



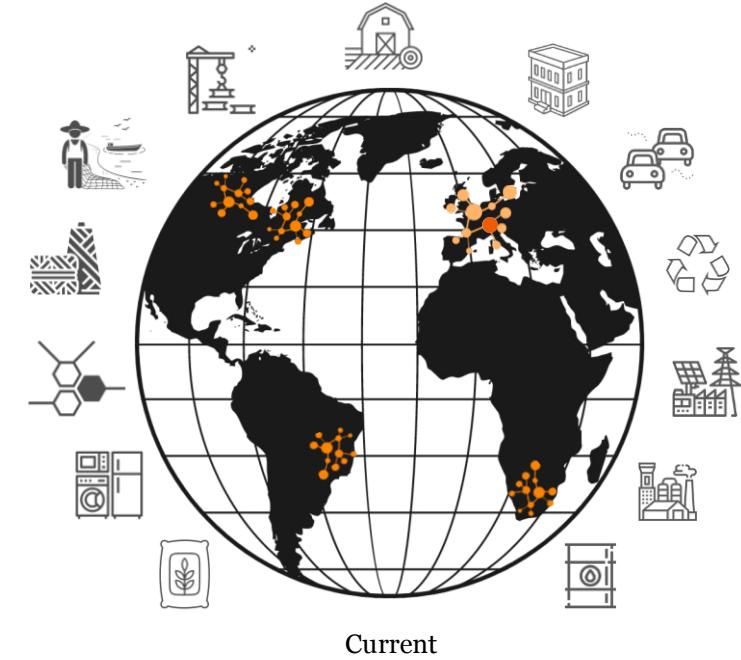
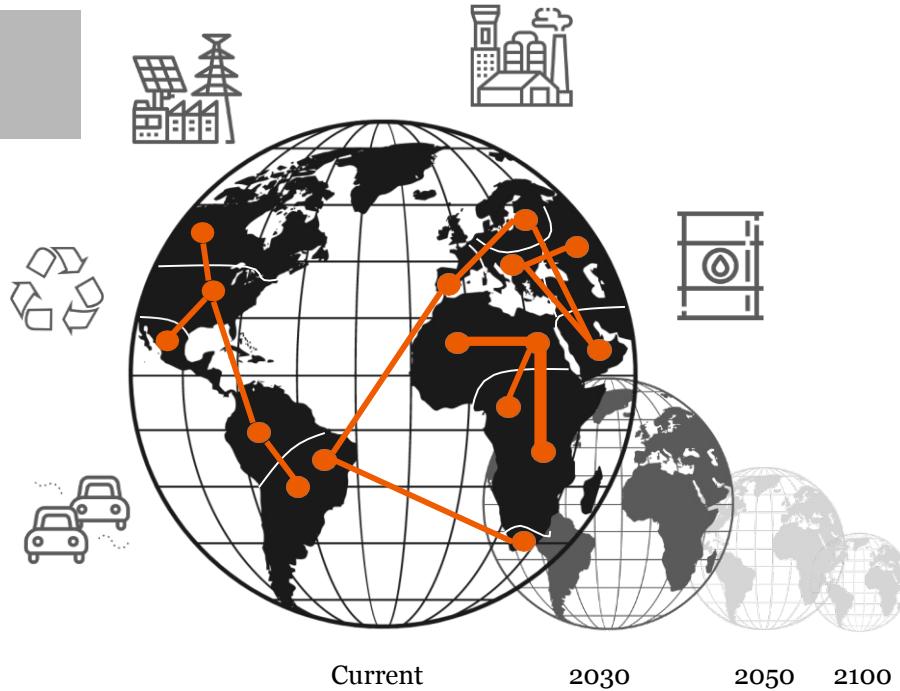
WIR SCHAFFEN WISSEN – HEUTE FÜR MORGEN

Romain Sacchi :: Postdoctoral researcher :: Technology Assessment :: Paul Scherrer Institut

# premise: IAM & user-generated prospective scenarios

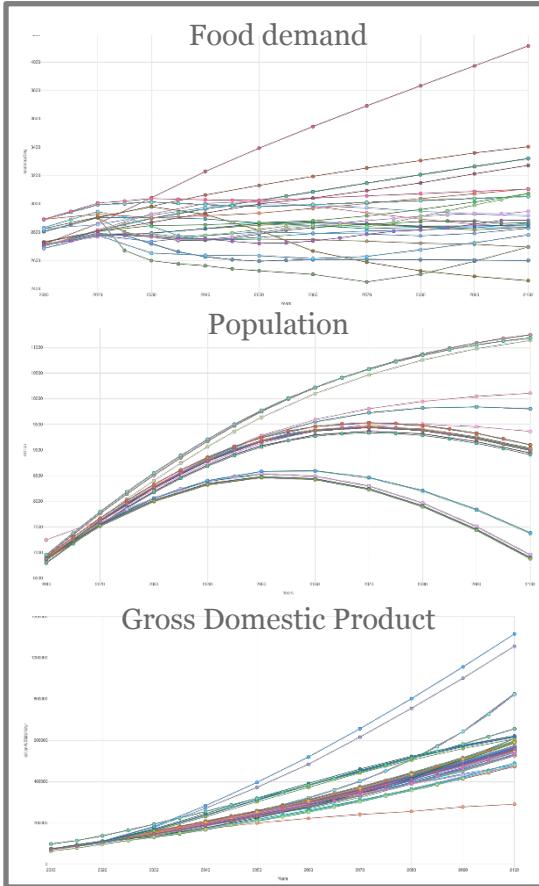
25.10.2022

# IAM/ESM world vs. LCA world

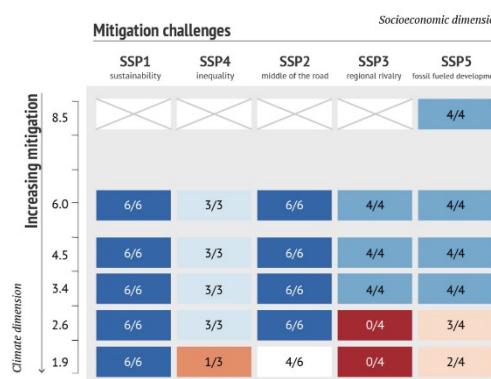
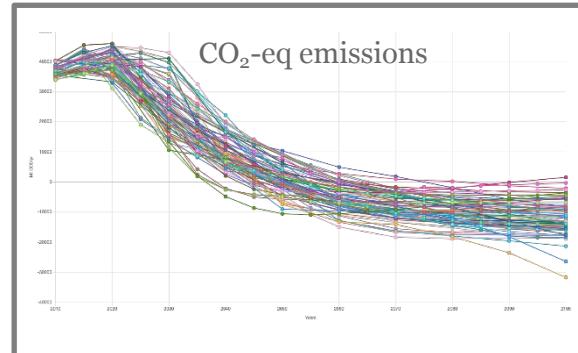


# The IAM world

## Socio-economic constraints (SSP)

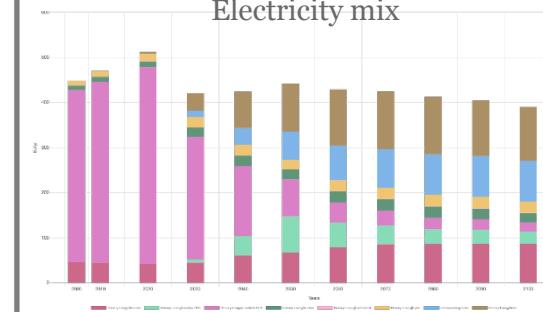


## Climate constraints (RCP)

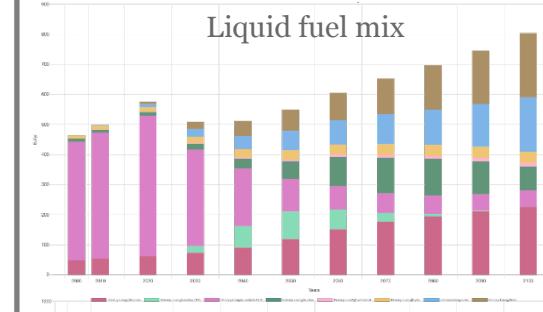


## Techno-economic solutions

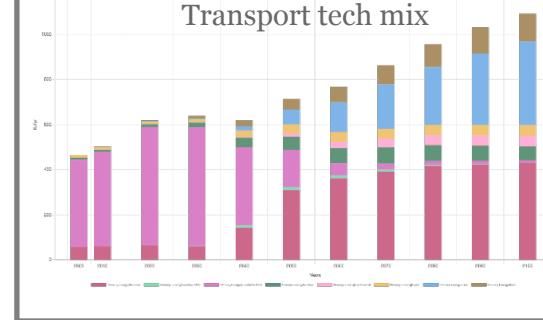
### Electricity mix



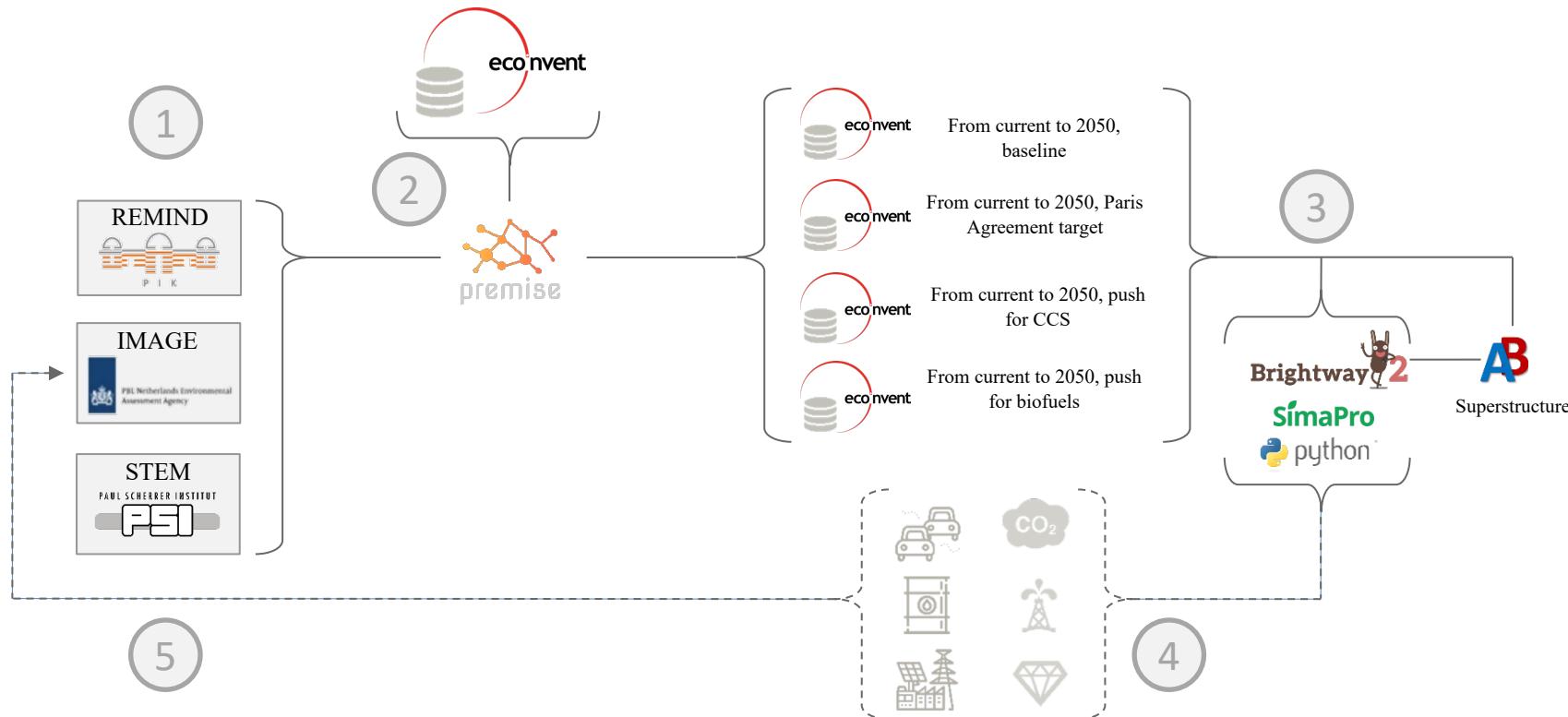
### Liquid fuel mix



### Transport tech mix



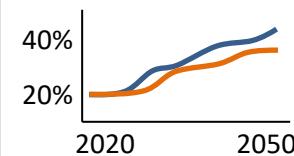
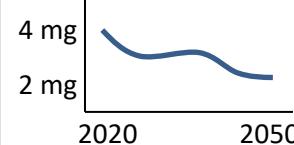
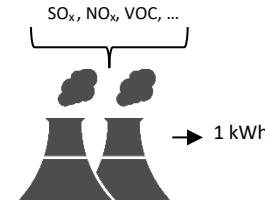
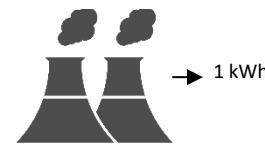
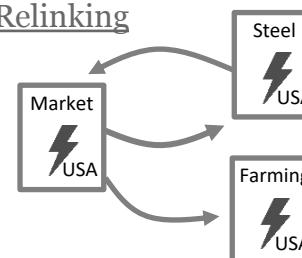
# Tool kit



# Example of transformation

## Power generation

IAM → LCA

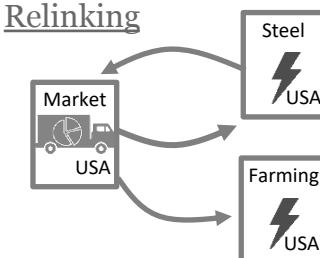
EfficiencyPollutantsMarket mixesLCA → Hard coal  
Lignite  
Natural gas  
Fuel oil  
...Relinking

## Transport

LCA →

Modelling new vehicles

IAM → LCA

Adjust fuel mixesMarket mixesRelinking

# What does *premise* do?



## Power

Create regional electricity markets  
Adjust power plant efficiency



## Fuels

Create regional fuel markets  
Add new production pathways  
(synthetic fuels)



## Metals recycling

Adjust future recycled content



## Hot pollutant emissions

Adjust hot pollutant emission  
from GAINS

30%



80%

## Renewables

Adjust solar PV and wind turbines  
efficiency



80%

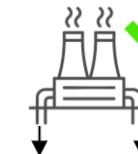
## Transport

Create market for passenger  
and freight road transport



## Industry

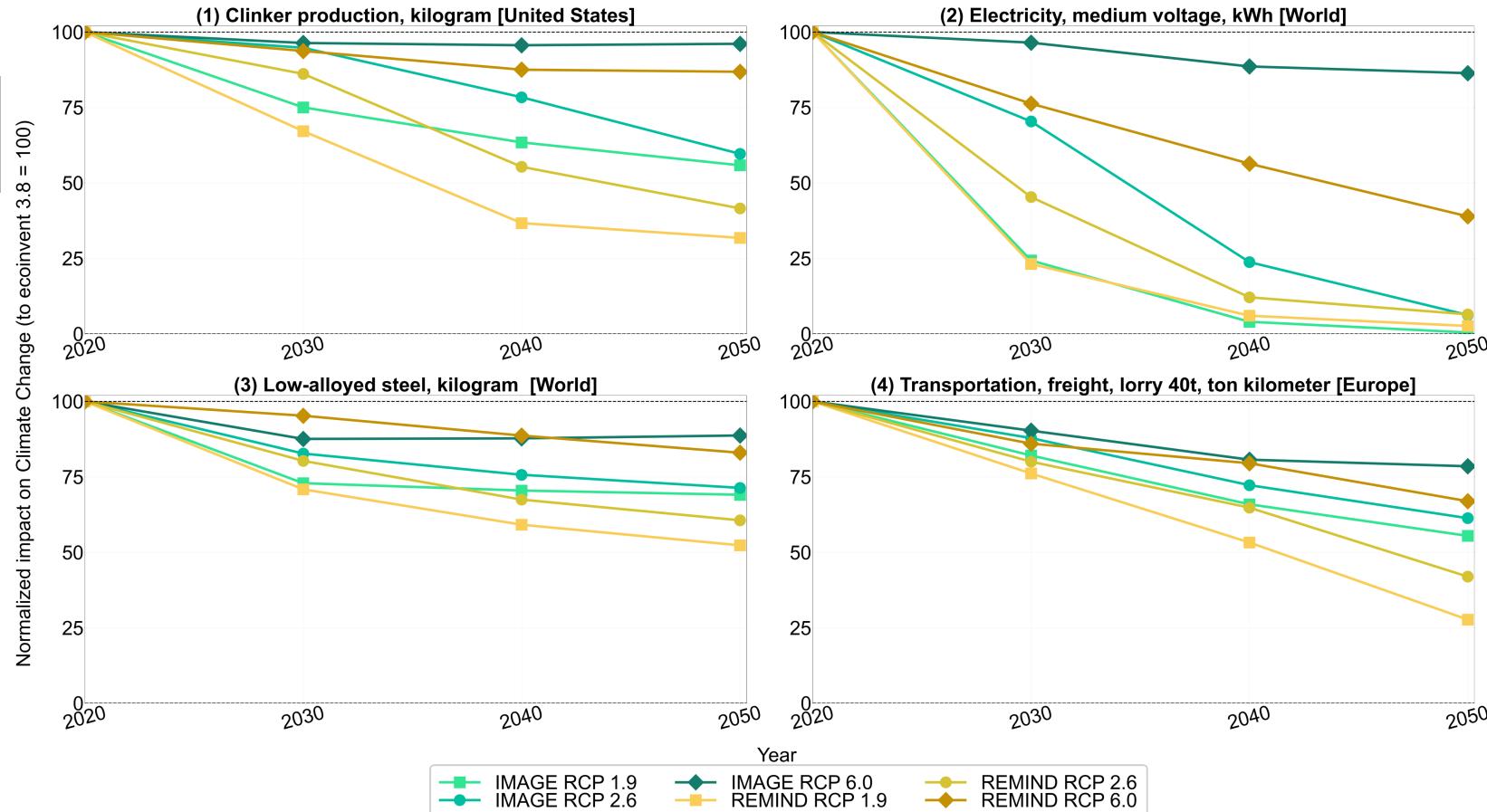
Adjust efficiency for cement  
and steel production (fuel  
mix, process efficiency,  
material composition, etc.)



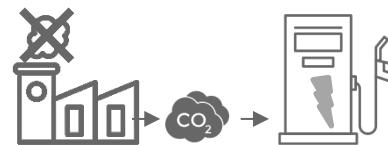
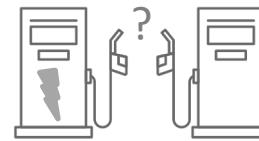
## Carbon capture and storage

Add carbon capture and  
storage where needed

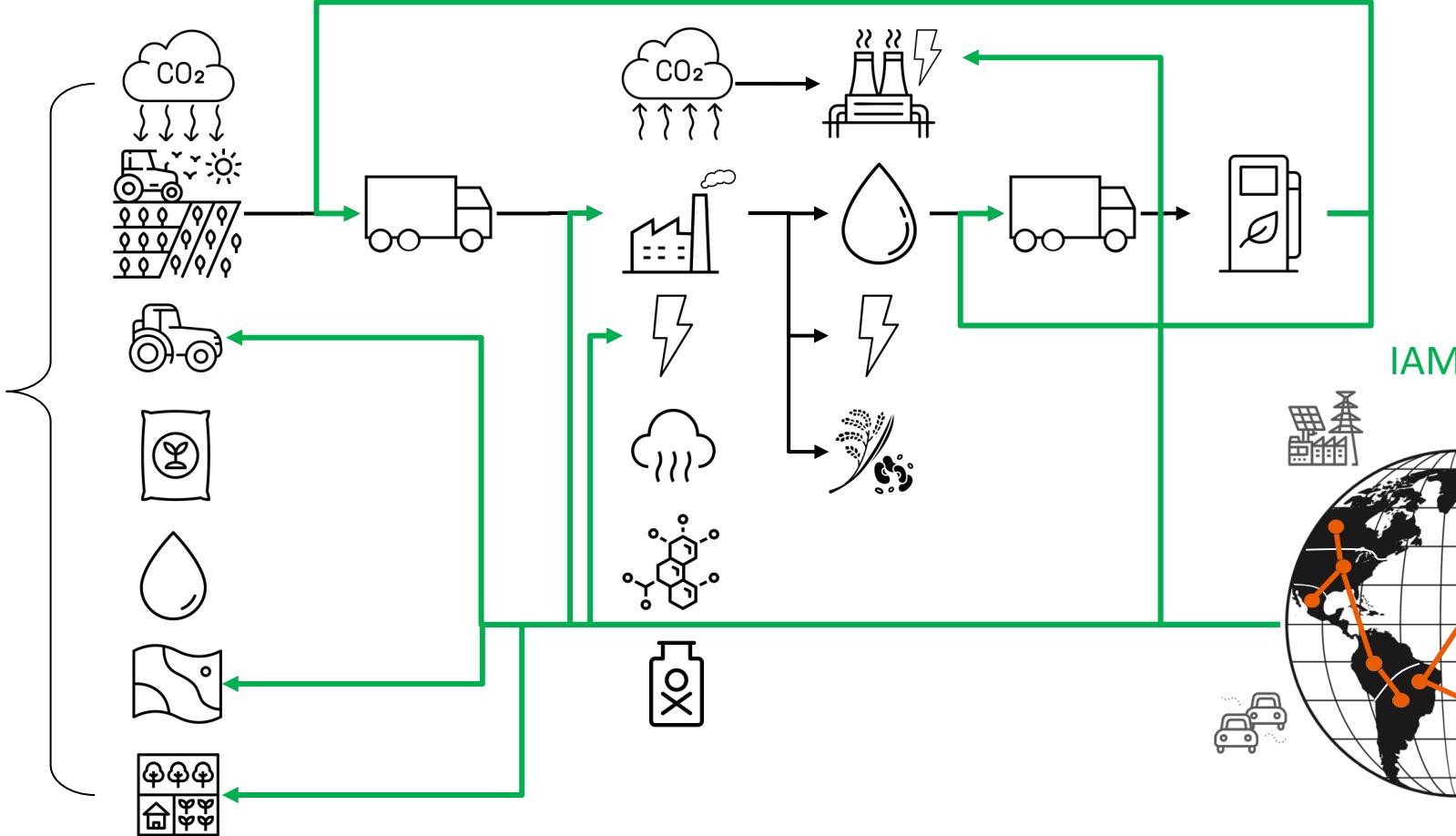
# Efficiency change across time and scenarios



# Cases using premise databases



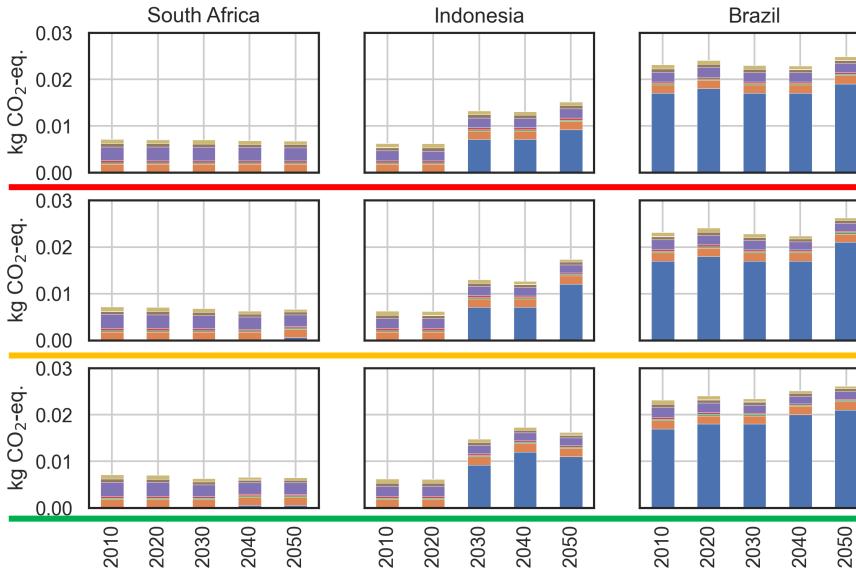
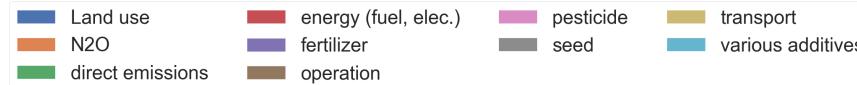
# Example: biofuels



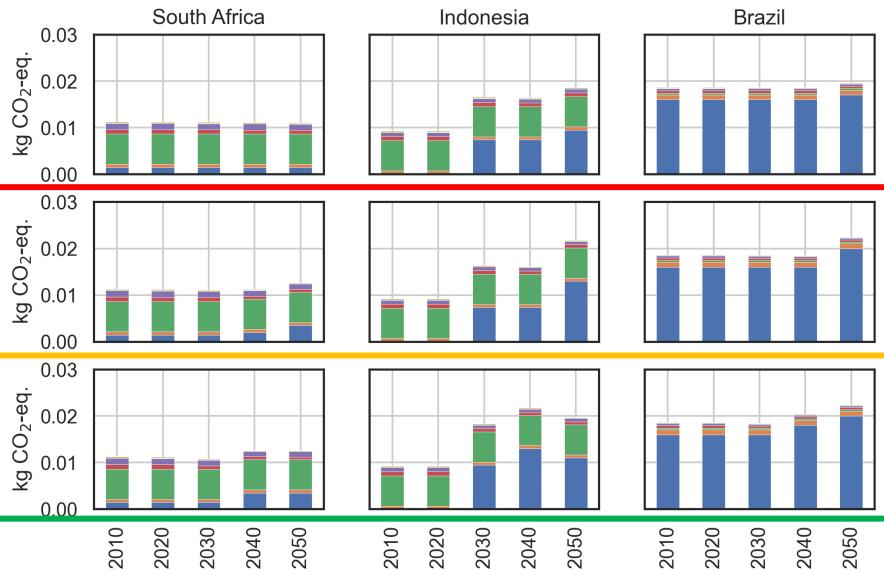
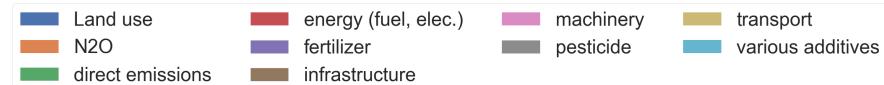
# Biofuels

**GWP<sub>100</sub> | Functional Unit: 1 MJ of crop**

Miscanthus



Sugarcane



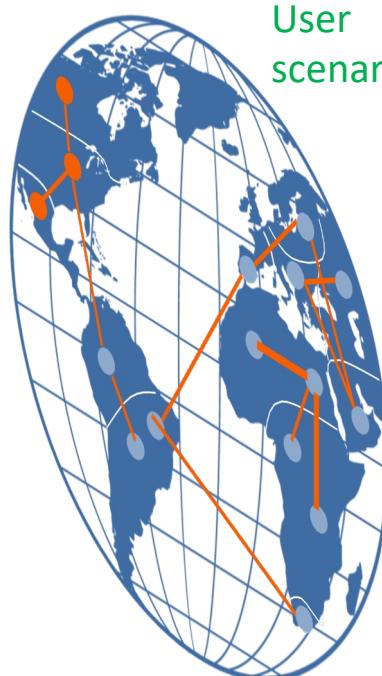
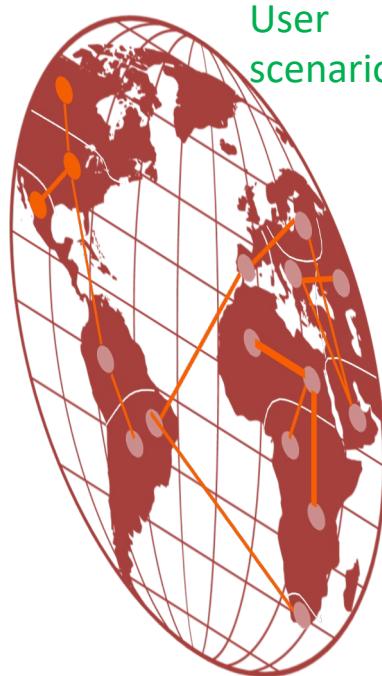
# Limits

- IAM scenarios can be limited in scope: very few information on metals, chemicals, water, etc.
- Difficult to systematically assess the spread of a technology
- Inadequate geographical resolution



# User-generated prospective scenarios

# User-generated scenarios

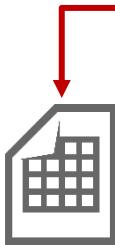


Maintain a coherent storyline

# Scenarios

*datapackage.json*

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{  
    "profile": "data-package",  
    "name": "ammonia-prospective-scenarios",  
    "title": "Ammonia decarbonisation pathways...",  
    "description": "Implementation of...",  
    "source": "Boyce, J. C. (2022). Ammonia...",  
    "version": "0.0.1",  
    "contributors": [  
        {  
            "title": "Johanna C. Boyce",  
            "email": "some.email@umail.leidenuniv.nl"  
        }  
    ],  
    "dependencies": {  
        "premise": ">=1.3.0"  
    },  
}
```



Scenario data



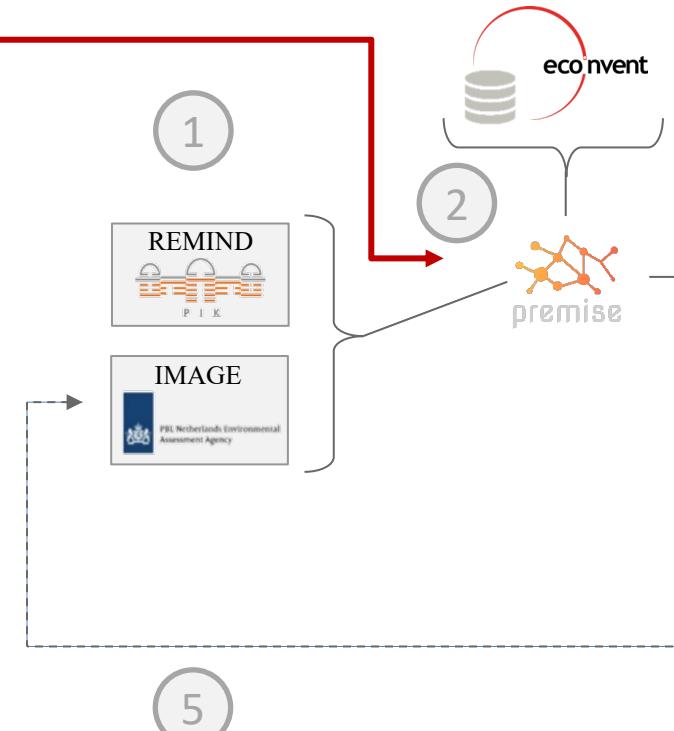
Inventories



Configuration

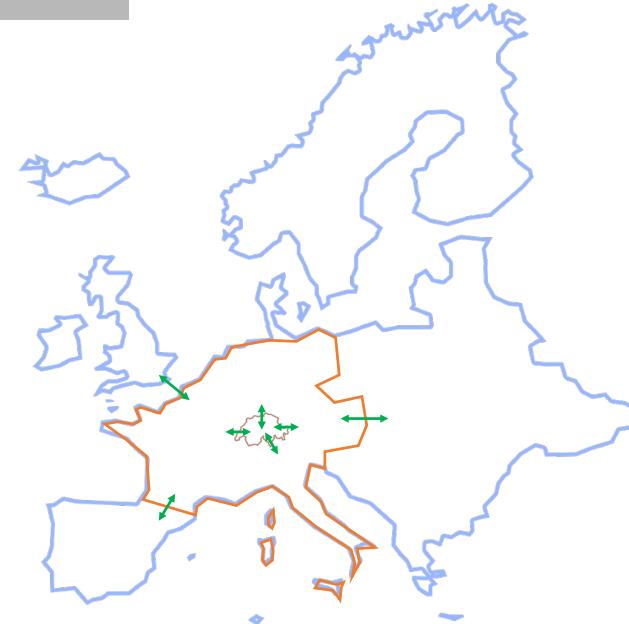


zenodo



# Examples

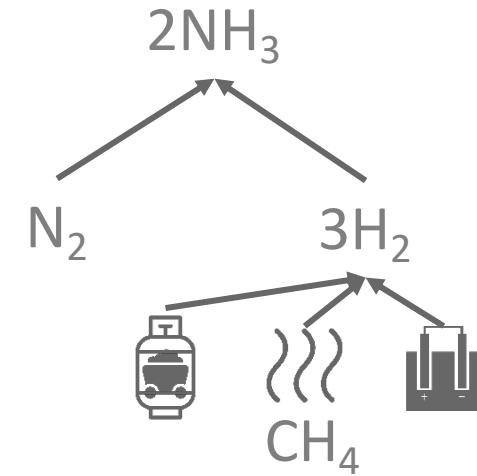
Switzerland 2050



Cobalt



Ammonia



<https://github.com/premise-community-scenarios>

# Walkthrough example

Your turn!

# Group exercises

- 2 to 3 persons per group
- ~2 hours (not too complex)
- Use ecoinvent v.3.8 & premise v.1.3.x
- Just for fun!
- Documentation: [https://premise.readthedocs.io/en/latest/user\\_scenarios.html](https://premise.readthedocs.io/en/latest/user_scenarios.html)
- Example notebook: <https://github.com/polca/premise/blob/master/examples/examples%20user-defined%20scenarios.ipynb>

## Suggestions:

- A future electricity market for your home country
- Phase out the use of CFCs and HCFCs
- Remove Russian CNG supply to Europe and replace it with US' LNG
- Increase the share of recycled aluminium
- Decrease the use of clinker in cement
- Replace all electricity use by a supply from renewables
- Stop the use of synthetic chemicals in agriculture
- Replace natural gas use by hydrogen
- Electrify trucks
- Change the diesel blend

# Wir schaffen Wissen – heute für morgen

Technology Assessment Group  
<https://www.psi.ch/en/ta>

Questions?



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