

Impacts of the distribution grid on the European energy system prospective scenarios



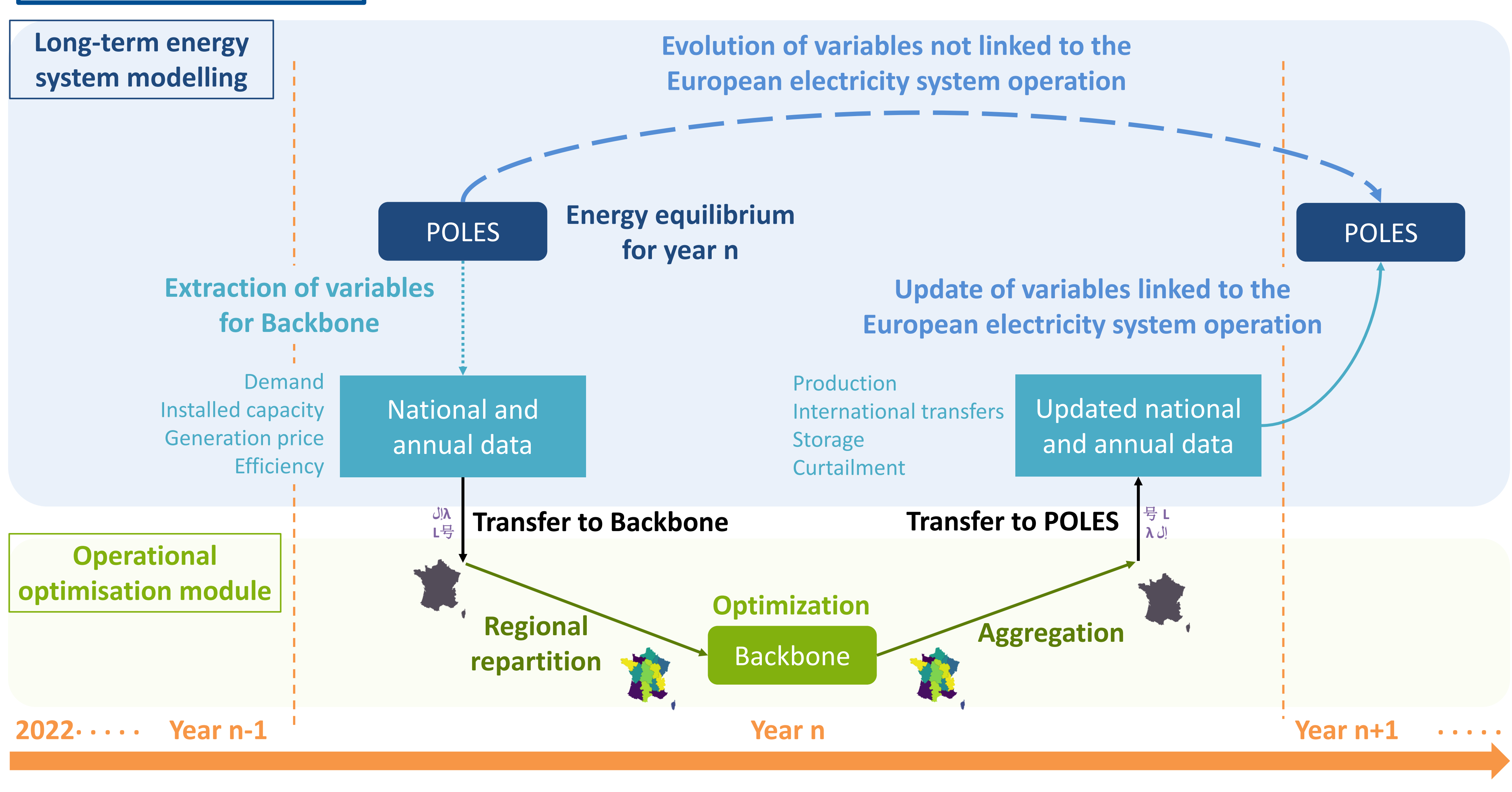
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Introduction

The prospective outlook for long-term energy systems, **POLES**, and the short-term energy model, **BACKBONE**, are coupled to provide more plausible transition pathways for the power system in Europe. This combined modeling focuses on the role of transport and distribution grids in NZE scenarios, up to the year 2050.

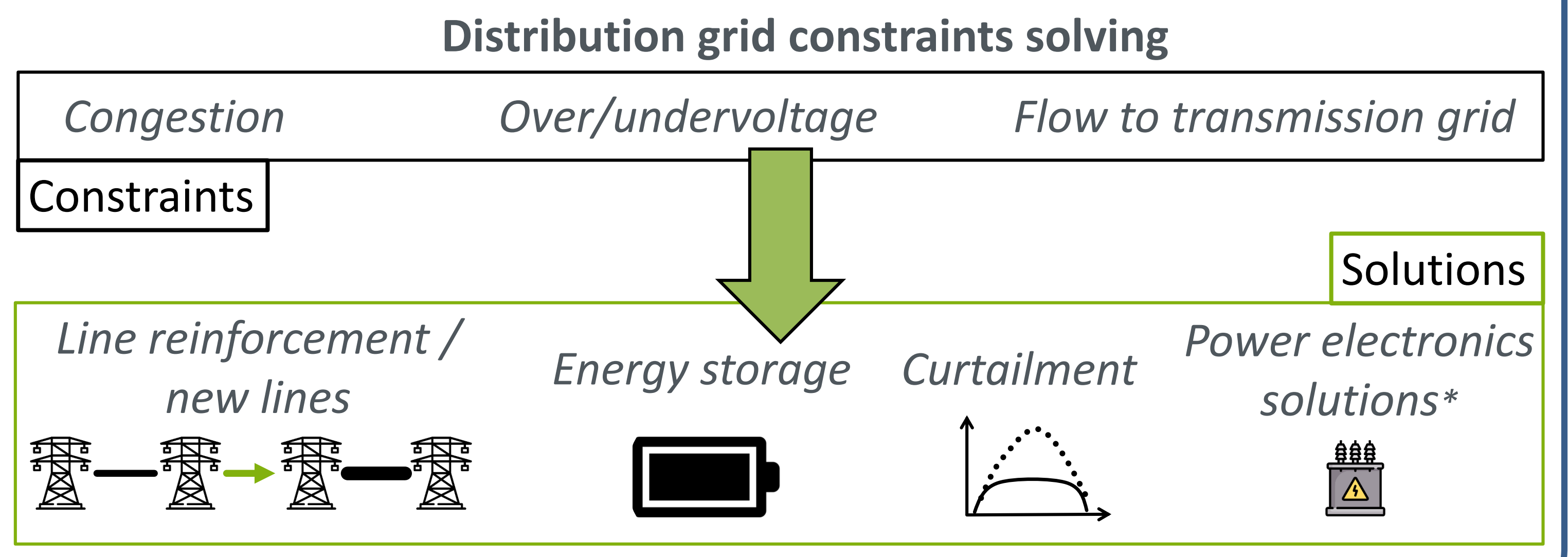
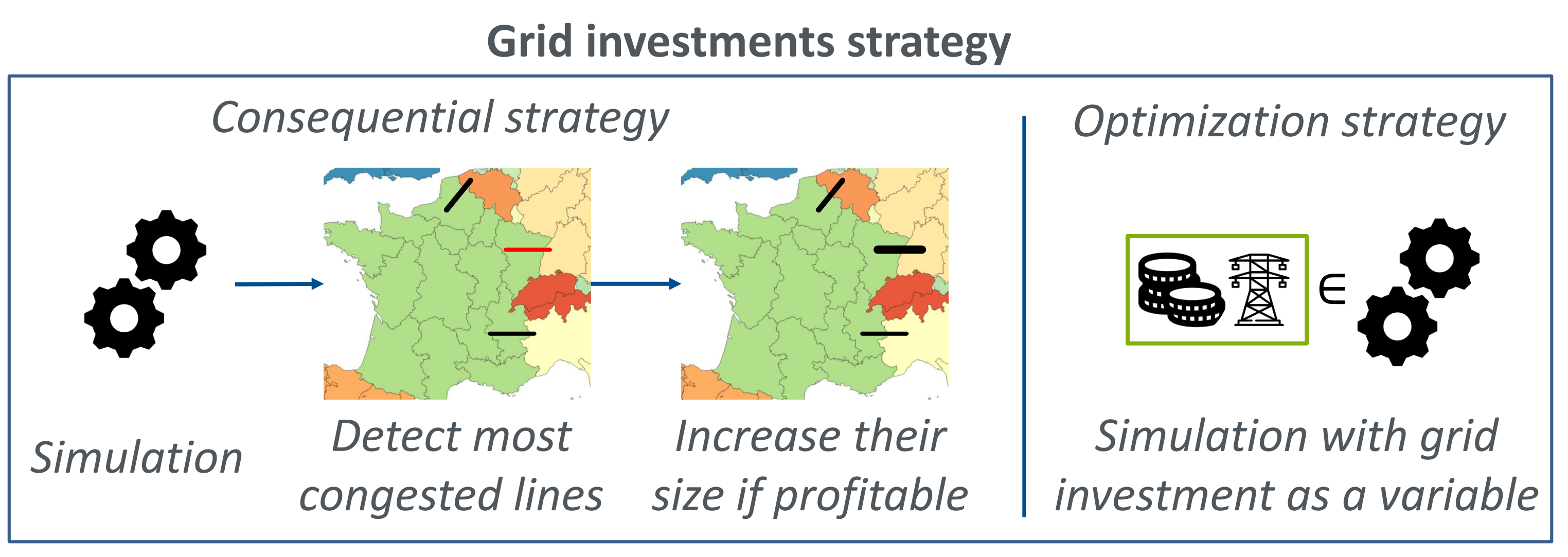
Methodology



2 TOOLS :

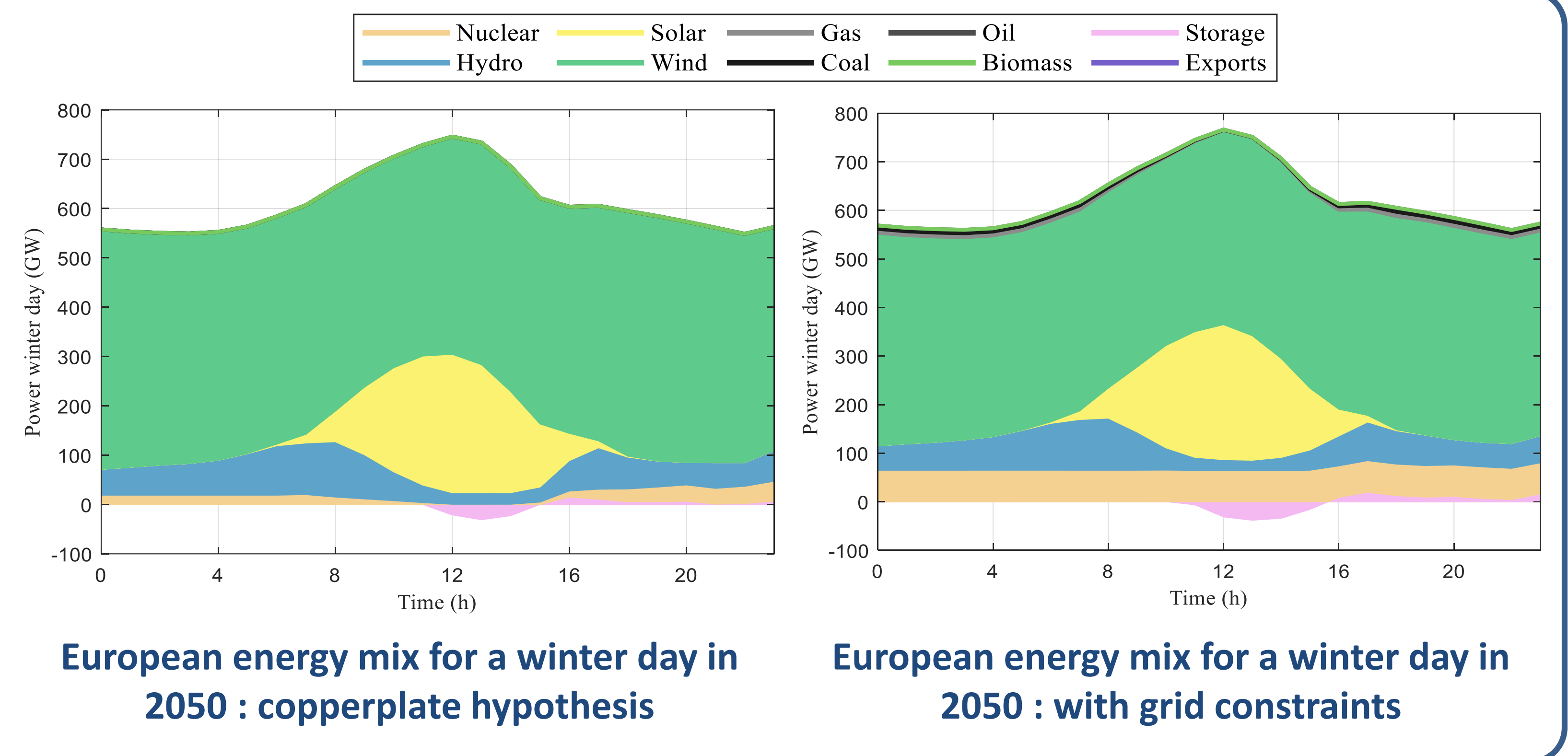
- **POLES (GAEL, France)** – Long-term global energy system modeling (up to 2100)
- **BACKBONE (VTT, Finland)** – Unit commitment and power grid operational optimization (cost minimization) module

European scale + Distribution grid consideration



Main results

- Considering the power grid for prospective scenarios :
- Leads to a higher cost of electricity generation and consequently of the **decarbonization**
 - **Better estimates investments in flexibility options.** E.g., storage is used 40% less with the copperplate hypothesis
 - Gives a more accurate estimation of the **grid investments**



Perspectives

- Couple year-by-year long-term model (**POLES**) with short-term one (**BACKBONE**) to estimate the role of the distribution grid as a flexibility option in the NZE scenario
- Identify a trade-off between grid investment and other flexibility options in prospective pathways up to the year 2050

References

1. S. Allard, et al. (2020). European transmission grid expansion as a flexibility option in a scenario of large scale variable renewable energies integration. *Energy Economics*
2. P. Criqui, et al. (2015). Mitigation strategies and energy technology learning: An assessment with the POLES model, *Technological Forecasting and Social Change*
3. N. Helistö, et al. (2019). Backbone—An adaptable energy systems modelling framework. *Energies*

