ETH zürich

Energy Science Center

The Role of Thermal Energy Storage within Net-Zero Scenarios for Switzerland

Gianfranco Guidati

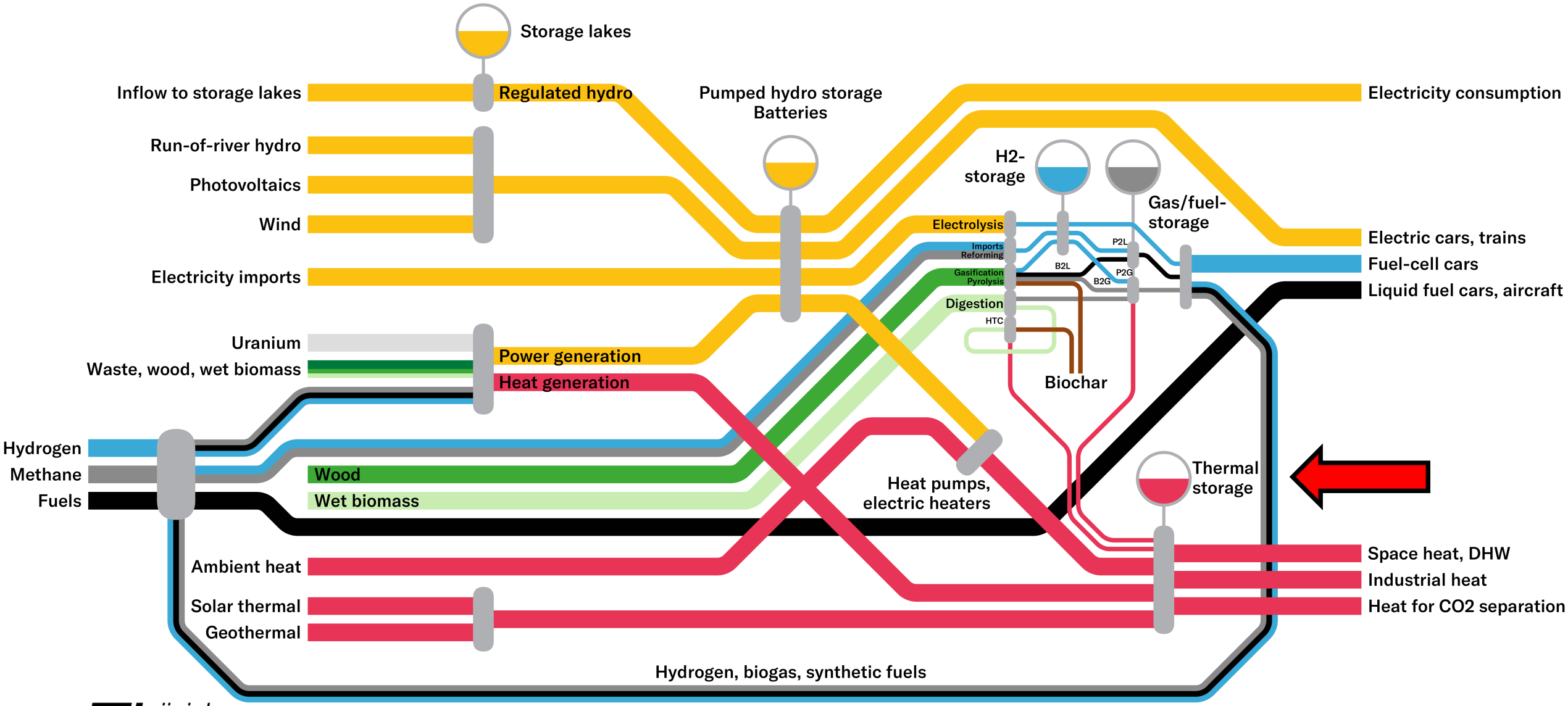
26. January 2024, 11th Swiss Symposium Thermal Energy Storage

ETH zürich

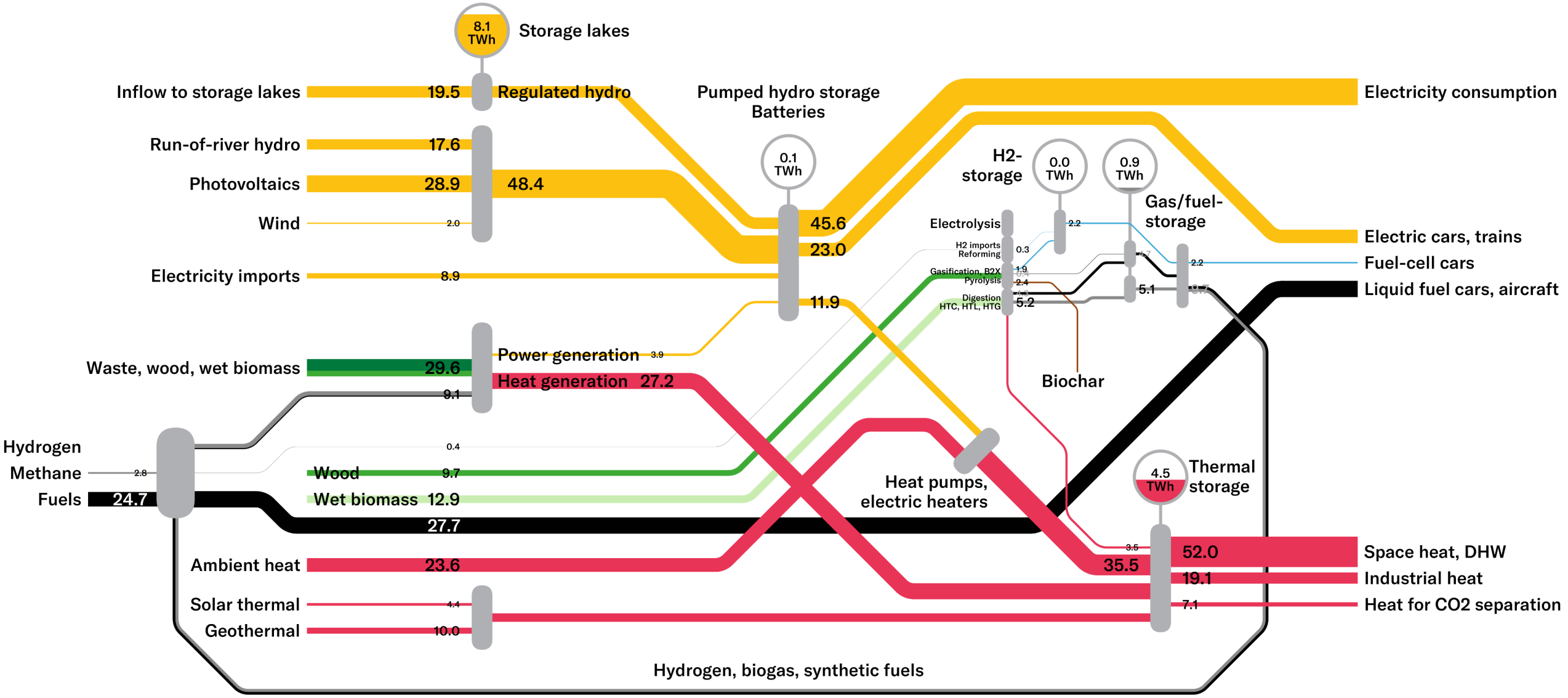
Rational people answer most questions about the future (...) by saying "I don't know".

John Kay, Mervyn King – Radical Uncertainty

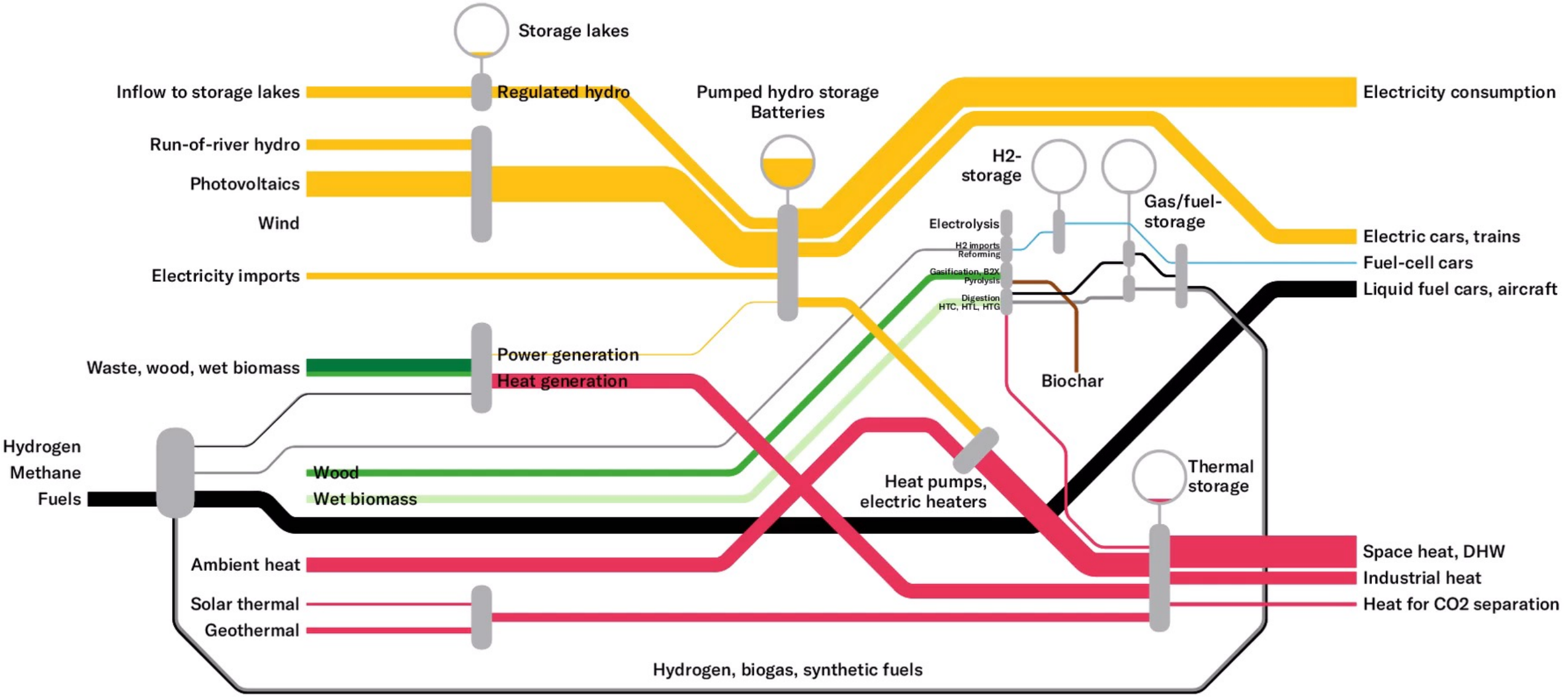
Use models to get a basic understanding of the future



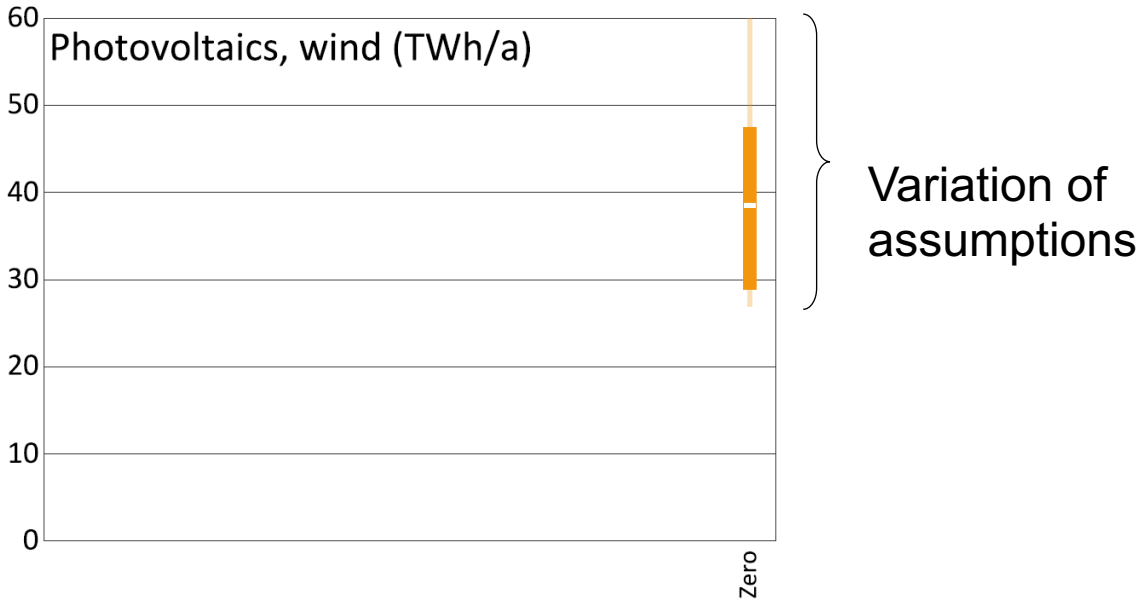
One possible realization of net-zero



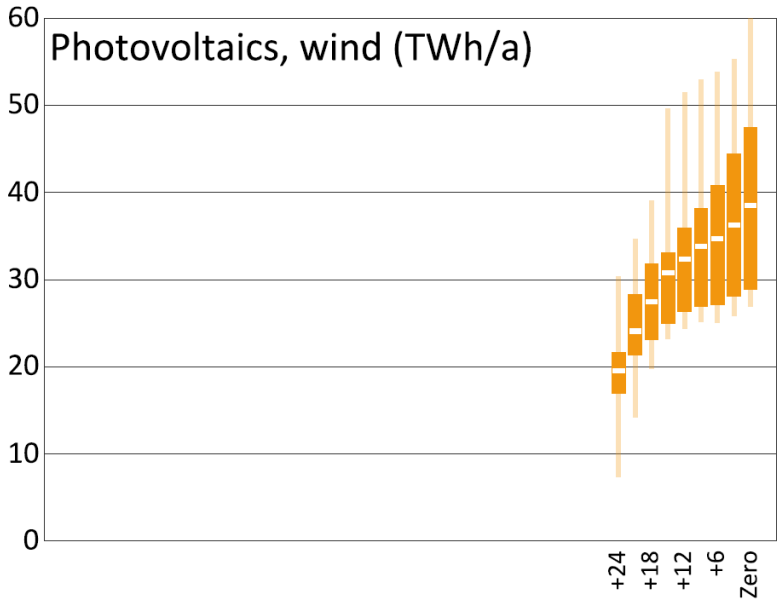
Variation of assumptions



Some indicators

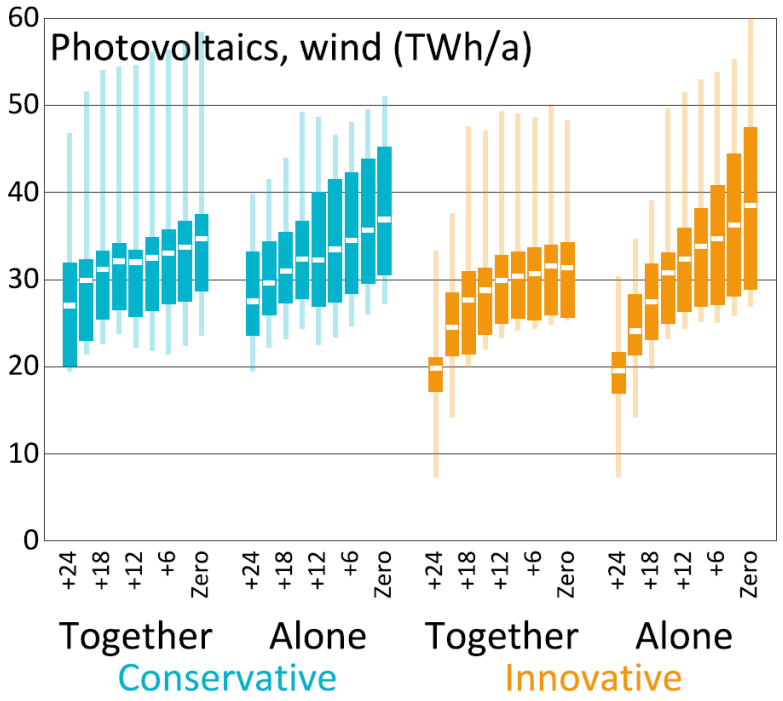


Some indicators



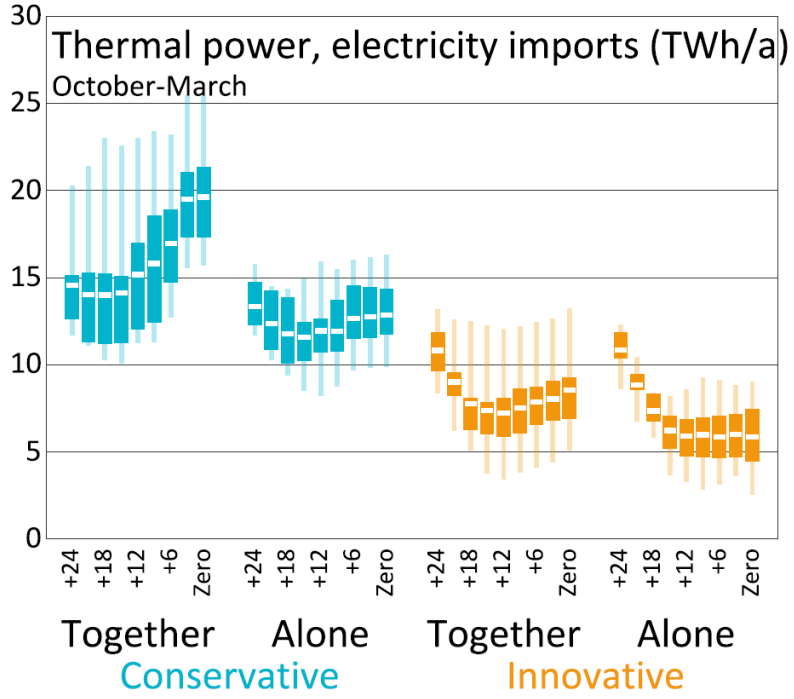
← Variation of CO2 targets

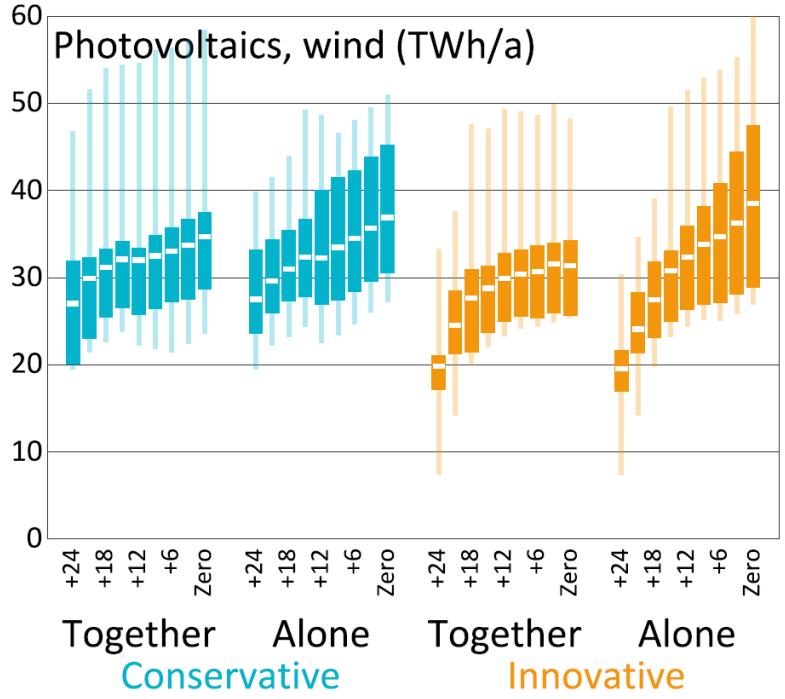
Some indicators

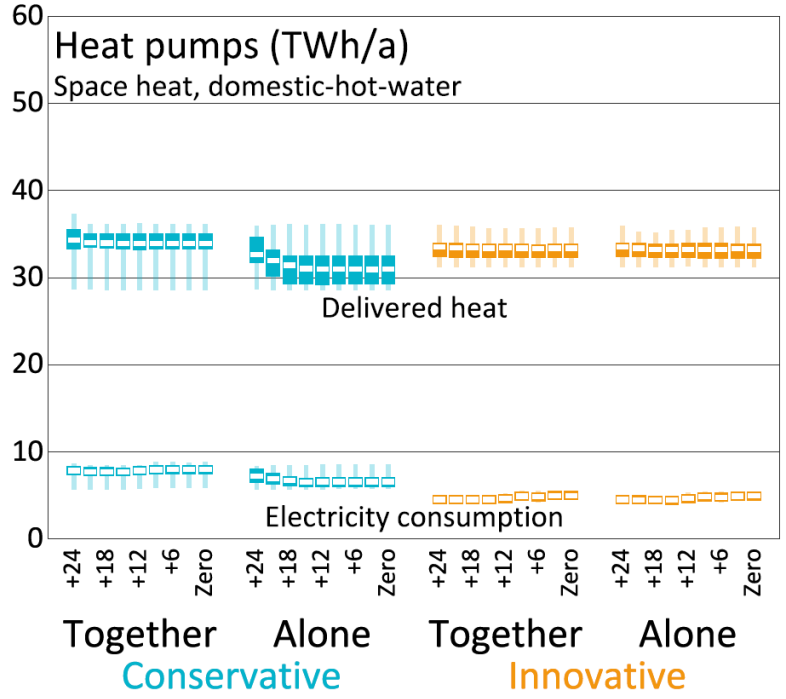


← Variation of scenario groups

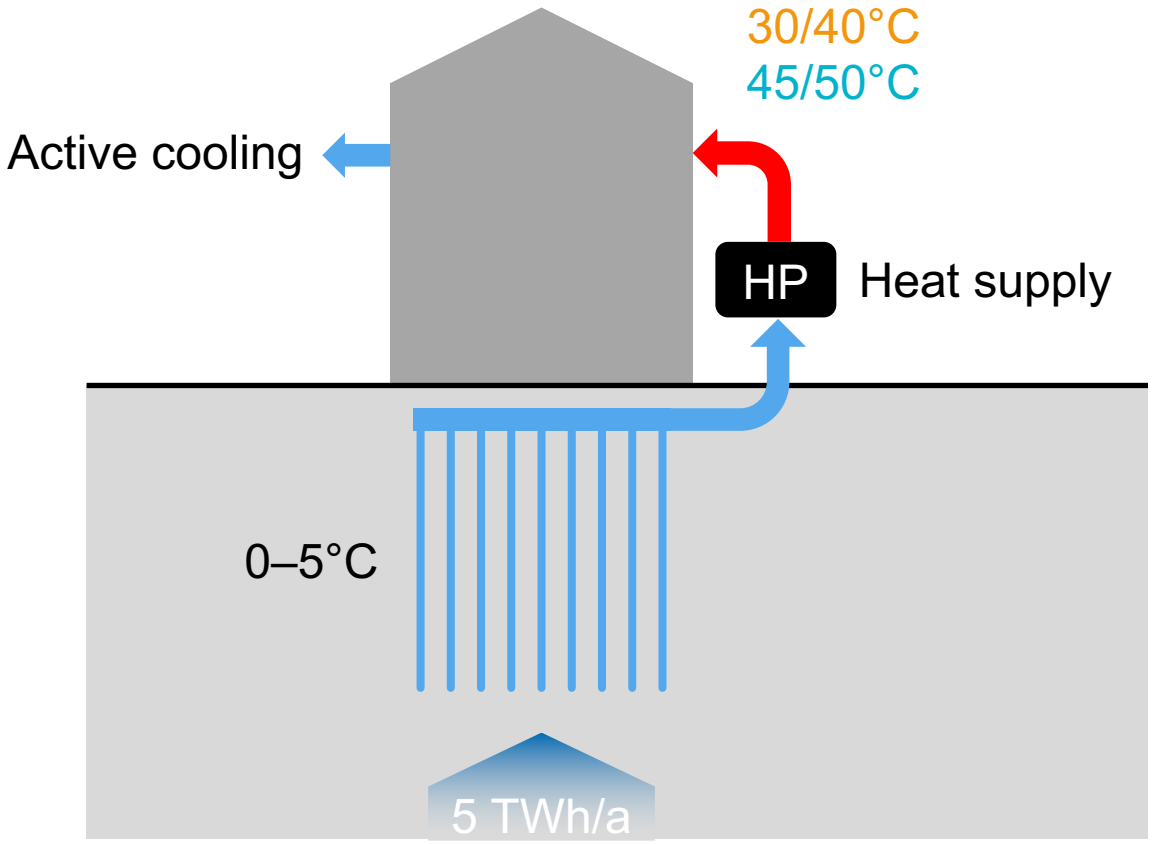
Some indicators







Thermal energy storage: borehole fields

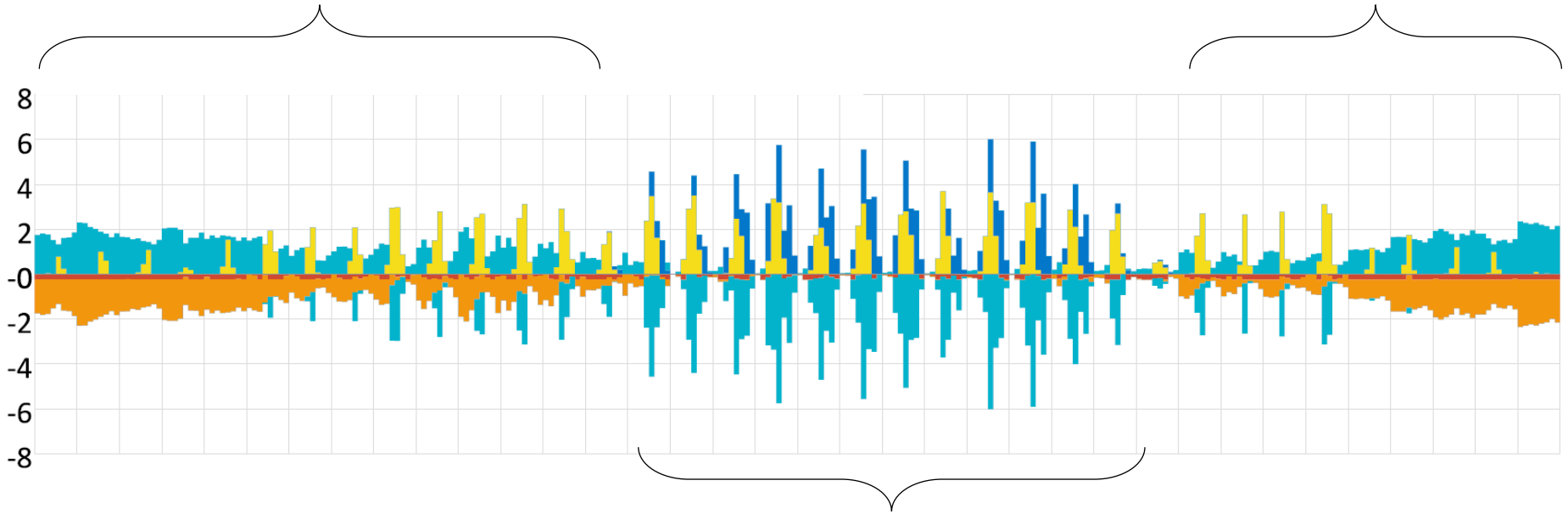


No regeneration

Time series for 36 typical days in 2050

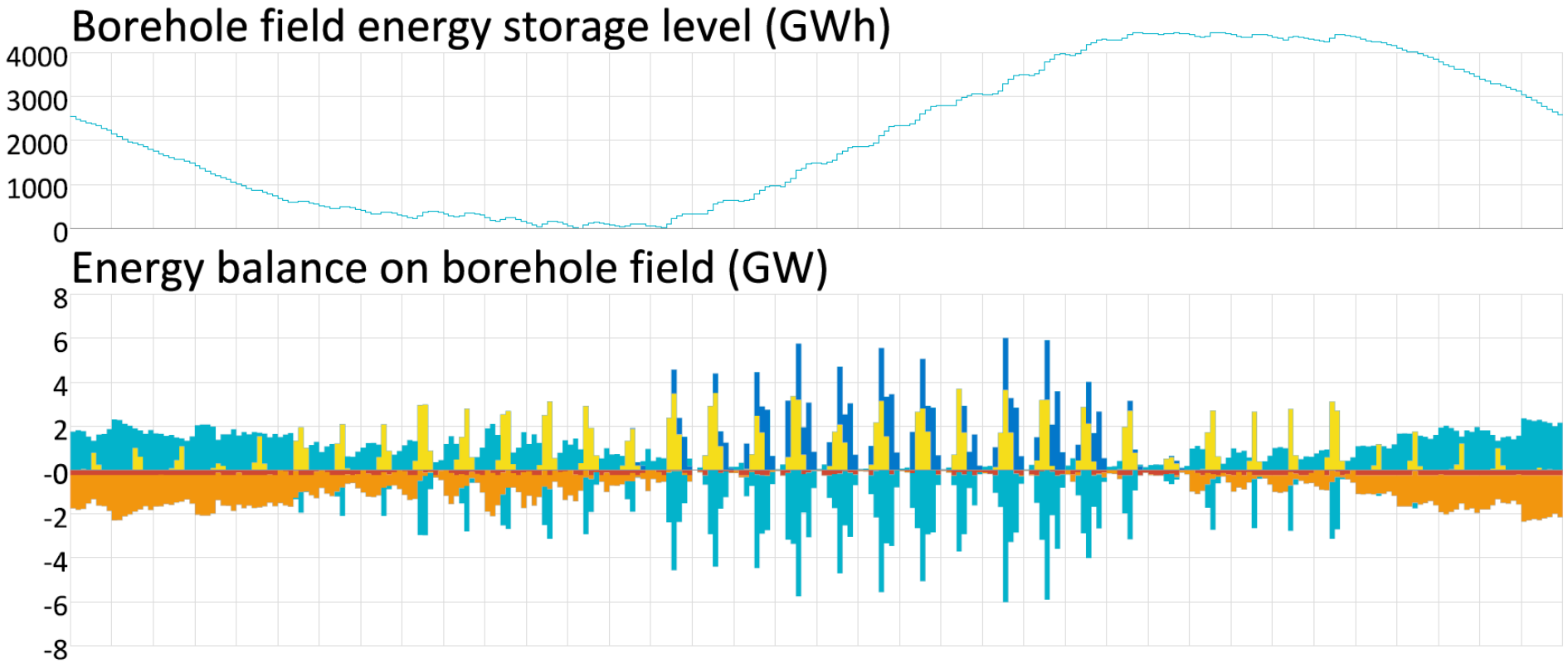
Energy balance on borehole field

Discharging in winter to feed heat pump

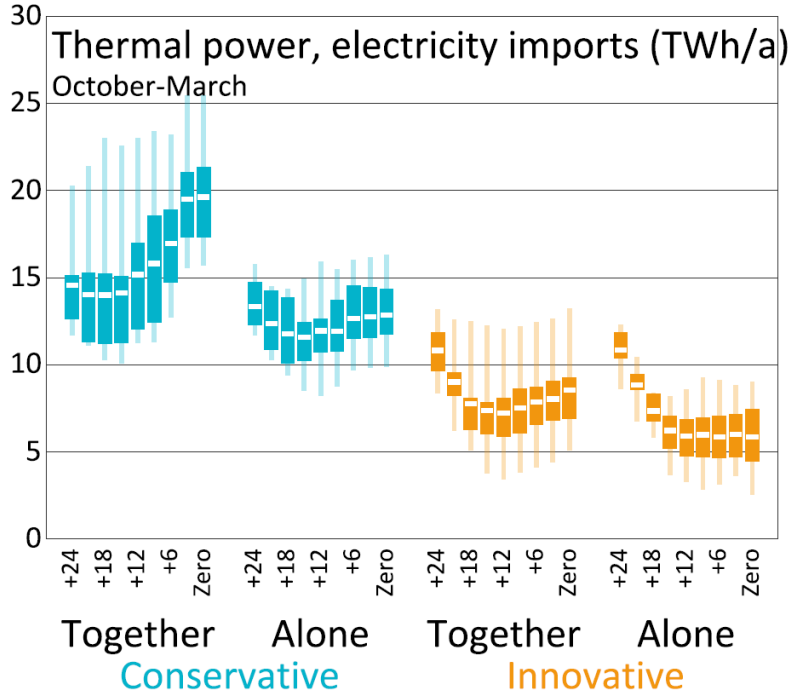


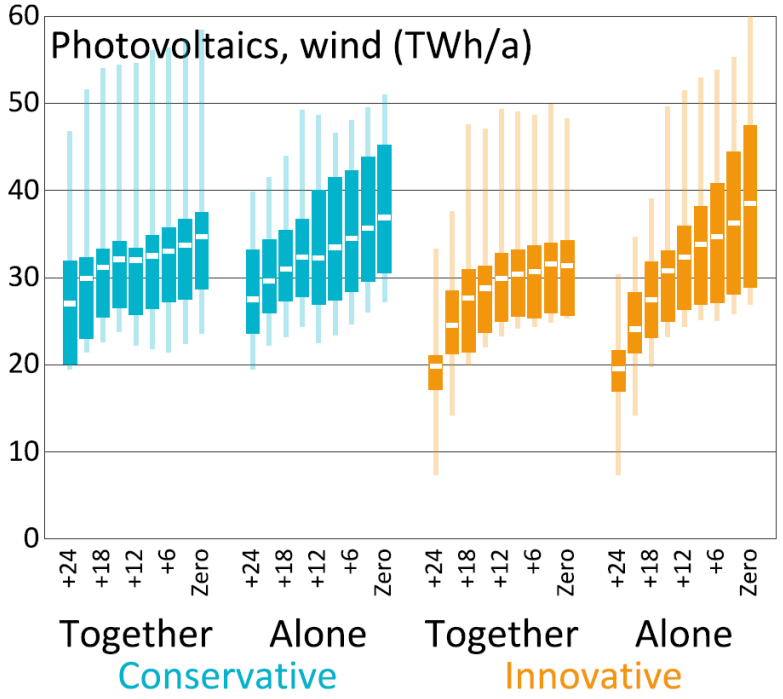
Charging in summer by free cooling and solar thermal

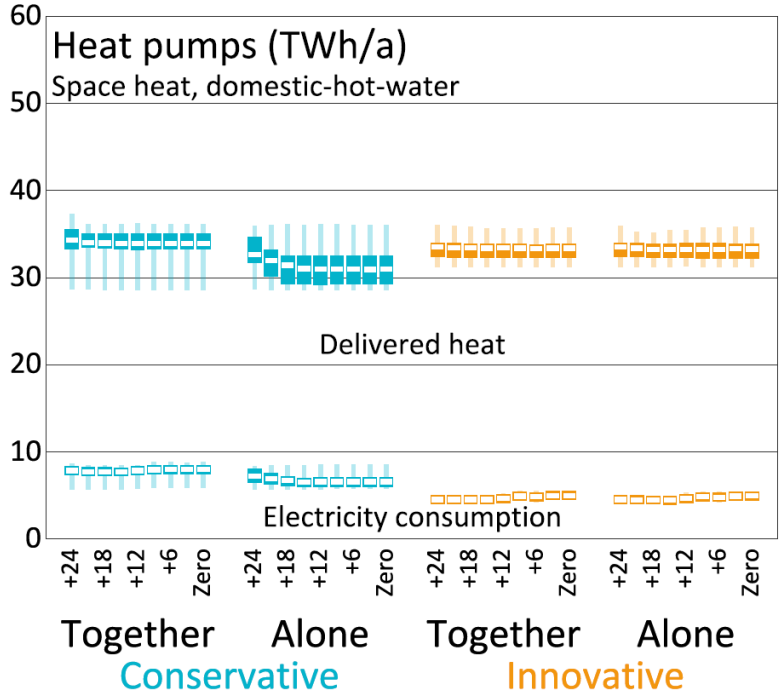
Time series for 36 typical days in 2050



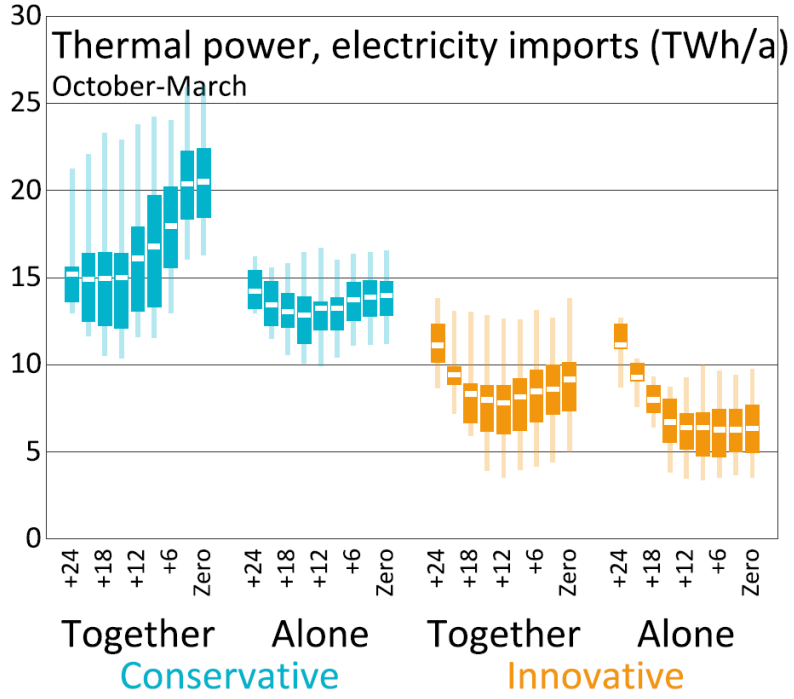
Regeneration available

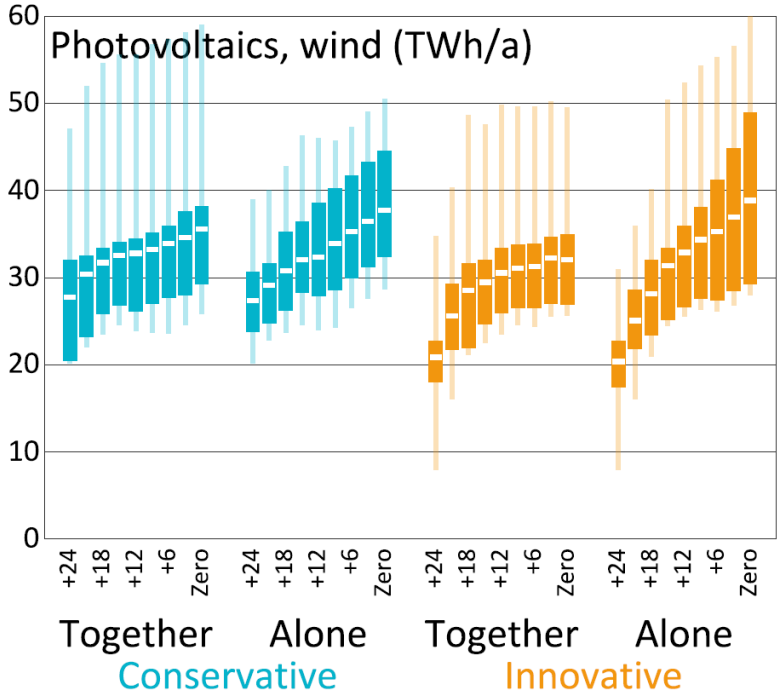


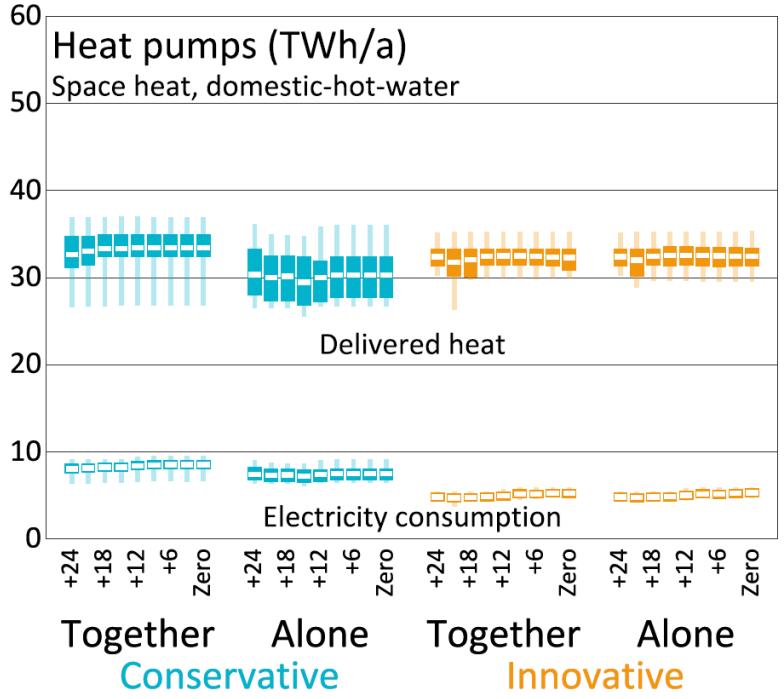




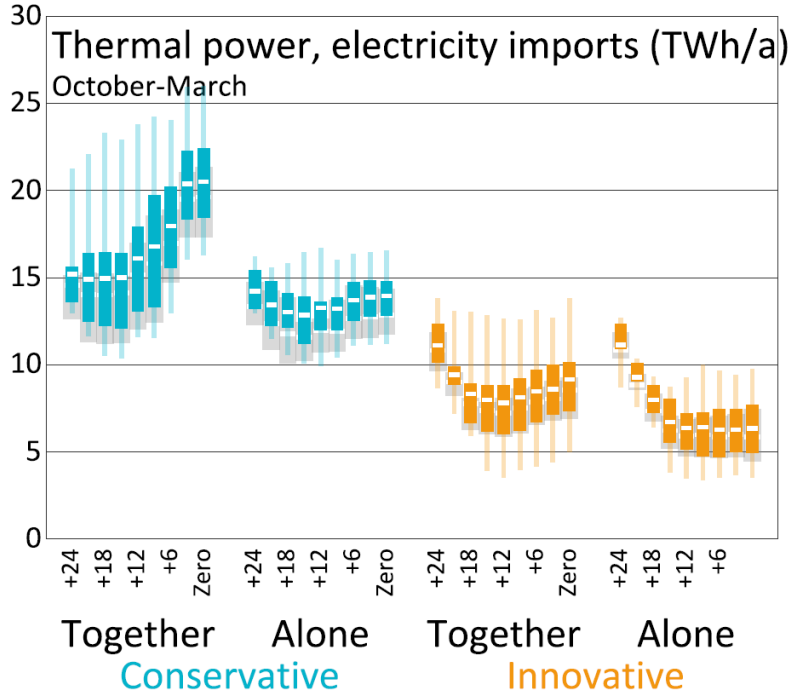
Regeneration **not** available

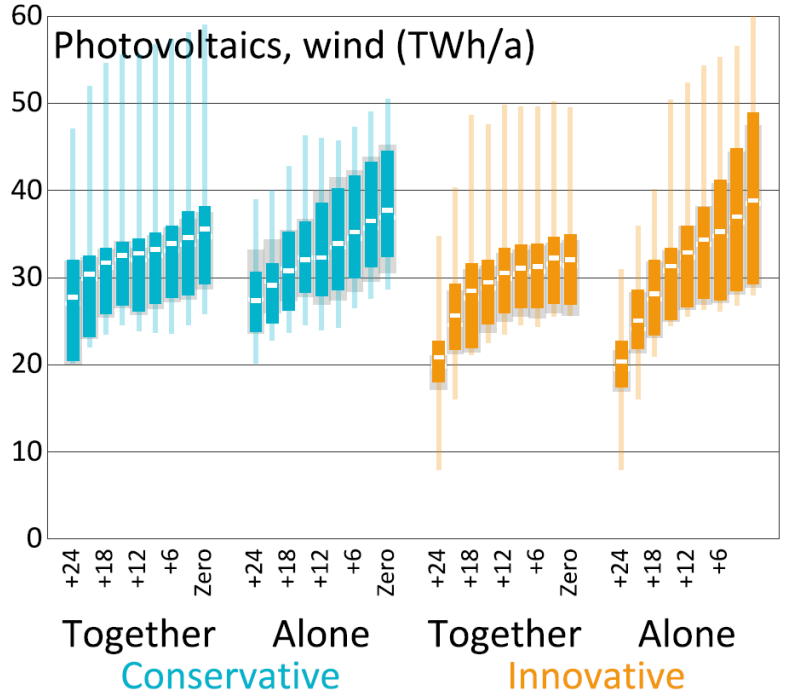


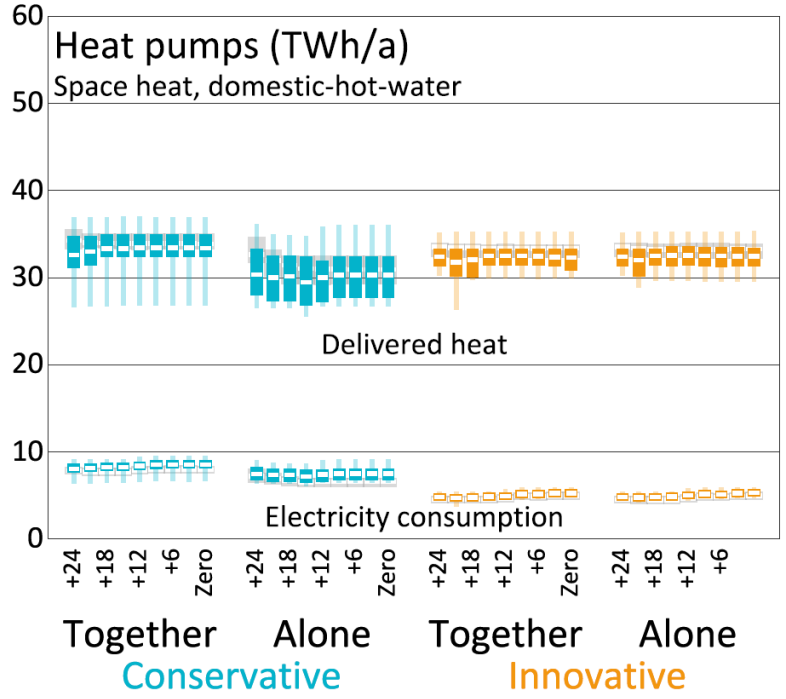




Borehole regeneration reduces winter electricity demand by ~1 TWh







Conclusions

- We don‘t know the future but we can use models to at least get an idea what‘s going on
- Regeneration of borehole fields is one variant of seasonal thermal energy storage
- It offers the option for free cooling which will become more and more important
- Having borehole regeneration allows to reduce the winter electricity demand by approx. 1 TWh

Dr. Gianfranco Guidati
Projektmanager
Gianfranco.guidati@esc.ethz.ch

ETH Zürich
Energy Science Center
Sonneggstrasse 28
8093 Zürich

www.esc.ethz.ch