#134 Monthly General Code & Initiative Meeting

25.07.2024 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Attendance: Katia, Daniele, Carlos, Fabrizio, Milyas, Victor, Virio, Yerbol, Sermisha, Margherita, Mario, Emmanuel

Agenda

🙌 General initiative updates (~10min)

1. **Focus on goals**
   a. <u>Grow the community</u> stronger and larger!
   b. <u>Make open-source the new norm</u> in energy modelling!
   c. <u>Grow the impact</u> of the tools!
   d. More into the specific subsections!
2. **MERGE event is getting closer**: PyPSA-Earth & PyPSA-Earth-sec
3. **Established streams developing**
   a. PyPSA-Hydro and Climate (every 2^d Fridays at 15:30 CET): Improving hydro modelling and introducing the climate impacts into energy system models
   b. PyPSA-Distribution (every 2^d Tuesday at 15:00 CET): Development of global energy system model at distribution scale for any place in the world, considering both power and heating/cooling supply.
   c. Network-comparison stream coordinated by Jess
      -> interesting paper idea on comparison and validation of EU network data

   Help wanted both with code, modeling and data analysis. Feel free to reach out for coordination!
4. New members!
   a. Victor: Lead operations and strategy at OET; engineering background in consulting and business development. Relatively new to pypsa but slightly different profile
   b. Mario

<u>Papers:</u>
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<u>Conferences:</u>
-

<u>Education:</u>

- Next edition Climate Energy workshop will take place in September; Katia prepares tutorial.
  Previous edition was organized 2y ago.
  This year we update material climate & energy stuff; if time, at the end of september worth participating
- On-site event in Kenya about Hydro and energy modelling supported by OET that brings impact.
  Members with many contacts

📣 Code and Data updates

Introducing and discussing new features.

1. <u>PyPSA</u>
   a. No updates
2. <u>PyPSA-Earth</u>
   a. **Current novel features:**
      i. Runoff modelling fixed for alternative clustering
      ii. Configuration versioning: now when repository is update but the config file is not, an error is thrown
      iii. Soon new release
   b. **Regional modelling studies:**
      i. Ongoing worth in modelling Eastern Power Pool; improvements needed for installed capacity but fully functional model that works. Need to adjust few inputs
   c. **Call for Earth!** We aim to have a validated global modal the sooner the possible and we only do that with you!
      Who's willing to take part?
      i. We can have a draft global model in weeks, but validation is essential -> continent-wise validation is ongoing
      ii. To have impact, we need to work together towards it. Who is available?
         Needs:
         1. Some spare time to run models to test 2050 Earth
         2. Support to validate generators, network and demand
         3. Join for usability improvements
         4. Support for bug-fixing is necessary for issues that will appear along the way.

3. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>
   a. Added myopic optimisation 🎉(a demo notebook is available in the documentation)

  b. Included scenario management

  c. Bug-fixing and clean-up

  d. Preparation for the merge is ongoing

    i. New release soon with current system

    ii. Then we integrate the support of the latest pypsa

    iii. New release and then the merge

4. <u>PyPSA-Distribution</u>

  a. Work ongoing to improve stability

  b. Advancement of demand modelling

  c. Usability and results are more realistic

  d. New notebooks added to investigate the results

5. <u>Network comparison</u>

  a. No updates

6. <u>earth-osm (Matin)</u>

  a. No updates

7. <u>Powerplantmatching</u>

  a. No updates

8. <u>Atlite</u>

  a. Release v0.2.13 is out:

    i. Compatibility with the updated SARAH3 solar irradiation dataset

    ii. Adds fetching the dew point temperature from ERA5 data

    iii. Provide time-series for capacity factors at each grid cell

    iv. Enable tracking argument for cutout.irradiation( ) function

    v. Bug fixing

9. <u>Linopy</u>

  a. New releases v0.3.12 & v0.3.13 are out!

    i. Add support of "warm start" for HiGHS solver – an option to use solved models

    ii. Improvements on usability and reliability

    iii. Bug fixing

  b. Future of linopy: https://github.com/PyPSA/linopy/issues/207

  c. It should be more oriented with pandas logic, but not so easy

💬 Discussion Topics

- Katia. When working in the update of PyPSA version. When tried to add v_nom into aggregation strategy, it changes the objective value.
Davide: Need to check it

- Yerbol. Accessibility of hydrobasins requires VPN in some regions. This encourages the use of open-source data for hydrobasins from Potsnam institute that have a CC alternative; it requires processing and comparison with hydrobasins.

- Virio. How does it work for creating a reserve model in pypsa-earth/-eur. The model has isolated networks; current solution to have a gas powerplant as reserve

#133 Monthly General Code & Initiative Meeting

27.06.2024 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Attendance:

Agenda

🙌 General initiative updates (~10min)

5. **Focus on goals**
    a. <u>Grow the community</u> stronger and larger!
    b. <u>Make open-source the new norm</u> in energy modelling!
    c. <u>Grow the impact</u> of the tools!
    d. More into the specific subsections!
6. **Established streams developing**
    a. PyPSA-Hydro and Climate (every 2^d Fridays at 15:30 CET): Improving hydro modelling and introducing the climate impacts into energy system models
    b. PyPSA-Distribution (every 2^d Tuesday at 15:00 CET): Development of global energy system model at distribution scale for any place in the world, considering both power and heating/cooling supply.
    c. Network-comparison stream coordinated by Jess
    -> interesting paper idea on comparison and validation of EU network data

    Help wanted both with code, modeling and data analysis. Feel free to reach out for coordination!
7. New members!
    a.

<u>Papers:</u>
-

<u>Conferences:</u>
-

<u>Education:</u>

-

📣 Code and Data updates

Introducing and discussing new features.

10. <u>PyPSA</u>
    a. No updates
11. <u>PyPSA-Earth</u>
    a. **Current novel features:**
        i.
    b. **Regional modelling studies:**
        i.
    c. **Call for Earth!** We aim to have a validated global modal the sooner the possible and we only do that with you!
       Who's willing to take part?
        i. We can have a draft global model in weeks, but validation is essential -> continent-wise validation is ongoing
        ii. To have impact, we need to work together towards it. Who is available?
            Needs:
            1. Some spare time to run models to test 2050 Earth
            2. Support to validate generators, network and demand
            3. Join for usability improvements
            4. Support for bug-fixing is necessary for issues that will appear along the way.

12. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>
    a.
13. <u>PyPSA-Distribution</u> [thanks @Margherita!!]
    a.
14. <u>Network comparison</u>
    a.
15. <u>earth-osm (Matin)</u>
    a.
16. <u>Powerplantmatching</u>
    a.
17. <u>Atlite</u>
    a.
18. <u>Linopy</u>
    a.

💬 Discussion Topics

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#133 Monthly General Code & Initiative Meeting

27.06.2024 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Attendance: Sermisha, Emmanuel, Virio, Katia, Yerbol, Davide, Margherita

Agenda

🙌 General initiative updates (~10min)

8. **Focus on goals**
   a. <u>Grow the community</u> stronger and larger!
   b. <u>Make open-source the new norm</u> in energy modelling!
   c. <u>Grow the impact</u> of the tools!
   d. More into the specific subsections!
9. **Established streams developing**
   a. PyPSA-Hydro and Climate (every 2^d Fridays at 15:30 CET):
      Improving hydro modelling and introducing the climate impacts into energy system models
   b. PyPSA-Distribution (every 2^d Tuesday at 15:00 CET):
      Development of global energy system model at distribution scale for any place in the world, considering both power and heating/cooling supply.
   c. Network-comparison stream coordinated by Jess
      -> interesting paper idea on comparison and validation of EU network data

   Help wanted both with code, modeling and data analysis. Feel free to reach out for coordination!
10. New members!
    a. Margherita. From Elba island in Italy, doing MSc in Energy Engineering in Pisa. Doing thesis on pypsa-distribution
11. Our DISCORD exceeded 1000 members!!!

<u>Papers:</u>

●

<u>Conferences:</u>

● Recordings are available from the second PyPSA User conference
  https://forum.openmod.org/t/2nd-pypsa-user-meeting-on-may-27-2024-3-pm-6-pm-cest/4675

<u>Education:</u>

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📣 Code and Data updates

Introducing and discussing new features.

19. PyPSA
   a. No updates
20. PyPSA-Earth
   a. **Current novel features:**
      i. Implemented a model for concentrated solar power [thanks @Emmanuel]
      ii. Usability improvements [thanks @Anton and @Fabrizio]
      iii. Added a demand linker: custom demand profiles can be now used as csv files
      iv. Soon support for latest version of PyPSA and linopy
   b. **Regional modelling studies:**
      i. All continents are functional!
      ii. Maintenance update for Kazakhstan data repository [thanks @Yerbol]
      iii. Korea University has introduced PyPSA-Earth for power systems modeling for Republic of Korea [thanks @rogerkwak]
   c. **Call for Earth!** We aim to have a validated global modal the sooner the possible and we only do that with you!
      Who's willing to take part?
      i. We can have a draft global model in weeks, but validation is essential -> continent-wise validation is ongoing
      ii. To have impact, we need to work together towards it. Who is available?
         Needs:
         1. Some spare time to run models to test 2050 Earth
         2. Support to validate generators, network and demand
         3. Join for usability improvements
         4. Support for bug-fixing is necessary for issues that will appear along the way.

21. PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)
   a. Merge is getting closer! Expected in the next month or so
      i. Enable seamless merge
      ii. 1-2 weeks are needed to finalise the projects
      iii. Usability improvements and bug fixing [thanks @Eddy, @Fabrizio and @Anton]
      iv. Workflow fixed to run for Africa [thanks @Davide]

> v. Introducing the latest PyPSA version and linopy for better interfacing with the solver

b. Ongoing validation of sector-coupled data for various countries worldwide

c. Soon support extended for multiple countries; continents included

22. PyPSA-Distribution [thanks @Margherita!!]

a. Improving methodology to estimate a power demand profile using OpenStreetMap data on buildings and RAMP.
Code is working 😃 Currently implementing a better methodology to estimate the demand (or RAMP inputs) based on the OSM data

b. Added demo-notebooks to investigate results of building clustering

23. Network comparison

a. Steadily making progress

> i. Graph comparison

b. Ready for EU comparison

24. earth-osm (Matin)

a. No updates

25. Powerplantmatching

a. No updates

26. Atlite

a. No updates

27. Linopy

a. New version v0.3.11 is released

b. Bugfixing and usability improvements:

> i. fixed behaviour of a sum on linear expressions
> ii. added an automated detection for a version of some dependency
> iii. improved import/export from nc files

💬 Discussion Topics

- Virio. PyPSA-Distribution: does it aim to replace the methodology to estimate demand? It aims to provide an alternative using bottom-up tools that based on devices can estimate the profile. Synergies between pypsa-earth and -distribution are envisioned
- Sermisha & Katia. GEGIS seems to lead to problems and outdated data. Difficult to find general simple fixes. Don't worry if challenges are found
- Davide. The contribution about subregions by Virio is very interesting and amazing! Virio: implemented a new draft version for addressing SouthEast Asia.

#132 Monthly General Code & Initiative Meeting

23.05.2024 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance: Fabrizio, Davide, Katia, Virio, Yerbol, Sermisha, metab, mwiche, Bryan

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Agenda

🙌 General initiative updates (~10min)

1. **Focus on goals**
   a. Grow the community stronger and larger!
   b. Make open-source the new norm in energy modelling!
   c. Grow the impact of the tools!
   d. More into the specific subsections!
2. **Established streams developing**
   a. PyPSA-Hydro and Climate (every 2 Fridays at 15:30 CET):
      Improving hydro modelling and introducing the climate impacts into energy system models
   b. PyPSA-Distribution (every 2 Tuesday at 15:00 CET):
      Development of global energy system model at distribution scale for any place in the world, considering both power and heating/cooling supply.
   c. Network-comparison stream coordinated by Jess
      -> interesting paper idea on comparison and validation of EU network data

   Help wanted both with code, modeling and data analysis. Feel free to reach out for coordination!
3. New members!
   a.
4. Our DISCORD exceeded 1000 members!!!

Papers:
- [An extension of the SEST2023 paper has been finalized](#) and submitted
  Summarizes results for country-wise analysis and it shows that the model can be successfully executed for any country and continent worldwide.
- Preprint online about effect of temporal hydrogen regulation for Morocco (Lead by Leon)
  http://dx.doi.org/10.21203/rs.3.rs-4285425/v1
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- Second PyPSA User conference is announced (next Monday 27th May 3–6PM EU time)
  https://forum.openmod.org/t/2nd-pypsa-user-meeting-on-may-27-2024-3-pm-6-pm-cest/4675
  Especially work-in-progress is of interest
  Only online, in the European afternoon; lighting talks 8min + 3min discussion,
  book your slot! 🙂
  - Carlos will be representing PyPSA meets Earth!
  - Marta will present the synergies between OET and PyPSA ecosystem

Education:

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📢 Code and Data updates

Introducing and discussing new features.

28. PyPSA
    a. New version v0.28!
        i. Improved statistics module to offer better insights of the network
        ii. Support for post-discretization of network results to round values to integers
        iii. Implementation to add networks (by Jess from PyPSA meets Earth)
29. PyPSA-Earth
    a. **Current novel features:**
        i. Soon support for latest version of PyPSA and linopy
        ii. Better options to customise demand by country [thanks @Virio]
        iii. Improved usability and less deprecations [thanks @Fabrizio]
    b. **Regional modelling studies:**
        i. All continents are functional!
        ii. South African Power Pool has been tested [thanks Stuart] ->
        iii. PyPSA-Earth application for Republic of Korea [thanks @ rogerkwak for sharing]
    c. **Call for Earth!** We aim to have a validated global modal the sooner the possible and we only do that with you!
       Who's willing to take part?
        i. We can have a draft global model in weeks, but validation is essential -> continent-wise validation is ongoing
        ii. To have impact, we need to work together towards it. Who is available?
            Needs:
            1. Some spare time to run models to test 2050 Earth
            2. Support to validate generators, network and demand
            3. Join for usability improvements

4. Support for bug-fixing is necessary for issues that will appear along the way.

30. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>
    a. Merge is getting closer! Expected in the next 1-3 months:
        i. Enable seamless merge
        ii. 1-2 weeks are needed to finalize the projects
    b. Ongoing validation of sector-coupled data for various countries worldwide
    c. Soon support extended for multiple countries; continents included
    d. Enhanced custom industry data
    e. Brainstorming about what to expect from the merge; Fabrizio looked into that and nothing catastrophic should happen, but we need to be careful on how to use the tools
31. <u>PyPSA-Distribution</u>
    a. Improved documentation
    b. Automated procedure to generate default profiles by user types
    c. Automatic data download for buildings of any region
32. <u>Network comparison</u>
    a. Steadily making progress
        i. Graph comparison
    b. Ready for EU comparison
33. <u>earth-osm (Matin)</u>
    a. No updates
34. <u>Powerplantmatching</u>
    a. New versions (v0.5.13-15)
        i. Updated datasets (IRENASTAT, JRC hydro)
        ii. Fix hydropower error for GB
35. <u>Atlite</u>
    a. No updates
36. <u>Linopy</u>
    a. New version!
    b. Fix for memory leaks
    c. Support for MOSEK
    d. Expressions in rhs of add_constraints

💬 Discussion Topics

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#131 Monthly General Code & Initiative Meeting

25.04.2024 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance: Fabrizio, Hazem, Katia, Davide, Sermisha, Fabrizio, Max

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Agenda

🙌 General initiative updates (~10min)

5. **Focus on goals**
   a. Grow the community stronger and larger!
   b. Make open-source the new norm in energy modelling!
   c. Grow the impact of the tools!
   d. More into the specific subsections!
6. **Established streams developing**
   a. PyPSA-Hydro and Climate (every 2 Fridays at 15:30 CET):
      Improving hydro modelling and introducing the climate impacts into energy system models
   b. PyPSA-Distribution (every 2 Tuesday at 15:00 CET):
      Development of global energy system model at distribution scale for any place in the world, considering both power and heating/cooling supply.
   c. Network-comparison stream coordinated by Jess
      -> interesting paper idea on comparison and validation of EU network data

   Help wanted both with code, modeling and data analysis. Feel free to reach out for coordination!
7. New members!
   a. Fabrizio! New employee of OET passioned of energy modelling and working in the initiative. Did a PhD in astrophysics and moved across different fields and contacted OET
8. Outreach team is back online

Papers:

- [An extension of the SEST2023 paper will be finalized soon](#)
  Summarizes results for country-wise analysis and the idea is to show that the model can be successfully executed for any country and continent worldwide. Our CI tests the model for a subset, but we underperform in terms of model application: we can do whatever region and also additional features.

- Idea: prepare a paper that details a methodology for network comparison and application to Europe.
- Call for help! Anybody interested in contributing to Africa and Earth modelling? Please, reach out!

Conferences:
- Second PyPSA User conference is announced https://forum.openmod.org/t/2nd-pypsa-user-meeting-on-may-27-2024-3-pm-6-pm-cest/4675
  Especially work-in-progress is of interest
  Only online, in the European afternoon; lighting talks 8min + 3min discussion, **book your slot!** 😀
  - 1 presentation on the initiative itself
  - ... as much as we want on the content ...

Education:
- Added an outreach stream focused on introducing the basics of PyPSA modeling
- A lot of in-depth discussions in the Support channel! (thanks to all the contributors) Let's coordinate on that? :)

📣 Code and Data updates

Introducing and discussing new features.
37. PyPSA
    a. Bug fixing
38. PyPSA-Earth
    a. **Current novel features:**
        i. Improved representation of different voltage levels in OSM-extracted networks
        ii. CSP integration is being finalised [Thanks @Emmanuel]
        iii. Advanced a toolkit to fix topology issues for OSM-extracted grids
        iv. Re-testing the global scale for performance and accuracy evaluations
    b. **Regional modelling studies:**
        i. Ongoing modeling for China [thanks @CUIJING]
        ii. Validation and testing for any country on Earth (soon paper will be submitted)
        iii. ... Your model? :)
    c. **Call for Earth!** We aim to have a validated global modal the sooner the possible and we only do that with you!
        Who's willing to take part?
        i. We can have a draft global model in weeks, but validation is essential -> continent-wise validation is ongoing

       ii.   To have impact, we need to work together towards it. Who is available?

          Needs:

          1.   Some spare time to run models to test 2050 Earth
          2.   Support to validate generators, network and demand
          3.   Join for usability improvements
          4.   Support for bug-fixing is necessary for issues that will appear along the way.

39. PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)

    New features:
    a. Hydrogen colours now separable
        i. Policies for H2 mix is now applicable
    b. Integrating Geothermal on Africa level
        i. Dataset fetching still ongoing
    c. Merge:
        i. Enable seamless merge
        ii. 1-2 weeks are needed to finalize the projects
        iii. Have some time for the merge; Leon needs to be onboard (he will be back on May 15 more or less)

40. PyPSA-Distribution
    a. Advanced documentation [thanks Margherita!]
    b. Automatic download of building data soon implemented

41. Network comparison
    a. Steadily making progress
        i. Graph comparison
    b. Ready for EU comparison

42. earth-osm (Matin)
    a. No updates

43. Powerplantmatching
    a. A new release v0.5.12 contains a fix for a known issue in Global Energy Monitor database, where some powerplants with status "Cancelled" or alike are not discarded
    https://github.com/PyPSA/powerplantmatching/pull/154 (improves data on the installed capacity, especially for coal power plants)

44. Atlite
    a. No updates

45. Linopy
    a. Memory leak (memory spikes x2 or x3 for short periods) for myopic problems

💬 Discussion Topics

- PyPSA User meeting; who is interested:
    - Carlos
    - Katia?
    - Davide?
- Environment:
    - 3 env files

#130 Monthly General Code & Initiative Meeting

25.03.2024 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance: Yerbol, Emmanuel, Davide, Katia, Alex, Swaechchha

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Agenda

🙌 General initiative updates (~10min)

9. **Focus on goals**
   a. <u>Grow the community</u> stronger and larger!
   b. <u>Make open-source the new norm</u> in energy modelling!
   c. <u>Grow the impact</u> of the tools!
   d. More into the specific subsections!
10. **New streams launched**
    a. Continental Study for South America coordinated by Carlos
    b. Crowd-sourced Energy Planning for Africa
    c. Network-comparison stream that is moving forward coordinated by Jess
    Help wanted both with code, modeling and data analysis. Feel free to reach out for coordination!
11. **Established streams developing**
    a. PyPSA-Hydro and Climate (every 2 Fridays at 15:30 CET):
       Improving hydro modelling and introducing the climate impacts into energy system models
    b. PyPSA-Distribution (every 2 Tuesday at 15:00 CET):
       Development of global energy system model at distribution scale for any place in the world, considering both power and heating/cooling supply.
    c.
12. New members!
    a. Alex. Working in energy modelling at Obio based in Switzerland working with district heating. Interested in PyPSA. Usually work as a SAS and consultant. Identifying roofs and generate new infrastructure; currently focusing on heat

<u>Papers:</u>
- Preprint on PyPSA-Earth-Sec is out
  http://dx.doi.org/10.2139/ssrn.4743242
- <u>An extension of the SEST2023 paper will be finalized soon</u>

- Call for help! Anybody interested in contributing to Africa and Earth modelling? Please, reach out!

Conferences:
- OpenMod Workshop 26–28 March, Grenoble organised by CRESYM and OTE Lab of Université Grenoble Alpes. Recordings will be available for the talks and more! https://forum.openmod.org/t/grenoble-workshop-2024-registration-and-details/4350
- CONFAP-ITALY 2023: opportunity for Brazil (MScs,) PhDs and post-docs to visit Italy; PyPSA has 2 topics there

📢 Code and Data updates

Introducing and discussing new features.

46. PyPSA
    a. **Release v0.27.1** is out:
        i. bug-fixing for MGA and multi-horizon optimizations;
        ii. Stability improvements;
        iii. performance advancement.
47. PyPSA-Earth
    a. **Current novel features:**
        i. The tutorial documentation is re-built completely to address the most pressing usability issue [many thanks to @Yerbol for leading this work and all the supporters who shared the feedback! ❣️]
        ii. Bug-fixing for global applicability and improved accuracy
        iii. CSP integration is ongoing! [Great job @Emmanuel]
        iv. Re-testing the global scale for performance and accuracy evaluations
        v. Improved accuracy of network capacity [Thanks @Katia] and usability with sector-coupled model
    b. **Regional modelling studies:**
        i. energy systems model for Nepal [hydropower is critical; hydro validation is interesting];
        ii. renewable resource assessment for Malaysia;
        iii. power system model for Korea;
            Do we miss anything? Feel free to reach out!
    c. **Call for Earth!** We aim to have a validated global modal the sooner the possible and we only do that with you!
        Who's willing to take part?
        i. We can have a draft global model in weeks, but validation is essential
        ii. To have impact, we need to work together towards it. Who is available?
            Needs:

1. Some spare time to run models to test 2050 Earth
2. Support to validate generators, network and demand
3. Join for usability improvements
4. Support for bug-fixing is necessary for issues that will appear along the way.

48. PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)
    a. Preprint is out!
    b. Ongoing testing of the functionality of the model for Africa as a whole
    c. Documentation has improved! (README updated with new schematic)
49. earth-osm (Matin)
    a. New version released!
    b. Buildings fully supported
50. Powerplantmatching
    a. Known issue in Global Energy Monitor database: some powerplants with status "Cancelled" or alike are not discarded
       PR will soon fix the issue:
       https://github.com/PyPSA/powerplantmatching/pull/154
51. Atlite
    a. No updates
52. Linopy
    a. **New release** (v0.3.8): bugfixing, improved stability, enhanced functionality to assess variables and constraints, added an interface to Mosek solver, added support of new math operators

💬 Discussion Topics

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#129 Monthly General Code & Initiative Meeting

22.02.2024 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance: Abdul, Emmanuel, Julius, Alan, Katia, Benjamin, Yerbol, Carlos, Sid, Martha

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Agenda

🙌 General initiative updates (~10min)

13. **Focus on goals**
    a. <u>Grow the community</u> stronger and larger!
    b. <u>Make open-source the new norm</u> in energy modelling!
    c. <u>Grow the impact</u> of the tools!
    d. More into the specific subsections!
14. **New streams launched**
    a. Continental Study for South America coordinated by Carlos
    b. Crowd-sourced Energy Planning for Africa
    Help wanted both with code, modeling and data analysis. Feel free to reach out for coordination!
15. **Established streams developing**
    a. PyPSA-Hydro and Climate (every 2 fridays at 15:30 CET):
       Stream focusing on hydro modelling and the climate impacts into energy system
    b. PyPSA-Distribution (every 2 wednesday at 10:00 CET):

<u>Papers:</u>
- Preprint on PyPSA-Earth-Sec soon will be out
- Submission to SEST 2024 conference on the topic of synthetic grids (PyPSA-Distribution)
- Call for help! Anybody interested in contributing for an Africa and Earth modelling? Please, reach out!

<u>Conferences:</u>
- FOSDEM 2024 was great (recordings are available): open source is a de facto standard in most areas of software development. Work ongoing for energy: Energy Dev Room: Reimagining this Ecosystem through Open Source devroom https://fosdem.org/2024/schedule/track/energy/ PyPSA-Earth has been presented, and received very warm feedback.

- 18.02 Max talks in Jharkhand biggest coal region India's.
  - PyPSA is big in India & will grow substantially. PyPSA-Earth is slowly getting adopted
- Macro Energy Systems June 6-7 at Princeton. Some folks should go. https://twitter.com/JesseJenkins/status/1749609144087404760
- Carlos Presentation on PyPSA-Earth applied to Bolivia in SDEWES in Chile. People were interested in working on country-level analyses and some were climate-related topics [Colombia or Brazil]
- CONFAP-ITALY 2023: opportunity for Brazil (MScs,) PhDs and post-docs to visit Italy; PyPSA has 2 topics there

📢 Code and Data updates

Introducing and discussing new features.

53. PyPSA
    a. Release v0.27 is out; improved representation of pathway optimisation and bugfixes
    b. Last year v0.24+ linopy integration is mainstream that provides strong mathematical features and an interesting new feature is the direct integration with the solver
54. PyPSA-Earth
    a. **2024 New year, New goals!**
        i. Model Earth as a whole: Version 1.0
        ii. Merge the PyPSA-Earth-Sec and PyPSA-Earth
        iii. Who wants to embark in modelling and testing each country?
        iv. What's yours?:
            1. Carlos: model south america
            2. Max: No bugs!
            3. Davide: Climate - energy study with PyPSA
            4. Katia: Make starting with energy modelling easy
    b. **Current novel features:**
        i. ReadTheDocs is back and in better shape! [thanks Emmanuel!]
        ii. Documentation is improving! [thanks Yerbol!]
        iii. Continental-scale modelling is now possible
        iv. Ongoing activities on verifying network topology and how open data can reproduce verified data by institutions [thanks Jess!]
    c. **Call for Earth!** We aim to have a validated global modal the sooner the possible and we only do that with you!
    Who's willing to take part?
        i. We can have a draft global model in weeks, but validation is essential

ii. To have impact, we need to work together towards it. Who is available?

  Needs:
  1. Some spare time to run models to test 2050 Earth
  2. Support to validate generators, network and demand
  3. Join for usability improvements
  4. Support for bug-fixing is necessary for issues that will appear along the way.

55. PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)
    a. Pushing for supporting the entire Africa!
    b. Ongoing plans to merge the model with PyPSA-Earth by mid 2024
    c. The first -sec paper has passed the internal review at Fraunhofer and soon a preprint will be out!
       https://github.com/pypsa-meets-earth/pypsa-earth-sec/pulls

56. earth-osm (Matin)
    a. No updates

57. Powerplantmatching
    a. Known issue in Global Energy Monitor database: some powerplants with status "Cancelled" or alike are not discarded
    b. No updates

58. Atlite
    a. No updates

59. Linopy
    a. New release (v0.3.4), improved handling of quadratic optimisation problems by different solvers

💬 Discussion Topics

- [Julius] Graduated recently and is interested in modeling of Argentina
- [Carlos] That is perfectly realistic to improve representation of a power system, the interfaces are available. The most tricky part is to get data, but that is doable, too!
- [Alan] Is working to find optimal injection points for renewable power, in particular for Argentine: https://www.renewableenergy.place/
- [Sid] Has worked with TIMES before, and joined to PyPSA community recently.
- [Benjamin] Developer of an open source app for live visualisation of generation in UK grid https://github.com/kilowatts-io/kilowatts-grid

#128 Monthly General Code & Initiative Meeting

25.01.2024 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance: Emmanuel, Julius, Davide, Yerbol, Julius, Abdul, Jess, Carlos, Akshat, Matin

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Agenda

🙌 General initiative updates (~10min)

1. **2023 has been great!**:
   a. <u>Community</u> exceeded 800 people (discord) and 160 stars (github)
   b. <u>2+ new streams</u> created:
      i. PyPSA-Hydro and Climate (every 2 fridays at 15:30 CET): Stream focusing on hydro modelling and the climate impacts into energy system
      ii. PyPSA-Distribution (every 2 wednesday at 10:00 CET): Stream focusing on developing a distribution-scale model for city-scale applications
   c. <u>3+ research papers</u> out
   d. <u>5+ projects</u> have used our tools
2. **2024 New Year, New goals!**
   a. <u>Grow the community</u> stronger and larger!
   b. <u>Make open-source the new norm</u> in energy modelling!
   c. <u>Grow the impact</u> of the tools!
   d. More into the specific subsections!

<u>Papers:</u>
-

<u>Conferences:</u>
- FOSDEM 2024, Energy: Reimagining this Ecosystem through Open Source devroom – 3-4 February
  https://fosdem.org/2024/schedule/
  Katia's talk:
  https://fosdem.org/2024/schedule/event/fosdem-2024-2614-can-open-source-development-drive-energy-transition-pypsa-earth-experience/
- 18.02 Max talks in Jharkhand biggest coal region India's.
  - PyPSA is big in India & will grow substantially. PyPSA-Earth is slowly getting adopted

- Macro Energy Systems June 6-7 at Princeton. Some folks should go. https://twitter.com/JesseJenkins/status/1749609144087404760
- Carlos Presentation on PyPSA-Earth applied to Bolivia in SDEWES in Chile. People were interested in working on country-level analyses and some were climate-related topics [Colombia or Brazil]
- CONFAP-ITALY 2023: opportunity for Brazil (MScs,) PhDs and post-docs to visit Italy; PyPSA has 2 topics there

📢 Code and Data updates

Introducing and discussing new features.

60. PyPSA
    a. New version out v0.26.2; minor bugfixing for StorageUnits
    b. Discussion on having delayed Links to support delays
    c. Last year v0.24+ linopy integration is mainstream that provides strong mathematical features and an interesting new feature is the direct integration with the solver
61. PyPSA-Earth
    a. **2024 New year, New goals!**
        i. Model Earth as a whole: Version 1.0
        ii. Merge the PyPSA-Earth-Sec and PyPSA-Earth
        iii. Who wants to embark in modelling and testing each country?
        iv. What's yours?:
            1. Carlos: model south america
            2. Max: No bugs!
            3. Davide: Climate - energy study with PyPSA
            4. Katia: Make starting with energy modelling easy
    b. **Current novel features:**
        i. Continental-scale modelling is now possible
        ii. Validation is ongoing for a number of practical-related problems around the world
        iii. Monte-Carlo implementation is close to being finalized [thanks Emmanuel!]
        iv. Usability improvements [thanks Yerbol!]
        v. Ongoing Network validation to verify how open data can reproduce verified data by institutions
    c. **Call for Earth!** We aim to have a validated global modal the sooner the possible and we only do that with you!
       Who's willing to take part?
        i. We can have a draft global model in weeks, but validation is essential

ii. To have impact, we need to work together towards it. Who is available?
Needs:
1. Some spare time to run models to test 2050 Earth
2. Support to validate generators, network and demand
3. Join for usability improvements
4. Support for bug-fixing is necessary for issues that will appear along the way.

62. PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)
    a. PyPSA-Earth-Sec is in great shape for a fantastic 2024!
    b. Finalizing the new version soon!
    c. A paper is under internal review at Fraunhofer and soon
       The first pypsa-earth-sec paper will be out!
       https://github.com/pypsa-meets-earth/pypsa-earth-sec/pulls
63. earth-osm (Matin)
    a. New version v0.1.0 supporting buildings!
    b. New sub-releases coming soon!
64. Powerplantmatching
    a. New version released (0.5.9), minor bug fixing
65. Atlite
    a. No updates
66. Linopy
    a.

💬 Discussion Topics

- Carlos, willing to jump into the South America; lots of data needs to be validated and willing to coordinate for that.

#127 Monthly General Code & Initiative Meeting

21.12.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance: Tosin, Haiping, Max, Albert, Carlos, Yerbol, Katia, Emmanuel, Swaechchha, Davide

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Agenda

🙌 General initiative updates (~10min)

3. **New members!**
   Haiping (NTNU) working on a research which joining energy systems modeling and climate
4. **A big PyPSA US tour has been a success!**
   a. PyPSA-US is working well to promote PyPSA. Merging may be considered as a way to go
   b. OpenMod workshop: recordings are about to be shared. Great exchange with groups developing other energy systems model (SWITCH, TEMOA). There are other focuses: production instead of expansion planning
   c. Sup3r NREL project: reanalys downscaling
5. **FOSDEM:** PyPSA-Eath proposal has been accepted for presentation in the section "Energy: Reimagining this Ecosystem through Open Source" ❤️ (3-4 February, Brussels, Belgium, Europe, Earth) https://fosdem.org/2024/
6. **PyPSA-Distribution**: established and running.
   a. Goals: local-scale sector-coupled energy modelling for microgrids, cities and local communities at distribution-building level
   b. Easy preparation of the inputs thanks to improvements in OSM processing
   c. Regular meetings: time is being adjusted for the next year. Feel free to reach out if interested!
7. **PyPSA-Hydro and Climate:**
   a. Light-weight approach to integrate the climate change inputs
   b. Hydro validation ongoing
   c. A research and development plan aligned with a state-of-the-art bigger picture of climate-energy research.
   d. Any interest in educational materials? 🙃
8. **PyPSA-Earth & PyPSA-Earth-Sec**:
   a. PyPSA-Earth: ready for continental modeling!

b. PyPSA-Earth-Sec: finishing a cross-sectoral model applicable to model any country of the world.

c. There has been a new Snakemake release! [Swaechchha] There is a chain of errors in PyPSA-Eur.

New projects:

9.

Papers:

●

Conferences:

●

📣 Code and Data updates

Introducing and discussing new features.

67. PyPSA
   a. Stand-by costs are now included correctly into the simulation
      https://github.com/PyPSA/PyPSA/pull/793
   b. Fixes and minor improvements
   c. Geographic scope increased!

68. PyPSA-Earth
   a. Stable data bundles.
   b. Working to make model set-up more accessible [thanks Yerbol!]
   c. Implementing enhanced Monte-Carlo functionality to account for deep uncertainties in a physically reasonable way [thanks Emmanuel!] Emmanuel: working on a case-study for Nigeria.
   d. Support of continental-scale modeling. Release is scheduled in the nearest future.
   e. Next step: **call for Earth**! We aim to having a validated global model the sooner the possible and we only do that with you! Tasks on hand:
      i. Run [continental-scale] models to test 2050 Earth;
      ii. Improve demand modeling;
      iii. Generate a cutout for Oceania;
      iv. Support validation of generators, network and dispatch;
      v. Join bug-fixing, when the issues that will appear along the way.

69. PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)
   a. Intensive bug-fixing.
   b. Massive improvements for detailed representation of carbon-intensive industry world-wide.

70. earth-osm (Matin)
   a. Release 0.2 is out 🎉

71. Powerplantmatching
    a.
72. Atlite
    a. No updates

💬 Discussion Topics

[Haiping] Does CO2 emission in constraints relate to power only? – [Katia] That is power only for PyPSA-Earth, but accounts also for other sections for PyPSA-Earth-Sec

#126 Monthly General Code & Initiative Meeting

23.11.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance: Maria, Nora, Martha, Davide, Max, Katia, Emmanuel

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Agenda

🙌 General initiative updates (~10min)

10. **New members!**
    a. Mari & Nora! Students in optimization (Operation Research) from Norway working for a Bolivian company. Supervisor Pedro cooperating with them.
11. **OpenMod workshop in San Francisco was held on Monday 13 – Tuesday 14.11.23 and was a great success!**
    https://forum.openmod.org/t/openmod-meets-usa-2023/4148/4 (format was great!)
    a. Recordings are still being processed
    b. Next openmod in Grenoble (26-28 March 2024)
    https://forum.openmod.org/t/grenoble-workshop-planning-26-28-march-2024/4277
    c. Exchanges with Julia-based model for market modelling (PCM), as well tools for dynamics.
    Note: combining planning, short-term dispatch and dynamics is important to compete with commercial tools
    d. PyPSA is getting momentum, but in US there is more diversified (TEMOA, Switch, GenX once, PyPSA-US)
12. **PyPSA-Distribution:** established and running every two weeks meeting on Friday at 5PM CEST!
    a. Goals: local-scale sector-coupled energy modelling for microgrids, cities and local communities at distribution-building level
    b. Documentation available
    https://pypsa-distribution.readthedocs.io/
    c. CI back online
13. **PyPSA-Hydro and Climate:** goal is to bridge energy modeling with climate research . Updates:
    a. Warming effects can be now included into the cutout with a new climate projections script.

b. Approaches to hydro validation are being developed
c. Next step: account for the runoff changes linked with climate change.

Meeting every second <u>Friday at 3:30pm CEST</u>.

14. **PyPSA-Earth & PyPSA-Earth-Sec:**
a. Release of fully reproducible 193+ power systems images created with PyPSA-Earth for all UN countries
https://zenodo.org/records/10080766
Linkedin post:
https://www.linkedin.com/posts/davide-fioriti-745693a5_opendata-opensource-pypsa-activity-7127905084763488256-aF2V
b. Finishing up a global scale model!

<u>New projects:</u>

15. None

<u>Papers:</u>

● Lot's of ideas! Who is interested in leading one of them?
Es. storage studies, technology options, large-scale energy modelling, climate effects and more!

<u>Conferences:</u>

●

<u>New members!</u>

●

📣 Code and Data updates

Introducing and discussing new features.

73. <u>PyPSA</u>
a. Geometries are now supported with geopandas backend!
PyPSA is a data structure to plot and do energy optimization, but plots were quite simple. Now the exact geometries of objects can be stored, so PyPSA is now a complete datastorage including geometries.
b. Modularity is now included! Integer capacity expansion is now merged!
https://github.com/PyPSA/PyPSA/pull/666
c.

74. <u>PyPSA-Earth</u>
a. **Current release v0.2.3** for the global coverage energy system model
i. Detailed representation of every country of the world
ii. Work ongoing to improve data management
b. Completed comparison of <u>ENTSO-E data with PyPSA-Earth</u>
[Thanks Emmanuel]
https://github.com/pypsa-meets-earth/documentation/pull/64

c. Ongoing work to improve documentation
   [Thanks Yerbol]
d. Ongoing work for improving the MonteCarlo analysis integrated in PyPSA-Earth, to estimate the effects of uncertainties of the parameters of the model
e. **Next targets!**
   i. Release **v0.3 (early december)** aims at validating the <u>workflow for every continent</u>
      -> requires volunteers willing to try out the model 😀
      -> <u>Missing cutout for Europe and Oceania</u>! Anyone interested?
      -> Ongoing <u>testing of continental models</u>! 👋
   ii. **Release v1.0 (second half december) aims at creating the Earth model**
      -> requires improvements of performances.
      -> we are addressing this issues and we have pending PRs partially covering this, volunteers are welcome 🚀

75. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>
    a. Improvements and bug-fixing for supporting every country.
76. <u>earth-osm (Matin)</u>
    a. Enabled download all data of a primary feature: now it's possible to extract data for all the buildings in the area of interest
77. <u>Powerplantmatching</u>
    a. No updates
78. <u>Atlite</u>
    a. No updates

💬 Discussion Topics

New tools:

#125 Monthly General Code & Initiative Meeting

26.10.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance: Emmanuel, Claudio, Yerbol, Stuart, Davide, Tommaso, Max, Matin, Carlos, Akshat, Katia, Thomas

Agenda

🙌 General initiative updates (~10min)

16. **We organise the next open energy modeling initiative (openmod) workshop in San Francisco on Monday 13 - Tuesday 14.11.23**. It would be fantastic if you could also join and share your insights and developments.
    https://forum.openmod.org/t/openmod-meets-usa-2023/4148/4
    a. [AGENDA](#) IS NOW FINALISED
    b. Next openmod in Grenoble (26-28 March 2024)
       https://forum.openmod.org/t/grenoble-workshop-planning-26-28-march-2024/4277
17. **PyPSA-Distribution:** established and running every two weeks meeting on Friday at 5PM CEST!
    a. Goals: local-scale sector-coupled energy modelling for microgrids, cities and local communities at distribution-building level
18. **PyPSA-Hydro and Climate:** coordinating efforts on better representation of climate in energy modelling. Meeting every second Friday at 3:30pm CEST. Work ongoing:
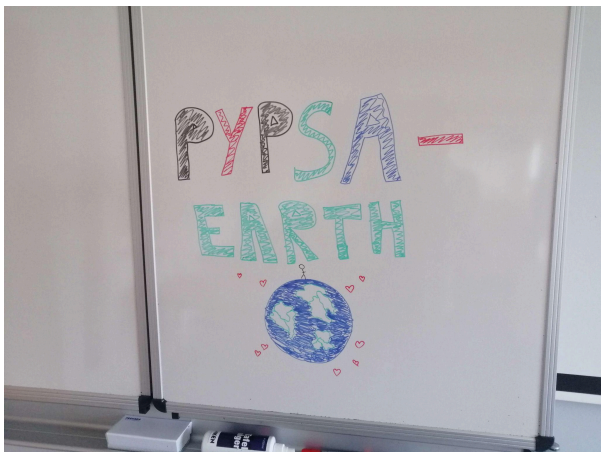   a. Validation of runoff and hydropower
    b. Implementation of climate change impacts: a prototype is functional
19. **PyPSA-Earth & PyPSA-Earth-Sec:**
    a. Finishing up a global scale model!
20. Appreciation by **Stuart's students**

New projects:
21. None

Papers:
- Lot's of ideas! Who is interested in leading one of them?
  Es. storage studies, technology options, large-scale energy modelling and more!

Conferences:

- [Max] Presenting on Energy Storage Global conference https://ease-storage.eu/
  - Storage community is in high-demand of energy system modelling with high spatial and temporal resolution
  - Open research opportunities in:
    - Assessing new storage technologies (globally -> Nature paper)
    - Assessing storage technologies with a sector coupled focus (store heat instead of electricity for thermal use)
    - Improved methodologies 4 flexibility assessments & policy studies
- [Katia] Presenting on European Climate and Energy Modelling Forum (ECEMF) https://www.ecemf.eu/ecemp/ecemp-2023/ , collaboration with Pablo. A prototype for forecasting climate parameters in high resolution. We are ready to look into the future 😀

New members!
- Claudio: MSc student in Rome, pursuing research in Canada on possible uses of VC, working on PyPSA. Found this problem interesting and interested to discover this world

📢 Code and Data updates

Introducing and discussing new features.

79. PyPSA
   a. Now support for geospatial components: PyPSA can store geometries for components! (Thanks Akshat!)
      https://github.com/PyPSA/PyPSA/pull/755
      i. Davide. Do buses store geometries as well? Quick answer: yes, but all geometries are stored into a separate component (shapes)
   b. Opportunity for great contribution -> PyPSA-Earth Issue:
      https://github.com/pypsa-meets-earth/pypsa-earth/issues/886
80. PyPSA-Earth
   a. **Released version v0.2.3** for the global coverage energy system model
      i. New official contributors (7!!!)!
      ii. Stable version for country-wise analysis: all UN countries are supported
      iii. Various bug fixing
      iv. Automatic emission targets downloaded
      v. Optionally add RES constraints
      vi. Automatic re-execution of the workflow when parameters change
      vii. … and more!

    b. Ongoing <u>validation efforts to compare ENTSO-E data with PyPSA-Earth</u> [Thanks Emmanuel]
       https://github.com/pypsa-meets-earth/documentation/pull/64

    c. **Next targets!**
       i. Release **v0.3** aims at validating the <u>workflow for every continent</u>
          -> requires volunteers willing to try out the model 😀
          -> <u>Missing cutout for Europe and Oceania</u>! Anyone interested?
          -> Ongoing <u>testing of continental models</u>! 👏
       ii. **Release v1.0 aims at creating the Earth model**
          -> requires improvements of performances.
          -> we are addressing this issues and we have pending PRs partially covering this, volunteers are welcome 🚀

81. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>
    a. A global demand workflow added
    b. A global industrial database added (and continuously improved)
    c. Model tested on 6 different countries for 2 different projects.

82. <u>earth-osm (Matin)</u>
    a. Focus on documentation ongoing
    b. Max. Hope OSM could replace the ENTSO-E data, but need for good quality check

83. <u>Powerplantmatching</u>
    a. No updates

84. <u>Atlite</u>
    a. Issues with chunks have been solved, auto-chunking has been enabled to potentially speed-up computations
       https://github.com/PyPSA/atlite/pull/328
       https://github.com/PyPSA/atlite/pull/326

💬 Discussion Topics

    New tools:

-

#124 Monthly General Code & Initiative Meeting

28.09.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance:

Agenda

🙌 General initiative updates (~10min)

22. **We are just organizing the next open energy modeling initiative (openmod) workshop in San Francisco on Monday 13 – Tuesday 14.11.23**. It would be fantastic if you could also join and share your insights and developments. https://forum.openmod.org/t/openmod-meets-usa-2023/4148/4
23. **PyPSA-Distribution:** established every two weeks meeting on Friday at 5PM CEST!
    a. Goals: local-scale sector-coupled energy modelling for microgrids, cities and local communities at distribution-building level
    b. Is it possible to model regional system e.g. only part of the country like Texas only?
        i. Davide. Yes for PyPSA distribution thats a goal. But PyPSA-Earth makes more sense for large state like Texas. There is an open PR addressing this
24. Max. A professor from Norway reached out and is keen to collaborate with his new PhD student that is working on Nepal & Indian grid modelling. I recommended to reach out to Davide

New projects:

25. None

Papers:

- Several PyPSA-Earth-Sec papers are in development
- Upscale on the power model is now covering every country in the world
- Carlos: will work soon on a nice paper!
    - Integrating new technologies: https://github.com/pypsa-meets-earth/pypsa-earth/pull/567
    - Great course on the whole ecosystem: https://github.com/fneum/data-science-for-esm

Conferences:

- SEST Conference @ Mugla, Turkiye went great!
Presented the Country-wise analysis of PyPSA-Earth on every country worldwide
Paper just went online today!
https://ieeexplore.ieee.org/document/10257559
- LF Open Source Summit insights:
  - World class developer attended (Also Linus Torvalds right hand on the kernel!)
  - Talking with LF Energy, PyPSA has a good name/reputation!
  - We could test: Sonar Cloud and Pydantic (issues are already open)

PyPSA-Earth-Sec
  - Question regarding the merge?
    - Is there a stable transfer? no

📢 Code and Data updates

Introducing and discussing new features.

85. PyPSA-Earth
   a. **Upcoming release v0.2.3** for the global coverage energy system model
      i. Stable version for country-wise analysis
      ii. Bug fixing
      iii. Automatic emission targets downloaded [Thanks Emre]
   b. **Finalization of PRs on computational time!**
   c. **Next targets!**
      i. Release **v0.3** aims at validating the workflow for every continent
      -> requires volunteers willing to try out the model 😀
      -> Missing cutout for Oceania! Anyone interested?
      -> Ongoing testing of continental models! 👋
      ii. **Release v1.0 aims at creating the Earth model**
      -> requires improvements of performances.
      -> we are addressing this issues and we have pending PRs partially covering this, volunteers are welcome 🚀

86. PyPSA
   a. CI was fixed by constraining pandas release
   b. Easing the pandas constraint currently in dev.
   https://github.com/PyPSA/PyPSA/pull/739
   c. Geopandas integration still in the making… Tests need to pass:
   https://github.com/PyPSA/PyPSA/pull/730
   d. Status on modularity/ non-continuous integer expansion PR ?
   https://github.com/PyPSA/PyPSA/pull/666
      i. There was also a question on Discord if it can be non-continuous expansion with 0 and continuous values from p_nom_min or larger. Possible?

87. PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)
    a.
88. earth-osm (Matin)
    a. Has finally a docs: https://pypsa-meets-earth.github.io/earth-osm/ (work in progress)
89. Powerplantmatching
    a. No updates
90. Atlite
    a. Power-curve cutout fix for wind:
    b. New data integration from CERRA in prototyping; https://github.com/PyPSA/atlite/pulls?q=is%3Apr+is%3Aclosed

💬 Discussion Topics

New tools:
- Geoparquet v.1.0 release is quite promisings: https://github.com/opengeospatial/geoparquet
- Could be applied for some of our data schemas? https://docs.pydantic.dev/latest/
- Yerbol & Neto work on documentation improvements:
    - Any news?
    - Discussed structure with installation, tutorial and advanced tutorial
    - Working on PR with pre-commit
- Emmanuel worked on network comparison. Status?
    - Compared ENTSOE data and OpenStreetMap data
    - Some countries deviate a lot -> Germany

#123 Monthly General Code & Initiative Meeting

24.08.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance: Anas, Albert, Anton, Carlos, Enrico, Katia, Max, Pablo, Stuart, Vincent LA,, Davide

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Agenda

🙌 General initiative updates (~10min)

26. **Max earned the PhD!!!!!!!**
27. **We are just organizing the next open energy modeling initiative (openmod) workshop in San Francisco on Monday 13 – Tuesday 14.11.23**. It would be fantastic if you could also join and share your insights and developments. https://forum.openmod.org/t/openmod-meets-usa-2023/4148/4
28. **PyPSA-Earth hydro-climate** modelling track is launched. There are compelling problems, brilliant ideas and a lot of space for development. Current priorities:
    a. global-scale validation of the PyPSA-Earth hydro simulation approach;
    b. improving docs on how hydropower is currently represented in PyPSA-Earth;
    c. integration of the climate projections into the modelling workflow.
    d. Tomorrow/ Friday will be a hydro meeting: 3:30 CEST
29. **PyPSA-Distribution:** first meeting went great! And follow-up coming! Interested? Feel the doodle below and send a message to Davide 🙂 https://www.when2meet.com/?20959573-g3ZL7
    a. Goals: local-scale sector-coupled energy modelling for microgrids, cities and local communities at distribution-building level

New projects:
30. Anton: PyPSA-Earth + PyPSA-Earth-Sec merge will happen early next year/ end of this year
31. Max & Co. (OET):
    a. New features will come this year: Concentrated Solar Power (CSP),
    b. Improvements will be added to current Monte-Carlo Method implementation
32. Davide & co: myopic optimization into PyPSA-Earth-Sec
33. Vincent (Climact): PyPSA-Eur - year independent profiles:
    a. Electricity baseload appliances & industry demand profiles

b. Use of Pathway Explorer for this demand predictions

<u>Papers:</u>
- Several PyPSA-Earth-Sec papers are in development
- Upscale on the power model is now covering every country in the world

<u>Conferences:</u>
- Davide will attend SEST conference in Mugla, Turkey, on 4-6 September. Anybody around? Let us know! 🙂
- Max: Going to OpenSource Summit to Bilbao, Spain – end of September https://events.linuxfoundation.org/open-source-summit-europe/about/sustainabilitycon/#registration-details

<u>PyPSA-Earth-Sec</u>
   ○

📢 Code and Data updates

Introducing and discussing new features.

91. <u>PyPSA-Earth</u>
a. **Upcoming release v0.2.3** for the global coverage energy system model
   i. Stable version for country-wise analysis
   ii. Improved modelling for offshore wind, hydro and other technologies
   iii. More stable version
b. **Improved cutouts coverage:** automatic and easy execution for any country in the world
   i. Africa (including islands)
   ii. South America (Thanks @Katherine Antonio)
   iii. North America (Thanks @Alex)
   iv. Asia (Thanks @Katia)
   v. Earth (optional - as it is 170Gb…)
c. **Soon extreme speed-up in computational time!** Recent developments are tracked algorithmic efficiency with improvements of up to 800x in some specific cases. Good contributions from to Matin & (Kevin?)
d. **New targets!**
   i. Release **v0.3** aims at validating the <u>workflow for every continent</u>
      -> requires volunteers willing to try out the model 😀
      -> new cutouts should be created; volunteers welcome for Asia and Oceania
   ii. **Release v1.0 aims at creating the Earth model**
      -> requires improvements of performances.
      -> we are addressing this issues and we have pending PRs partially covering this, volunteers are welcome 🚀
92. <u>PyPSA</u>
a. What about integer expansion from Enrico? https://github.com/PyPSA/PyPSA/pull/666

93. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>
    a. Substantial work on improving the quality and features in the sector-coupled model
    b. New open data sources are being coupled to support coverage
    c. The target is to publish a stable version v0.1
94. <u>earth-osm (Matin)</u>
    a. No updates
95. <u>Powerplantmatching</u>
    a. No updates
96. Atlite
    a. Couple of ongoing issues & PRs

💬 Discussion Topics

- Carlos status: Work on PR customised lines. Work on conference paper in Latin America in January using the Bolivia PyPSA model. Soft-linking between PyPSA and Dispatch model (Dispa-SET?) for validation.
- Vincent: with the explorer with can make predictions for several time horizons. We would like to do scenarios for multiple years. The model is bottom-up starting from consumer-type approaches and alike. Industry demand is important to estimate. Some shares of demand are endogenously set

#122 Monthly General Code & Initiative Meeting

27.07.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance:

Agenda

🙌 General initiative updates (~10min)

34. **Successful launch of "Open Energy Transition"** ([LinkedIn post](#)).
    We offer customized solutions for energy planning. E.g. consultations (reports etc.), software development/maintenance, training/capacity building
35. **PyPSA-Earth hydro-climate** modelling track is launched. There are compelling problems, brilliant ideas and a lot of space for development. Current priorities:
    a. global-scale validation of the PyPSA-Earth hydro simulation approach;
    b. improving docs on how hydropower is currently represented in PyPSA-Earth;
    c. integration of the climate projections into the modelling workflow.
36. **PyPSA-Distribution meeting:** planning a small-scale use of PyPSA tools! Interested? Feel the doodle below and send a message to Davide 🙂
    https://www.when2meet.com/?20704271-wkZPD
    a. Powerflows? A: yes!
    b. Goal: Building level distribution level modelling
37. Max at IAEE in Milan
    a. Met model maintainer Federico Parolin in Milan (they have 4 models there doing the same thing)
    b. Met urbs (TU Munich) developer. They start global modelling. Probably checking out PyPSA-Earth and maybe swapping to it. Urbs team member can support on the PyPSA-distribution side
38. Sneak preview: We will host a OPENMOD workshop end of this year

New projects:

39.

Papers:

- PyPSA-Earth country-wise validation paper accepted for presentation on SEST conference :)
  - Global scale country wise validation

- Magazine paper "Energy transition by PyPSA-Earth model" published in WindTech International (thanks Dhruv and Davide!)

Conferences:
- Davide: Powertech2023 - presentation at the Tutorial on Digital Energy Systems https://powertech2023.com/tutorials/
  - Erikson was interested in the operation side
  - Telecommunication planning depends on Diesel but interest in sustainable solutions
  - Interested in small scale application

Anybody joining? Let us know and write your name here! 🙂

PyPSA-Earth-Sec
  - Working paper will be released within the next 3 months
  - Merge: Goal is combining PyPSA-Earth & Sec developments

📣 Code and Data updates

Introducing and discussing new features.

97. PyPSA-Earth
   a. **New release v0.2.2** for the global coverage energy system model
      i. Stability and reproducibility increased. The model runs pretty much for any country on Earth. A: Nice!
      ii. New Global Energy Monitor powerplant data is implemented. Thanks for the data improvement
      iii. Enhanced flexibility and reproducibility. Doing detailed country studies with custom data outside of the workflow is now easier
   b. **New targets!**
      i. Release **v0.3** aims at validating the workflow for every continent
         -> requires volunteers willing to try out the model 😀
         -> new cutouts should be created; volunteers welcome for Asia and Oceania
      ii. **Release v1.0 aims at creating the Earth model**
         -> requires improvements of performances.
         -> we are addressing this issues and we have pending PRs partially covering this, volunteers are welcome 🚀

98. PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)
   a. Many things!

99. earth-osm (Matin)
   a. Added buildings to Earth-OSM 2 weeks ago
   b. Still a lot of working needs to be done
   c. A lot of TODO's still there

d. It's developing into a nice package & documentation will be added soon
e. Someone want to join?
f. What is earth-osm: extractor for OSM data and preparing it for usage
g. It solves: Language issues with SQL/ non-Python and performance bottlenecks especially for country and continental modelling
h. Long-term goal: Have also the data cleaned in earth-osm, allow easier extension to other datasets e.g. Marine etc. (add test cases and automated way)
100. <u>Powerplantmatching</u>
   a. Integrated new GEM data updates
      i. Calling only GEM instead of individual ones

💬 Discussion Topics

- Someone going to COP?
   - TZ applied for this
   - To get a room is challenging
   - Get passes as observer –> go over government (Dubai)
   - Alois –> company (from Kenya) is going. Got as part of an event. Organised as a side panel
   - Tom: It's worth it (went 2015)! This year it's about transmission for 1.5* goal
   - Alois: Hot topic is also JUST TRANSITION.
- Code question Davide:
   - Need to split Earth in parts for continental modelling
   - Problems (US –> covering half of the Earth & Russia)
   - Suggestion: cutout Asia but no Russia…
   - Max idea:
      - 1. Download cutout for each country
      - 2. Function that combines the cutouts of interests
      - 3. Use for the model
      - Feedback Davide: Probably hard to maintain even though we have the automation
      - Tom: Break up cutout into chunks when it's too large?
      - Davide: US cutout is above 170 GB compressed entire globe

#121 Monthly General Code & Initiative Meeting

22.06.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.
Attendance: Carlos, Max, Tom, Katia, Shankar, Lucie

Agenda

🙌 General initiative updates (~10min)

40. PyPSA-Earth repo
    a. GitHub 103 ↗ 115 ↗ 118
    b. Discord: 500+ people!!!
41. EU commission recommends PyPSA ([LinkedIn post](#))
42. The Canadian Energy Regulator (CER), a governmental org just published a big net zero modeling exercise. Looks like they used PyPSA for the electricity portion (see Discord -> general channel)

New projects:

43. ?

Papers:

- Conference paper, "Using PyPSA-Earth to address energy systems modelling gaps in developing countries. A case study for Bolivia", https://orbi.uliege.be/bitstream/2268/303927/1/Addressing%20ESM%20gaps%20%2B%20rev%20ECOS%2015.05.23.pdf
  - Carlos presenting results & outcomes
  - Learnings/ improvement suggestions to close gaps:
    - Missing information on powerplant e.g. 1.8GW missing in dataset (e.g. Biomass & Hydro was missing)
    - Need to update network data in OSM/ stream into the model
    - Limiting biomass was a challenge
- 1 SEST paper rejected :/ what can we learn/improve?
  - Silk way, (+ more orientation to existing great pypsa papers like https://www.sciencedirect.com/science/article/pii/S036054422101032X?via%3Dihub)
- 1 SEST paper accepted :) what can we learn/improve?
  - Global scale country wise validation,
- Magazine paper "Energy transition by PyPSA-Earth model" submitted to Windtech (thanks Dhruv and Davide!)

- Research presentations at CEAT2023 (Penang, Malaysia) and ICRES (Bangkok, Thailand) conferences
- Tutorial presentation at Powertech conference in Belgrad, Serbia, on 25 june (sunday)
  Tutorial title: Digital energy systems – Technologies, Use cases and Policy Options

  Anybody joining? Let us know and write your name here! 🙂

PyPSA-Earth-Sec
   - 1st of 10 PyPA-Earth-Sec paper is out
   - 1st Master thesis is out

Outreach Updates (Stuart)
   44. Idle mode
   45. Member story posts on LinkedIn

📢 Code and Data updates

Introducing and discussing new features.
   101.   PyPSA-Earth
      a. Various bug fixing to generalize the tool to cover all Earth also including small countries
      b. Support for new dataset Global Energy Monitor (GEM) in powerplantmatching
      c. Enabled full support of AC and DC system representation
          i.   Some errors in Philippines/ India but the source of the error was found 🙂
      d. Soon support for all 193 UN countries on default configuration
      e. Practically-driven improvements on the model usability and flexibility
      f. Country-wise technology costs PR by Tom is ready for review
          i.   Let's add
          ii. Also nice would be country-wise discount
   102.   PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)
      a.
   103.   Detect-Energy & Demand
      a.
   104.   Earth-OSM
      a. Couple of things left e.g. Docs & code
   105.   Powerplantmatching
      a. Open PR: New solar and wind data. Is hanging in powerplantmatching

💬 Discussion Topics

-

#120 Monthly General Code & Initiative Meeting

25.05.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~10min)

46. PyPSA-Earth repo
    a. GitHub 103 ↗ 115
    b. Relicensed from GPL to AGPL
47. Linopy paper is published in JOSS. A lot of [LinkedIn engagement](#) by optimization folks. Great insight:
    a. Python can be faster than JUMP/ Julia. Fabian H. shows a nice benchmark that shows Linopy is more memory efficient than Jump but still slower. Four interesting paths for research:
        i. Take Linopy xarray -> convert to pandas -> use pyarrow engine
        ii. Rebuilt Linopy as pandas (easier use than xarray) -> use pyarrow engine
        iii. Use old nomopyomo code -> use pyarrow engine
        iv. Write a paper comparing large optimization solvers in Pyomo, Jump, Linopy. Assess how much time/ memory in solver interface (Pyomo etc.), how much time/ memory in solver (highs, cbc/ gurobi). Feeling is that for large optimization solvers only few minutes are spent in the solver interface making the speed of Julia/etc. Irrelevant in this case anyways.

Projects:
48. Updates from Kazakhstan project
    a. Several PR's to allows network updates
49. Fraunhofer IEE applied for ZA PtX call (we didn't pass eligibility -> always apply with established larger companies as newcomers)

Papers:
50. SEST Conference Paper on Country-wise validation: Finalized! Aim: Test pypsa-earth on every country on earth.
    a. SUBMITTED
    b. Aim: Show that the model can used for any country

51. Silkway/Silkroad paper: Finalized. Aim: quantify how climate change will impact power systems and investigate how trans-boundary power interconnections can help to tackle this
52. Pablo and Katia collaborate on heat demand predictions
53. PyPSA-Earth-Sec
54. [New preprint](#) on "The Value of Competing Energy Storage in Decarbonized Power Systems" using PyPSA-Earth
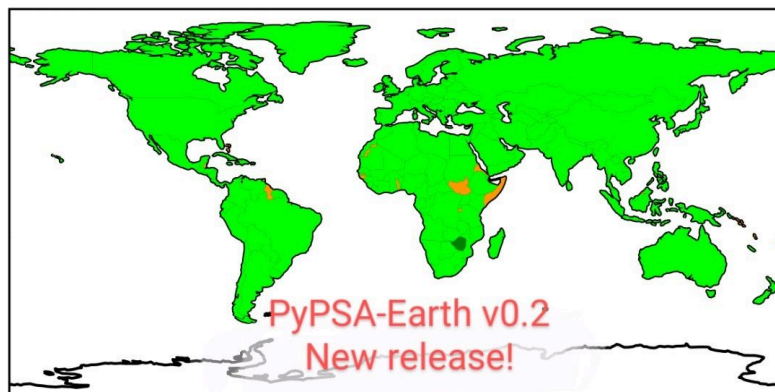
Outreach Updates (Stuart)
55. Idle mode
56. Member story posts on LinkedIn

📣 Code and Data updates

Introducing and discussing new features.

106. <u>PyPSA-Earth</u>
   a. <u>Version 0.2 and 0.2.1 released! PyPSA-Earth available for most UN countries!</u>
      https://github.com/pypsa-meets-earth/pypsa-earth/releases

   b. RELICENSING to AGPL license with 0.2.1.
      Full discussion at:
      https://github.com/pypsa-meets-earth/pypsa-earth/issues/693
   c. Improved documentation: improved readability, revision of the documentation to comply with later version, new notebook on make_statistics
   d. Testing docker implementation
      https://github.com/pypsa-meets-earth/pypsa-earth/pull/726
   e. Added all GEM datasets to powerplantmatching
      https://github.com/PyPSA/powerplantmatching/pull/110
      (Tom contributed 5 databased   , Max contributed 2 databases, Fabian H review)
   f. Practical-driven customisation: add custom power plants, generalise a base voltage level

107. <u>PyPSA–Earth–Sec (an upgrade to PyPSA–Earth to include sectors & new energy carriers)</u>
   a.
108. <u>Detect–Energy & Demand</u>
   a. Master students interested in finishing paper on object detection of towers
   b. Conference paper required to add more results
109. <u>Earth–OSM</u>
   a.

💬 Discussion Topics

- Tom: Powerplantmatching gets an update with GEM dataset
    - In next PR: Make contribution to test more easily non–EU countries
        - CONFIG had some lot, lat filter
- Carlos will presenting the use of PyPSA–Earth on Bolivia (conference paper)
    - Mostafa NTNU is also part of the work
    - Hydro modelling was an issue as well as possible some disregarded components

✅ Action Items

Last
- ☑ ~~Create a list of names, contributions to package, LinkedIn profiles in the GitHub documentation to shorten the initial introduction~~
- ☑ ~~Celebrate PyPSA–Earth birthday!!! (24/12/2022)~~

New
- ☐ Some housekeeping is required:
    - ❏ Our google forms for the newsletter need to be moved form PyPSA–Africa to PyPSA–Earth
    - ❏ PyPSA–Africa mail is deprecated & not anymore supported – remove all old emails & post the new wherever
    - ❏ Review and improvement of the automatic meeting scheduling that was created by Davide
- ☐ Investigate the GitLab "handbook". I posted my opinion on that on Discord: https://discord.com/channels/911692131440148490/911728377193451550/1065613860398190613
    - ❏ How is it build?
    - ❏ How do they use it?
    - ❏ Can we use this?
    - ❏ What are pro's and con's

#119 Monthly General Code & Initiative Meeting

27.04.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~10min)

57. PyPSA-Earth paper is published in Applied Energy:
    https://www.sciencedirect.com/science/article/pii/S0306261923004609
    a. Twitter. 35k views, 320 ❤️, 92 shares
    b. LinkedIn. 16k views, 218 ❤️, 12 reposts
    c. GitHub 92 ↗ 103

Projects:

58. Updates from H2-Hub project (OTH)
    a. Investigating hydrogen export potentials & also analysing local benefits
    b. Current focus on Morroco
    c. How is it going for validation?
        i. Dev since 1 year
        ii. Work on papers/outputs strengthens validation
        iii. Lacking in validation on export of H2
        iv. PyPSA-Earth-Sec includes energy demands of transport, industry, buildings. Includes not only electricity as carrier but PtX fuels
59. Updates from Kazakhstan project
60. Updates from Zambian Clean Cooking project
61. Updates from Zambian Green Growth project
62. Updates from Tauritron project
63. Updates from load prediction activities at UoAbuja (CPEEL) Nigeria
64. Updates from NEPAD (AU-EU) electricity forecasting proposal
65. Updates from PtX South Africa proposal
66. Updates from CEED, India engagement
67. Updates from Young innovator application Germany

Papers:

68. SEST Paper on Country-wise validation: final section writing ongoing: status 90%. Ready for upcoming submission on April 30th
    a. Aim: Test pypsa-earth on every country on earth

69. Silkway/Silkroad paper. Is the grid interconnection of the Silkroad countries beneficial? How does climate change impact these countries? Is there a benefit of tackling climate change together?
70. PyPSA-Earth-Sec

Outreach Updates (Stuart)
71. Idle mode
72. Member story posts on LinkedIn

📢 Code and Data updates

Introducing and discussing new features.

110. PyPSA-Earth
    a. **Target new release v0.2 by mid May**: support for UN countries; we currently cover 99% of the total population.
       To simulate all UN countries, in #654 it is possible to specify "countries: ["UnitedNations"]" in the config file.
       https://github.com/pypsa-meets-earth/pypsa-earth/pull/654
    b. Relicense discussion started here (deadline vote 19.05):
       https://github.com/pypsa-meets-earth/pypsa-earth/issues/693
    c. Add new script to upload files to Zenodo via code
       https://github.com/pypsa-meets-earth/pypsa-earth/pull/688
    d. Work on weather observations integration started
    e. Work on Global Energy Monitor database started
    f. Add Population performance bottleneck is closing
    g. OSM performance bottleneck
111. PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)
    a.
112. Detect-Energy & Demand
    a. Object detection work from detect energy is rounding of with paper
    b. Master students are working on object detection
    c. Currently inactive, Demand is starting with CPEEL
113. Earth-OSM
    a. Matin works on a new release

💬 Discussion Topics

- Tom: Powerplantmatching gets an update with GEM dataset
    - In next PR: Make contribution to test more easily non-EU countries
        - CONFIG had some lot, lat filter
- Carlos will presenting the use of PyPSA-Earth on Bolivia (conference paper)

- Mostafa NTNU is also part of the work
- Hydro modelling was an issue as well as possible some disregarded components

✅ Action Items

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- ☑ ~~Celebrate PyPSA-Earth birthday!!! (24/12/2022)~~

New
- ☐ Some housekeeping is required:
    - ❏ Our google forms for the newsletter need to be moved form PyPSA-Africa to PyPSA-Earth
    - ❏ PyPSA-Africa mail is deprecated & not anymore supported – remove all old emails & post the new wherever
    - ❏ Review and improvement of the automatic meeting scheduling that was created by Davide
- ☐ Investigate the GitLab "handbook". I posted my opinion on that on Discord: https://discord.com/channels/911692131440148490/911728377193451550/1065613860398190613
    - ❏ How is it build?
    - ❏ How do they use it?
    - ❏ Can we use this?
    - ❏ What are pro's and con's

#118 Monthly General Code & Initiative Meeting

23.03.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~10min)

73. PyPSA-Eur & PyPSA-Eur-Sec **Merge** is complete! 🎉
74. Tauritron started activity.
    a. Current goal implement streamlit https://h2-network.streamlit.app/ to https://github.com/PyPSA/pypsa-server
75. Updates from Kazakhstan event (Katia/ Albert/ Davide)
    a. Astana ITU colleagues are building a multidisciplinary energy-modelling group to support implementation of the national energy transition plan (there is experience in GAMS)
76. Concept note updates from NEPAD (AU-EU) engagement?
    a. Can impact African energy infrastructure planning
77. CENTRE FOR ENVIRONMENT AND ENERGY DEVELOPMENT (India) seems to be interested in collaboration. Currently exploring ways to do so.
78. PhD student from China working on energy planning and who contributed to Earth-OSM wants to visit Edinburgh for a research visit
    a. Recommendation, Davide hosts the student instead
79. New PtX project for ZA:
    a. https://ausschreibungen.giz.de/Satellite/public/company/project/CXTRYY6Y7OZ/de/documents
80. Outreach Updates (Stuart)
    a. Guest Lecture at University of Texas "UT Energy Symposium" was a success - people were interested and had a bunch of questions
    b. First member story post on LinkedIn (Leon Schumm)
        i. Almost 900 impressions after 2 weeks - not bad at all!
   ii. Who would like to be featured next? 🙂

📣 Code and Data updates

Introducing and discussing new features.

114. <u>PyPSA-Earth</u>
    a. Max: New docs on performance profiling to see speed bottlenecks: https://pypsa-earth.readthedocs.io/en/latest/how_to_contribute.html#performance-profiling
    b. GridGrapher (Kevin) PR's/ Issues
        i. – Add population speed boost; https://github.com/pypsa-meets-earth/pypsa-earth/pull/650
        ii. .gpkg file loading speed boost by Pyogryo: https://github.com/pypsa-meets-earth/pypsa-earth/pull/645
    c. Davide: Massive updates to make PyPSA-Earth work smoothly on the global scale:
        i. <u>Cleaning of osm-extracted power grid data</u> thoughtfully revised: resilience to unexpected values, less data loss, **force_ac** option added https://github.com/pypsa-meets-earth/pypsa-earth/pull/610
        ii. <u>Fixing isolated buses</u>: a new option to drop and/or merge isolated buses according to predefined thresholds https://github.com/pypsa-meets-earth/pypsa-earth/pull/632
        iii. <u>Improved hydro power calculations</u>: runoff re-scaling procedure reimplemented in a more robust and transparent way https://github.com/pypsa-meets-earth/pypsa-earth/pull/631
        iv. <u>Minor bug fixing</u> needed to make country-wise simulations work https://github.com/pypsa-meets-earth/pypsa-earth/pull/635

    As a result: PyPSA-Earth runs for (almost) every country of the world
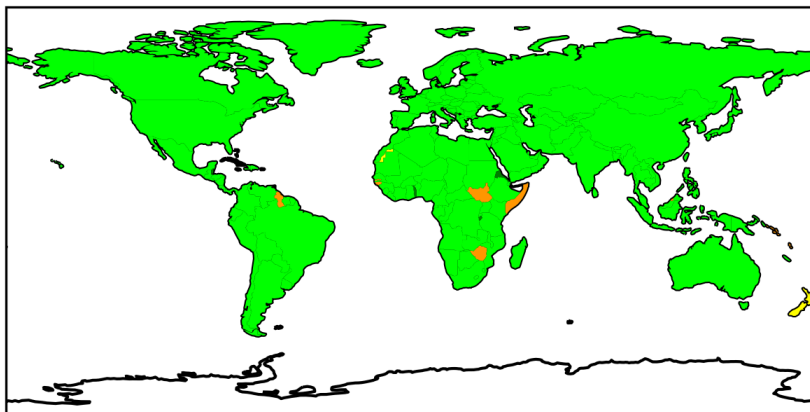
        v. <u>Documentation improvements</u> to clarify usage of environmental data by the modeling workflow https://github.com/pypsa-meets-earth/pypsa-earth/pull/603
115. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>

a. Version 0.0.2 is released after we had testing and fixing phases: https://github.com/pypsa-meets-earth/pypsa-earth-sec/releases/tag/0.0.2

b. Workflow is adapted and tested for the following countries: Morocco, Namibia, Nigeria and Benin

c. Sectoral demand data is still dummy data, but planned to be improved in future

d. Probably adding pypsa-earth as a subworkflow to have a pypsa-earth version fixed to a certain commit

116. <u>Detect-Energy & Demand</u>

a.

117. <u>Earth-OSM</u>

a.

💬 Discussion Topics

- Max: Automated speed profiling at or after each PR? Some OS projects have that in the Azure pipeline. Possible in GitHub Actions?
  - Could avoid aggregation of performance hits

✅ Action Items

Last

☑ ~~Create a list of names, contributions to package, LinkedIn profiles in the GitHub documentation to shorten the initial introduction~~

☑ ~~Celebrate PyPSA-Earth birthday!!! (24/12/2022)~~

New

☐ Some housekeeping is required:
  - ❏ Our google forms for the newsletter need to be moved form PyPSA-Africa to PyPSA-Earth
  - ❏ PyPSA-Africa mail is deprecated & not anymore supported – remove all old emails & post the new whereever
  - ❏ Review and improvement of the automatic meeting scheduling that was created by Davide
  - ❏ https://pypsa-meets-earth.github.io/results.html The website toggle should have a dropdown to show page content e.g. project list. Otherwise its hard to find… (code is open-source)

☐ Investigate the GitLab "handbook". I posted my opinion on that on Discord: https://discord.com/channels/911692131440148490/911728377193451550/1065613860398190613
  - ❏ How is it build?

- ❏ How do they use it?
- ❏ Can we use this?
- ❏ What are pro's and con's

#117 Monthly General Code & Initiative Meeting

23.02.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~10min)

81. Fabian Neumann shared a new Python course on "Data Science for Energy System Modelling." https://fneum.github.io/data-science-for-esm/intro.html
82. Kazakhstan study will be soon on the list of current projects using PyPSA-Earth: https://pypsa-meets-earth.github.io/results.html (The website toggle should have a dropdown to show page content e.g. project list)
83. **Four** conference papers submitted:
    a. Lukas Franken, Matin Mahmood, Davide Fioriti, Maximilian Parzen, Cesare Caputo and Gaurav Kumar. "On Transfer Learning to Detect Electric Infrastruc- ture in Satellite Imagery". In: ICLR 2023 Workshop: Tackling Climate Change with Machine Learning. (2023). Under review.
    b. Ekaterina Fedotova, Ekaterina Voronkova, Davide Fioriti and Maximilian Parzen. "Regional Applicability of PyPSA-Earth Framework: Case Study for Kazakhstan". In: IEEE Smart Information Systems and Technologies Conference. (2023). Under review.
    c. Ekaterina Voronkova, Maximilian Parzen, Davide Fioriti, Ekaterina Fedotova "Interconnecting the Silk Way: validation of power transmission data for Western and Central Asia". In IEEE International Conference on Smart Energy Systems and Technologies (2023). Accepted.
    d. Davide Fioriti, Maximilian Parzen, Ekaterina Fedotova, Denise Giubilato, Martha Maria Frysztacki, Leon Schumm, Hazem Abdel-Khalek, Stuart Daniel James and Davide Poli. "Country-wise open energy planning in high-resolution with PyPSA-Earth". In: SEST 2023 Conference. (2023). Accepted.
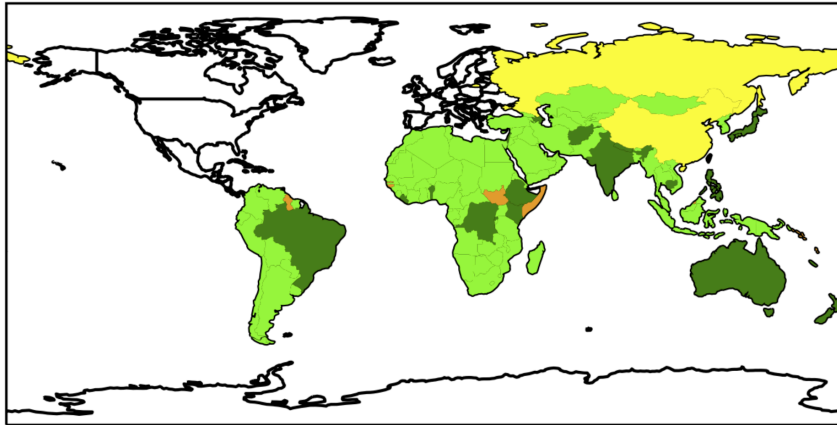
Current status (light green fully working, dark green almost working, more green coming; white not tested yet)

84. PyPSA meets Earth (Davide and Katia) was at [FOSDEM Conference](#) in Bruxelles. Davide presented a talk about "Open data and open-source adoption in the energy sector: filling the gaps with the open community"

85. Outreach.
    a. Status?: LinkedIn "member stories" template finished – who wants to be the first member sharing their story? Monthly post (every four weeks)
        i. LEON volunteered
    b. Max idea: **All newsletter hosted on GitHub using markdown.** Markdown page is super simple to edit and can be convert to HTML using pandoc. HTML can be embedded in any email looking quite nice: https://www.youtube.com/watch?v=mYNgNLmQ4Qc and shared with people on other platform e.g. LinkedIn/openmod. History of old newsletter is kept by this approach (ideally we share also the last 2 newsletters with this approach as well).

📣 Code and Data updates

Introducing and discussing new features.

118. PyPSA-Earth
    a. New members have joined!
    b. **Goals**:
        i. Earth power model: no later than Q3-Q4 2023
        ii. Earth sector-coupled model: no later than Q4 2023
    c. **Various major developments:**
        i. Linker for demand: A new rule "build_demand_profiles" is created that makes easy to feed your custom nation-wise data if you have better data. It can also support the inclusion of more advanced features to derive demand time series, such as including climate-change considerations and alike. https://github.com/pypsa-meets-earth/pypsa-earth/pull/582

ii. <u>Automatic scenario management</u> to execute a stack of simulations automatically. Run_all_scenarios
   https://github.com/pypsa-meets-earth/pypsa-earth/pull/577
   iii. <u>Automatic workflow statistics</u>: the new rule "make_statistics" can generate automatic statistics for many rules, including computational requirements, installed capacities, capacity factors for RES, and much more
   https://github.com/pypsa-meets-earth/pypsa-earth/pull/579
   iv. <u>Full compatibility with earth-osm</u>
   https://github.com/pypsa-meets-earth/pypsa-earth/pull/547
   v. <u>Automatic download of latest costs technologies</u> by the new rule retrieve_cost_data. It can be disabled if you are satisfied with the current approach or you have your own data.
   https://github.com/pypsa-meets-earth/pypsa-earth/pull/600
   d. Country coverage is improving!

119. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>
   a. PyPSA-Eur "merge March" is coming
120. <u>Detect-Energy & Demand</u>
   a. – Conference paper hustle
121. <u>Earth-OSM</u>
   a. Updated to 0.0.9

💬 Discussion Topics

- Max: Davide any updates from University of Oxford contact Jasper?
   - Yes. 15 March 2023!

✅ Action Items

Last
- ☑ ~~Create a list of names, contributions to package, LinkedIn profiles in the GitHub documentation to shorten the initial introduction~~
- ☑ ~~Celebrate PyPSA-Earth birthday!!! (24/12/2022)~~

New
- ☐ Some housekeeping is required:
   - ❏ Our google forms for the newsletter need to be moved form PyPSA-Africa to PyPSA-Earth
   - ❏ PyPSA-Africa mail is deprecated & not anymore supported – remove all old emails & post the new whereever

- ❏ Review and improvement of the automatic meeting scheduling that was created by Davide
- ❏ https://pypsa-meets-earth.github.io/results.html The website toggle should have a dropdown to show page content e.g. project list. Otherwise its hard to find… (code is open-source)
- ☐ Investigate the GitLab "handbook". I posted my opinion on that on Discord: https://discord.com/channels/911692131440148490/911728377193451550/1065613860398190613
  - ❏ How is it build?
  - ❏ How do they use it?
  - ❏ Can we use this?
  - ❏ What are pro's and con's

#116 Monthly General Code & Initiative Meeting

26.01.2023 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~10min)

86. Cowboy Stuart Daniel will present our initiative in a public Seminar at the University of Texas – howdy partner 👋
87. Davide Fioriti, will introduce our initiative to research group at the University of Oxford. Max already had an exchange with Jaspar – they do cool stuff 🎉
88. Katia Fedotova is preparing a post sharing our experience on a collaborative project with the Environmental Defense Funds (still going; the first project part has been focused on training and capacity building, the current stage is aimed to build cross-model cooperation) 👍
89. Robbie led the open data letter in collab with Max Parzen. Please sign if you haven't done it here.
90. Prototypefund. Focusing on open-source GUI improvements will start on 01.03.
91. Outreach. Stuart
    a. Stuart shared our Newsletter - great one! 🎉
        i. Max. Should we share that in a LinkedIn post? "Hey we shared out Newsletter – check it out" (Unfortunate that everything is per email – would be could to have it as a html/ webversion)
            1. Stuart. Could look into Mailchimp as an easy alternative.
    b. LinkedIn "member stories" template finished - who wants to be the first member sharing their story? Monthly post (every four weeks)
92. PyPSA-Earth will be at the FOSDEM23 conference! https://fosdem.org/2023/ + https://fosdem.org/2023/schedule/track/energy/
93. Someone going to IEW, Golden US? The Macro-Energy System Community will gather there. Deadline for papers is 01. 02.23. See more about that in the Discord event channel.
94. Preparation of abstract for SEST about running the model worldwide: https://www.sest2023.org/

📣 Code and Data updates

Introducing and discussing new features.

122. <u>PyPSA-Earth</u>
    a. **New people are joining :)**
    b. **New year new goals!**
        i. Increase country coverage
        ii. Full Earth model PyPSA-Earth Q4 2023
        iii. PyPSA-Earth and PyPSA-Earth-Sec integration Q3-Q4 2023
        iv. New features:
            1. Linkers for importing custom data
            2. Data validation
            3. …
    c. Improved country coverage (ongoing); image dated 12-01-23 and new updates will improve the coverage!
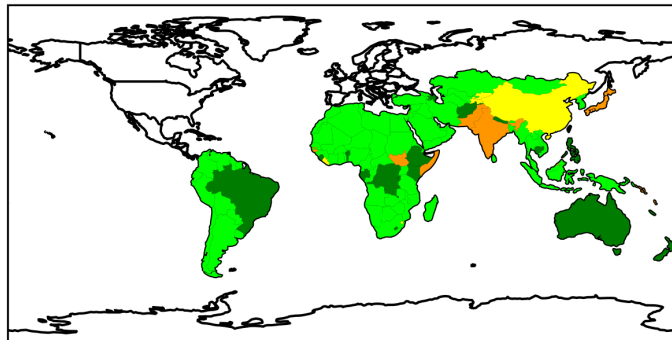
    d. Major code updates
        i. Improved workflow to cover more countries: bug fixing for data cleaning and analysis
        ii. Added pypsa-eur-like scenario management to easily run multiple scenarios
        iii. Improved parallel performances of build_shapes: <u>important for large countries e.g. China, India, Brazil</u>

123. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>
    a. Bug fix: rules to make summary and graphs are working now
    b. Bug fix: Shipping demand and hence electrolysis + Fischer-Tropsch was way to high, bug is fixed but not pushed yet
    c. In general: many minor bug fixes and updates also to improve workflow. Also not pushed yet

  d.   Minor update: location of export bus is modified for better plots

  e.   Next: People from OTH Regensburg (aside from Leon) will join the development (and meetings) in April

124.   <u>Detect-Energy & Demand</u>

  a.   Solid Progress by Master's student on working with satellite imagery

  b.   Interesting Grant, well suitable for demand estimation tools ([here](#)).

    i.   **Deadline 01.03.23, 150k$** == GEGIS alternative! (12 pages)

  c.   Perfect venue for **detect-energy work**. ClimateChangeAI workshop at ICLR (International Conference on Learning Representation - one of the big three machine learning venues) - see [here](#). **Deadline: 04.02.23**

    i.   Lukas will get in touch Team Gaurav, etc....

125.   <u>Earth-OSM</u>

  a.

💬 Discussion Topics

- Casper is back from holiday.. Now running in clustering issue
- Stuart Q. Stuart followed discussion about landlock country and run into issue.
  - Get rid of Offshore in config

✅ Action Items

Last

- ☑ ~~Create a list of names, contributions to package, LinkedIn profiles in the GitHub documentation to shorten the initial introduction~~
- ☑ ~~Celebrate PyPSA-Earth birthday!!! (24/12/2022)~~

New

- ☐ Some housekeeping is required:
  - ❏ Our google forms for the newsletter need to be moved form PyPSA-Africa to PyPSA-Earth
  - ❏ PyPSA-Africa mail is deprecated & not anymore supported – remove all old emails & post the new whereever
  - ❏ Review and improvement of the automatic meeting scheduling that was created by Davide
- ☐ Investigate the GitLab "handbook". I posted my opinion on that on Discord: https://discord.com/channels/911692131440148490/911728377193451550/1065613860398190613
  - ❏ How is it build?
  - ❏ How do they use it?
  - ❏ Can we use this?
  - ❏ What are pro's and con's

#115 Monthly General Code & Initiative Meeting

22.12.2022 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~10min)

95. H2Global meets Africa. Leon Schumm (OTH Regensburg), PyPSA coordinator of the winning large scale project will introduce what is planned.
96. Climate Compatible Growth Flexfund. We wrote 2 proposals. One lead by Anas (TU Offenburg) and Albert (UoEdinburgh) - **they just won** - and one by Kumbosu (ZESCO, Zambia) and Max (UoEdinburgh). Authors will present briefly on: Motivation? When do we know if the proposal was successful? What is planned?
    a. Assessing Economic Implications and Prospects for Green Growth in Zambia
    b. Energy System Chef – The energy system implications of transitions to clean cooking in Zambia
97. Prototypefund. **Just won!** What is planned and when? (Max Parzen, UoEdinburgh)
98. Update on the Environmental Defense Fund project. Data Seminar Session. (Katia)
99. Outreach. Stuart
    a. LinkedIn "member stories" template finished - who wants to be the first member sharing their story? Bi-weekly post.
    b. Newsletter to be shared on the last 6-month activity
    c. Botswana and Namibia experience supported by Bavarian funding led by Tobias TuD
100. PyPSA-Earth will be at the FOSDEM23 conference!
    https://fosdem.org/2023/

📣 Code and Data updates

Introducing and discussing new features.
126. PyPSA-Earth
    a. Linopy implementation for PyPSA-Earth (Max)
        i. Keep old script with depreciation warning?
            1. + I think we might need to keep old solving_network.py script to optionally use Pyomo

2. – extra maintenance
    b. Improvements of documentation
    c. Expansion and workflow validation for regions beyond Africa

127. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>
    a. Looking into hourly and annual matching of RE generation and electrolysis electricity demand ("green" hydrogen)
    b. Config.default.yaml introduced to run standard scenarios
    c. Bug fixed regarding Biomass
    d. Wrap up of code/meetings/paper for 2022 done
128. <u>Detect-Energy & Demand</u>
    a. Lukas
129. <u>Earth-OSM</u>
    a. Very cool potential to contribute. Matin created an open-source package and we need to integrate tests, build recipes, add documentation. Also we need to work on integrating it into PyPSA-Earth
    b. https://github.com/pypsa-meets-earth/earth-osm

💬 Discussion Topics

✅ Action Items

Last
☑ ~~Create a list of names, contributions to package, LinkedIn profiles in the GitHub documentation to shorten the initial introduction~~
☑ ~~Create simple sample videos: examples how to run the model, how to obtain a sample network, output profiles, etc. (@ANAS with the new videos?)~~
☑ ~~Big rebranding project (website, repo, organization)~~
New
☑ ~~Celebrate PyPSA- Earth birthday!!! (24/12/2022)~~

#114 Monthly General Code & Initiative Meeting

24.11.2022 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~10min)

101.   BIG SECRET NEWS. Someone wrote a successful proposal with about 4.5MEuro. Brings at least 3 PhD students to PyPSA-Earth/PyPSA-Earth-Sec & some new ways to address uncertainty

102.   Currently applying for CCG flexfund. See details in the Discord funding channel. We apply for project 1 & 6 that mainly creates PhD and research positions in Africa and requires only some support from us (anyone wants to write a proposal? Tight deadline 05.12. & we need to find partners in mainly Zambia!)

103.   25/11 Webinar on Friday 12:00 UK time with Leon, Denise, Davide and Max on *"How open energy modelling can save the planet – Unlocking potentials in research and industry"*

104.   28/10 Presentation with Tom and Max in an openmod presentation in South Africa:
   a.   Great recording on Tom's presentation. Recommend to watch and share.
   b.   Meridian Economics uses PyPSA-Earth code to impact decision-making in South Africa energy policy

105.   Carlos just approved now that he is starting his PhD with Belgium & Bolivia

106.   Update on the Environmental Defense Fund project. Model training and support:
   a.   Chile, Thailand, Bangladesh, Columbia, Kazakhstan, China, India, Vietnam, Malaysia, Indonesia
   b.   Finished big tutorial (heavy update of PyPSA-Earth documentation & hackathon material)

107.   IRENA works now on high spatial demand predictions
   a.   No response from Asami on collab reach out

108.   News on Kazakhstan
   a.   Agora Energiewende reached out for Q. Kazakhstan modelling tasks

b. Delegation of Kazakh researchers came to Edinburgh. Want to use PyPSA-Earth & contribute to the ecosystem. Their Uni focus on data science.

109. Outreach
   a. Stuart. LinkedIn "member stories" template finished – who wants to be the first member sharing their story? Bi-weekly post.
   b. Botswana and Namibia experience.

📣 Code and Data updates

Introducing and discussing new features.

130. <u>PyPSA-Earth</u>
   a. Denise, Max, Davide. Modelling landlock countries finalized. Running blocks: Nigeria&Benin, Botswana, Morocco
   b. Davide: finalised global natura.tiff file to capture the land availability for the possible installation of renewable sources worldwide
   c. Included new GADM shapes v4.1
   d. Katia: improvement of documentation on data workflow with a goal to make around-the-world application as smooth as possible (huge thanks to Emre, KatiaV and Anas for sharing thoughts and experiences!)

131. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>
   a. Tested the sectoral demand and custom RES linkers.
      i. Q. Max. Still need to be disentangled, need documentation? Hazem. Yes.
      ii.
   b. Started two new use cases in Namibia and Brazil
      i. Started onboarding 2 masters thesis students that will work with PyPSA-Earth-Sec
   c. Fixed long lasting bugs:
      i. Biomass and biogas are now adapted and working
      ii. Scaling bugs in prepare sector network
      iii. CI fix
   d. Added different carriers to the residential and services sector
   e. Started to test the model on a different country outside Africa: UAE
   f. Exchanged with PyPSA-Eur people to implement the simultaneity constraint that will help with the verification of hydrogen colour.

132. <u>Detect-Energy & Demand</u>
   a. Built infrastructure of electricity demand package in preparation for Friday meeting. A data science undergraduate student will join Lukas.

      b. Two master students working on satellite detection. (from Hertie School in Berlin).

      c. Silicon Valley MSc student got AWS job & is doing thesis as side hustle

      d. Potential synergies with other projects on country level demand, Lukas will discuss this further with the respective people.

133.   Earth-OSM
      a. https://github.com/pypsa-meets-earth/earth-osm
      b.

💬 Discussion Topics

- South Korea team is validating the model in their region. (quite good running atm.)
- [Max] – Use **snakemake.module** instead **snakemake.subworkflow** (trouble maker in PyPSA-Eur-Sec!). -> allows to combine multiple workflow. **Snakemake.module** is more stable but requires quite a lot of work to transition

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✅ Action Items

Last

☐ Create a list of names, contributions to package, LinkedIn profiles in the GitHub documentation to shorten the initial introduction

☐ Create simple sample videos: examples how to run the model, how to obtain a sample network, output profiles, etc.

☑ ~~Big rebranding project (website, repo, organization)~~

#113 Monthly General Code & Initiative Meeting

27.10.2022 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~10min)

110.   Leon (OTH Regensburgh) and Denise (University of Pisa) are visiting Edinburgh
111. New professor in Edinburgh tries to get involved.
    a. His team uses a PyPSA-GB version in a Scottish government consultation
112.   Two professors in Bolivia try to get involved -> Carlos will soon focus on Bolivia & "maybe" South American energy system.
    a. Carlos is busy with GIZ work
113. A research group from Yonsei University (Korea) reached out for the possible use of PyPSA-Earth for modelling East Asia
    a. Working on climate issues in Korea
    b. They want to model the east-asian energy system
    c. Study climate and energy system interactions because this an issue …
    d. Motivation for us: We improve the documentation
114. Austrian lead consortium asked for consortium participation for AU-EU Horizon call
115. Linking IAM's with ESM - discussion insights with Alice di Bella from https://www.eiee.org/ (European Institute on Economics and the Environment)
    a. PhD will start in February
    b. Start with country & expand the coupling on global level
116. 1st PyPSA user meeting summary/feedback. LinkedIn post. Openmod post.
    a. Really important event: https://www.youtube.com/watch?v=fmwDxNpSMM4
    b. **HiGH-PRIORITY PROJECT LINKERS**: Create a .rst documentation file to explain data interfaces and how they can add data to a new country.
        Hazem: We need clear data interfaces & create everything modular!
        Davide: We need to integrate simple interfaces e.g. static and timeseries data for powerlines, powerplants, load, & whatever input
117. Environmental Defense Fund project is ongoing. We improve training material, train and assist local country teams and work on getting better representation of these countries in PyPSA-Earth. Countries include:

       a. **Running:** Chile, Thailand, Bangladesh, Columbia, Kasachstan**…**
       b. **To be run:** China, India**…** requires pre-compiled files or script optimization
       c. **Fix required:** Vietnam
       d. **Optional (not relevant for now):** Malaysia (runs smoothly), Indonesia (tbd),

118. Opportunity to work on impactful research with TU Delft that might influence policy making in the offshore energy space. (little modelling support, Atlite wave converter integration) – Tim Fuermann might work on this

119. IRENA works now on high spatial demand predictions - **push for collab?** (more in discussion)
    a. Davide:
       i. In practice it would be a good way to collaborate!
       ii. What can work, …
    b. Katia:
       i. Q. If you train a model on closed data, then the model will be influenced. Do they agree to share this ML outputs? Davide: could work with a NDA
    c. Tom K:
       i. It's up to the members in IRENA to decide what to go for
    d. Max:
       i. Maybe we can collab on methodology & get work together on the foundational open-source tool. Build interfaces to closed data
    e. Asami, and Himalaya in (cc)

120. New master thesis student (Alonso) got in touch and would like to use PyPSA-Earth(-Sec) to assess the hydrogen supply potential in Costarica.

121. Outreach
    a. Stuart. LinkedIn "member stories" template finished – who wants to be the first member sharing their story? Bi-weekly post.
    b. Stuart is flying to Botswana and Namibia in November.
       i. Does anyone have contacts there?
       ii.

📣 Code and Data updates

Introducing and discussing new features.

134. <u>PyPSA-Earth</u>
    a. Max. Introducing the new PyPSA-Earth test design.
       https://github.com/pypsa-meets-earth/pypsa-earth/pull/466
       i. New config test design
       ii. Run locally tests by `snakemake -j4 run_tests`
       iii. These test will be also run in the CI
       iv. New usability function `snakemake -j1 clean` (= `--delete-all-output`)
    b. Denise & Max. Modelling landlock countries runs now smoothly

c. Max. We found out that modelling China and India is somehow difficult, especially with processing population, GDP data and also doing the network cleaning stuff. There is a need to profile the code to detect the bottlenecks & optimise it. If someone wants to learn code profiling and optimising code maybe this opportunity might be interesting. GOAL. Do the processing in below 1 hour. We can also set a "bounty" e.g. 500$ (DF thoughts on that?)
   i. If processing below 1hour is not possible for e.g. China we could think about hosting data in aggregated form. NUTS3 e.g. is shared with the geometry, population and GDP data. So we could create a data shape workflow which creates the data we host. (could be also a separate package?)
   ii. Katia used C profiler (python built-in tool) to assess the performance bottlenecks
      1. Important to know that geospatial computations are non-linear
      2. Probably issue with parallel processing with rasterio
   iii. Tom. What kind of resolution are we using?
      1. Katia: 1x1 km resolution is used
      2. Davide: computational times rise per build-shape. It is only parallelized between countries & not within the country.
         a. Need to parallelize in country
      3.
d. Davide&Max. Repository has been cleaned:
   i. Total size of the repo is now 2Mb
   ii. Documentation for pypsa-Earth has been moved to a separate repo to keep the main model small and be able to store images and notebooks in an easier way: https://github.com/pypsa-meets-earth/documentation
e. Davide: improved snakemake folder structure to ease the use of the mode
f. Davide. Recurrent weekly meeting moved to every **Thursday 4PM UK time**
g. Davide: ongoing development of global natura.tiff file to capture the land availability for the possible installation of renewable sources worldwide
h. Included new GADM shapes v4.1
i. Katia: improvement of documentation on data workflow with a goal to make around-the-world application as smooth as possible (huge thanks to Emre, KatiaV and Anas for sharing thoughts and experiences!)

135. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>

       a. Introduction of a feature to allow endogenous hydrogen demand. This feature will be used to assess countries' potential in terms of hydrogen export.

       b. Started implementing a simultaneity constraint that will help with the verification of hydrogen colour. This feature will be useful especially in combination with the hydrogen export to EU countries.

            i. Guarantees that only green hydrogen will be exported!

       c. First conceptualization of a data fetching and processing tool towards building a sectoral demand database.

136. <u>Detect-Energy & Demand</u>
       a. Working on a Python package for demand estimation, starting with electricity.
       b. Current implementation allows the user to obtain electricity demand data on a country level.
       c. Further steps are the implementation of statistical tools that estimate demand profiles for any regions based on local demography, GDP, climate etc.
       d. Currently, investigating training data, evaluating if it's better to predict hourly demand and Fourier-coefficients.
       e. Next is adapting methods from PyPSA-Earth tools for the purposes of this package.
            i. LUKAS NEEDS DATA FOR ARBITRARY LUKAS

137. <u>Earth-OSM</u>
       a. New package
       b. https://github.com/pypsa-meets-earth/earth-osm
       c. Davide: possible to get the data on small scale? E.g. mini-grid
       d. Matin: User can specify bounding box & then get the data for that regions (not pushed yet)… Though it will always download the country
       e. API would allow specific extraction …

💬 Discussion Topics

- [Katia] It could be the right time to think about progressing in climate data inclusion into the modeling workflow. We have on our side strong teams of Hojeong and NextGen community who are very open and ready to support us in tackling this tricky but very important part. My feeling is that the following points are worth considering:
    - supplementing reanalysis data with bias-correction tools (may be important for correct representation of the climate inputs when localised power systems);
    - approaches to account for multi-annual climate dynamics are urgently needed as that is crucial for resilience of renewable-based power grids;

○ account for the climate change manifestation in load and climate inputs.

✅ Action Items

Last
- [ ] Create a list of names, contributions to package, LinkedIn profiles in the GitHub documentation to shorten the initial introduction
- [ ] Create simple sample videos: examples how to run the model, how to obtain a sample network, output profiles, etc.
- [x] ~~Big rebranding project (website, repo, organization)~~

#112 Monthly General Code & Initiative Meeting

22.09.2022 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~10min)

122. PyPSA-Earth preprint is out: https://arxiv.org/abs/2209.04663
123. Reminder. Our efforts helped the open source solver HiGHS to secure now more than **500k€** funding (see post). We write up a GUI funding proposal for 100-300k Euro open-source development. The proposal will be similar to the HiGHS proposal, and we aim to create an open-source solution tested for PyPSA but useful for any other energy system model. Some stuff needed:
    a. Define clear requirements for users/developers (1 solution for all what be great)
    b. Define a pipeline with stages for development
    c. Define the budget requirements for the development
124. Received 20k pounds budget from the University of Edinburgh on talking about GUI requirements
125. Received 20k dollar budget from non-profit on training and assistance on global energy system model teams
126. Anas received an **A** for his master thesis about Saudi Arabia energy future. See his thesis here: https://zenodo.org/record/7017741#.YwVMvXbMKM9
127. Outreach team is on Summer break. Stuart (outreach lead) starts his PhD research & moves to southern Germany. We are looking forward to cooperating more in the future.
128. PyPSA-Earth presented on the NextGenEC workshop and has been discussed in the context of the energy modeling accessibility worldwide. It looks like open modeling is bridging very important cross-disciplinary and cross-boundary knowledge gaps.
129. 50k euros prototype funding opportunity for German open-source and data developers: https://okfn.de/projekte/prototypefund/ (some of us apply):
    a. Idea 2 - Lukas. Demand creator package/ Infrastructure detection.
    b. Idea 4 - Max. GUI for model input, cluster execution, viz-art.
130. PyPSA-meets-Earth website in beta. See source code here.
131. Meeting with Odyseey for local energy modelling with PyPSA (PyPSA-Microgrids)

a. Company from the US which provides services. They are interested especially in the micro-grids part
b. The contact was the manager who link new tools
c. He highlighted that tools are very much needed
d. Benefit to collab with them?
   i. We can have them as industrial partner
   ii. If we have a developer, we can let developer work with them.
e. A student, DENISE, is coming to Edinburgh to work on the mini-grid model

📢 Code and Data updates

Introducing and discussing new features.

138. <u>PyPSA-Earth</u>
   a. Release of version v0.1: Africa validated model !
   b. General bug fixing for v0.1
   c. Training notebooks to showcase possible usage of PyPSA-Africa
      https://github.com/ekatef/pypsa-africa/tree/main#training
   d. Next step. Rename the repository & clean it.

139. <u>PyPSA-Earth-Sec (an upgrade to PyPSA-Earth to include sectors & new energy carriers)</u>
   a. Slow down a little with the next release (v0.0.2) to add more features.
      i. Allow different demand sectors in the residential sector
      ii. Allowing for export of hydrogen.
      iii. Add an option to restrict hydrogen demand to only "green"
   b. Allowing data linkers to work with custom shapes
      i. Data linkers allow pypsa-earth-sec to be modular such that user specific data can be added
         1. Renewable potential linker is very generic but we need to palace it differently -> Should be placed in PyPSA-Earth
         2. Other linkers are not scalable atm.
         3. We need to make our model as modular as possible
         4. Katia wish to participate there as well
         5. Ideally should be one closed hackathon (improvement) & public hackathon for demonstration
   c. Testing features to prepare for v0.0.2 release

140. <u>Detect-Energy & Demand</u>
   a. Discussion with Diana Moreno from Aalborg: Heating Demand estimation based on a few geographical and demographic indicators appears feasible.
   b. Super basic version of electricity demand package soon available.

💬 Discussion Topics

- A bit annoying but better now than later. We rename the organization & the mode to PyPSA-meets-Earth/PyPSA-Earth. Plan to execute is given here: https://github.com/pypsa-meets-africa/pypsa-meets-africa.github.io/issues/7
- Climate modelling & energy modelling:
  - Katia: It's the third workshop of NextGenEC. Purpose is to establish a dialogue between the climate & energy system modelling community. Climate models are very complex. We need to understand the requirements for both sides (energy and climate model).
  - Davide: How to link the both?
  - Katia: Shift in energy demand and heating demand … are the things that are impacted by climate change the most. Two points should be addressed:
    - Climate change impact on demand
    - Investigate/address uncertainties in weather/climate-data and their impact on the energy system
  - Ho-Joeng: Uncertainty in climate models is an issue. Need a better understanding of energy system modelling
  - Davide: Are there decision variables that have "loops". Would be interesting to investigate.
- Shari. Are the opportunities to train trainers such they educate researchers or students etc.? Few universities know what energy system modelling is. What they don't know they can't teach…
  - [Max] a 20k funding will be focused to training people in local areas
  - [Hazem] This was the core goal of the initiative. Having some budget for this task let's us to work on this more. We have a paper that is good for users. We have a stable model. If someone wants to become a trainer, bring us in touch. We have some hackathon material etc., so a good start to get started.
  - [Davide] There are some connections such as RES4Africa https://www.res4africa.org/advanced-training-course. There are two courses. Advanced course.. Microgrid academy … They can provide assistance on this topic. The paper was good to enable strong collaborations. RES4Africa is founded by ENEL. Goal of them is to train people on energy activities.

✅ Action Items

Last
- [ ] Create a list of names, contributions to package, LinkedIn profiles in the GitHub documentation to shorten the initial introduction
- [ ] Create simple sample videos: examples how to run the model, how to obtain a sample network, output profiles, etc.
- [ ] Move the AEO discussion to next meeting: Report of the Africa Energy Outlook (released on 20 June): https://www.iea.org/events/africa-energy-outlook-2022
- [ ] Big rebranding project (website, repo, organization)

#111 Monthly General Code & Initiative Meeting

25.08.2022 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

### 🙌 General initiative updates (~10min)

132. Our efforts helped the open source solver HiGHS to secure now more than **500k€** funding (see [post](#)). Can we attract these sums also for our global developments in future?
133. Upcoming opportunity for PyPSA instructors and PyPSA model teams to work on project with US based Environmental Defense Fund
134. Anas finished his master thesis about modelling Saudi Arabia. Interesting results. https://zenodo.org/record/7017741#.YwVMvXbMKM9
     a. Hazem. Student looks into Namibia with sector coupled model
     b. Davide. Validation scripts should be shared
     c. Shari. Likes the Saudi Arabia study. Shari used Osemosys but wasnt comfortable. Clicksand was good. Difficult to validate the data. Spreadsheet was make working simple. Only constraints needed to be added.
135. Outreach team is on Summer break. Stuart (outreach lead) starts his PhD research & moves to southern Germany. We are looking forward to cooperating more in the future.
136. Katia. David Brayshaw asked in openmod about a possibility to build a multi-model comparison for energy modeling like it's done in climate science with [CMIP](#) project. https://groups.google.com/g/openmod-initiative/c/n7wk5NntWHs/m/asrZY7jtAgAJ?utm_medium=email&utm_source=footer (the third message in the thread :))

📣 Code and Data updates

Introducing and discussing new features.

141. PyPSA-Earth
     a. PyPSA-Earth paper will be published as preprint in the next days.
        i. Paper outcome will be version v0.1

b. Version v0.1 (Africa-stable) model about to be public: all major issues have been addressed; only a last is pending, yet with the [proposed fixing PR](#) ready, and soon to be merged. See the milestones at: https://github.com/pypsa-meets-africa/pypsa-africa/milestone/3

c. Katia & Katia started working on a central Asia study with PyPSA-Earth
  i. No major obstacles to finish the central asia validation in couple of months.
  ii. Tricky parts will be how to make the model work in real life
  iii. Katia attended conference. There is a lot of interest around the model work and shaping the energy transition. We can probably extend the work/collab.

d. Improvements with last time:
  i. Significant validation of data and the workflow for the preprint (lots of updated networks and data validation with respect to IEA, IRENA, Our World In Data)
  ii. Flexible definition of aggregation strategies moved to config files. In the clustering process, the parameters of the clustered nodes are now aggregated according to rules specified in the configuration file.
  iii. Improvement of workflow at global scale. Rule currently at global scale: download_osm_network, build_shapes, build_cutout (yet with an [atlite branch](#)); ongoing tests for clean_osm_data. Current output:
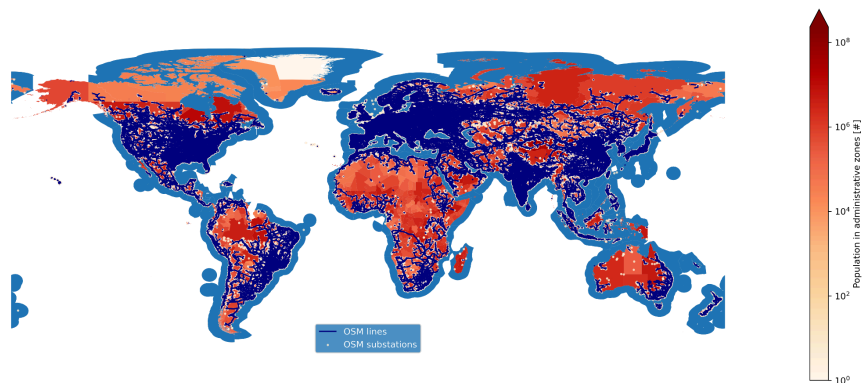
https://github.com/pypsa-meets-africa/pypsa-africa/pull/433
  iv. Comparison of HiGHS with Gurobi for the dispatch study Nigeria 2020 to be published in the preprint. Results are encouraging; HiGHS (no multithreading) is still 20-30 times slower than Gurobi (4 threads) but the results show that a normal laptop can still solve acceptable models at 1 year resolution. Note: this is only a dispatch analysis, hence no capacity expansion. The latter study will follow
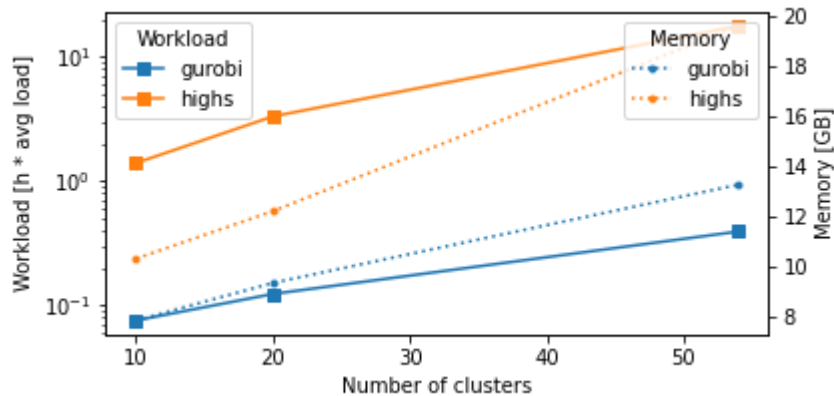
    v. Monte-Carlo approach that enables global sensitivity analysis with uniform sampling (implemented interfaces: chaospy, scipy, pyDOE2) is now finalised . (see more on draft PR here: https://github.com/pypsa-meets-africa/pypsa-africa/pull/409) A couple of potential improvements are listed in the PR such as non-uniform sampling. Max envisions an uncertainty focused extension for the model that provides options to run MGA, MGA+parameter sweep, global sensitivity analysis + others (leveraging Fabians N. work/ collab with him)

        1. Hazem. Dealing with uncertainty is important. Having a smart integration for this is helpful.

142. <u>PyPSA-Earth-Sec</u>

    a. Version v0.0.2 (Morocco-stable) model about to be public

        i. Sectors incl. aviation, agriculture, transportation,...

        ii. Agriculture is 10-15% energy demand in Morocco. Was a missing piece in PyPSA-Earth-Sec

    b. New features (compared to PyPSA-Eur-Sec):

        i. Restructuring Industry demand sector

        ii. Allowing for oil nodal representation

            1. Max: Is this flexible? Nodal & aggregated?

           2. Hazem: Yes, it's a binary flag. True or False aka. Nodal or aggregated.

        iii. Model connected to up-to date PyPSA-Earth

        iv. New linker to allow for custom demand data

        v. New linker to allow for custom REs potential data

143. <u>Detect-Energy & Demand</u>

    a. Toby building a full dataset creation pipeline for maxar imagery

        i. *Training and inference pipeline

    b. Demand prediction tools for heat/electricity developing with a project between University of Glasgow and University of Edinburgh

c. Translating GEGIS to Python. It's more a less a software engineering task & really feasible.
d. Davide. Has exchange with ESA (European Space Agency) scheduled. Someone is predicting the energy demand in South America. Synergies exist. Collab. opportunities exist.

💬 Discussion Topics

- A bit annoying but better now than later. We rename the organization & the mode to PyPSA-meets-Earth/PyPSA-Earth. Plan to execute is given here: https://github.com/pypsa-meets-africa/pypsa-meets-africa.github.io/issues/7

✅ Action Items

☐ Big rebranding project (website, repo, organization)

Last

☑ ~~After the meeting, share a Highlight post on LinkedIn. Invite in the post other people. GOAL. Inform people & create interest.~~

☑ ~~PRIORITY FIX THE ICS!!!!!~~

☐ Create a list of names, contributions to package, LinkedIn profiles in the GitHub documentation to shorten the initial introduction

☐ Create simple sample videos: examples how to run the model, how to obtain a sample network, output profiles, etc.

☐ Move the AEO discussion to next meeting: Report of the Africa Energy Outlook (released on 20 June): https://www.iea.org/events/africa-energy-outlook-2022

28.07.2022 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~10min)

137. Davide and Leon successfully presented at Nigeria's no. 1 public university. Recording can be found here: https://youtu.be/0IB0n00y7CA

138. Max visited and presented at University of Strathclyde (Glasgow) to talk with Waqquas (OATS main developer). Interesting features that could be useful for the PyPSA community are **ACOPF & OLTC**. Collab with Waqqas? If merging efforts is the goal we need to provide him enough benefits (full-time support and training to get familiar with PyPSA, credits to Waqquas to contributions)

TABLE VI
COMPARISON BETWEEN OPEN-SOURCE POWER SYSTEMS ANALYSIS SOFTWARE

		OATS 1.0.1	PyPSA 0.16.0	minpower 4.4.0	PSAT 2.1.10	MATPOWER 6.0	PYPOWER 5.1.2	PowerModels.jl 0.13.1	pandapower 2.1.0	MOST 1.0.2	EGRET 0.1
	Citation	[21]	[12]	[8]	[6]	[5]	[9]	[54]	[10]	[55]	[23]
Methods	DC Load Flow	✓	✓			✓	✓	✓	✓	✓	
	AC Load Flow	✓	✓		✓	✓	✓	✓	✓		
	DC Optimal Power Flow	✓	✓	✓		✓	✓	✓	✓	✓	✓
	AC Optimal Power Flow	✓			✓	✓	✓	✓	✓		✓
	Multiperiod DC OPF	✓	✓					✓		✓	
	Continuation power flow					✓				✓	
	Unit commitment	✓	✓	✓						✓	✓
	DC SCOPF	✓	✓							✓	
	AC Pre-fault, DC Post-Fault SCOPF	✓									
Models	Distributed slack	✓	✓								
	On-load tap changing transformer	✓			✓				✓		
	Storage	✓	✓					✓		✓	
	Three winding transformers								✓		
	DC line model		✓		✓	✓			✓		

139. Davide introduced PyPSA to Italian National Research Center (Ricerca Sistema Energetico) and it is planned to have a presentation in the end of September about it to be used for (multi-energy) system modelling

140. Our efforts helped the open source solver HiGHS to secure **110k+€** funding (more is coming). This means we probably can soon solve big problems with

open source solvers! Post on the news:
https://www.linkedin.com/posts/maximilian-parzen-b047a1126_free-opensource-supports-activity-6955795991027425280-xaNs?utm_source=linkedin_share&utm_medium=member_desktop_web

141. A PGMO project has been won at University of Pisa to interface PyPSA and SMS++ to enable strong mathematical decomposition techniques to speed up multi-step energy planning

142. Research related:
    a. Katia & Katia are starting soon working on a central Asia study with PyPSA-Earth
    b. The PyPSA-Africa paper is in the final stage. Expect two weeks to be ready as a preprint
    c. PyPSA-Earth-Sec v0.0.2 in the final steps of validation before release.
    d. … Other news?

143. Aldis, PhD student from Stanford, reached out to figure out if our model can be used for transmission expansion studies. Our answer, YES!

144. Outreach team is on Summer break. Stuart (outreach lead) starts his PhD research & moves to southern Germany. We are looking forward to cooperating more in the future.

📣 Code and Data updates

Introducing and discussing new features.

144. PyPSA-Earth
    a. Version v0.1 (Africa-stable) model about to be public
    b. Improvements with last time:
        i. HVDC implementation as lines or links by option
        ii. Inclusion of Transformer and converter components
        iii. Hydro time series are now normalised to match yearly totals
        iv. Security options for reserve margins implemented
    c. In development. Add Monte-Carlo approach with uniform distribution for global sensitivity analysis (implemented interfaces: chaospy, scipy, pyDOE2). Future work can also add non-uniform distributions. (see more on draft PR here:
    https://github.com/pypsa-meets-africa/pypsa-africa/pull/409

145. PyPSA-Earth-Sec
    a. Showcase of v0.0.2 features: a short presentation

146. Detect-Energy & Demand
    a. Code Advances by Matin/Toby
    b. Finalise paper during intense effort in August/September
    c. Investigated GlobalEnergyGIS model that aims at generating estimates for time series demand for countries; his plan is to look into it and improve the analysis to multiple sectors and regions

     d.   Stephen is working on integration of satellite transfer learning from Ookla and NTL into his demand workflow. No updates.

     e.   Won't be able to attend this meeting. – Pierre

💬 Discussion Topics

- Move the AEO discussion to next meeting: Report of the Africa Energy Outlook (released on 20 June): https://www.iea.org/events/africa-energy-outlook-2022
- Lukas: found a paper on dataset of hydro powerplants
- Lukas will implement geothermal (described here): https://github.com/PyPSA/pypsa-eur-sec/issues/72

✅ Action Items

- ☑ ~~After the meeting, share a Highlight post on LinkedIn. Invite in the post other people. GOAL. Inform people & create interest.~~
- ☐ Idea. The initiative could provide full-time support and training for developers of other packages for fast and easy transition
- ☑ ~~PRIORITY FIX THE ICS!!!!!~~

Last
- ☑ ~~Need for video material for speed up the learning~~
- ☐ Create a list of names, contributions to package, LinkedIn profiles in the GitHub documentation to shorten the initial introduction
- ☐ Rename the website and initiative from PyPSA-Africa to PyPSA-Earth (not urgent)
- ☐ Create simple sample videos: examples how to run the model, how to obtain a sample network, output profiles, etc.

#109 Monthly General Code & Initiative Meeting

23.06.2022 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~10min)

1. Davide and Leon will present our initiative for the main Nigerian university (CPEEL). Presentation at 07 July 2022.
   a. Max: Please make sure it will be recorded. I would suggest recording it yourself with OBS Studio just in case.
2. Max presented on 22 June our initiative at a [Global Power System Transformation event](#) along with Linux Foundation Energy, RTE, NREL and Fraunhofer.
3. Max presented our initiative at Summer School "PyPSA Database and Remote Sensing" (International Centre for Theoretical Physics – Summer School on Energy Modelling)
   a. 2 week summer school for students & government agency related
   b. ONSSET, Flextool, MUSE (Imperial College), CLEWS, OSEMOSYS
   c. 120 students in total. 80% made it rough. (40 for OSEMOSYS)
   d. Close collab with Policymakers
   e. Pierre. PyPSA can contribute to Policy insights. PyPSA is not CCG related so difficult to include.
4. University of Capetown uses PyPSA for their course with ESKOM & others (see [here](#)). We have slides available on request. Is someone interested?
5. Old but always gold. EU JRC will receive training for PyPSA.
6. Outreach
   a. Stuart. LinkedIn "member stories" template in the making.
   b. News. Stuart is flying to Botswana and Namibia in November.
      i. We can present the project there.
      ii. Great opportunity to gather interest in Africa. Hopefully developers and users join us.
   c. Max. Google in discussion with HiGHS team for funding. Our activities reaching out to people created one potential opportunity with Enertrag.
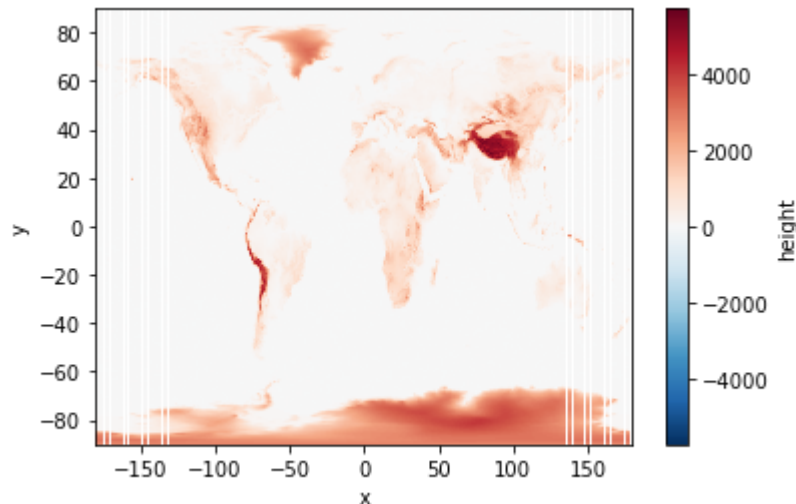   d. Website. Still to do.

📣 Code and Data updates

Introducing and discussing new features.

147. <u>PyPSA-Earth</u>
   a. Davide.
      i. Working fast towards v0.1. Only <u>one major issue is missing</u> and by next general meeting, the model is expected to be complete
      ii. Atlite branch works globally and with pypsa-earth the following result has been produced

   b. Max. After the Africa paper, let's create a minimal "global" release where all scripts run through.
      i. – Atlite was a bottleneck
      ii. – Demand is also an issue
   c. PyPSA-Africa -> PyPSA-Earth (cleaning + refining of repository)
   d. PyPSA-Earth -> PyPSA-Earth-Sec (at v0.5)
   e. PyPSA-Earth-Sec (v1.0 global validated model)

148. <u>PyPSA-Earth-Sec</u>
   a. Hazem.
      i. Model development is in line with the next milestone: v0.0.2 by mid July.
      ii. Computation time is very high. Need for code optimization.
      iii. Models are merged already. But it is a hard merge. We need a more mature PyPSA-Earth-Sec to enable the merge.
      iv. New feature. Background. Easy to get data for one country, but we can benefit from dissaggregation. That's what Hazem's team works on.
      v. We need geolocation with industry building (Cement/Steel etc.) to distribute the demand accurately!

vi. →Max. Let's build package with geolocation from the beginning (eventhough if we not know the exact location everywhere. Using the centroid/ or visual center coud be a good start)

vii. Hazem. We already use OSM airport & harbours to distribute the demand. We need data, people and time = money!

b. Davide.
    i. Included heat sector, transportation with EV, CO_2 storage potentials, biomass
    ii. Morroco as test case. Hazem & Leon working hard on it.
    iii. Showcase for the demand disaggregation feature.

149. <u>Detect-Energy</u>
    a. Full experimental pipeline is being developed.
    b. Toby (MSc student - Senior Silicon Valley Engineer) is making great progress - sooner or later we should transition to having his code as the backbone to the repo
    c. Overview of remote sensing journals provided by Encarni Medina-Lopez (University of Edinburgh).
    d. Meeting next week.

150. <u>Demand</u>
    a. Pierre. Pretty quiet atm. Integrate satellite stuff with stephen work and will be shared with community.
    b. CPEEL applies for funds
    c. Lukas and I build up a prototype

151. <u>Matin</u>
    a. Global-OSM-Extractor is public in the master https://github.com/pypsa-meets-africa/Global-OSM-Extractor
    b. More robust and lean built-in functions that replace esy.osm dependency
        i. Important for integrating it to PyPSA-Earth etc.
        ii. Few things left:
            1. Just to make it work as a package
            2. Require documentation & implementation test
    c. Can replace osm-extractor in PyPSA-Earth by new global-extractor-tool
    d. Mayor improvement:
        i. New package allows easy download, extraction and clean data
        ii. You can view what is available before downloading a subset
        iii. Added support for acquiring data outwith Power (buildings, lines, …)

💬 Discussion Topics

- Pierre. Updates from the OSeMOSYS Summer School:
- Max. OSeMOSYS-global released their preprint: https://www.researchsquare.com/article/rs-1736011/v3
  Little review:

- Contribution.
  - The paper <u>introduces</u> OSeMOSYS global (power-focused model). The main contribution is the implementation of "snakemake" allowing flexible spatial and temporal resolution studies for any subset of countries on Earth
- Study **does** include:
  - Global example optimization between 2015 and 2050 for a selected number of technologies
  - Explanation of possible use cases
  - Brief method and data description
- **Does not** include:
  - Validation
  - Missing technologies: Storage
  - → Example case studies are meaningless
- What is the difference to PyPSA-Earth?
  - Used demand prediction from multivariate linear regression described in https://doi.org/10.1016/j.envsoft.2022.105336
  - Potentially interesting data of powerplant and variable OPEX cost per region
  - Missing documentation
  - Much fewer config options
  - No network data
  - No CI testing
- Can we reuse or learn something?
  - **Maybe something for the technology data repo**. *"Capital costs and fixed operating costs for power plants are extracted from the World Energy Outlook [39], while the variable operating costs are taken from the World Bank Commodity Market Outlooks [40]. Power plant operational lifespans are from the NREL Annual Technology Baseline [41], while emission factors for each fuel are from the United States Environmental Protection Agency [42]"*
- Their future plans?
  - Make it sector coupled, probably make code more mature, implement some kind of Atlite tool (did not name anything specific).
  - Add interface
- Do we need to adapt our plans?
  - LOOKS LIKE DUPLICATION. WOULD BE GREAT TO WORK TOGETHER.
  - CAN WE OFFER OSEMOSYS OUR DATA TO MERGE OUR EFFORTS?
  - THEY COULD BUILD UP ON OUR WORKFLOW & WE WORK TOGETHER ON ENRICHING IT.
  - PEOPLE CAN THEN EITHER USE OSEMOSYS OR PYPSA

- Report of the Africa Energy Outlook (released on 20 June):
  https://www.iea.org/events/africa-energy-outlook-2022

✅ Action Items

Last
- ☑ ~~Need for video material for speed up the learning~~
- ☐ Create a list of names, contributions to package, LinkedIn profiles in the GitHub documentation to shorten the initial introduction
- ☐ Rename the website and initiative from PyPSA-Africa to PyPSA-Earth (not urgent)
- ☐ Create simple sample videos: examples how to run the model, how to obtain a sample network, output profiles, etc.

#108 Monthly General Code & Initiative Meeting

26.05.2022 Purpose: Inform briefly about all major initiative activities. Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates (~15–20min)

7. <u>Summary from PyPSA meets Earth summit (from Saturday, 14.05.2022)</u>. Miro board allows us to host the next summit as a hybrid. All results of the summit are <u>here</u>. Here is a short summary:
   a. **Review of the initiative**
      i. <u>Motivation why people join us & stay with us:</u> Team, beneficial collab, our vision on global energy system modelling
      ii. <u>Challenges</u>:
         1. **Internal**. Increasing complexity & high learning barrier regarding understanding. Allocating time and some collab. Overhead.
         2. **External**. Need to show concrete outputs/results (e.g. papers for methods & models). Lack of funding for people.
      iii. <u>Our adjusted initiative vision.</u>
         1. Info. PyPSA core team (Berlin & co.) keep their focus on improving methods, large scale optimization and usability while pushing the research edge in the general domain of energy system planning.
         2. Our vision: "PyPSA meets Earth's vision is to create together the most compelling open data and open source planning tools to accelerate the world's sustainable energy transition." Mission statements::
            a. Accelerating global energy transition
            b. Improving openness to maximize global impact
            c. Enabling effective global collaboration
         3. Our core values:
            a. doing the best, but taking risks
            b. constant learning, but also as a community
            c. being inclusive, collaborative and transparent,

d. focus on global rather than national impact.

  b. **Package vision/roadmap/research activities.** The list is given [here](#).
  c. **Resource planning.**
    i. Need to push research outputs to enable substantial funding opportunities:
      1. Show preliminary results on selected cases (e.g. Nigeria, Morocco)
      2. Perform comparisons with established modelling (goal comparison with PLEXOS)
    ii. Need to focus on attracting people with time/ own funding (=maintainer) to grow and create benefits for collaboration (=less overhead/person, max benefits/person).
      1. Create webpage to clarify the above
      2. Add wishlists both for practical contributions and funding activities: if a person comes, what should she develop and to gain what? If a funder comes, what can it fund and to gain what?

8. <u>New members:</u>
  a. Carlos, 1st year PhD student at UoLiege working on modelling South America (focus Bolivia) supervised by [Sylvain Quoilin](#) (Associate Prof. at the University of Liege)
  b. Eddie, PhD candidate at Technical University Brandenburgh, Germany working on energy import + export benefits of EU surrounding countries. The topic is not decided yet. Collab. with Hazem? His colleague might join on global scale modelling mission.
  c. Mohammad Suhermanto, teaching in mechanical engineering, PhD Student at Purdue University, from Indonesia. Quantifying greenhouse gas emission in the mining sector & searching for ways to reduce it.

9. <u>YouTube concept to create developers/contributors (from action point list).</u>
  a. Problem: GitHub is complicated. The computer setup needs to be right.
  b. Solution: In case you help someone, make a mini recording with OBS Studio and the person you helped is responsible sharing the video on YouTube (low overhead & great content creation). Example: https://www.youtube.com/watch?v=zOQpV5bgPPk

10. <u>HiGHS got 75k€ funding through our [proposal](#)</u> 🙌. More is in the making. Do you have friends in companies which are using optimization solvers? Do they want to fund them but don't know yet?

11. <u>Other funding opportunities for us:</u>
  a. Only eligible for African institutions: Name: Ruforum https://ruforum.wordpress.com/2022/04/28/call-for-innovation-research-grants-onresponsible-artificial-intelligence-for-climate-action/. **Funding amount: 50-60k€** for 12-18 month **Application deadline: June 30th,**

2022 Point interesting for our open-source initiative: "8. Climate change, landscapes and renewable energy"

b. Eligible for Earth societal profit companies, research institutions etc.: Name: Lacuna Fund. Lacuna Fund seeks proposals to unlock, create, aggregate, and/or improve labelled datasets that can support efforts to develop open and accessible datasets for machine learning applications that will enable equitable climate and energy outcomes in Africa, South and Southeast Asia, and Latin America. **Funding amount: 10-200k€**. **Application deadline: 17. July 2022** https://lacunafund.org/apply/

12. Outreach updates (Stuart)

a. **HiGHS proposal support:** We will meet in a "Hackathon" to find potential companies that could support the project next week Tuesday at 9 am German time

b. **VDMA Power Systems outreach:** We delayed our activities with VDMA due to our new focus on getting Agora Energiewende to support us

c. **Newsletter:** We posted our latest newsletter last Sunday with a summary of our activities since January.

13. **@All**, please add your data to the memberlist https://bit.ly/join-the-memberlist. This will help the WP leaders in receiving an automatically updated list of people that are interested in participating in our activities **(Thanks Davide)**

📣 Code and Data updates

Introducing and discussing new features.

152. Davide

a. Defined package development strategy

   i. v0.1 focusing on a stable Africa model to be released in 1-2 months (along with the preprint of the paper)

   ii. v0.2-0.4 releases including different continental expansions

   iii. v0.5 successful merge of the Sector coupled version into main PyPSA-Earth model

   iv. v1.0 first stable Earth model

b. Ongoing validation and model definition of the Africa model. **Goal finalize v0.1.** Validation ongoing for network, demand and installed capacity for:

   i. Nigeria: detailed analysis

   ii. Africa: overall analysis to be improved in further research studies. **Do you want to jump in?**

c. New members for the Demand Team?

153. Hazem

a. Sector-coupled model new releases planned:

   i. v0.0.2 planned release date: 15.07.2022

   ii. V0.1 planned release date: 30.11.2022

   iii. Full merge with PyPSA-Earth after v0.1
  b. Two paper ideas are identified, and planned until the end of the year
  c. Currently two main features are being added:
   i. Biomass carrier being included
   ii. Industry demand disaggregation feature

154. <u>Lukas</u>
  a. Discussion of Lacuna Fund (https://lacunafund.org/apply/)
  b. Current status of AI detection: Further refinements in training sets
  c. Long-term shape of AI detection and bridging gap to the energy modelling
  d. 200k$ just for Equatorial Guinea!

155. <u>Pierre</u>
  a. New interim leader
   i. Looking for permanent leadership
  b. Demand meetings moving to an ad-hoc basis

156. <u>Matin</u>
  a. Global-OSM-Extractor public
   https://github.com/pypsa-meets-africa/Global-OSM-Extractor
  b. More robust and self built-in
  c. Ideally move the pypsa-earth (some) osm-related code moved into osm extractor

💬 Discussion Topics

- Mo. Question. @Lukas can we work on detecting assets in South East Asia?
  - Lukas. Yes. Methods are agnostic to the location we can apply them everywhere.
- Mo. Can I see the Demand prediction implementation?
  - Max. Here: https://github.com/niclasmattsson/GlobalEnergyGIS/blob/master/paper/Mattsson%20et%20al.%202019%20-%20An%20autopilot%20for%20energy%20models.pdf
  - We aim to separate the demand part from GEGIS and improve the tool. Requires to apply "simple" Machine Learning techniques & some work on the data. Can be a 2-4 months project in case person has medium coding knowledge.
- Katia. Maybe its good to discuss protocols. Community questions & funding will be discussed in Discord. Bug & code stuff on Github.

✅ Action Items

Last

- ☑ ~~Need for video material for speed up the learning~~
- ☐ Create the list of contributions and short bio in the GitHub documentation to shorten the initial introduction in the Code&Data meetings
- ☐ Rename the website and initiative from PyPSA-Africa to PyPSA-Earth (not urgent)

New

- ☐ Create simple sample videos: examples how to run the model, how to obtain a sample network, output profiles, etc.
- ☐ Creating "frequent bugs", "known issues" and alike. Maybe like playlists and alike

#107 Monthly General Code & Initiative Meeting

28.04.2022 Purpose: Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates

14. PyPSA meets Earth summit **on Saturday, 14.05.2022**:
    a. Agenda is here and has 3 parts:
        i. Reviewing the initiative
        ii. Long-term planning
        iii. Outreach, growth and funding
    b. Reach out to Max if you like to join
15. Middle-East team is working on a funding proposal with German partners **(thanks Davide, Hazem, Kasim)**

16. [Sylvain Quoilin](#) (Associate Prof. at the University of Liege) just informed us that **now** 1 PhD student of him, actively works on and joins us to build a South American model
17. Exchange with 2x Nigerian universities and 1x Egyptian universities are promising to attract contributors. <u>Does someone want to do a 30min presentation of our initiative at a top 3 University in Nigeria?</u> – This is a nice exercise
18. Outreach updates
    a. [LinkedIn post plan is out](#). It's a list of posts that are scheduled for LinkedIn publication. If you/your work package want to share cool methods, news, or stories you can share the post with the outreach team and/or insert your post directly to the Linked plan **(Thanks Irene).**
    b. Leads for open-source solver HiGHS. We released our public funding proposal with HiGHS. To attract meaningful donations/sponsors, communication is necessary. The outreach team will create quality leads for HiGHS by talking with industries such as Amazon, Facebook or similar. **(Thanks Stuart, Irene, Hana)**
        i. **@All** Please, post in the outreach channel if you know a company that might be interested to fund HiGHS
19. **@All**, please add your data to the memberlist https://bit.ly/join-the-memberlist. This will help the WP leaders in receiving an automatically updated list of people that are interested in participating in our activities **(Thanks Davide)**

📢 Code and Data updates

Introducing and discussing new features.

157. Davide
    a. Release of new version v0.0.2 of PyPSA-Earth; version v0.1 will be a stable Africa version, and v1.0 will be a stable Earth version
    b. Lots of improvements, we have 4 major issues to solve before releasing the v0.1, expected in 1-2 month time. The issues are:
        i. Including existing RES powerplants (especially hydro)
        ii. Validating Hydro data
        iii. Properly including HVDC lines
    c. We are extending the model to Earth scale: validated OSM load import and data cleaning **(Thanks Katia)**
    d. New members are actively joining
158. Lukas
    a. Setup a new experiment
    b. Results have cool numbers. Precision looks good but there is a bug (-1 instead float between 0-1)
    c. Matin might focus on HV-towers & no cycle GANS to test how it would work on large objects
159. Stephen

      a. Exciting updates:
https://docs.google.com/document/d/18ssYse6yXzhzc3YIW4I8So6BrqOgY3
5FAcgxFaQjdiY/edit

160.   Hazem
      a. Version 0.0.1 of the PyPSA-Earth-Sec was released on 31.03.2022
      b. Sector coupled model can now cover Morocco in higher resolution easily
      c. First steps of merging PyPSA-Earth & PyPSA-Earth-Sec → **Thanks Davide**
      d. Heat sector is now incorporated in the sector coupled model
      e. New feature to disaggregate the national demand data into nodal demand
      f. New feature in plotting the network by showing the subregions each node represents.
      g. Biomass energy carrier is currently being added
      h.

161.   [Matin]
      a. Global-OSM-Extractor public
https://github.com/pypsa-meets-africa/Global-OSM-Extractor

162.   Audience
      a.

💬 Discussion Topics

-

✅ Action Items

Last
- ☐ Need for video material for speed up the learning
- ☐ Create the list of contributions and short bio in the GitHub documentation to shorten the initial introduction in the Code&Data meetings
- ☐ Rename the website and initiative from PyPSA-Africa to PyPSA-Earth (not urgent)

#106 Fortnightly Code Meeting

24.03.2022 Purpose: Exchange, coordinate projects, and discuss pressing topics.

Attendance: Davide, Lukas, Hana, Hazem

Agenda

🙌 General initiative updates

20. PyPSA-Earth
    a. Mission and vision.
    b. Clarifying the core concept. Avoiding too many models…(PyPSA-Eur -> MyPyPSA-Ger, PyPSA-UK other examples, PyPSA-China, PyPSA-India, PyPSA-US, PyPSA-SouthAfrica) But rather create a "wikipedia" of energy models where everyone can contribute
    c. Saves time and increase quality
21. Outreach
    a. Plan for renaming of the website and the initiative from Africa to Earth (to be implemented)
    b. Actively working to reach and have onboard industry and institutions to have them involved to increase visibility and practical implications of our studies
    c. Soon format to manage emails and your interests
22. General code meeting
    a. First monthly meeting, lots of updates!
23. New members
24. Crowdfunding activities for open source solvers
    a. We are currently writing a proposal:
       https://pypsa-meets-africa.github.io/highs
    b. Now we collect funds for the new and now already best open-source solver HiGHS
       https://crowdfunding.lfx.linuxfoundation.org/projects/9b777a28-c660-4490-ad00-fa314a731515
25. Hazem.
    a. Expected first release of the Minimum Viable Product of the sector coupled PyPSA-Earth: PyPSA-Earth-Sec!
    b. After first release, we can build upon it with the long-term of merging back to PyPSA-Earth repository

📢 Code and Data updates

Introducing and discussing new features.

163. Davide
    a. New version of PyPSA-Earth coming soon (v0.1)
    b. Lots of developments
        i. Generalized retrieve_databundle for the Earth scale
        ii. Preliminary OSM and build_shapes for Earth scale, though some refinings are needed (Katia)
        iii. Fixing issues on the OSM data to avoid topology problems in the network
        iv. Added licensing information, which can be further improved
    c. We want to reach out soon a stable version v0.2 including the main features for Africa; v0.3 shall focus on first multi-continental scales, whereas v1.0 shall be the first Earth scale simulation
164. Lukas
    a. Parameter tuning for the neural network
    b. Currently, substantial overfitting
    c. Targeting to allow a model to detect towers from a dataset that it has not been trained on
165. [Matin]
    a. Global-OSM-Extractor public!
    https://github.com/pypsa-meets-africa/Global-OSM-Extractor
166. Hana
    a. Working on solving the World_iso issue
167. Audience
    a.

💬 Discussion Topics

-

✅ Action Items

Last
- ☑ ~~Need for video material for speed up the learning~~
- ☐ Create the list of contribution and short bio in the github documentation to shorten the initial introduction in the Code&Data meetings
- ☐ Rename the website and initiative from PyPSA-Africa to PyPSA-Earth (not urgent)
- ☑ ~~MAKE CI run for all OS without stopping when one crashes~~
- ☑ ~~Ask WP leaders comments beforehand the meeting to fill some updates~~

#105 Fortnightly Code Meeting

24.02.2022 Purpose: Exchange, coordinate projects, and discuss pressing topics.

Attendance: Max, Johannes, Hazem, Lukas, Jan, Thomas, Davide

Agenda

🙌 General initiative updates

26. PyPSA-Earth
    a. Mission and vision.
    b. Clarifying the core concept. Avoiding too many models…(PyPSA-Eur -> MyPyPSA-Ger, PyPSA-UK other examples, PyPSA-China, PyPSA-India, PyPSA-US, PyPSA-SouthAfrica) But rather create a "wikipedia" of energy models where everyone can contribute
    c. Saves time and increase quality
27. Outreach
    a. Plan for renaming of the website and the initiative from Africa to Earth (to be implemented)
    b. Davide: meeting with colleagues from two italian Universities (EURAC and Sapienza University) actively interested in the activity
28. General code meeting
    a. Modify the periodicity from bi-weekly to monthly. More substantial updates.

📣 Code and Data updates

Introducing and discussing new features.
168.   Davide

    a. Generalisation of retrieve_databundle ready to work at global scale; data licensing verification

    b. Shared Zenodo account

        i. Possible to ask for access asking one of the coordinators

169. Hazem

    a. Expected first viable product for PyPSA-Earth-Sec around March for Marroco

    b. FInish the model by end of the year

    c. Working in an agile way with Leon to accomplish that.

    d. They plan new tasks every 2 weeks

    e. Open meeting welcoming contributors at: Thursday 10 am, german time

    f. https://github.com/pypsa-meets-africa/pypsa-africa#get-involve

    g. Implementation:

        i. Now:

            1. – Focus on demand. Industry, transpart, shipping

            2. Focus on features (functionality) before implementing the data

        ii. April focus: Implement data

    h. PR on GADM clustering should be final soon. https://github.com/pypsa-meets-africa/pypsa-africa/pull/264

170. Max

    a. Implemented demand PR from Giacomo. Allows now easy change of load data in config. (Essential if we integrate hourly predictions)

    b. https://github.com/pypsa-meets-africa/pypsa-africa/pull/275

    c.

171. Lukas

    a. Results of new tower inference method in a few weeks

172. Johannes – PyPSA-Africa updates

    a. CI speed up: https://github.com/pypsa-meets-africa/pypsa-africa/pull/277

    b. 2nd PR was copernicus code update: https://github.com/pypsa-meets-africa/pypsa-africa/pull/272 Allows to remove areas from renewable potential (you can not build in a jungle a wind power plant

    c. WPDA will get a new PR (remove the current way how wpda is rasterized)

173. Introduction –

    a. Thomas (Timbis). Working in a french company & wants to contribute. Works in Dakar. Focus on low voltage grid. Use of pandapower.

    b. Jan. Norwegian consultancy. Works with Tanzania, Zambia, … Background in economics but programms also. Works on power system model on Tanzania. Fully independent Tanzania model

        i. Not open source

💬 Discussion Topics

- Max. Can we create one data for the world and store all data per country on Zenodo? Allows fast computations.
  - Needs unique naming.
  - Needs a function that merges files.
  - Discuss afterwards if it makes sense…
- Caching the CI data

✅ Action Items

Last

- ☐ Need for video material for speed up the learning
- ☐ Create the list of contribution and short bio in the github documentation to shorten the initial introduction in the Code&Data meetings
- ☐ Rename the website and initiative from PyPSA-Africa to PyPSA-Earth (not urgent)
- ☐ MAKE CI run for all OS without stopping when one crashes
- ☑ ~~Ask WP leaders comments beforehand the meeting to fill some updates~~

#104 Fortnightly Code Meeting

10.02.2022 Purpose: Exchange, coordinate projects, and discuss pressing topics.

Attendance: Katia, Davide Fioriti, Hana Elattar, Max Parzen, Hazem

Agenda

🙌 General initiative updates

29. PyPSA-Earth
    a. Mission and vision.
    b. Clarifying the core concept. Avoiding too many models…(PyPSA-Eur -> MyPyPSA-Ger, PyPSA-UK other examples, PyPSA-China, PyPSA-India,

PyPSA-US, PyPSA-SouthAfrica) But rather create a "wikipedia" of energy models where everyone can contribute
   c. Saves time and increase quality
30. Outreach update
   a. The prototype and new initiative event went amazing.
   b. Hazem. News on Egyptian and Moroccan contact? Christine got in touch but has a lot on the plate and will reach out in mid-february.
31. PyPSA-Earth-Sec initiative is born
   a. Led by Hazem
   b. Plans ahead - how and where can people get involved?
   c. Working towards a Minimum Viable Product. Agile manner, start with an initial small product soon and keep improving it. Goal mid-March for morocco and 3 carriers: power, h2, methane, [gasoline]
32. Demand team
   a. New leader: Stephen, PhD student at MIT, focuses in his work on demand prediction in high resolution
   b. Pipeline of activities on high-resolution demand estimation

📣 Code and Data updates

Introducing and discussing new features.
   174. Davide
      a. Build_shapes preliminary tests to download general world data
      b. Download_osm_data improved to cover the world, with help by Katia
      c. Create a standard for data validation
   175. Hazem
      a. PyPSA-Earth-SEC minimum viable product in March
         i. Country: Morocco
         ii. Energy Carriers: Power, Hydrogen, Methane & Liquid HC
         iii. All demand sectors (only as features, with dummy data)
         iv. (Hazem added a "support student" to the project)
   176. Lukas
      a. Images are labelled
      b. No big results but everything is prepared for the show
   177. Stephen
      a. Working on downscaling techniques to estimate demand for small regions
      b. Work organised in tasks, each one with a role
   178. Johannes (can't join today): Working on renewables potentials & profiles workflow (off-project; probably ready to bring to pypsa-africa in a few weeks)
      a. WDPA & WDPA Marine: codes/workflow improvements
      b. Topology/Slope site assessment for (non-) eligible areas
   179. Emre
      a. Working on Turkey, now workflow works till add_electricity (soon beyond)

180. Dahunsi + Emre
    a. Working on open source solver benchmark of HiGHS compared to others

💬 Discussion Topics

- Davide. Linkers. Create a folder with all the linker (replace global default data by more detailed data)...
- Hana, works on urban planning with Enerplanet at the TH Deggendorf. They use OSM data and predict building-wise demand profiles and create mini-grid system models
  - Not open source yet
  - They also work on traffic etc.
  - Providing data/platform to communities (incl. city wise exclusion areas etc)
  - Davide has some thoughts on mini-grids

✅ Action Items

Last
- ☑ ~~Need for data validation~~
- ☑ ~~Apply to have a talk during the OpenMod workshop~~
- ☑ ~~Share a post about the OpenMod workshop~~
- ☑ ~~Add a github page to track data validation~~
- ☑ ~~Create notebook folder for data validation~~
- ☐ Need for video material for speed up the learning
- ☐ Create the list of contribution and short bio in the github documentation to shorten the initial introduction in the Code&Data meetings

New
- ☐ Rename the website and initiative from PyPSA-Africa to PyPSA-Earth
- ☐ Ask WP leaders comments beforehand the meeting to fill some updates

#103 Fortnightly Code Meeting

13.01.2022 Purpose: Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates

33. PyPSA-Earth
   a. Intro
   b. Welcome guests
   c. Prototype release v.0.0.1
   d. A project won a funding proposal intending to jump in the dev
   e. Exciting demand group updates

34. Outreach update
   a. Prep for the prototype release event (January 27th)
   b. Publicity update
   c. Hazem. PyPSA-Earth 2 pager

📣 Code and Data updates

Introducing and discussing new features.

181. Lukas
   a. Changing directory structure to make repo more accessible
   b. Evaluated results of naive cycle gan approach
   c. Set up trello with tasks
182. Hazem
   a. PyPSA-Africa-SEC!
183. Katia
   a. Add world_dictionary to comply with geofabrik naming
   b. Making osm data tests for countries of Northern Eurasia
184. Davide
   a. Add plot_summary, make_summary rule
   b. Rules renamed: scripts name adhere with snakemake rule
   c. First Africa solved network
185. Max
   a. Move from "new-main" to "main"
   b. Add issue, and PR template
186. Johannes
   a. –

187. You?

💬 Discussion Topics

- Katia. Do we want to support the OpenMod workshop?
- Max. Does someone want to join to adjust the website design? (i.e. pypsa-earth logo and add content? Would guide the developments - content and code)
- Max. Does someone want to do a new open-source solver benchmark? We are trying to collect funds for the HiGHS solver team to improve HiGHS and add features to tackle large optimization needed for our problems.
- Davide. Data validation shall be improved. Validation may be done similarly to validation_nigeria notebook available in the notebooks and store the validation notebooks in a specific folder

✅ Action Items

Last
- ☐ Transfer data from Teams to Google drive (step closer to transfer)
- ☐ Analysing AI detection performance
- ☑ ~~Improve hydro performances (Matija will take care)~~
- ☑ ~~Create issue. Split "world dictionary" in ISO and Geofabrik.~~
- ☑ ~~Create issue. Downscaling based on Urbanisation and roadmaps & presence of certain infrastructure.~~

New
- ☐ Need for data validation
- ☐ Apply to have a talk during the OpenMod workshop
- ☐ Share a post about the OpenMod workshop
- ☐ Add a github page to track data validation
- ☐ Create notebook folder for data validation
- ☐ Need for video material for speed up the learning
- ☐ Create the list of contribution and short bio in the github documentation to shorten the initial introduction in the Code&Data meetings
- ☐ Videos or description for motivating people and advertising the event

#102 Fortnightly Code Meeting

16.12.2021 Purpose: Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates

35. PyPSA-Earth
    a. Intro
    b. Welcome guests
    c. Active work on PyPSA-Africa paper (start of series)
    d. NREL, Frauenhofer and RTE fun project over Christmas. Purpose for LinuxFoundation Energy/ G-PST presentation. Does someone want to join? See more here: https://github.com/G-PST/power-flow-exercise/blob/main/planning-exercise.md)

36. Outreach update
    a. Prep for prototype release & PyPSA-Earth announcement
    b. Potential publicity Sat1 Fruhstucks Fernseh (Germany) or The Guardian
    c. #PyPSACon2022

📣 Code and Data updates

188. Davide
    a. CI fix
    b. Powerplantmatching
    c. Debugging script and validation for Nigeria
    d. Improvement performances and issue fixing of osm data extractor
    e. Minor fixes and styling (remove warnings in build_bus_regions and build_shapes, add progress bars in build_shapes, …)

189. Katia
    c. Testing OSM data download for different regions (RU + Central Asia). Relates to the data workflow issue https://github.com/pypsa-meets-africa/pypsa-africa/issues/133
    d. Draft cleaning script of osm generators to match powerplantmatching standard

190. Max
    a. Augmented line connections implemented https://github.com/pypsa-meets-africa/pypsa-africa/pull/175

b. Add missing demands. Rescaled Nigerian demand timeseries according to GDP/capita. Manual file replacement is necessary. See: https://github.com/pypsa-meets-africa/pypsa-africa/blob/new-main/notebooks/0demand_gegis.ipynb (implement in script?)

💬 Discussion Topics

- Max. Update and move databundle to Zenodo (requires license check). Reason faster download compared to googledrive downloader? When. ASAP as need before and after prototype release?
- Max. Generating shapes with population data is a pain in the * and takes some time to be generated for the continent. Upload shape to Zenodo. Can GADM shape data fill the Voronoi cell region?
- Davide. As the goal is to release the first version, we shall focus on validating the model as most as we can and fix the corresponding relevant issues. To know, those shall be: integration of adequate powerplant data (fix powerplantmatching to be populated with data from OSM), fix and validate the hydro capacities and energy production, produce nice plots and validate the results for at least a country (Nigeria) to be later extended to Africa.

✅ Action Items

Last
- ☐ Transfer data from Teams to Google drive (step closer to transfer)
- ☐ Analysing AI detection performance
- ☐ Improve hydro performances

New
- ☐ Create issue. Split "world dictionary" in ISO and Geofabrik.
- ☐ Issue. Downscaling based on Urbanisation and roadmaps & present of certain infrastructure.

#101 Fortnightly Code Meeting

02.12.2021 Purpose: Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates

37. PyPSA-Earth
    a. Pivot to Discord instead of Slack
    b. Run PyPSA-Africa Hackathon 01.12.21, great teamwork Matin, Lukas, Davide
    c. Active work on PyPSA-Africa paper is starting
38. PyPSA-Distribution updates
    a. TH-Deggendorf prototype presentation
39. Outreach update
    a. HiGHS implementation made some publicity (see [here](#))

📣 Code and Data updates

191. Davide
     a. First realistic solution of the network
     b. Enabled solar, wind and hydro resources
     c. Enabled conventional generators
192. Max
     a. Continuous Integration implemented in Github
     b. Developed procedure to create databundle with smaller size, such as the tutorial data kit
193. [Johannes] (added by Davide)
     a. Pull request to implement csp in atlite
        https://github.com/PyPSA/atlite/pull/194
194. [Omer] (added by Davide)
     a. First contribution by Omer to address when lines do have multiple voltages
195. [Ekaterina] (added by Davide)
     a. Working on powerplantsmatching and how to incorporate data by OSM
196. Lukas
     a. Implement model from paper to detect transmission towers, based on a github repository

💬 Discussion Topics

- Q[Max]. [Dispa-SET Africa](#) colleagues are interested to validate/improve hydro integration in PyPSA-Africa. Since hydro makes 30-40% of Africa's current energy supply maybe good to have a closer look into it? (they could write the section about it in the paper?)

✅ Action Items

- ☐ Transfer data from Teams to Google drive (step closer to transfer)
- ☐ Analysing AI detection performance
- ☐ Improve hydro performances

#100 Fortnightly Code Meeting

18.11.2021 Purpose: Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates

40. PyPSA-Earth
    a. New collaborators (Shari, Thierry, Katia)
    b. **Wednesday 01.12 Hackathon, 12-15:00 (UK-time).** Contributors? Github repo?
    c. Exchange with ZUSE institute (PIPS-IPM++ and co.). Offering collab. Does someone want to establish contact with Egypt? Hazem?
    d.

41. PyPSA-Distribution updates
    a. Exchange with German DSO
    b. Scheduled exchange on Tuesday with Deggendorf, Edinburgh, Heriot-Watt
    c.

42. Outreach update
    a. Mattermost? Thinking about a pivot? ›
        i. Chat over **slack**,
        ii. video over **zoom**,
        iii. documents over shared folder **google drive,**
        iv. voice channel over **???**
    b. Google drive access on invite only, rest open 4 ALL
    c. Migration of documents

📣 Code and Data updates

197. Max
    a. Debugging old stuff (need for CI)
    b. HiGHS implemented (waiting for PR acceptance and publication of results)
    c. Update. Does PyPSA_Africa solves correctly?

198. Davide
    a. Improvement of documentation, structure ok, some quality refinements but ok
    b. Structure-related
        i. CI: need for sample case study to be kept in github to simplify CI

ii. Improve retrieve-databundle to incorporate multiple regions (africa, europe, etc)

199. Hazem
    a. Finalized improvement of clustering by external shapefile (GADM shapes)
200. Lukas
    a. Data for AI are not precise, thus trying to enhance precision
    b. Testing algorithm on Ghana
    c. Improvement on the results

💬 Discussion Topics

- Kmeans for clustering (seed for more stable clustering)
- Grouping lines and substations together. We have that already (Matin)
- Flexibility analysis for Nigeria
- How to start: check Github open issues and write us
- Contacts with institution in Berlin with contacts with Egypt (ministry & university)
- Problems with installation (Linux interface such as https://docs.microsoft.com/en-us/windows/wsl/install solves most problems according to Johannes)

✅ Action Items

- ☐ ~~Find out what is the error in solving (approach Max if you want to investigate the reason for bugs)~~
- ☐
- ☐ ~~Add Windows/Mac installation note that an interface can solve installation problems: Linux interface such as https://docs.microsoft.com/en-us/windows/wsl/install~~
- ☐ ~~Problems/Issues should be posted on SLACK (add info in readthedocs/documentation)~~

#XXX Fortnightly Code Meeting

XX.XX.XXXX Purpose: Exchange, coordinate projects, and discuss pressing topics.

Agenda

🙌 General initiative updates

43. PyPSA-Earth
    a.
44. PyPSA-Distribution updates
    a.
45. Outreach update
    a.

📣 Code and Data updates

201.   Name
        a.
202.   Name
        a.
203.   Name
        a.

💬 Discussion Topics

-

✅ Action Items
☐