# TECHNO-ECONOMIC TRANSITIONS PATHWAYS FOR DECARBONSING EUROPE'S POWER SUPPLY

Dr. Benjamin Pfluger

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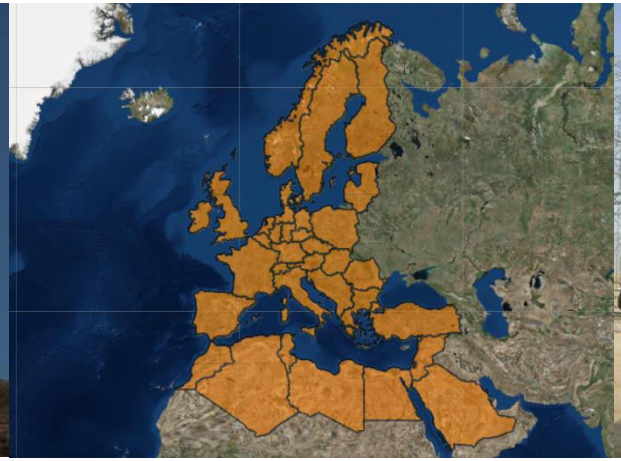
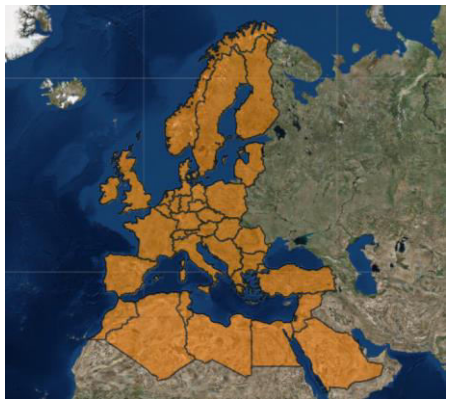
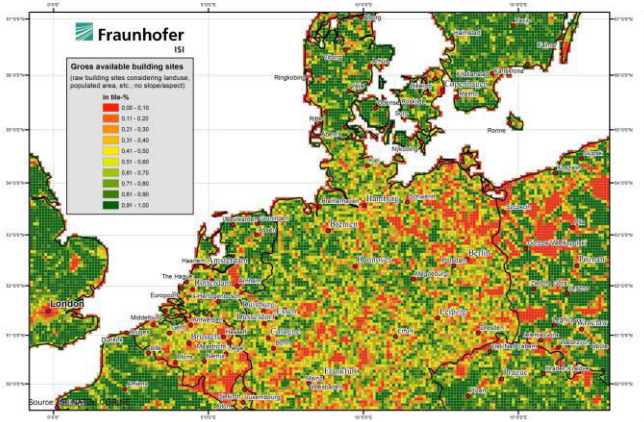
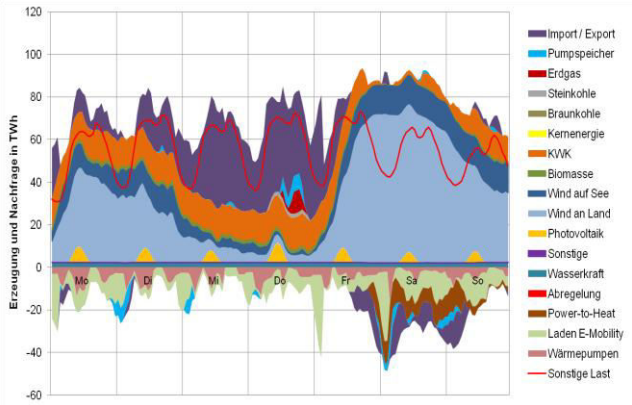


# Methodology
# Enertile structure

- The power system optimisation model *Enertile* has to balance demand and supply in every hour in 2020, 2030, 2040 and 2050
- Goal: Cost minimisation, while staying below the targets defined by the global Integrated Assessment Model (IAM) *IMAGE*
- Very high resolution of space and time
- Scenario design by technology constraints (land available for RES plants, …) or by costs (lower interest rates for PV)



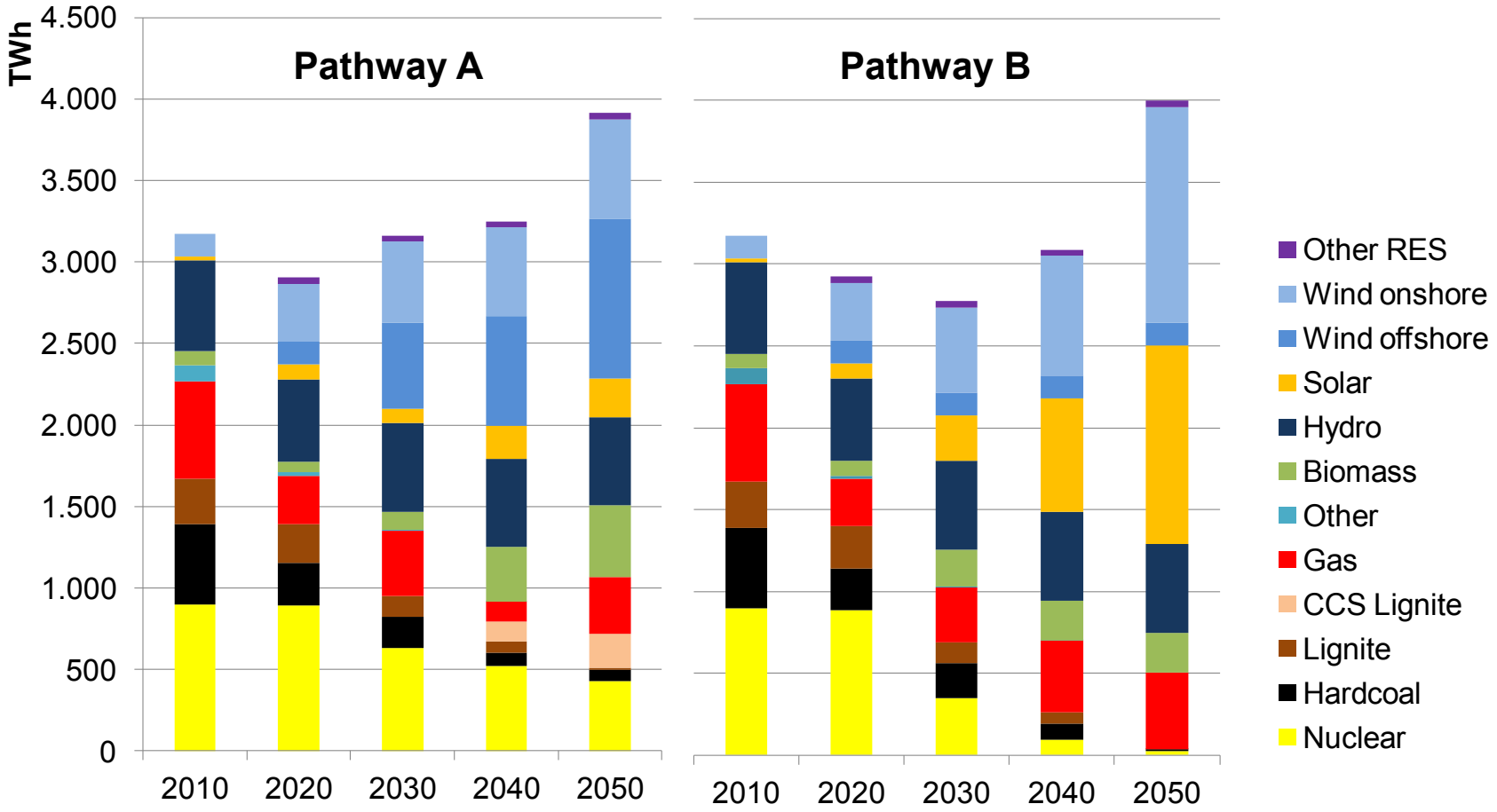


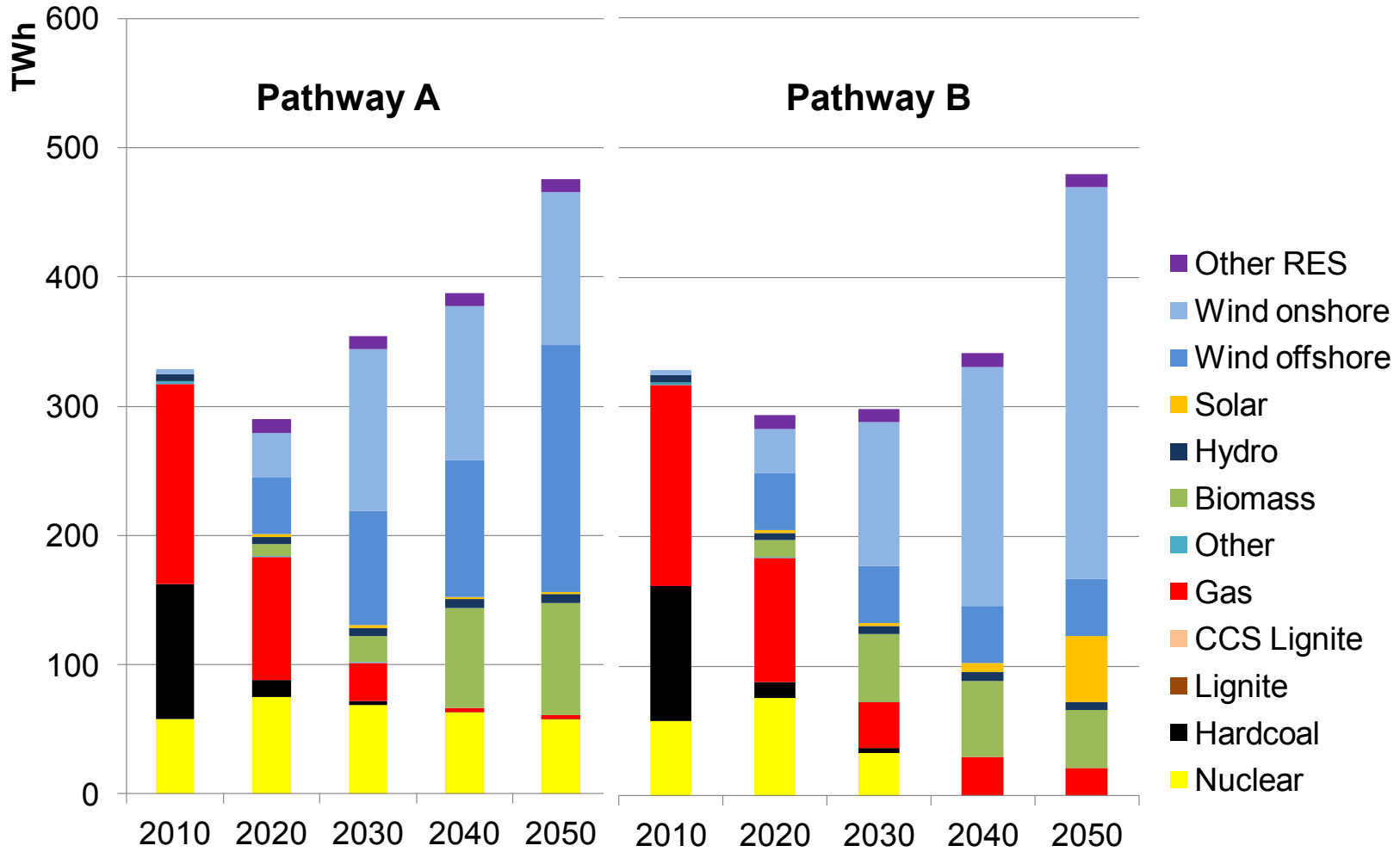
# Methodology
# Scenario design

| | PATHWAY A | PATHWAY B |
|---|---|---|
| **Photovoltaics** | | • Lower interest rate for rooftops<br>• Higher land availability |
| **Onshore wind** | | • Lower land availability |
| **Offshore wind** | • Price similar to onshore | • Lower land availability |
| **Bioenergy** | • BECCS is used<br>• Therefore more bioenergy in the power sector | |
| **Nuclear** | • Allowed, exogenously set path | • No new capacity after 2010 |
| **CCS** | • Allowed | • Excluded |

# Results
# European power sector



# Results
# UK power sector

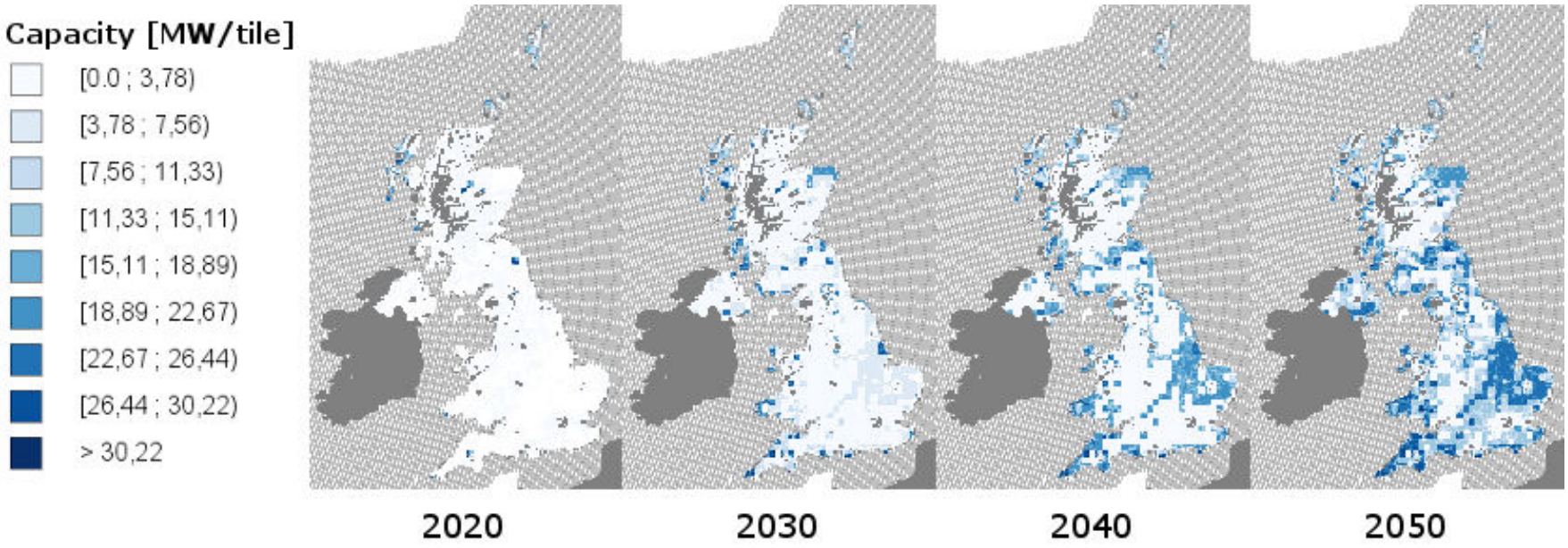


# Results
# UK power sector – main frictions

- **Both Pathways**
  - No CCS in the UK
  - High exports
  - Strong grid expansions
- **Pathway A**
  - High costs for offshore wind energy
  - UK plans to upscale gas (WP2), but model results suggest otherwise
  - Nuclear power is relatively expensive and its upscaling questionable
- **Pathway B**
  - Strong expansion of wind onshore
    - Acceptance
    - Capacity building
    - …
  - Drastic change in actors and regimes (incumbents vs. niches)

# Results
# UK power sector

- Cost optimal diffusion of onshore wind power in Pathway B
- Costs-effective, yet currently not very likely



# Conclusions

- Strategy options of Pathway A and B face different issues in different countries
  - In the UK, a rather decentralised strategy with new actors seems difficult
  - In Germany a strategy based on CCS and offshore wind does not seem plausible
- Massive grid expansions, onshore wind diffusion and increased costs are necessary in any strategy
- Cost minimisation and market liberalisation often acts as a fig leaf

- Translating techno-economic scenarios into in depth storylines reveals frictions
- The best decarbonisation strategy might be the one balancing acceptance issues best

Thank you for your attention!

Questions?

pfluger@isi.franhofer.de