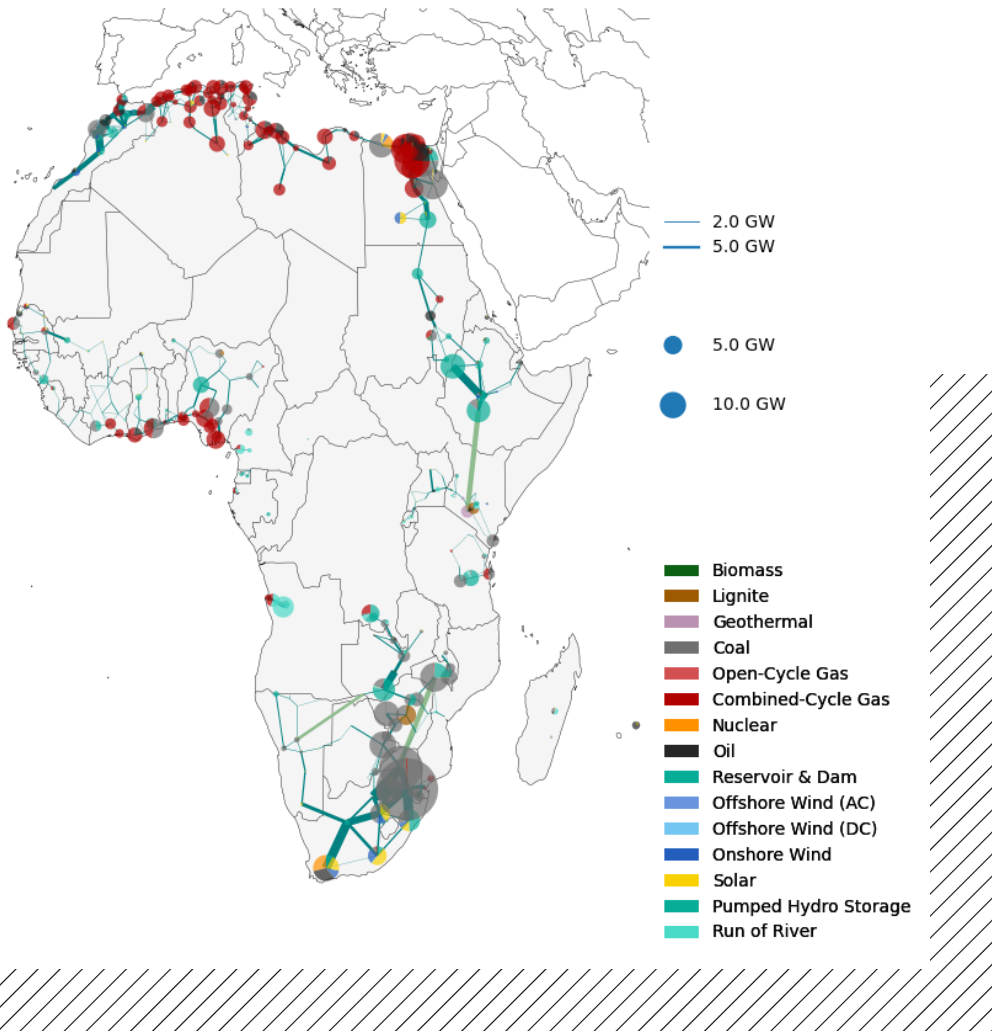




REGENSBURG



H2GLOBAL MEETS AFRICA

ANTON ACHHAMMER, M.SC, OTH
REGENSBURG

H2Global meets Africa

Projektübersicht



- Projektlaufzeit: 01.01.2023 – 31.12.2025
- Budget: 4.2 Millionen €
- Gefördert vom Bundesministerium für Bildung und Forschung

GEFÖRDERT VOM



Bundesministerium
für Bildung
und Forschung

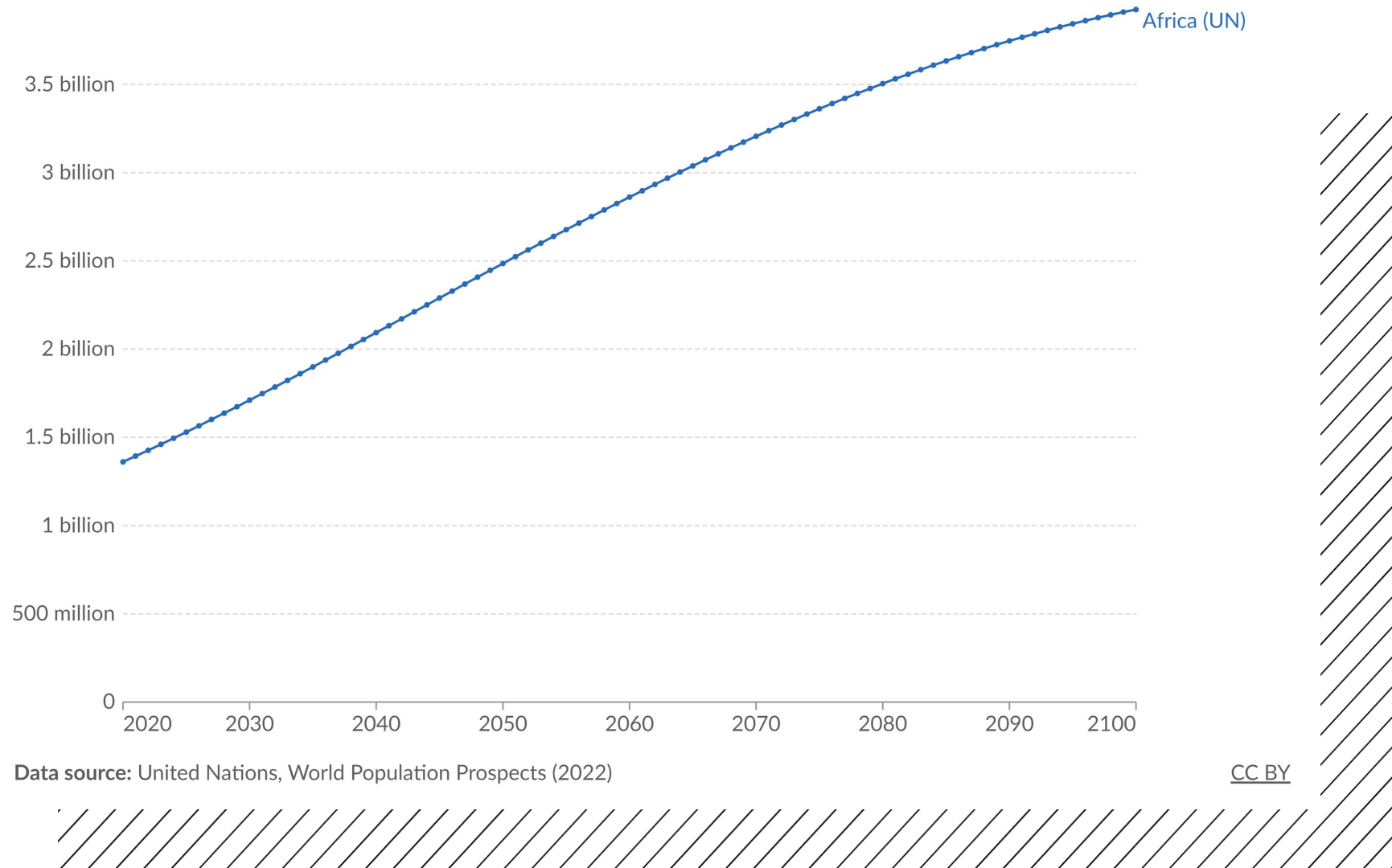
Projektpartner

- H2Global Foundation 
- Fraunhofer IEE 
- Assoziierte Partner: AfDB, WASCAL, SASSCAL



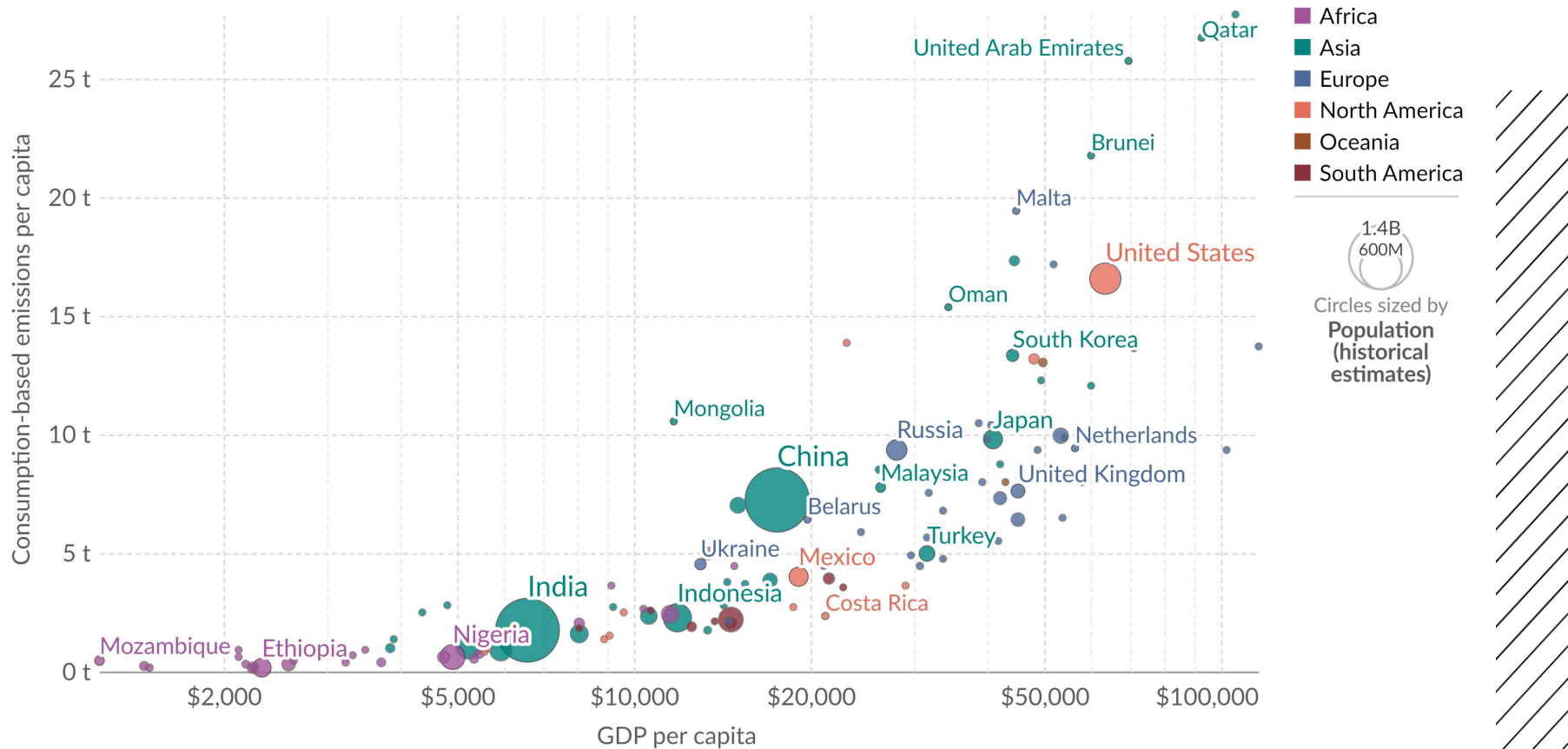
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Motivation



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Motivation

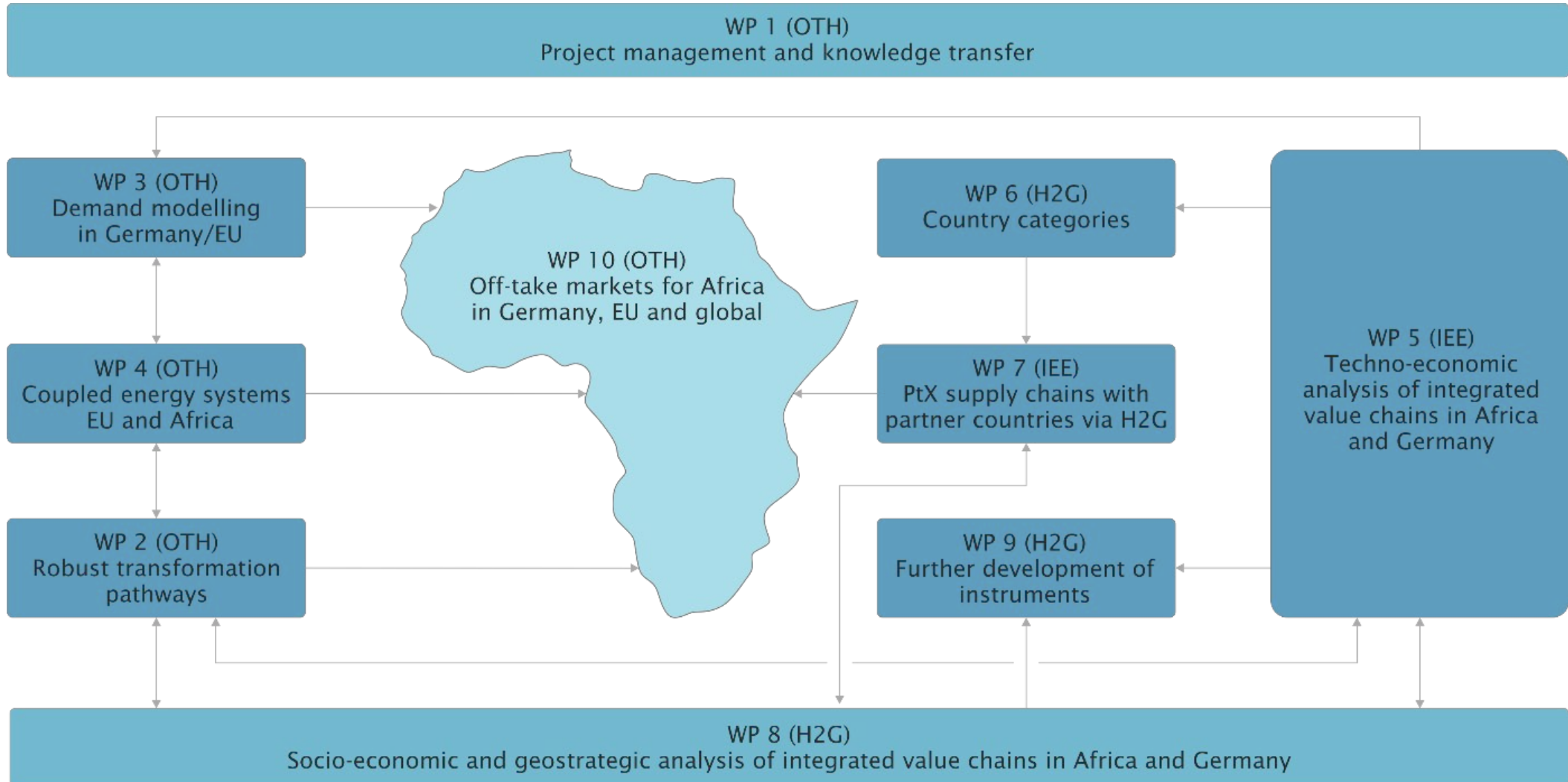


Data source: Global Carbon Budget (2023); Population based on various sources (2023); World Bank (2023)

[OurWorldInData.org/co2-and-greenhouse-gas-emissions](https://ourworldindata.org/co2-and-greenhouse-gas-emissions) | CC BY

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Methodik



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Modellierung von Transformationspfaden für die Energiewende

Die wichtigsten Modelle:

- PyPSA-Earth
- PyPSA-Earth-Sec
- PyPSA-Eur



PyPSA-Earth. A new global open energy system optimization model demonstrated in Africa

Maximilian Parzen^{a,*}, Hazem Abdel-Khalek^b, Ekaterina Fedotova^c, Matin Mahmood^d, Marha Maria Frysztacki^e, Johannes Hampf^d, Lukas Franken^a, Leon Schumm^{b,e}, Fabian Neumann^g, Davide Poli^f, Aristides Kiprakis^h, Davide Fioriti^{i,*}

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GRAPHICAL ABSTRACT



ARTICLE INFO

Dataset link: <https://github.com/pypsa-meets-earth-paer>

Keywords:
Macro-energy systems
Optimization
OpenStreetMap
Copernicus
openmod

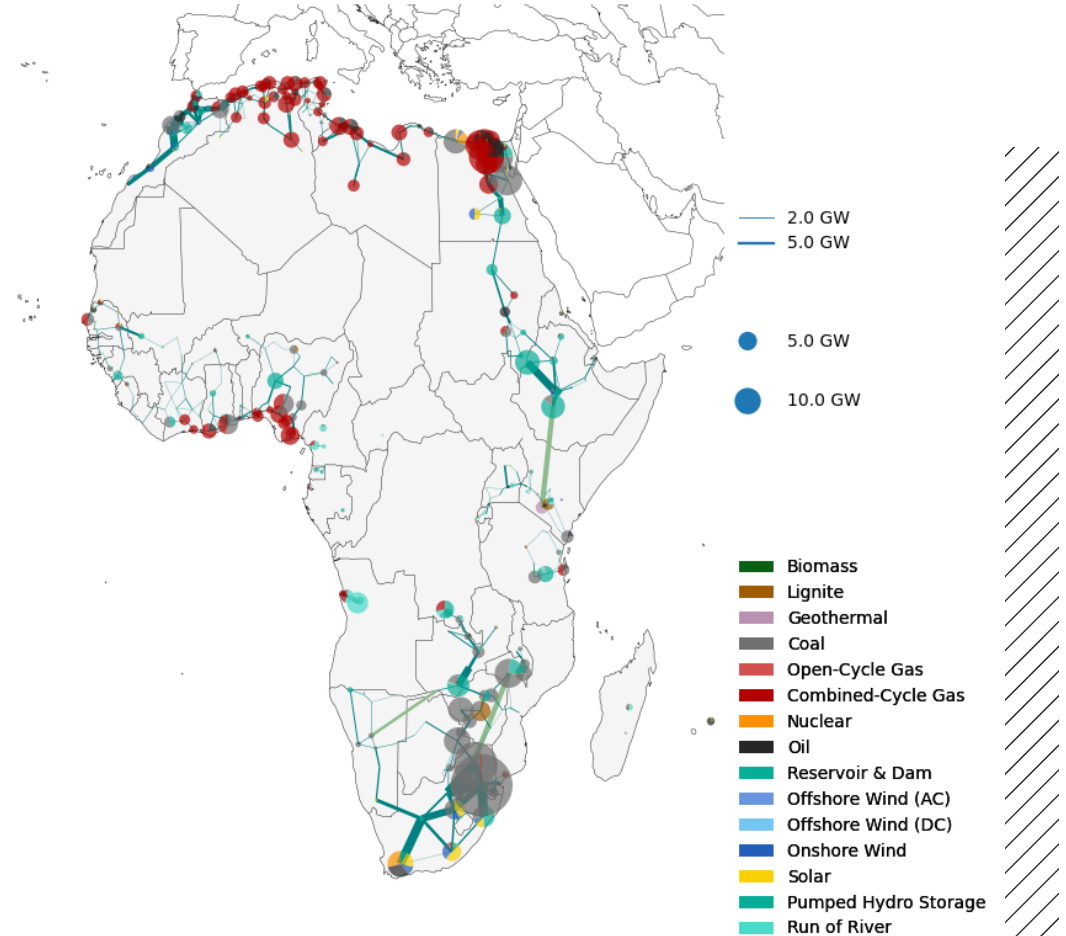
ABSTRACT

Macro-energy system modelling is used by decision-makers to steer the global energy transition towards an affordable, sustainable and reliable future. Closed-source models are the current standard for most policy and industry decisions. However, open models have proven to be competitive alternatives that promote science, robust technical analysis, collaboration and transparent policy decision-making. Yet, two issues slow the adoption: open models are often designed with particular geographic scope in mind, thus hindering synergies from collaborating, or are based on low spatially resolved data, limiting their use. Here we introduce PyPSA-Earth, an open-source global energy system model with data in high spatial and temporal resolution. It enables large-scale collaboration by providing a tool that can model the world's energy system or any subset of it. The model is suitable for operational as well as combined generation, storage and transmission expansion studies. In this study, the novel power system capabilities of PyPSA-Earth are highlighted and demonstrated. The model provides two main features: (1) customizable data extraction and preparation with global coverage and (2) a PyPSA energy modelling framework integration. The data includes electricity demand, generation

Check out
PyPSA-Earth here:



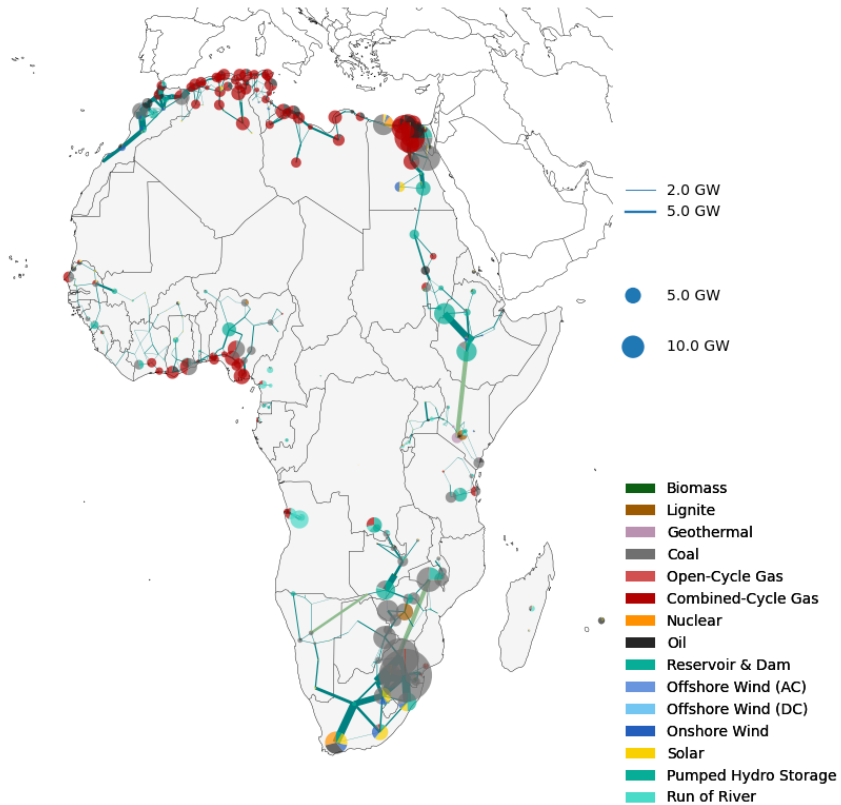
Check out
PyPSA-Earth-Sec here:



Quelle: Erstellt mit PyPSA-Earth und https://github.com/pypsa-meets-earth/documentation/blob/main/notebooks/viz/regional_transm_system_viz.ipynb

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Weitere Möglichkeiten – Modellierung Afrika/Europa

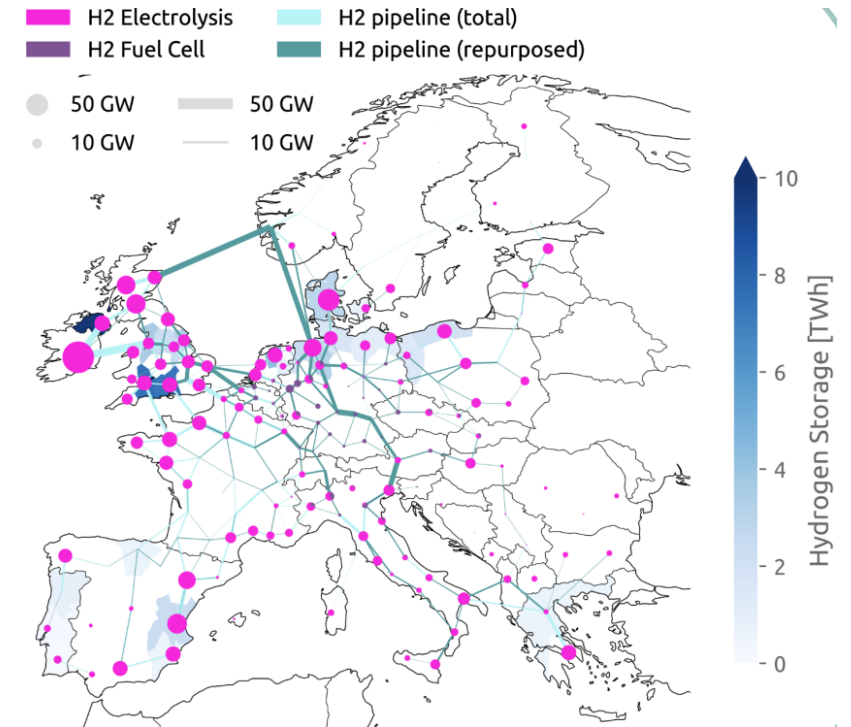


Quelle: Erstellt mit PyPSA-Earth und https://github.com/pypsa-meets-earth/documentation/blob/main/notebooks/viz/regional_transm_system_viz.ipynb

Direkte Modellkopplung



Gemeinsame Optimierung
ausgewählter Ländern



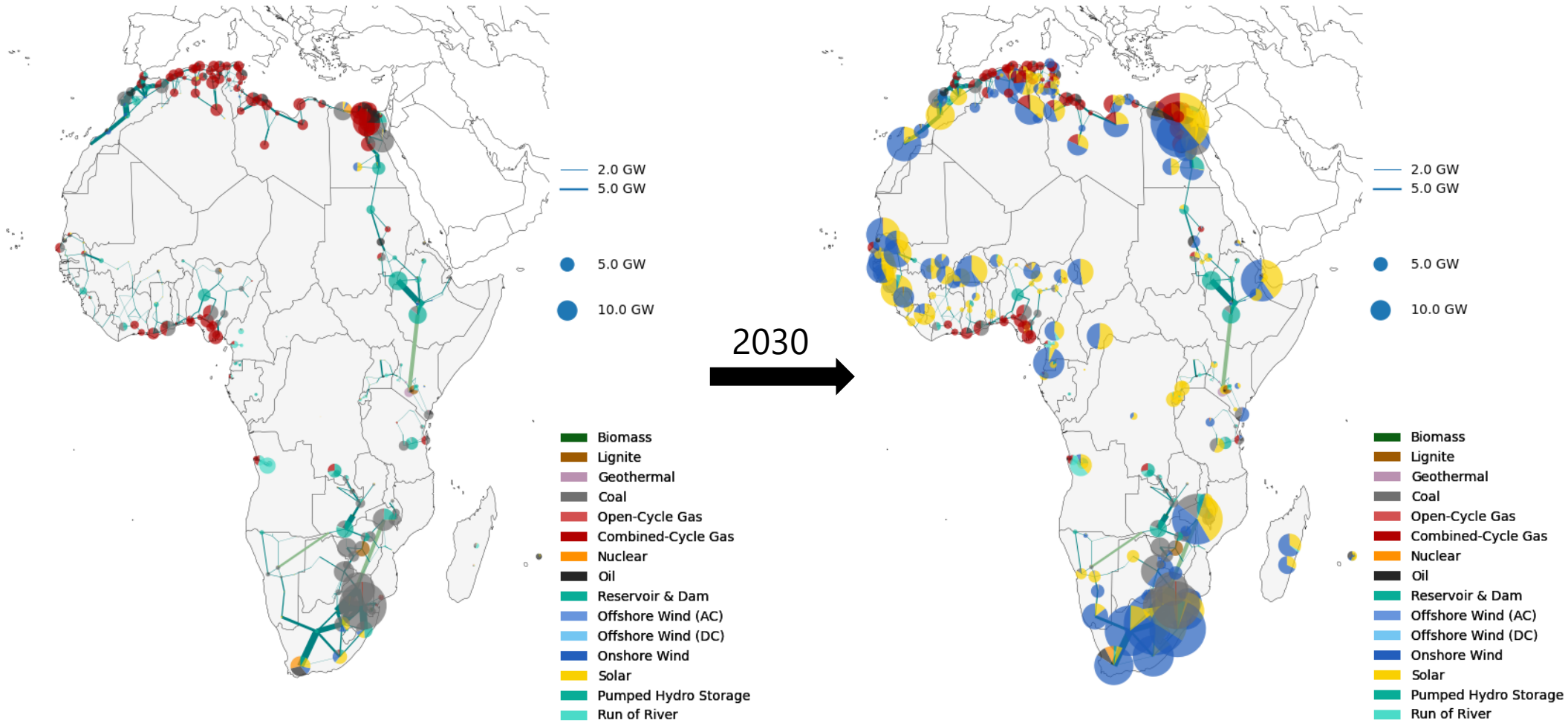
Quelle: Neumann, Fabian; Zeyen, Elisabeth; Victoria, Marta; Brown, Tom (2022): Benefits of a Hydrogen Network in Europe

Warum Open-Source-Modelle?

- mehr Transparenz, Reproduzierbarkeit und Glaubwürdigkeit
- reduziert Doppelarbeit und setzt Zeit/Geld für die Entwicklung neuer Ideen frei
- ermöglicht ein hohes Maß an Anpassbarkeit, da der Code offen ist
- ermöglicht es neuen Akteuren, sich an der Debatte zu beteiligen (z. B. NGOs, Forscher:innen, etc.)
- kann die Qualität der Forschung durch Feedback und Korrekturen verbessern
- ermöglicht eine einfachere Zusammenarbeit (keine Notwendigkeit für Verträge, NDAs usw.)
- ist angesichts der zunehmenden Komplexität des Energiesystems unverzichtbar - wir alle benötigen Daten aus verschiedenen Bereichen (Netze, Gebäude, Verkehr, Industrie) und können sie nicht allein sammeln
- kann die öffentliche Akzeptanz für schwierige Kompromisse bei der Infrastruktur erhöhen

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Ergebnisse



Check out
PyPSA-Earth here:

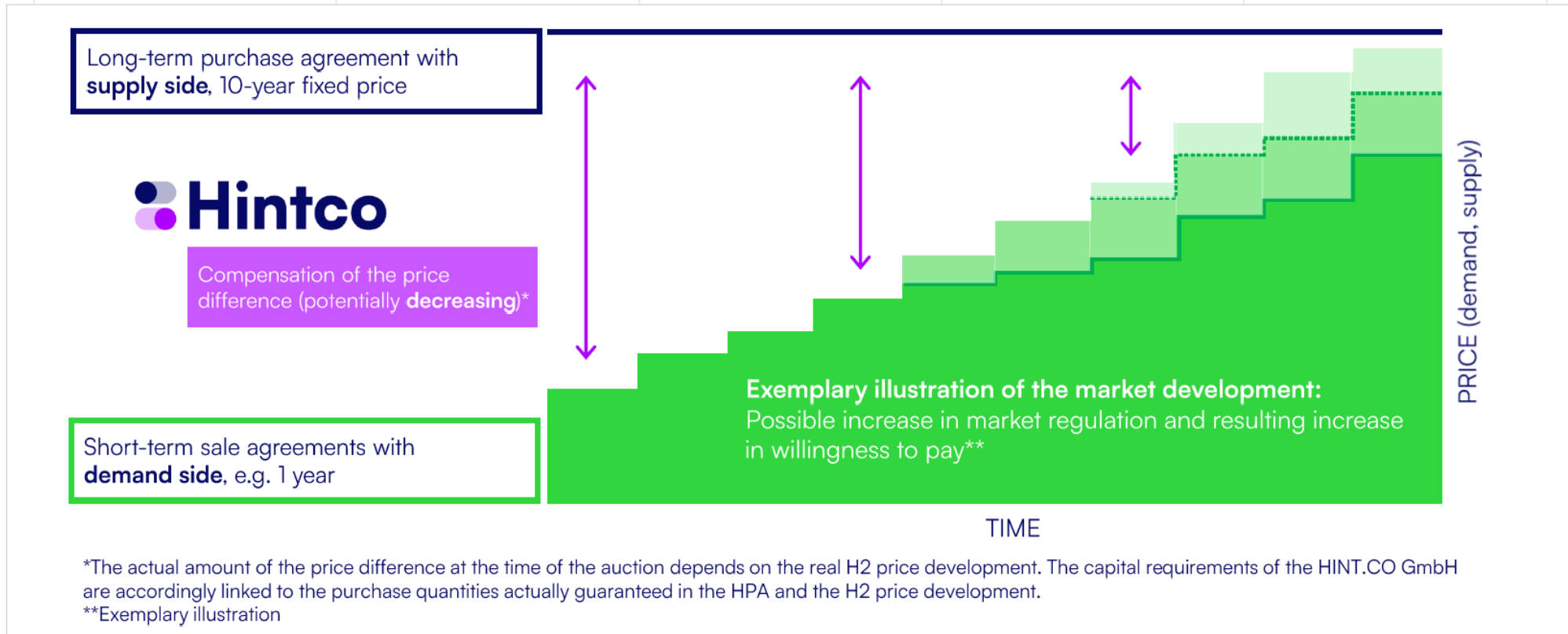


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Compensating the price difference

The Hintco compensation mechanism over time during market development



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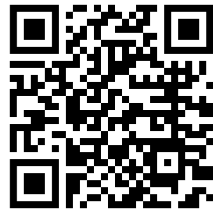
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