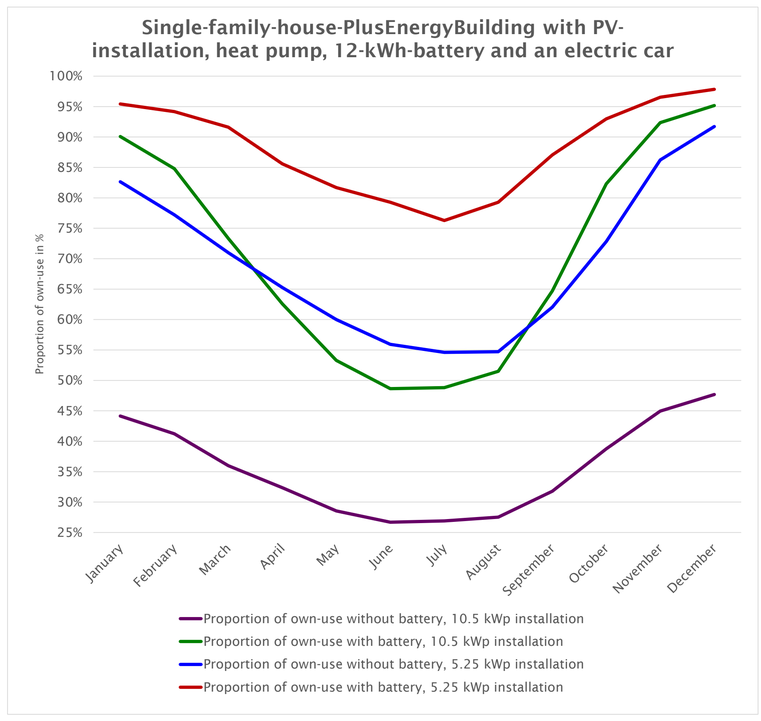

Figure 3: Comparison of the proportion of own-use in four different utilizations.

A stationary battery or charging an electric car may increase the internal consumption. Research on lithium-ion battery technology has made great progresses in the last few years. The number of charging cycles could be enhanced in the future. Also, the increasing demand will reduce the price for battery storage.

Further Information

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