STRATEGIC PLANNING SUMMIT 2022

Long-Term Planning

DAVIDE FIORITI

14.05.2022


PyPSA
meets Earth

WE ARE USING 1.8 EARTHS!

Unsustainable ecological footprint: NEED TO ACT FAST!

Data from: https://data.footprintnetwork.org/

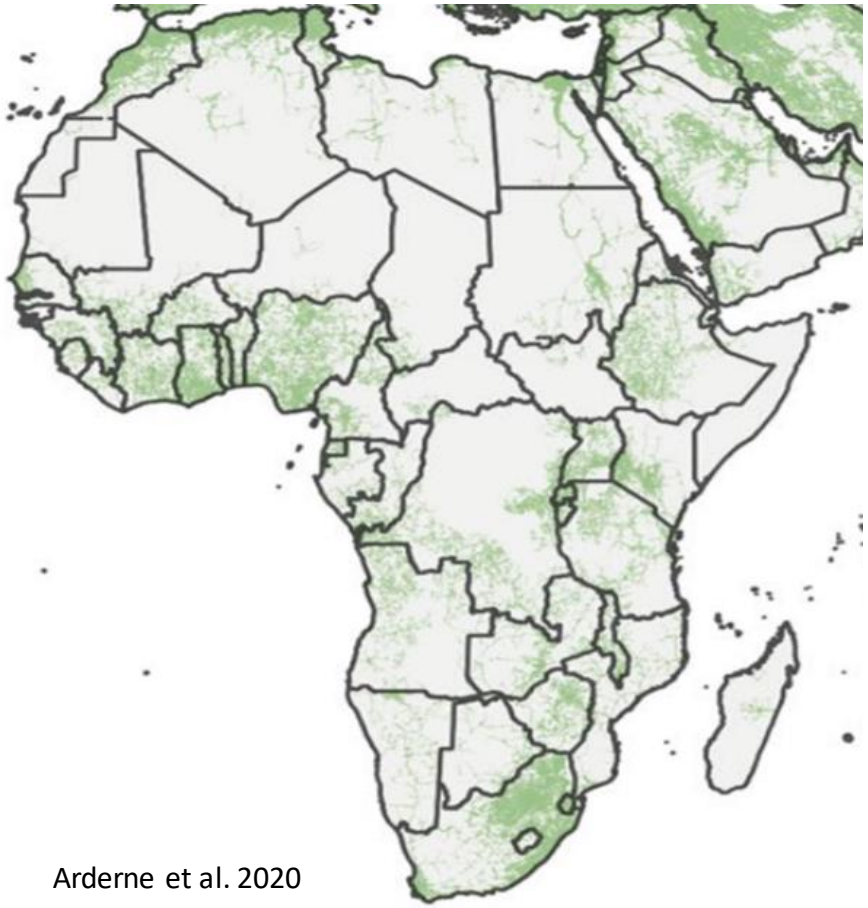
ENERGY TRANSITION FOR SUSTAINABILITY

NEEED PLANNING FOR A BRIGHT FUTURE

NEED INFRASTRUCTURE DATA!

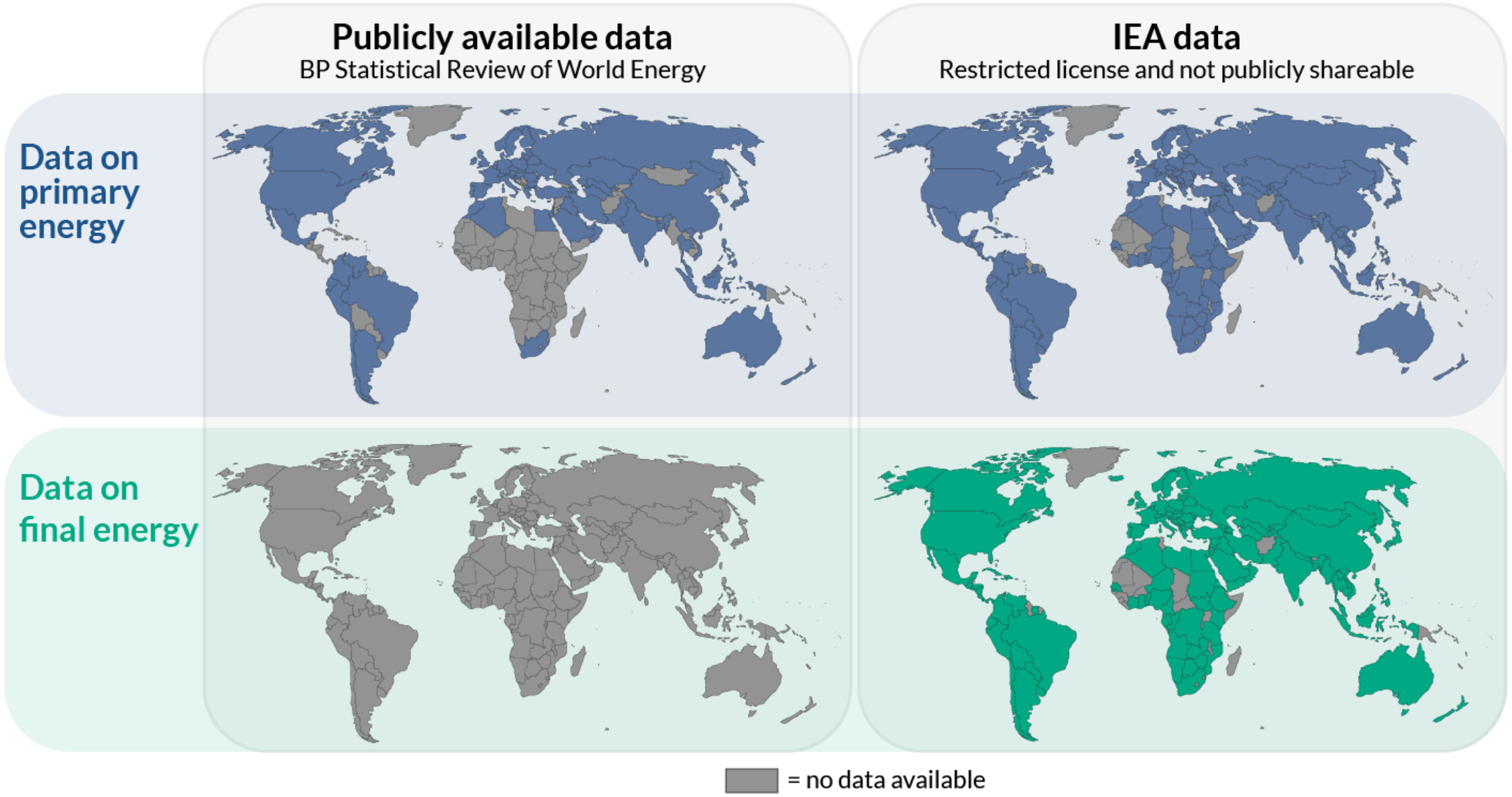
OpenStreetMap public data

AI-enabled network estimation



Arderne et al. 2020

NEED CONSUMPTION DATA!



Available from: https://ourworldindata.org/iea-open-data

OPEN Global Independent Research Initiative

SOLVER

Help sustaining

Support developers

Reveal bottlenecks

Initiate new paths

ENERGY SYSTEM MODELS

High resolution

Features

Performant

Problem formulator

Modular

DATA

Creating open data

Predicting data

Data workflow

High resolution

USER AND DEVELOPER COMMUNITY

Open

Collaborative

Dialogue

Training

Empower

OUR HISTORY

PyPSA meets Earth

1Q 2021
PYPSA MEETS AFRICA
- PyPSA-Africa
- Outreach team

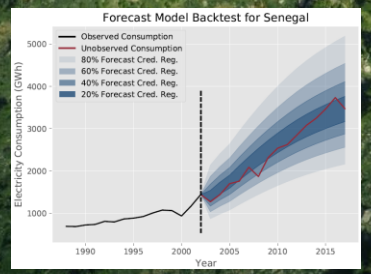
PyPSA meets Africa

4Q 2021
- We go global!
PyPSA-meets-Earth

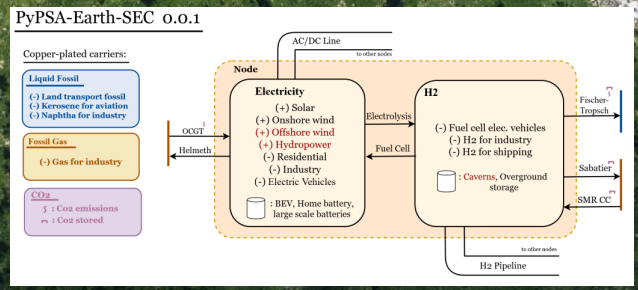
PyPSA meets Earth

2022…2030
what next?

3Q 2021
- AI Detection Team
- Demand Team



1Q 2022
- PyPSA-Earth-Sec
- HiGHS&SMS++

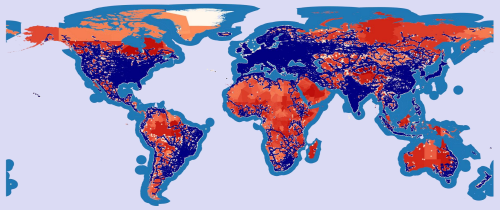


27 forks
Discord > 80pp

THE WORKSTREAMS TODAY

ENERGY MODELS

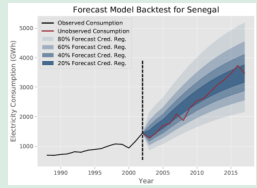
PyPSA-Earth & PyPSA-Earth-Sec



DATA

AI Infrastructure Detection

Demand estimation



- Visibility to HiGHS funding
- SMS++ interface

SOLVER

Outreach

COMMUNITY

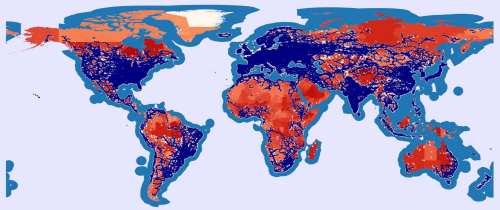
THE WORKSTREAMS TOMORROW

ORGANIZATION OF THE SESSION

ENERGY MODELS

PyPSA-Earth & PyPSA-Earth-Sec

1.

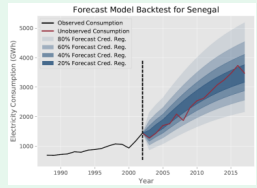


DATA

2.

AI Infrastructure Detection

3. Demand estimation



- Visibility to HiGHS funding
- SMS++ interface

4. SOLVER

LATER

Outreach

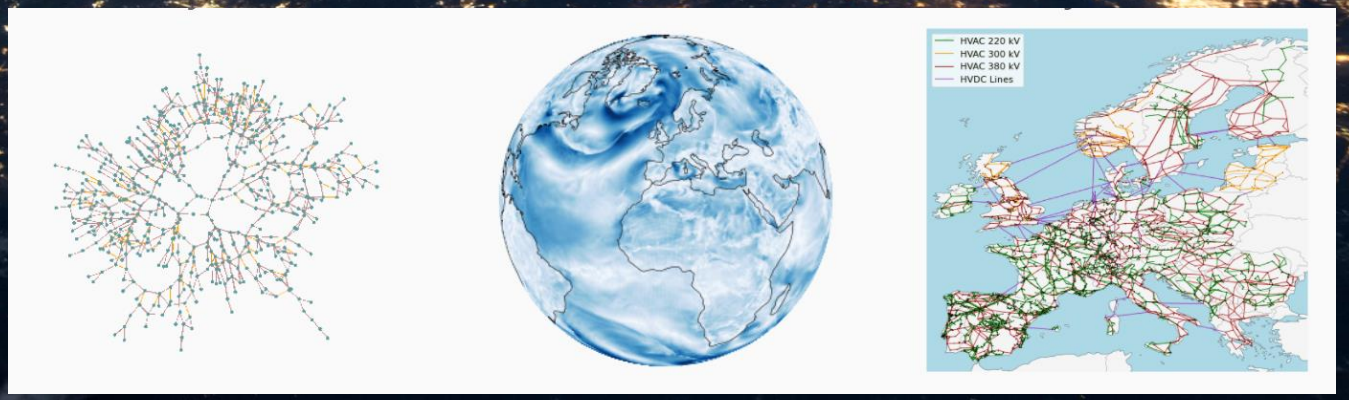
COMMUNITY

4. MISSING PIECES?

SECTION 1:
PyPSA-Earth & PyPSA-Earth-SEC

The power and sector-coupled models of the Earth energy system

Based on



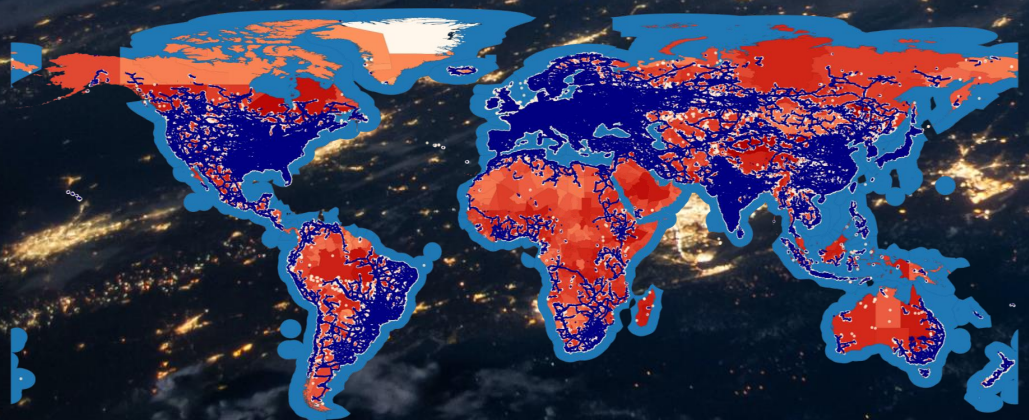
PyPSA Atlite PyPSA-Eur(-Sec)

VISION

Speed up global energy transition by open energy modelling

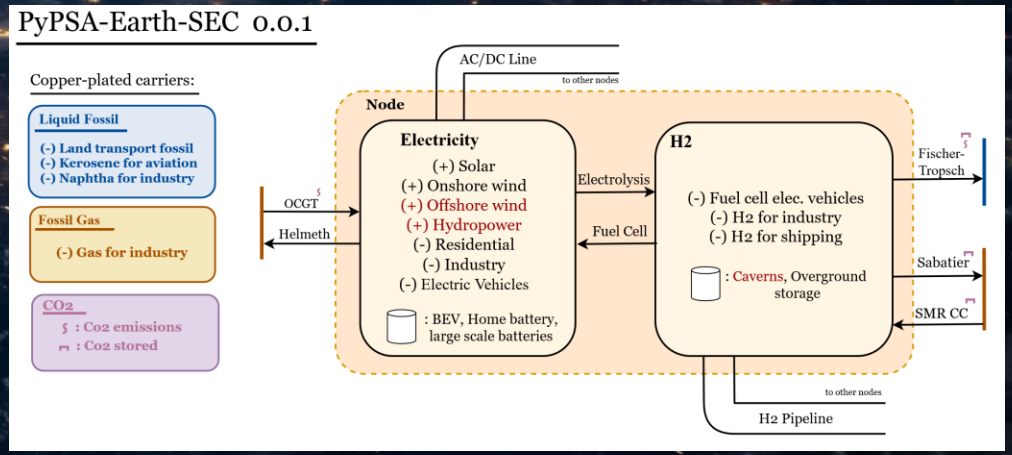
PYPSA-EARTH

Earth power system model



PYPSA-EARTH-SEC

Earth sector-coupled model



Our two modelling repos… for how long?

FEATURES

Application oriented

1. **Planning&Dispatch tool**
   -> PyPSA
2. **Low usage barriers**
   -> Open source python
3. **Scenario and policy analysis**
   -> Plotting fetures
4. **Credibility and robustness**
   -> Based on PyPSA-Eur
   -> Validation [with …]

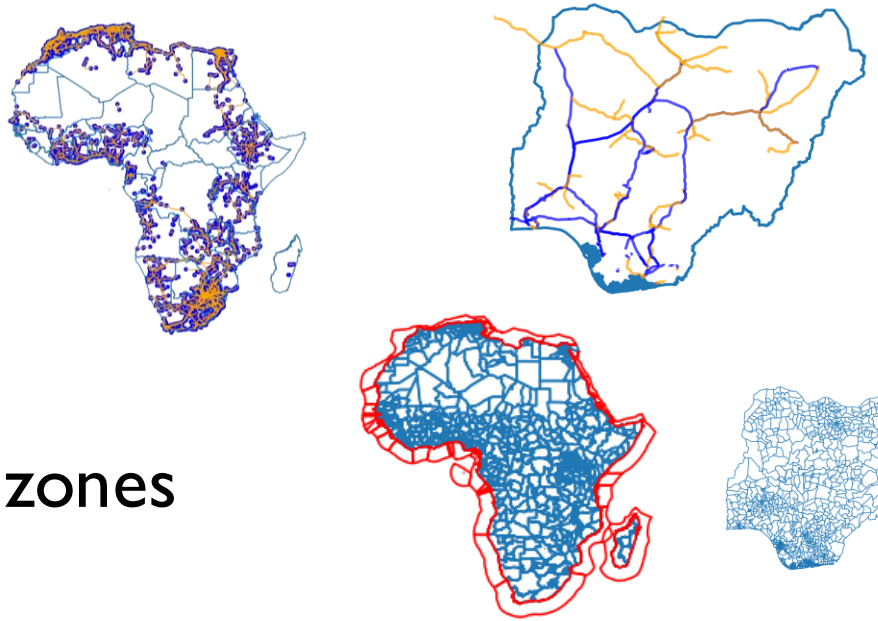
User oriented

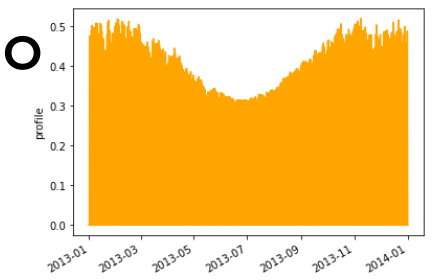
1. **Easy to use**
   -> Documentation and simple functions
   -> User interface
2. **Reliability**
   -> Enlarge usage community
3. **Highly customizable**
   -> Modular
   -> Options & linkers

PYPSA-EARTH STATUS

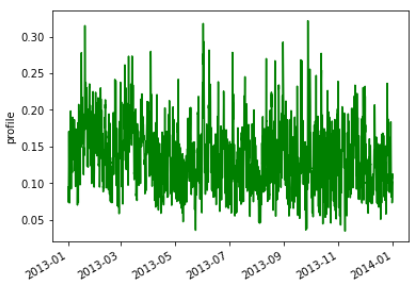
Automatic data extraction

- ✓ Open Street Map
  (buses, cables, lines and generators)
- ✓ Shapes of administrative and economic zones
- ✓ Renewable production by scenario
  2012, 2013, …

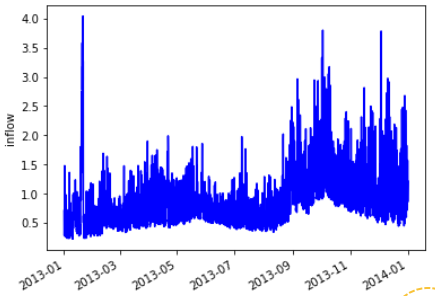




Solar



Wind

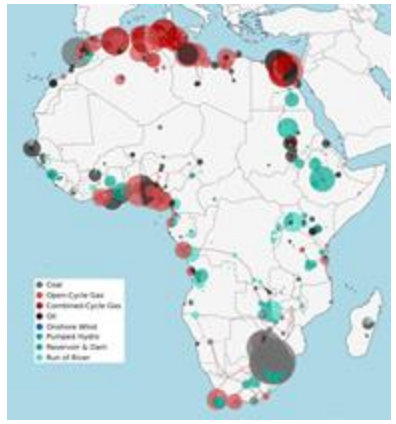


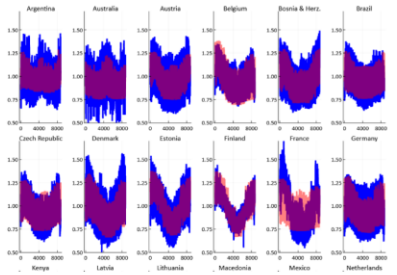
Hydro

PYPSA-EARTH STATUS

Data cleaning and merging

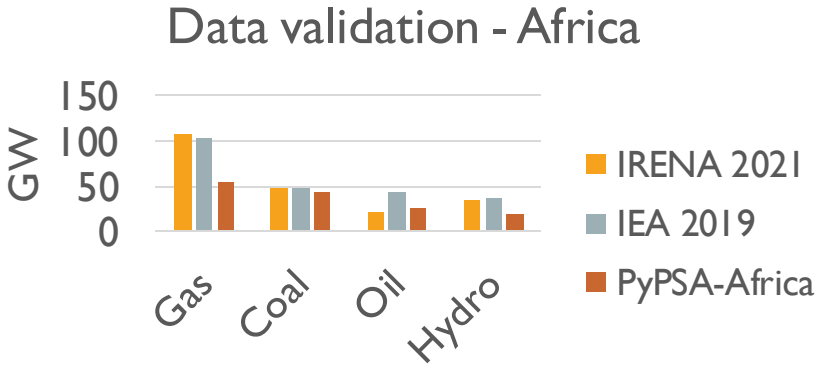
- ✓ Cleaning OSM,
  yet missing HVDC, converters, transformers
- ✓ Generators
  (powerplantmatching, yet OSM issues)
- ✓ Data import by (weather) scenario
  (2030, 2050, …)





GEGIS

(yet missing data and uncertainties)

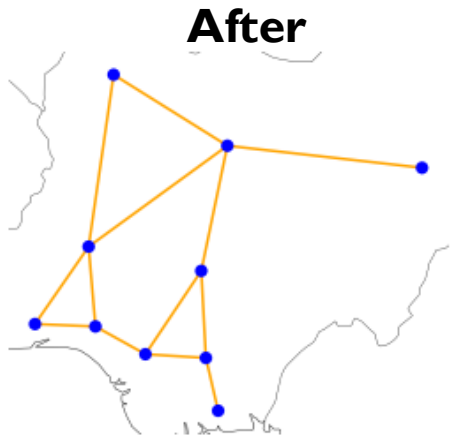


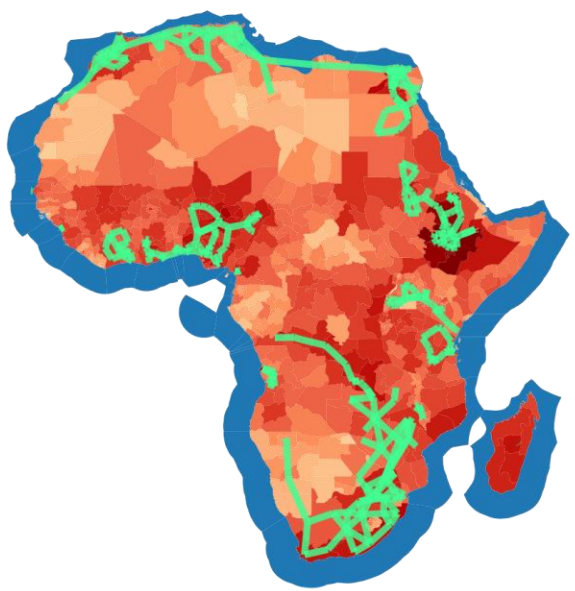
Demand team…

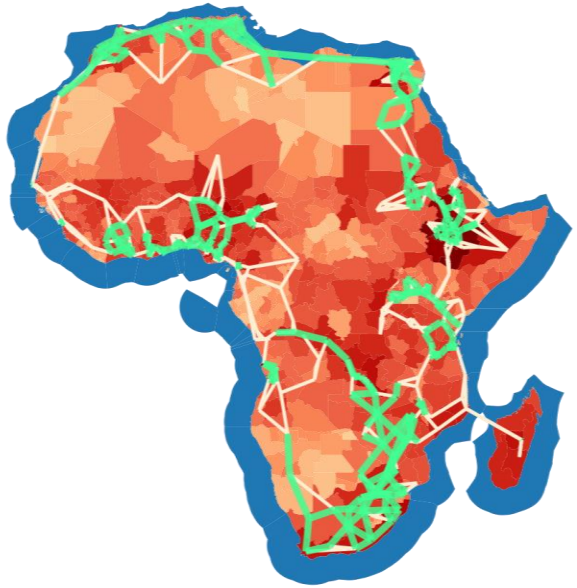
PYPSA-EARTH STATUS

Dominate complexity

- ✓ Network clustering
- ✓ Time series clustering
- ✓ Network augmentation

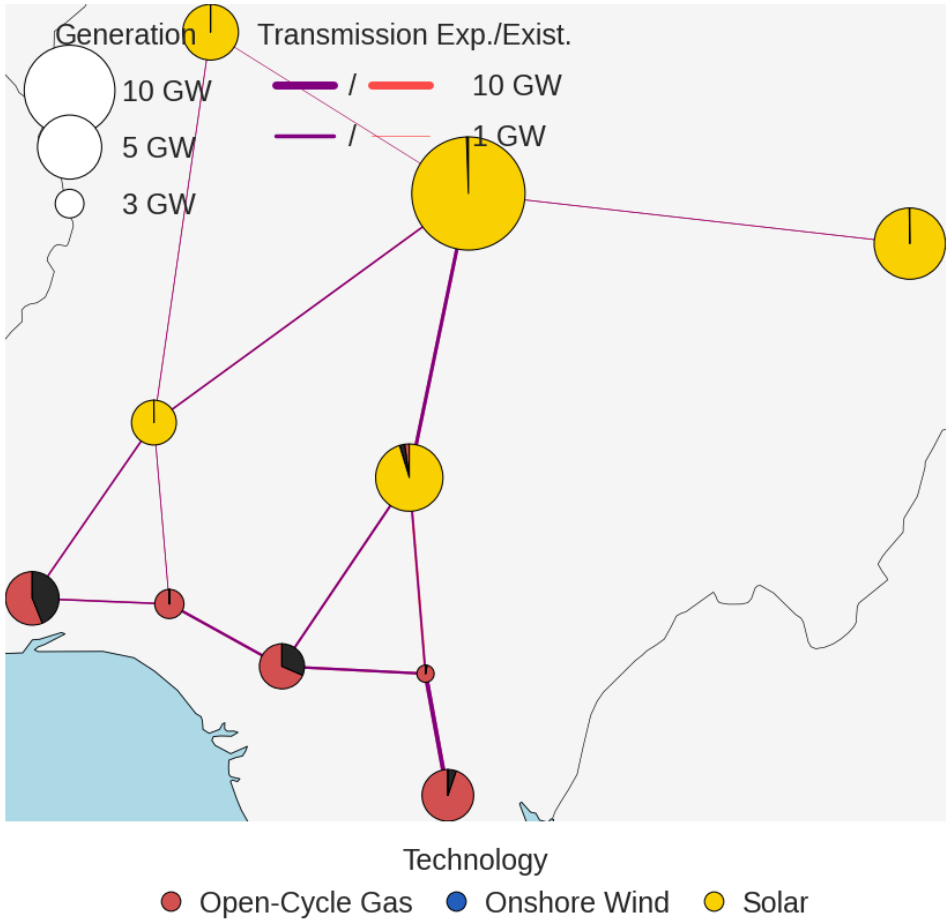


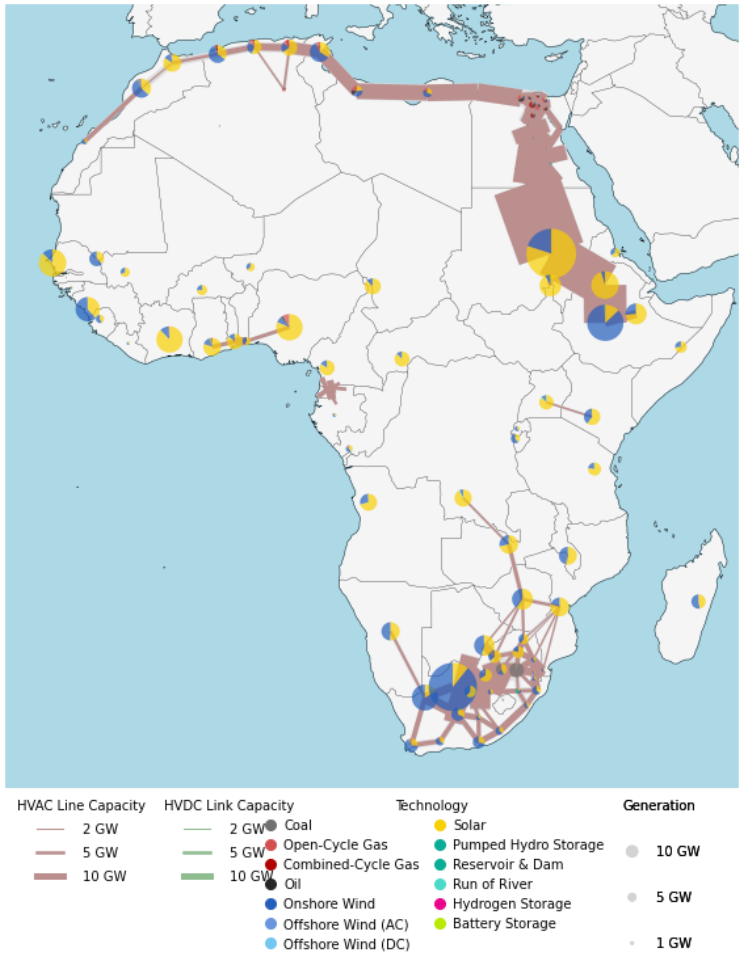




PYPSA-EARTH STATUS

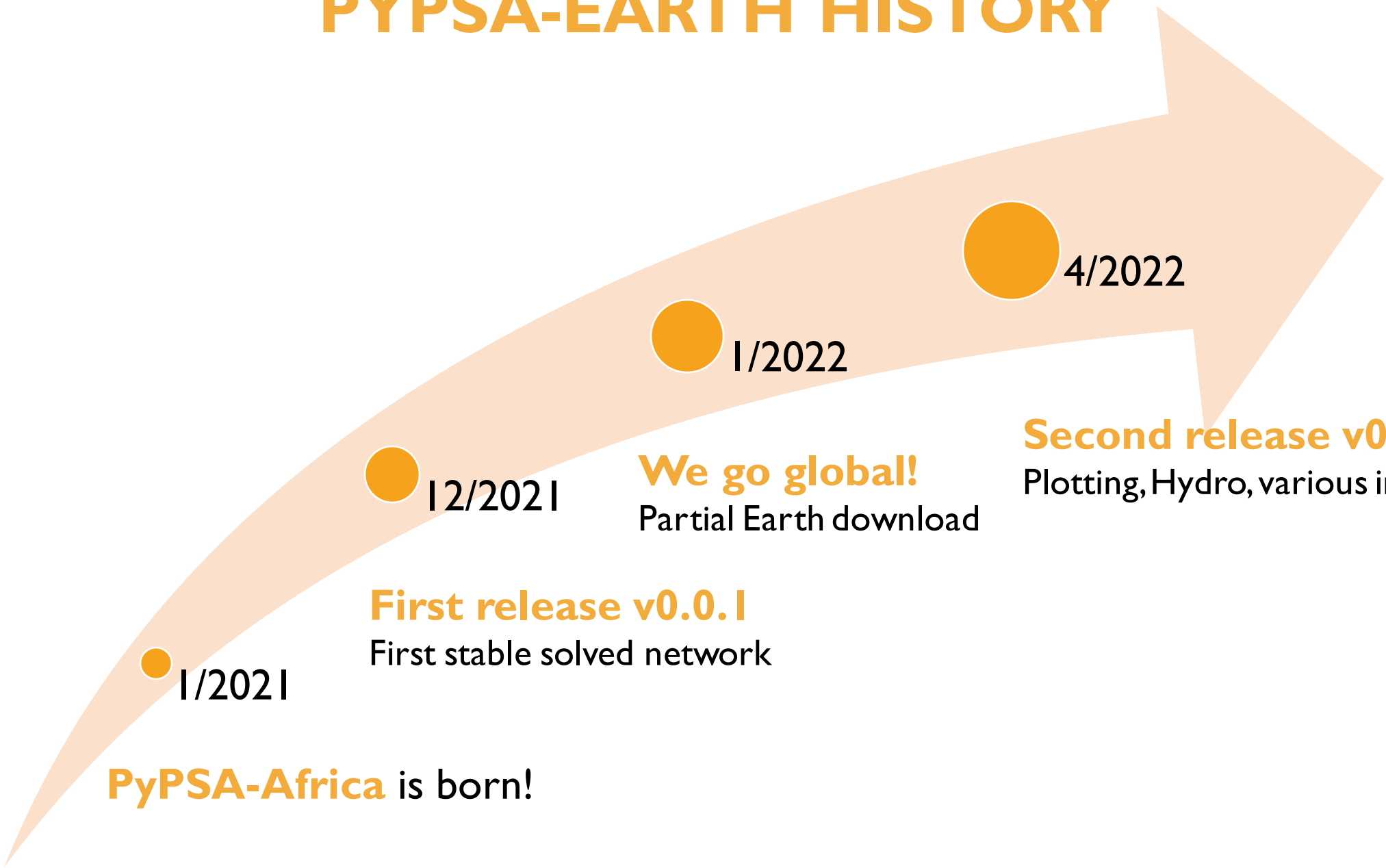
Design, dispatch and plotting





Ideas for better plotting?

PYPSA-EARTH HISTORY



1/2021

PyPSA-Africa is born!

12/2021

First release v0.0.1

First stable solved network

1/2022

We go global!

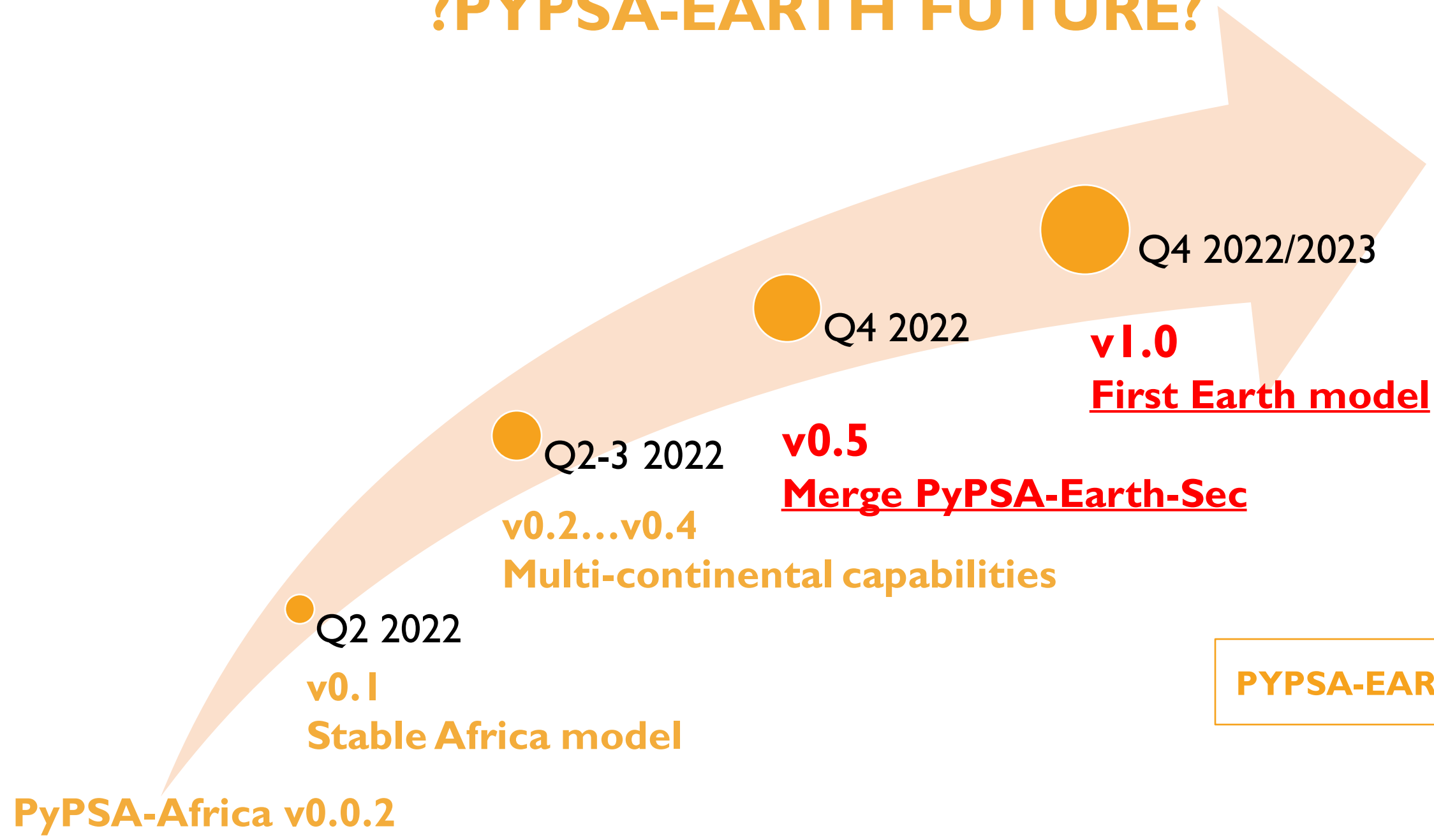
Partial Earth download

4/2022

Second release v0.0.2

Plotting, Hydro, various improvements

?PYPSA-EARTH FUTURE?



PYPSA-EARTH-SEC

Hazem slides

PYPSA-EARTH FUTURE?

LET’S DISCUSS TOGETHER

1. PyPSA-Earth & PyPSA-Earth-SEC

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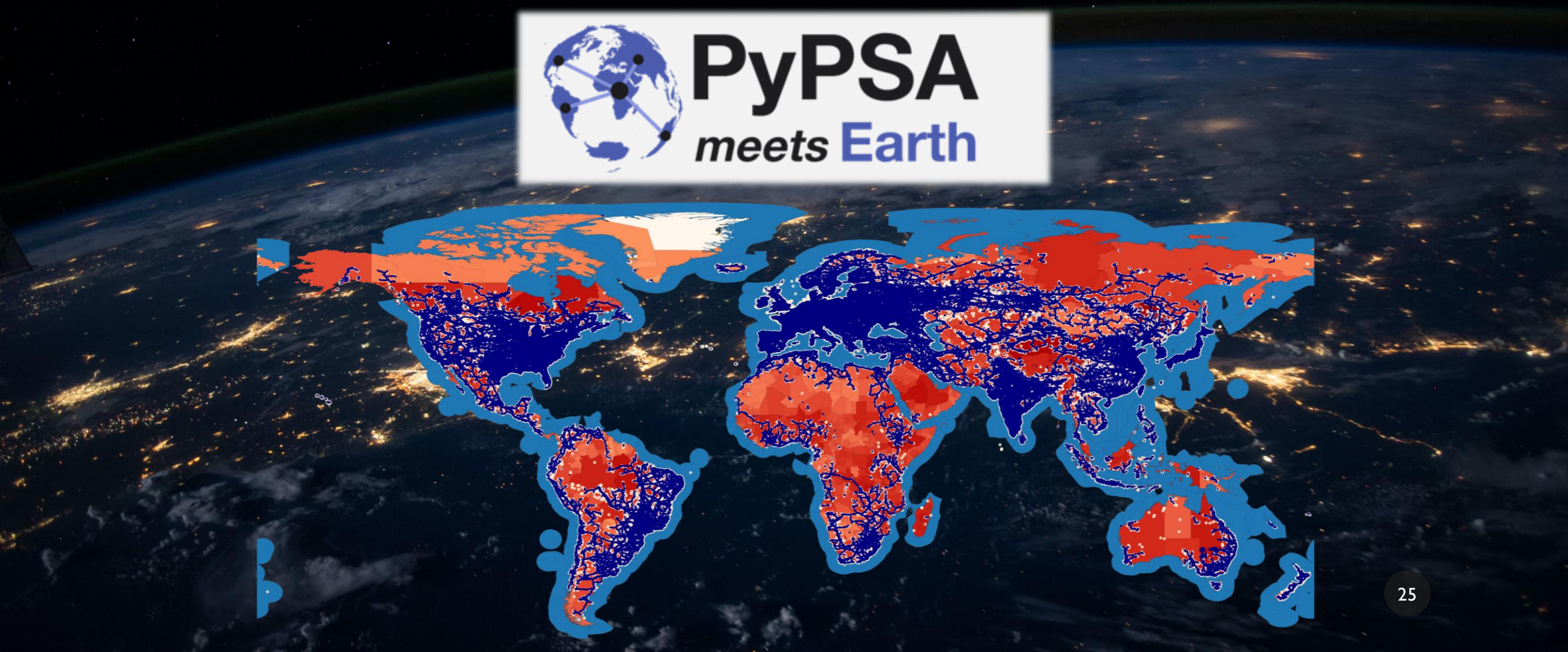

THE WORKSTREAMS TOMORROW

ENERGY MODELS

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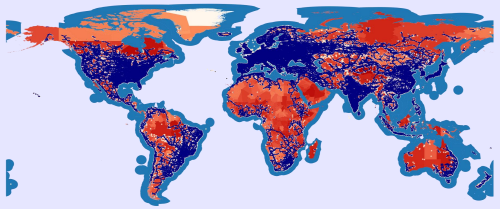

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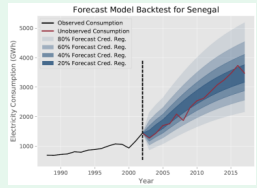

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NEW WORKSTREAMS?

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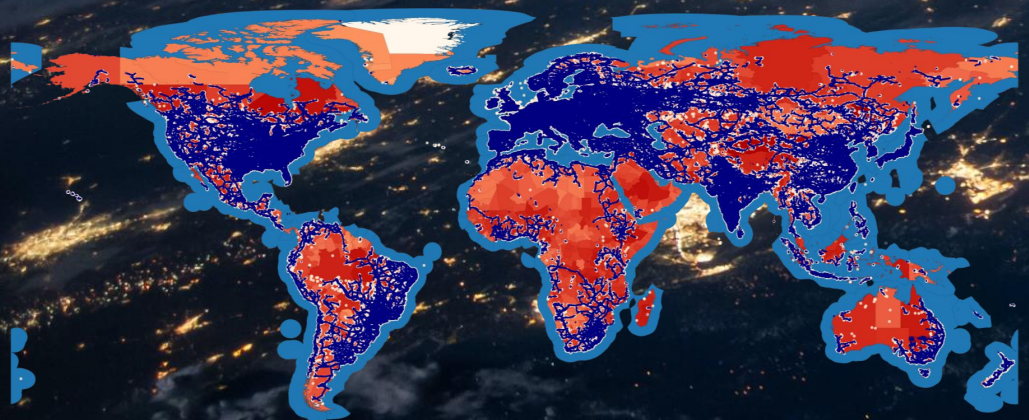
Speed up global energy transition by open energy modelling

PYPSA-EARTH

Earth power system model



PYPSA-EARTH-SEC

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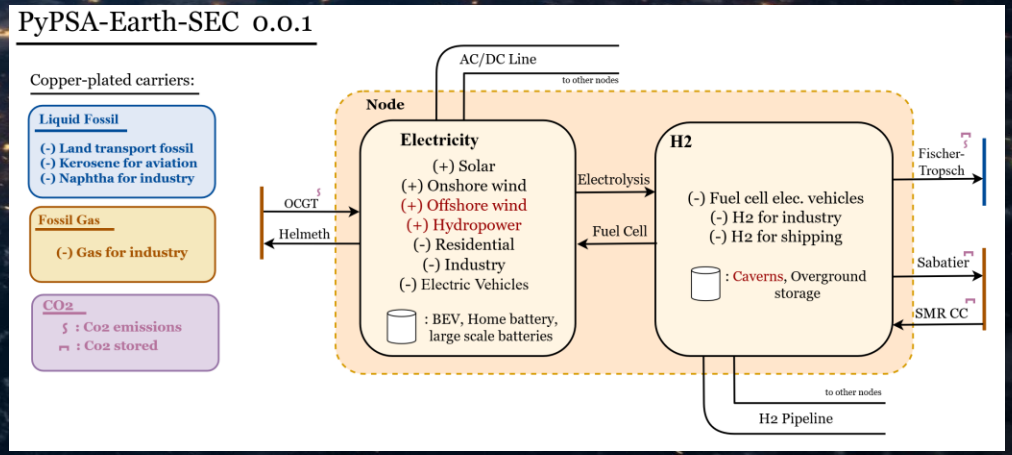

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