CLIMACT

CAN Europe
PAC 2.0 scenario modelling

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Climact Team

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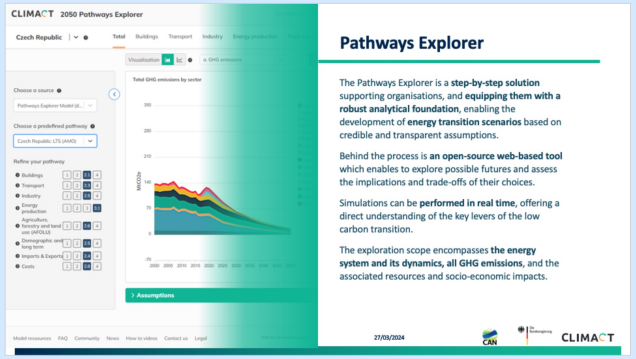
The PAC 2.0 project

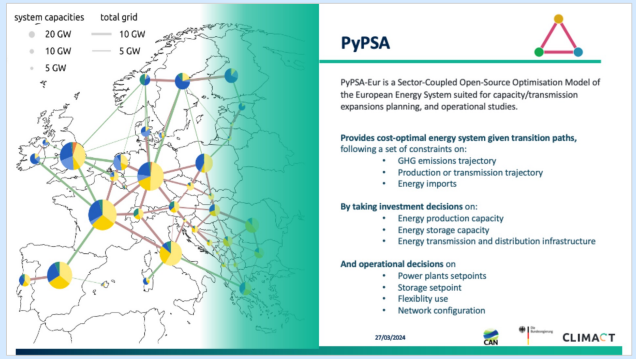
The objective of the project was to…

- optimize Europe's pathway towards **net zero emissions by the year 2040**,
- including a **fully renewable** energy system without **fossil fuels by 2040**,
- with fully-fledged **country-specific PAC scenarios**,
- for the EU27 Member States and for selected neighbouring non-EU countries

and using two modelling approaches



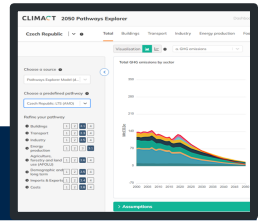
Model energy demand



Model energy supply

Disclaimer: The results are based on assumptions taken by the CAN EUROPE secretariat and the CAN EUROPE network. Climact provided modelling capacities and technical expertise, but both the assumptions and the results are not representative of Climact's vision.

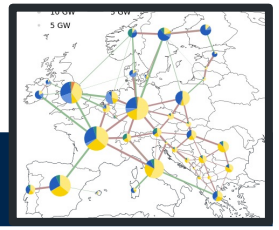
Why use both models?



Pathways Explorer

- **In-depth insights** through societal, technological and political choices
- Explore the solution space in **real time**

- No cost optimization
- Yearly modelling, resulting in poor representation of system dynamics



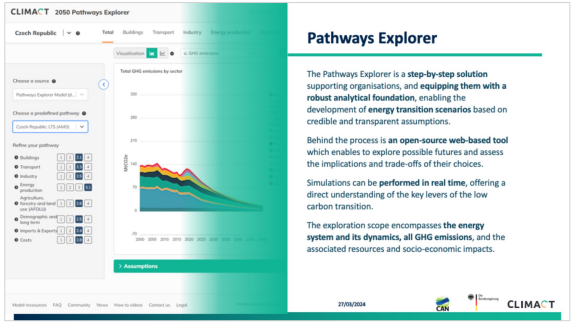
PyPSA-Eur

- **Costs-optimal** energy systems
- Tackle **intermittency** and fast response phenomena
- Explore **transmission, storage and infrastructure**

- Very sensitive to input parameters
- Time/resource intensive to run
- Requires a lot of input data

The PAC 2.0 Scenario

Necessary actions to reach net zero in 2040



Lifestyle changes

- Major changes in social patterns and societal organization
- Sobriety, frugality and circularity

Process improvements and energy efficiency

- Technological progress and process improvements
- More sustainable economy

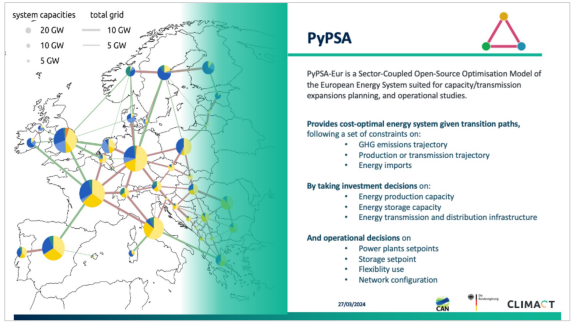
Electrification coupled with zero carbon power production

- Electrification of the processes across all sectors
- Coupled with zero carbon power production (100% RES)

Decarbonizing what is left

- Fuel switch (bio or e-fuels) (for processes that cannot be electrified)
- Carbon capture (for remaining industrial activities with process emissions, e.g., cement)
- Land-Use (Natural sinks for carbon removal)

A 100% RES scenario can achieve a PAC scenario



A **100% RES scenario is feasible**, and **in line with REPowerEU** but requires

- Rapid and massive investment,
- Drastic reductions in the demand.

This means that

- **Exceptional solar expansion** of 2023 becomes the norm,
- **Wind** needs to **ramp up significantly** (x1.55),
- **Cross-border transmission** increases drastically (almost x2 by 2040),
- **Hydrogen** increases **early and fast**, to keep pace with fossil fuel phase-out,
- **Batteries** are needed to provide daily storage for solar power.