

*Industrial Efficiency 2020 | Panel 2, Session II | online*

# **Simulating geographically distributed production networks of a climate neutral European petrochemical industry**

---

Mathieu Saurat, Clemens Schneider

Wuppertal Institute

Division: Future Energy and Industry Systems

Research Unit: Sectors and Technologies

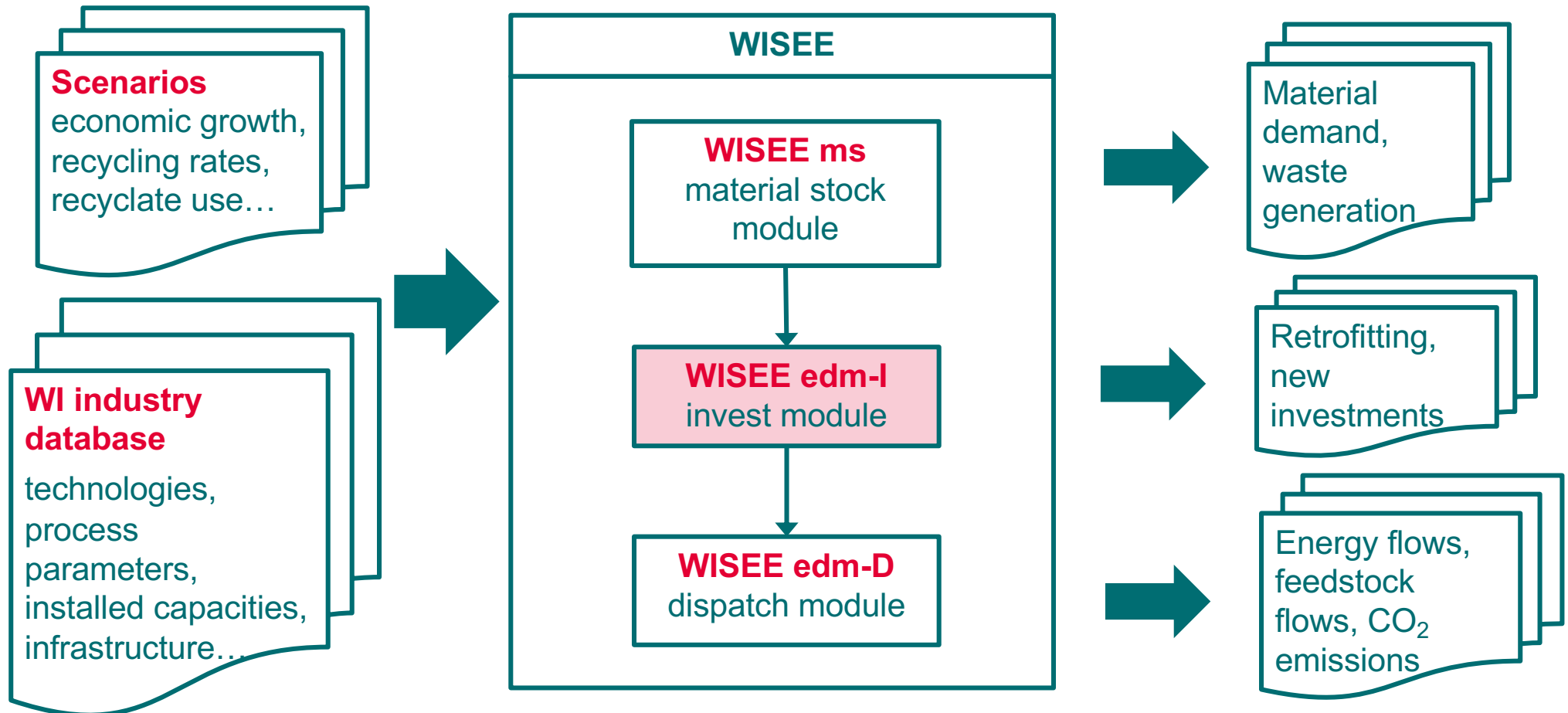
### **Analysis of (paths to) possible futures of the European chemical industry production system, starting from the current production system:**

- Which technology mixes can comply with given CO<sub>2</sub> emission reduction targets in 2050?
- When do investments in innovative processes have to start in order to reach a set target?
- Which energy sources are needed, in what quantity, when and where?
- What do future production networks look like technologically and geographically?

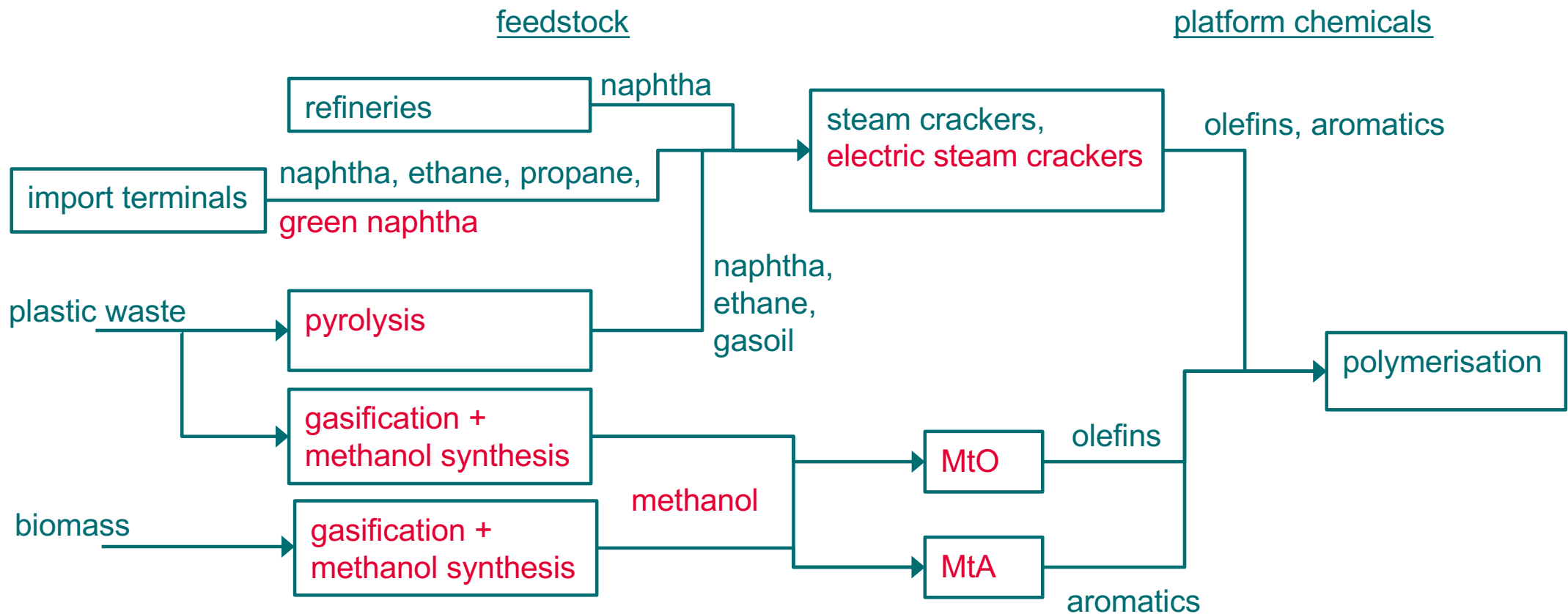
### **Method:**

1. Develop scenario narratives
2. Quantify scenarios *via* modelling
3. Analyse

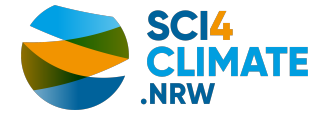
## Modelling framework



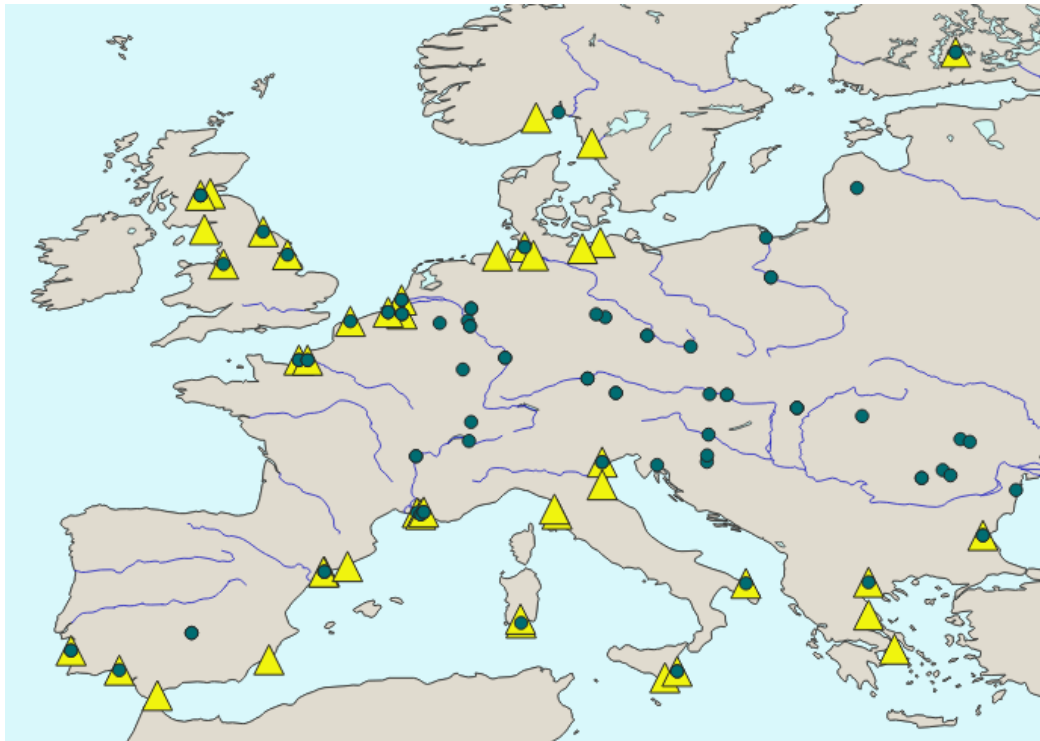
## HVC production routes in the invest module



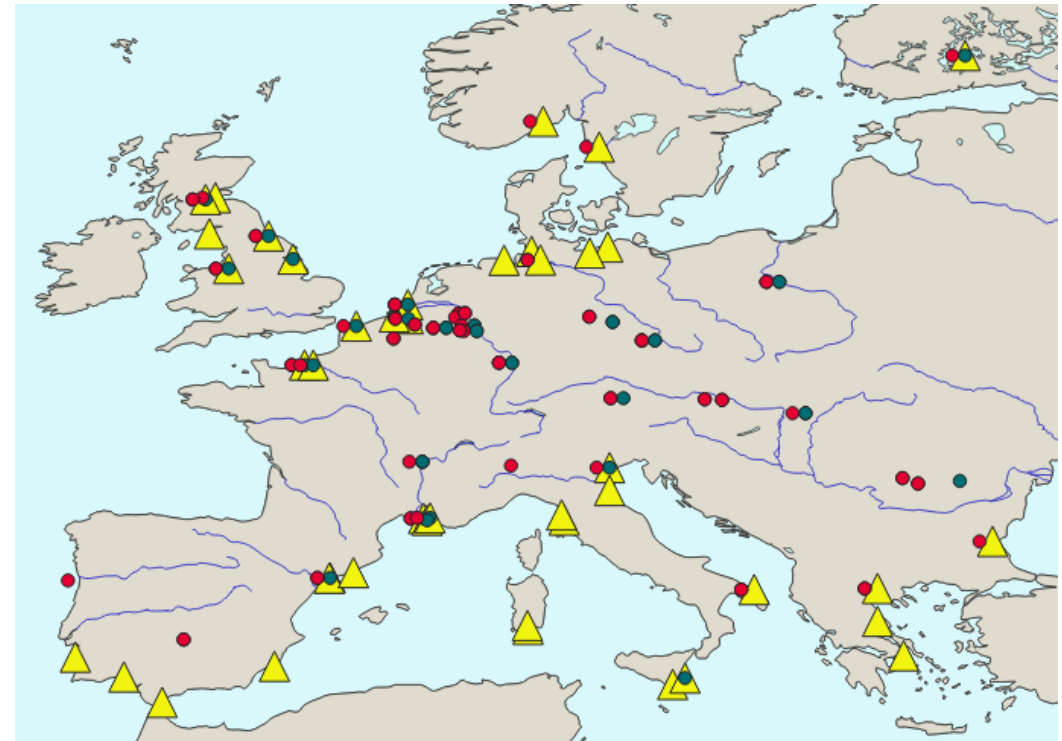
## Feedstock and HVC production and import sites in the invest module



2020



2050



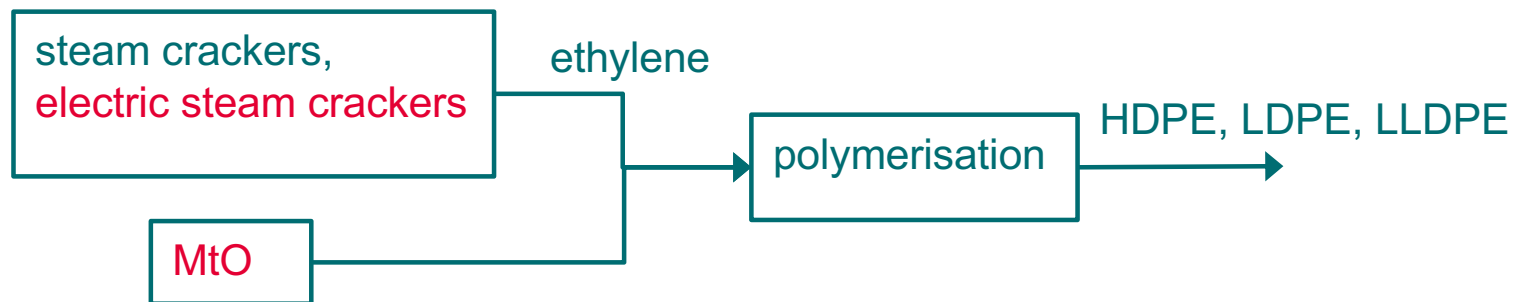
▲ import  
terminals

● refineries,  
steam crackers

● methanol production,  
MtO, MtA

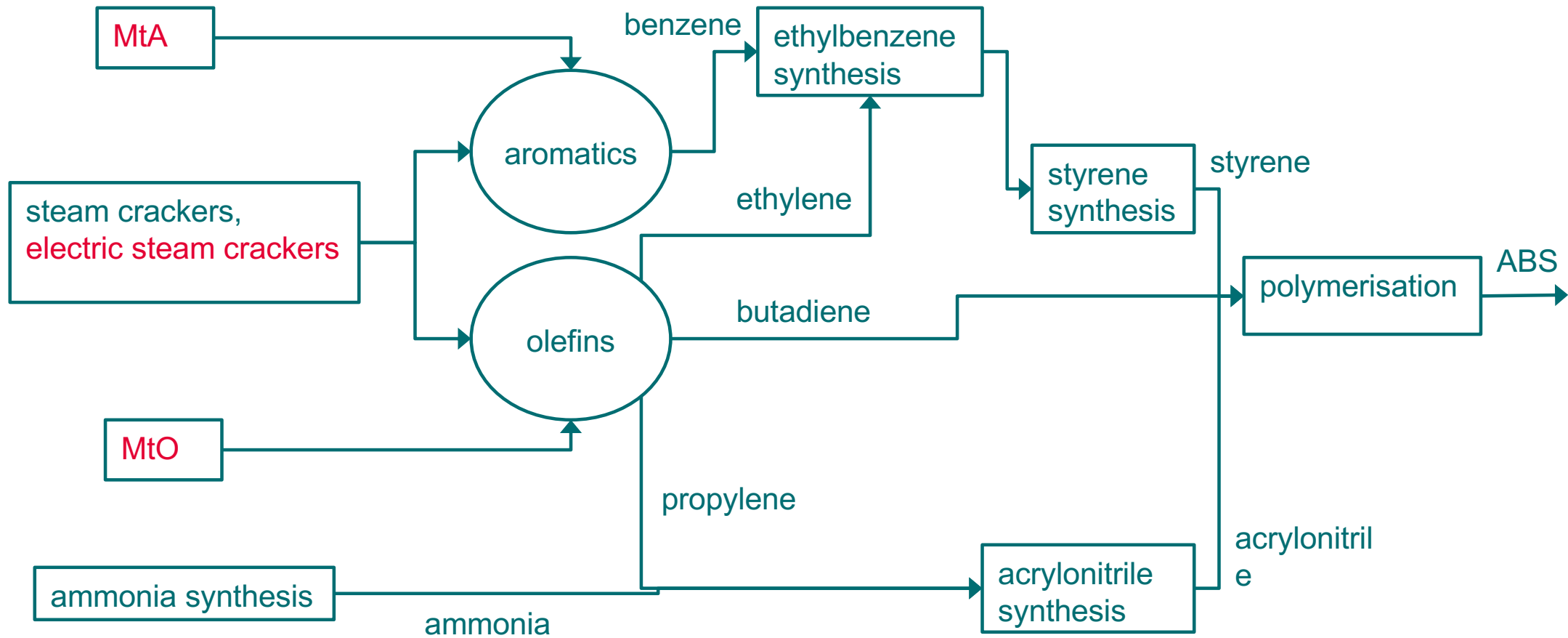
## Polymerisation routes in the invest module

### Example: PE (polyethylene)



## Polymerisation routes in the invest module

### Example: ABS (acrylonitrile butadiene styrene)



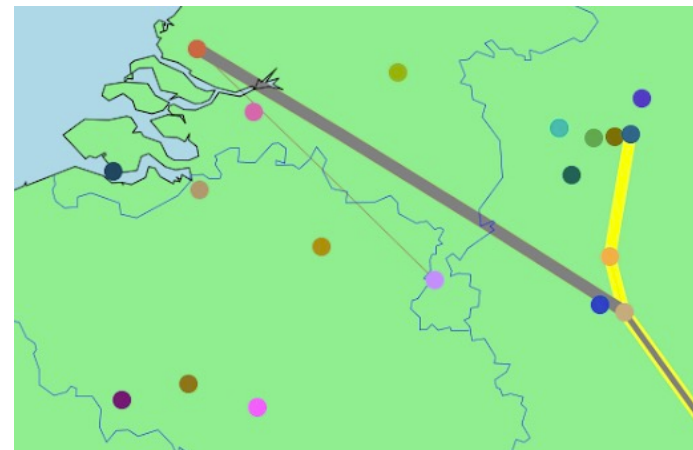
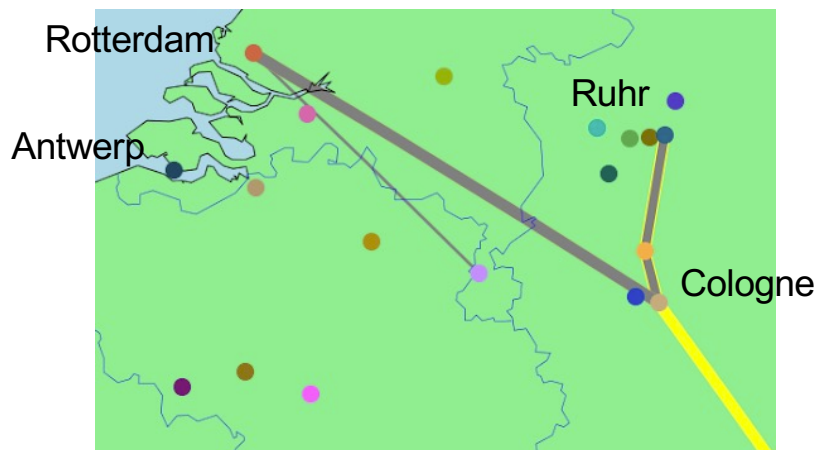
# Transport in the invest module

## Zoom-in on Rotterdam-Antwerp and its hinterland



2030

2050



pipelines

 naphtha capacity

 naphtha use

 ethylene capacity

 ethylene use

 lower Rhine shipping

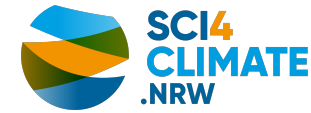
 middle Rhine shipping

14.09.2020

ECEEE 2020

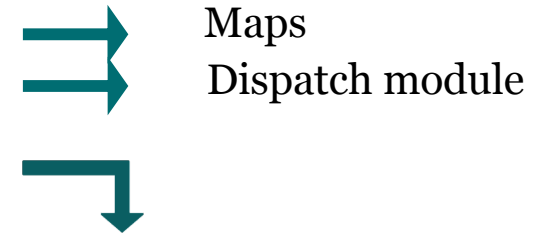
8

## Findings and further research

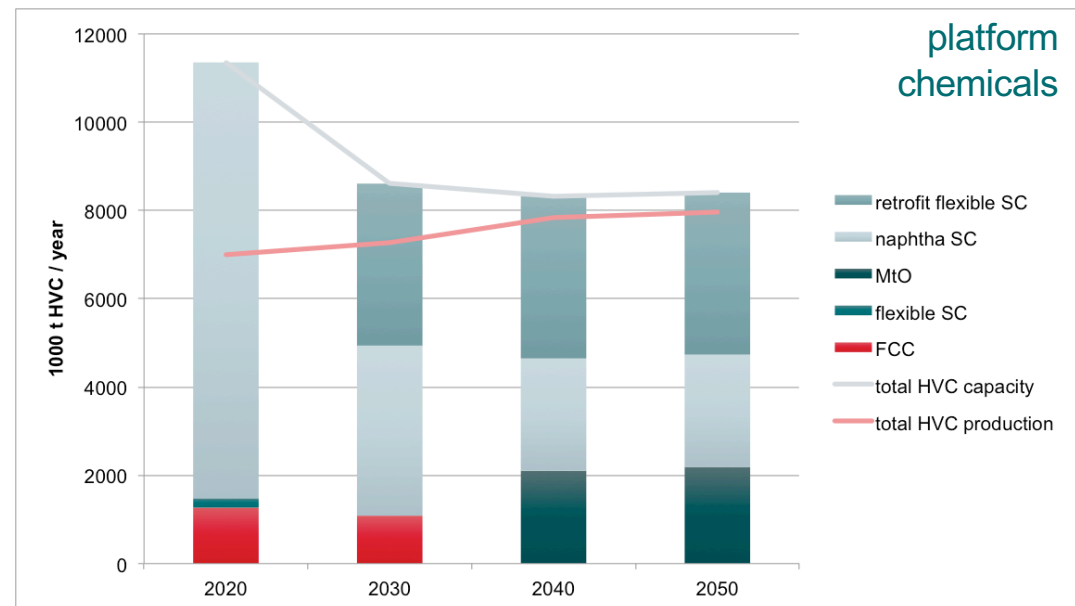
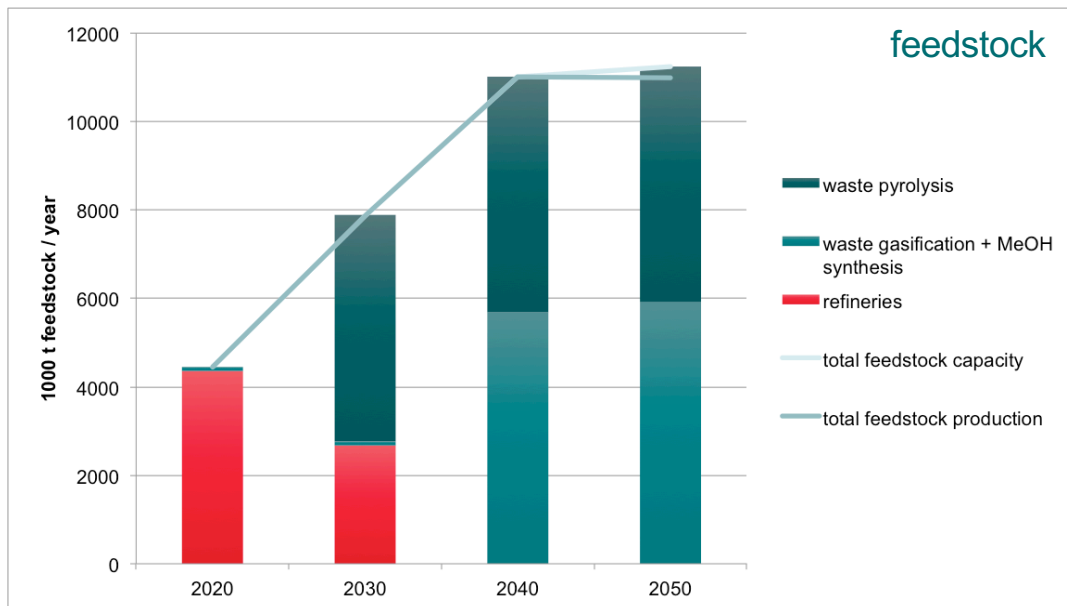


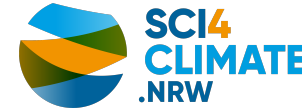
With this model (within its limitations) we gain insight into our research questions:

- Future technological and geographical production networks?
- Which energy sources, how much, when and where?
- Future technology mixes for climate neutrality in 2050?
- When to invest in which innovative processes?



Production capacity and volume of a climate neutral chemical industry in Germany in a high plastic consumption society





Mathieu Saurat | [mathieu.saurat@wupperinst.org](mailto:mathieu.saurat@wupperinst.org)

# Thank you for your attention

---

For further information about our work, please visit:

[www.wupperinst.org/en](http://www.wupperinst.org/en)

*This work received funding from the Ministry of Economic Affairs, Innovation, Digitalization and Energy of the State of North Rhine-Westphalia as part of the project SCI4climate.NRW and from the European Union's Horizon 2020 Research and Innovation Programme as part of the project REINVENT.*

[www.in4climate.nrw/en/stakeholders/scientific-community/](http://www.in4climate.nrw/en/stakeholders/scientific-community/)

[www.reinvent-project.eu](http://www.reinvent-project.eu)