sweet swiss energy research for the energy transition

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CROSS

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CROSS-Scenarios with Swiss Energyscope (ETH)

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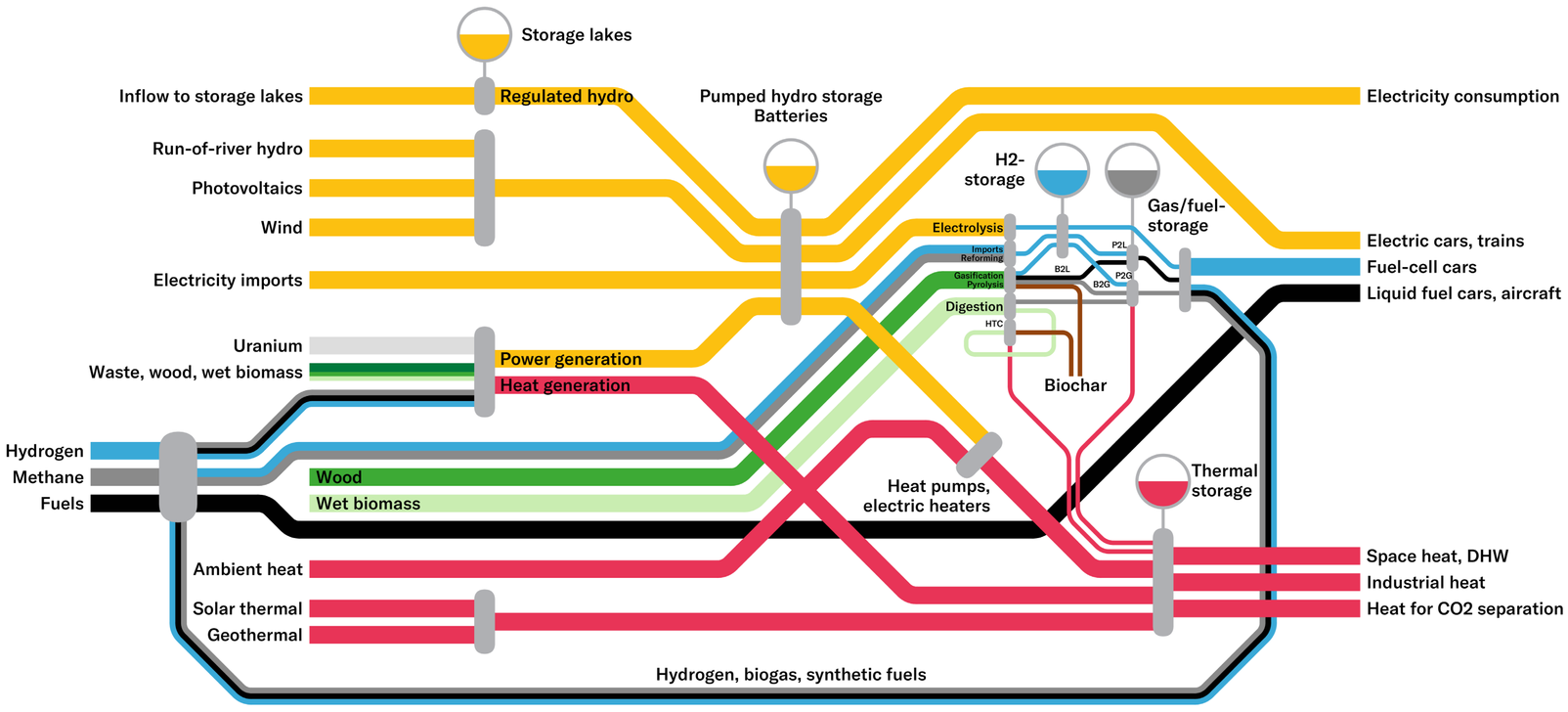
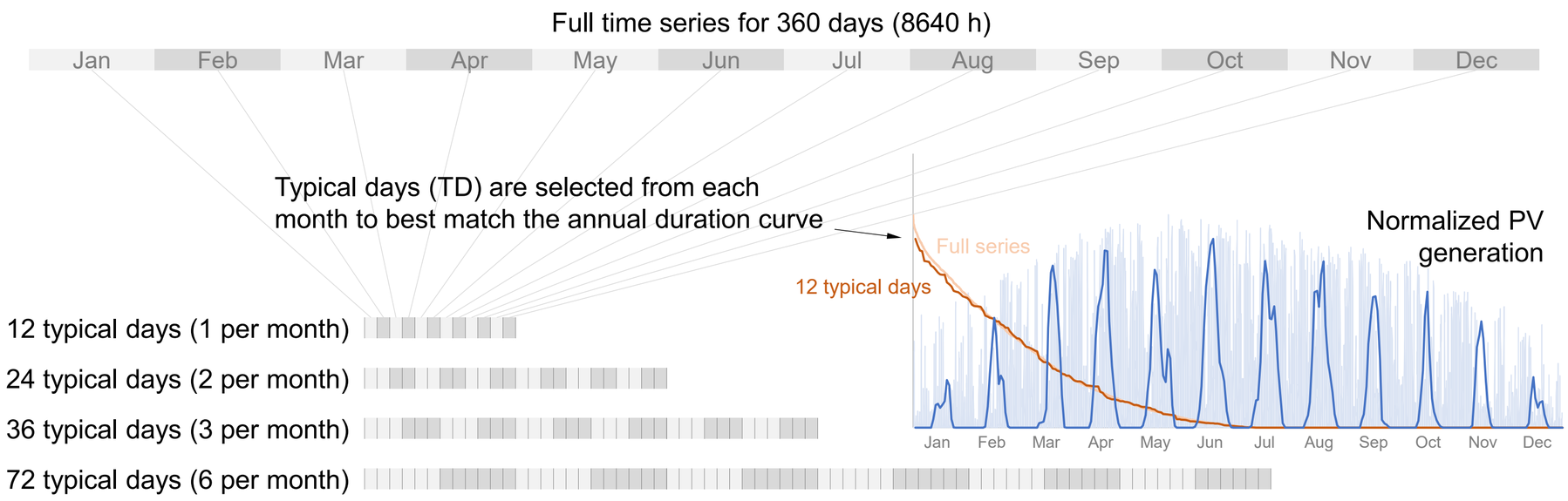
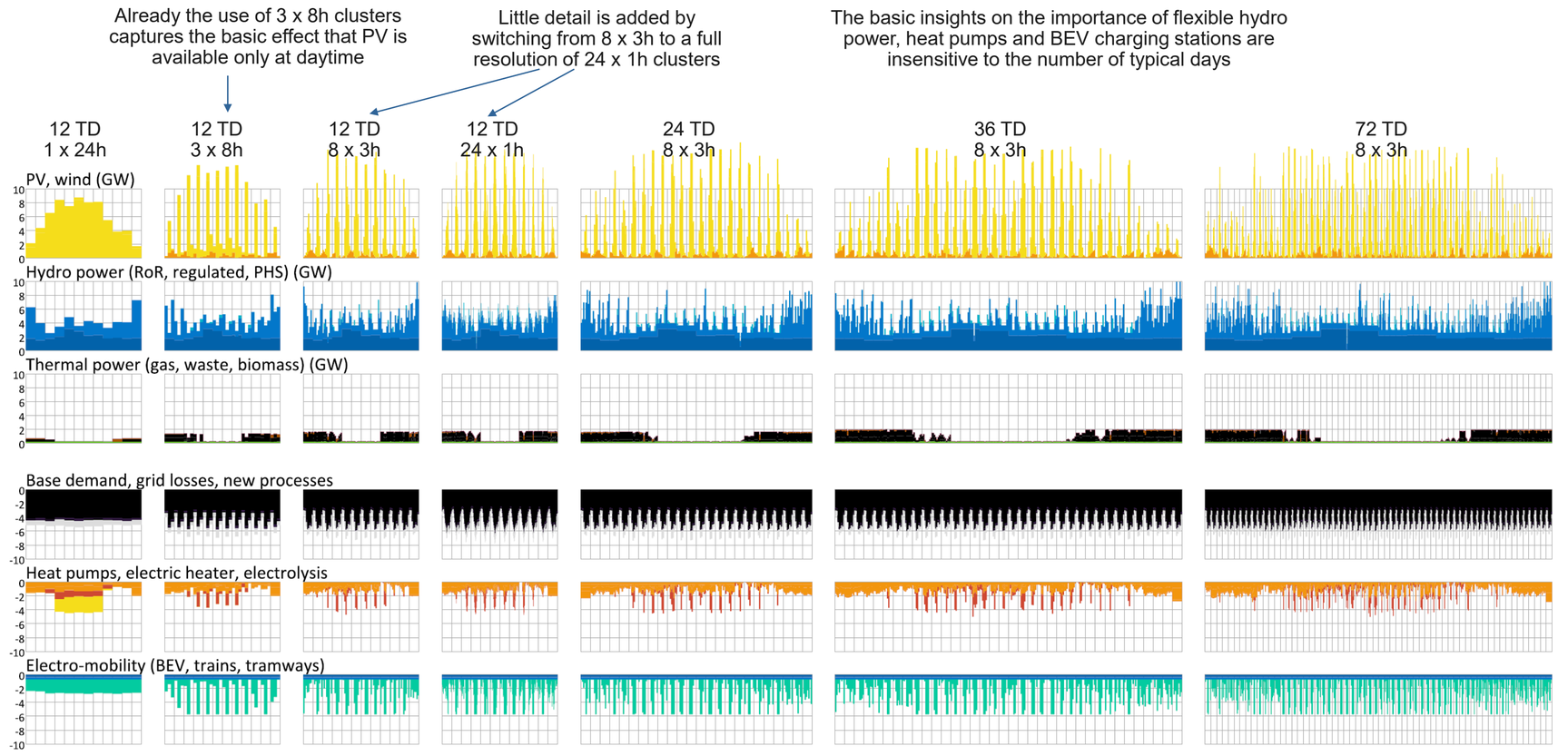
The model balances energy flows from supply via various transformation and storage steps to the demand for electricity, heat and mobility (incl. aviation). It optimizes both the sizing of all assets and the operation throughout a typical year (here 2050). It repeats the analysis multiple times to account for the uncertainty of key drivers such as technology costs. It allows to extract robust recommendations for technology development and support.





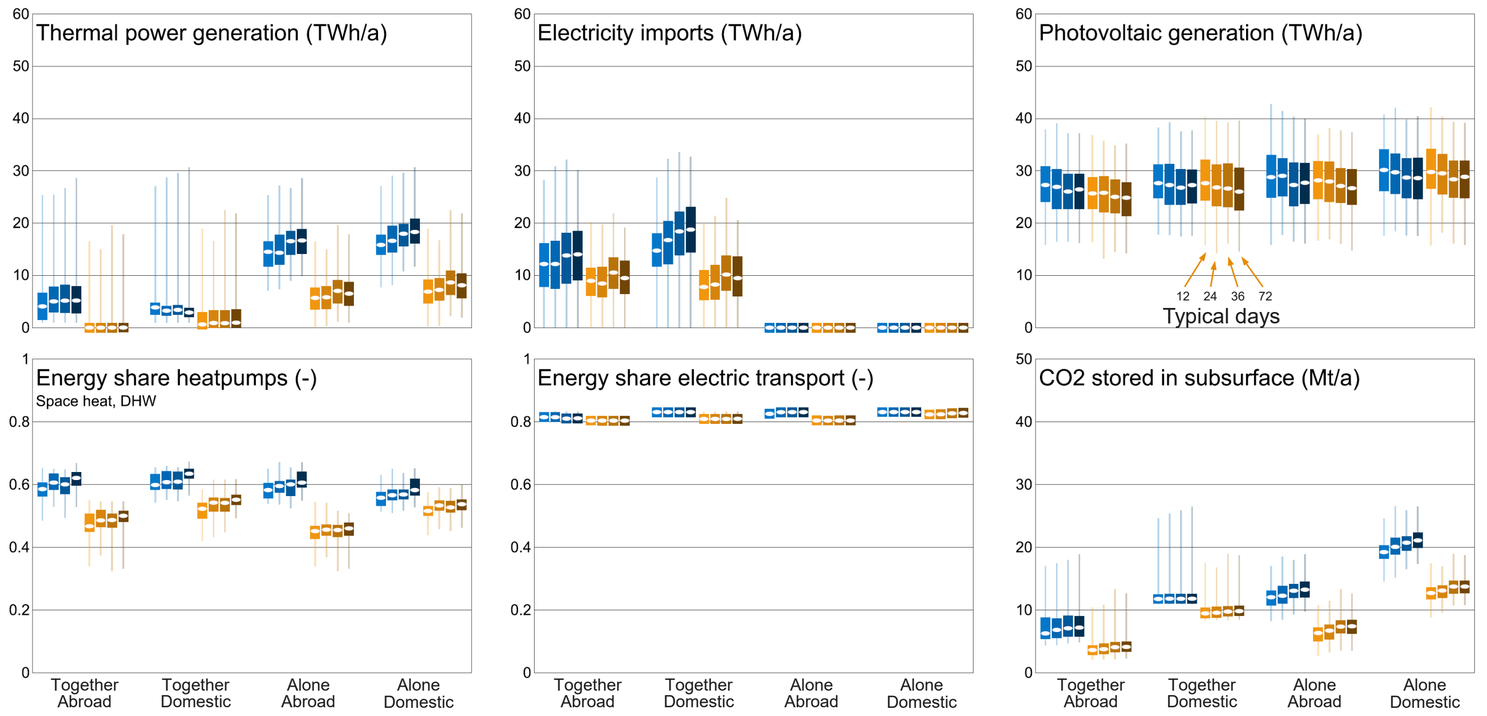
A typical day (TD) approach is used to reduce computational effort. In addition, an intra-day clustering is applied. Seasonal storage spans through the entire year while short-term storage can only operate within a TD.

We used different number of typical days and intra-day clusters. Already three 8-hour clusters per day capture the important features of an electricity system with lot of photovoltaics: flexible (pumped) storage hydro power, flexible heat pumps/electric heaters with thermal storage and most important flexible charging stations for electric vehicles. Additional electricity generation in winter must come from domestic thermal power plants and/or net imports.



Winter electricity needs to be supplied by imports or by domestic thermal power generation. A robust strategy should aim at a full integration into the European power system (Stromabkommen) while building up a reasonably sized domestic thermal power capacity.

We need a lot of photovoltaics – on roofs, on free fields and in the alps



Heat pumps and electric mobility are the key technologies for achieving the Swiss climate targets – and the additional electricity demand can be satisfied.

We need a CO2 pipeline network to connect to a European transport and storage infrastructure

The analysis is carried out for a **conservative** and an **innovative** scenario. The latter foresees higher availability of hydro and wind power, geothermal energy, alpine PV, seasonal thermal storage, etc. Considering this variation together with the four different CROSS scenarios and the uncertainty of other drivers (technology costs, population count, climate, etc) allows to extract robust conclusions that lead to actionable recommendations.

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