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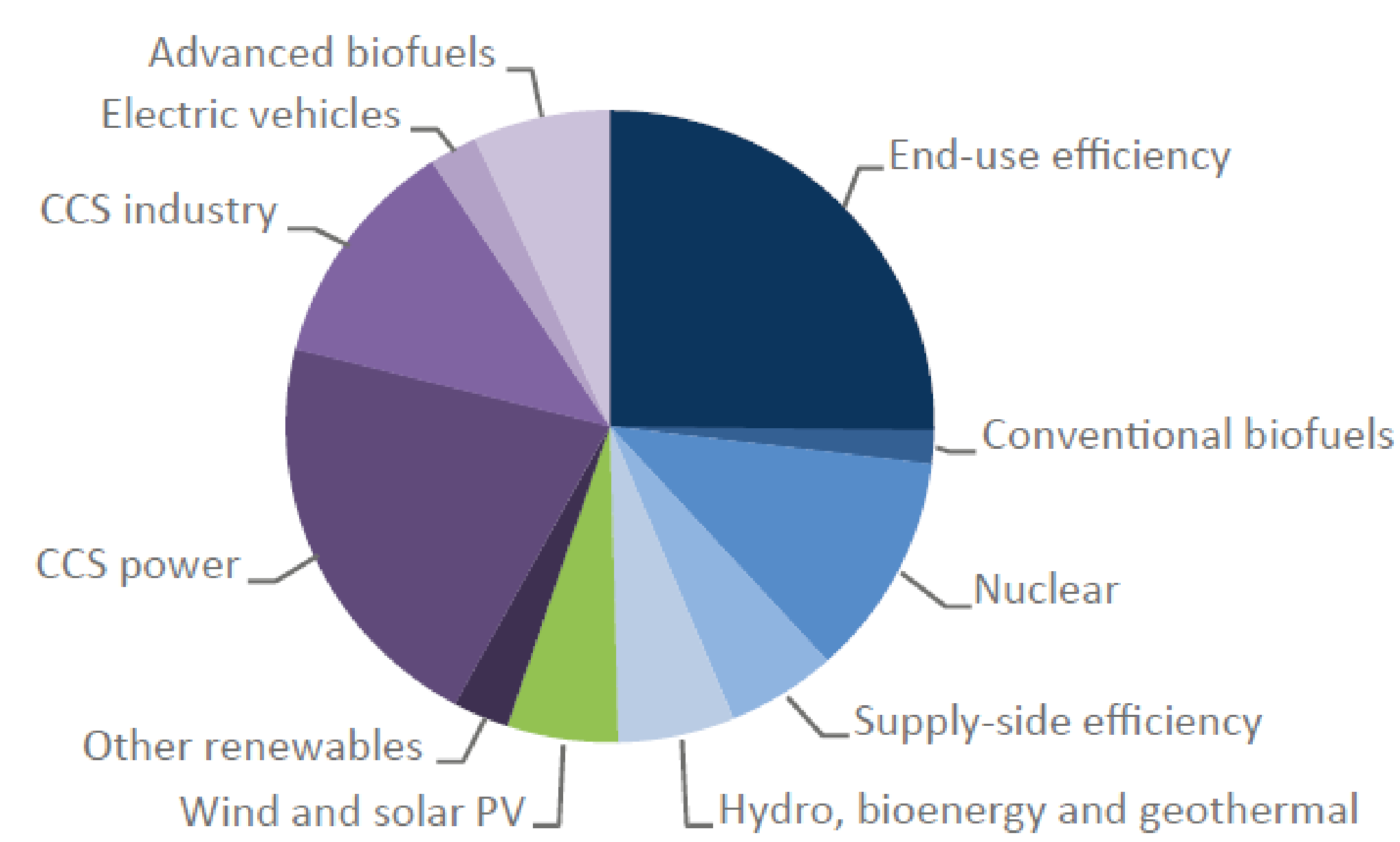
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Research Focus in this part of PEPs group

The **Energy Transition** needs more **sustainable ways of collecting and transforming energy**. In the PEPs group, we also study technologies to

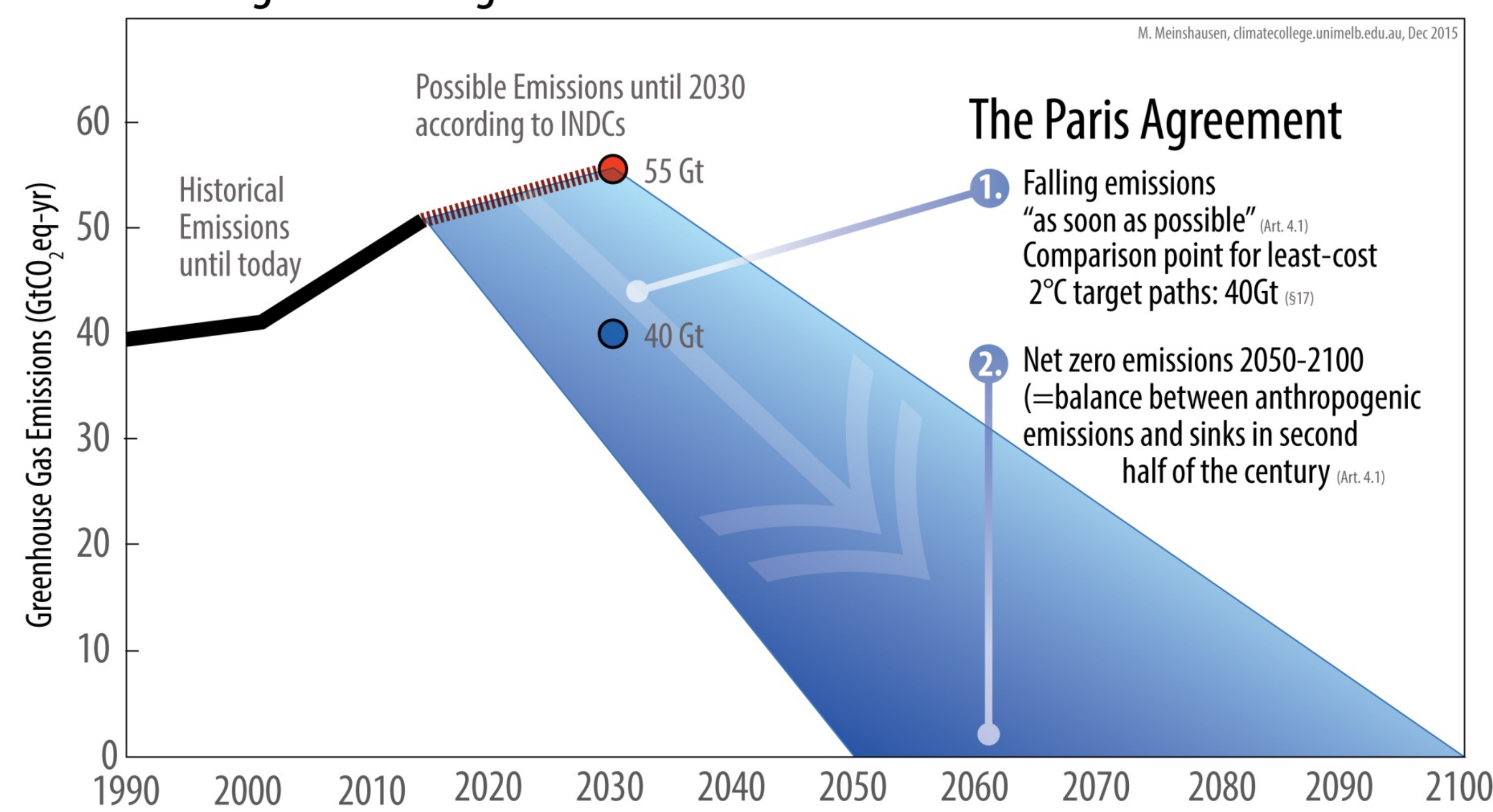
- Increase the **efficiency** of industrial processes
- **Capture CO₂**
- **Re-use CO₂** for various applications

European Commission wants to **cut CO₂ emissions by 80-95% in 2050** compared to 1990. In the electricity sector, the decarbonisation should even reach 96-99%^[1].



Possible solutions for reducing world CO₂ emissions in the 450 Scenario (2015-2040)^[2]

Global greenhouse gas emissions



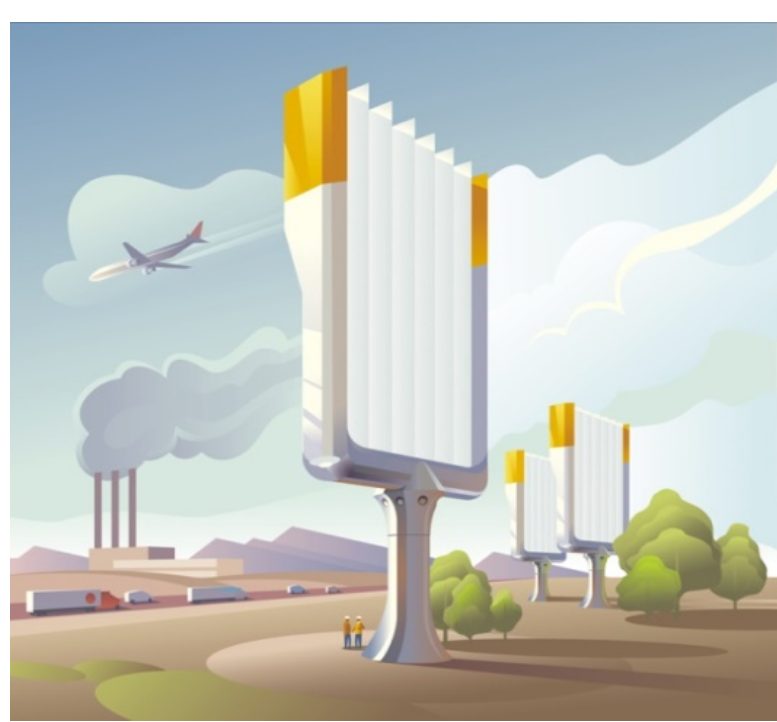
Large efforts are still required to reduce world CO₂ emissions, the COP 21 is only a very first step!

CO₂ capture

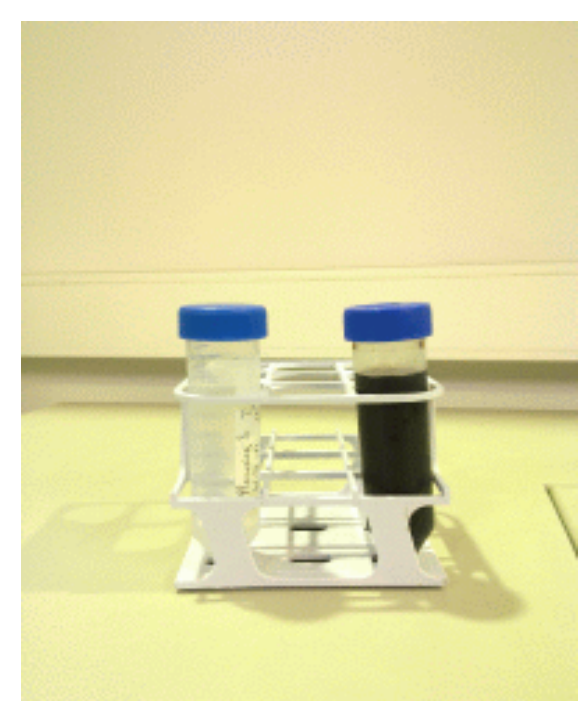
Main technology uses solvents to **capture CO₂ from industries and power plants**. We study and optimize the capture process.

A **strong interaction between lab work and simulation** is encouraged for PhD students. Experimental results are used to improve the process model.

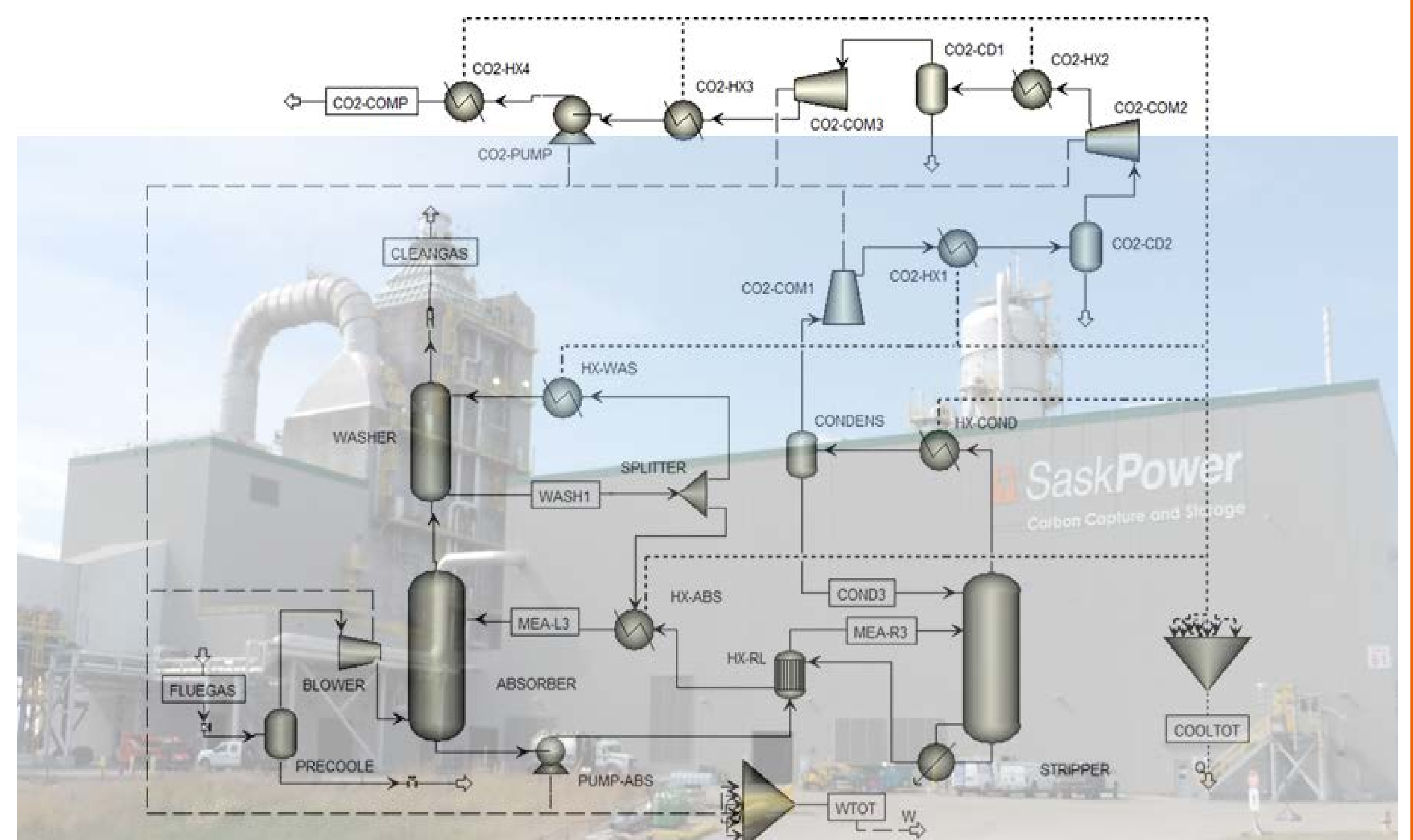
We also look at **CO₂ capture from air or from biomass**, leading to **negative CO₂ emissions**!



Artificial tree for CO₂ capture from air^[3]



Solvent degradation



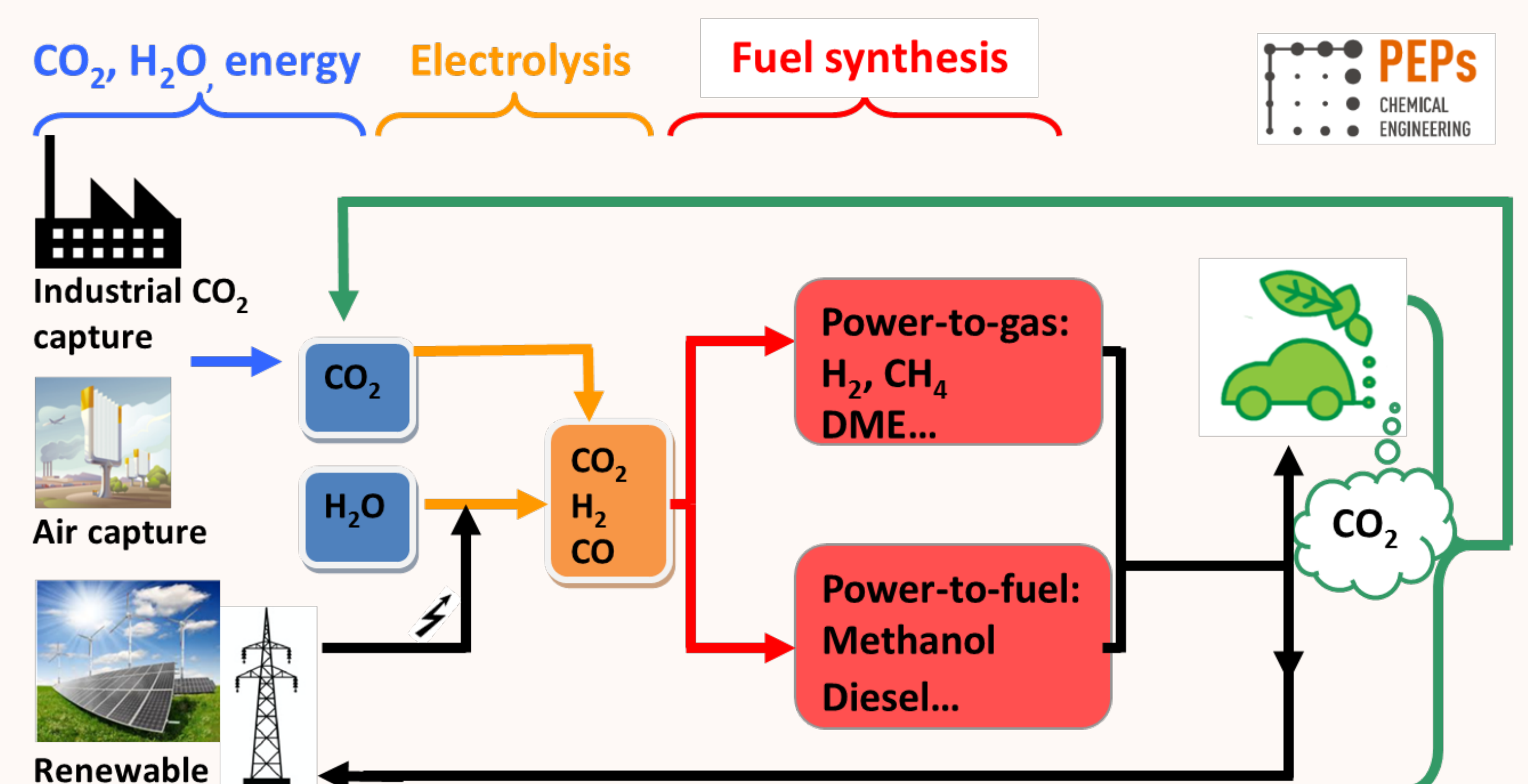
Modeling of the CO₂ capture process

CO₂ re-use

We are part of a transfaculty platform at ULiège for **developing CO₂-based products and technologies**, and we are founding member of a European Association for CO₂ re-use. **CO₂FUTURE**

In particular, in the PEPs group, CO₂-related topics study the **conversion of CO₂ into fuels for long-term energy storage**: the **Power-to-Fuel** Process. This process represents a **sustainable and CO₂-neutral route to liquid fuels** for interseasonal energy storage.

Other research topics include the study of carbon-efficient processes and their optimization. Our research implies both experimental and modeling aspects, with focus on the process design, efficiency and cost.



Long-term energy storage with power-to-fuel

[1] EU Energy Roadmap 2050, doi:10.2833/10759
[2] IEA 2015, WEO special report, Energy & Climate Change
[3] engineering.asu.edu/cnce