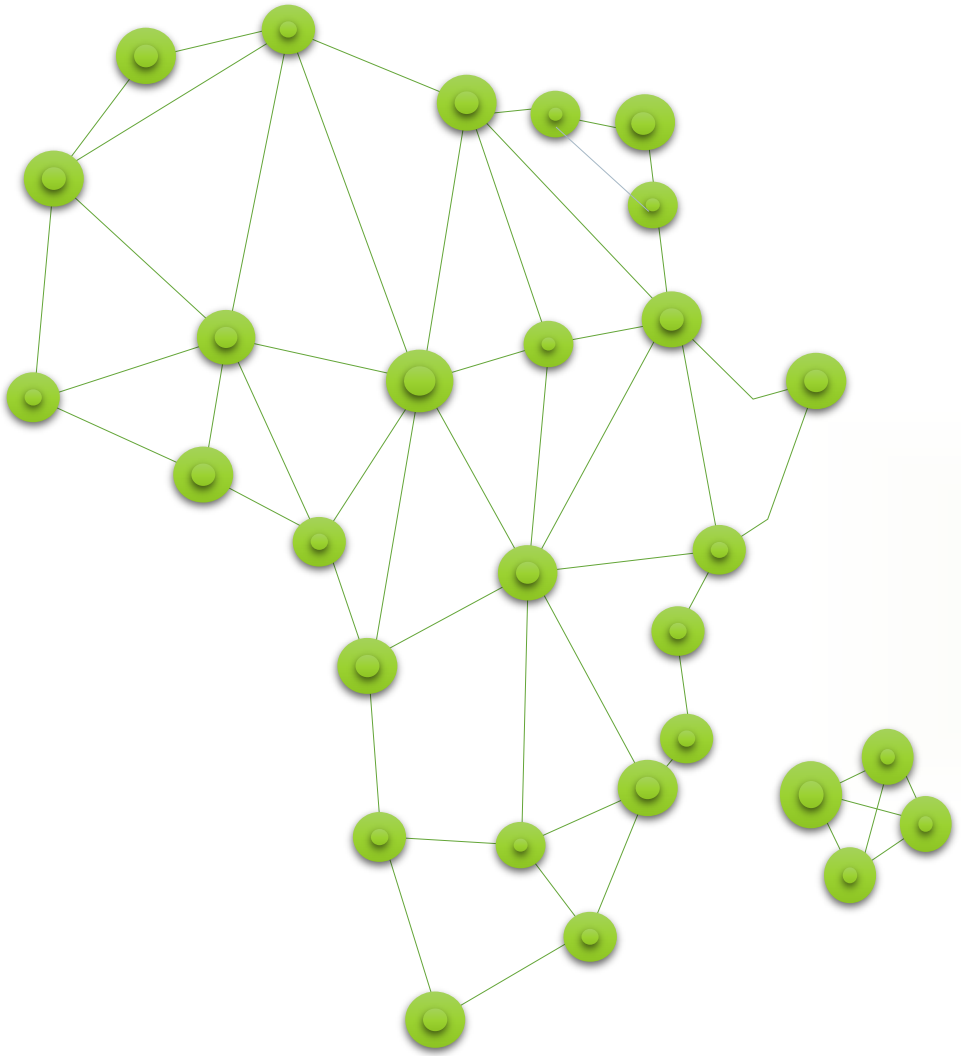

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InfraFair: Infrastructure Cost Allocation

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This project receives funding from the European Union's Horizon 2023 Framework Programme for Research and Innovation under Grant Agreement no. 101118123

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Introduction

The Problem

Infrastructure (network) cost allocation

- Who will pay the investment cost for new infrastructure projects?
- How do we recover the cost of existing network assets?
- …etc.

Regulatory questions

- How do structure network charges?
- Do charge generators or only demand? How much each?
- …etc.

Search Ctrl + K

Getting Started

- Introduction
- Installation
- Quick Start

Examples

- Electricity Networks
- Gas Networks
- Heat Networks

Model Details

- Mathematical Formulation
- Input Data
- Output Results

Help & References

- Release Notes
- Contributing
- Research Projects
- Contact Us

Infra*Fair*™

"Fairness in allocating infrastructure cost"

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INSTITUTO DE INVESTIGACIÓN TECNOLÓGICA

InfraFair is an open-source modelling tool for infrastructure cost allocation that can be used for any flow-based energy infrastructure, such as the electricity, gas, heat and hydrogen infrastructure.

The tool has been developed at the Instituto de Investigación Tecnológica (IIT) of the Universidad Pontificia Comillas.

Documentation

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Read the Docs

https://infrafair.readthedocs.io/en/latest/#

https://github.com/IIT-EnergySystemModels/InfraFair/tree/main

python 3.8 | 3.9 | 3.10 | 3.11 | pypi package 1.1.0 | License AGPL v3 | docs passing | downloads 2k

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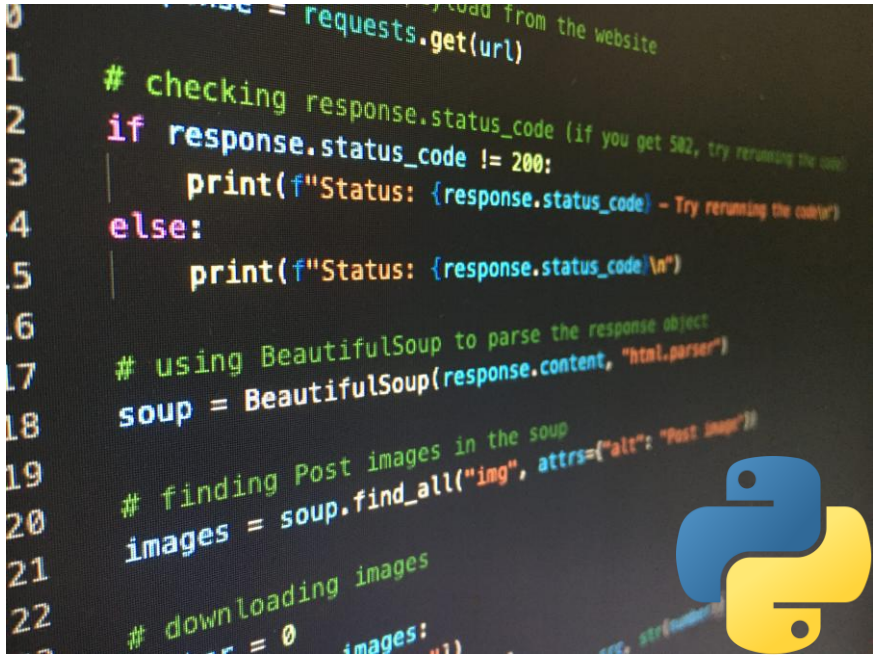
Development goals

- Simplicity and transparency
- Code written to be read by humans
- Scalability: from small- to large-scale cases
- Flexibility: optional inputs and cost allocation criteria
- Strong orientation to computational efficiency using matrix operation
- Verifiable results
- Developed in **Python**
- Input data and output results in text format (csv)



Modelling

InfraFair

InfraFair is a modelling tool aimed at computing the allocation of the cost of energy infrastructure according to the economic use expected to be made by users, in order to drive efficient investment decisions and facilitate agreements on new projects.

InfraFair™
Infrastructure Cost Allocation

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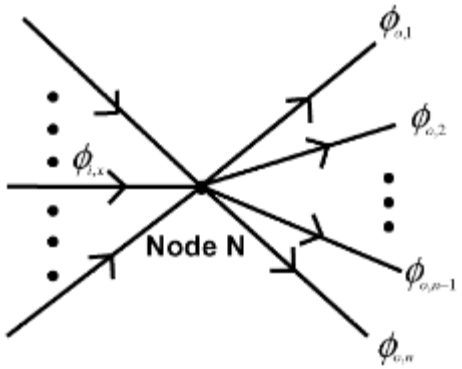
Modelling methodology

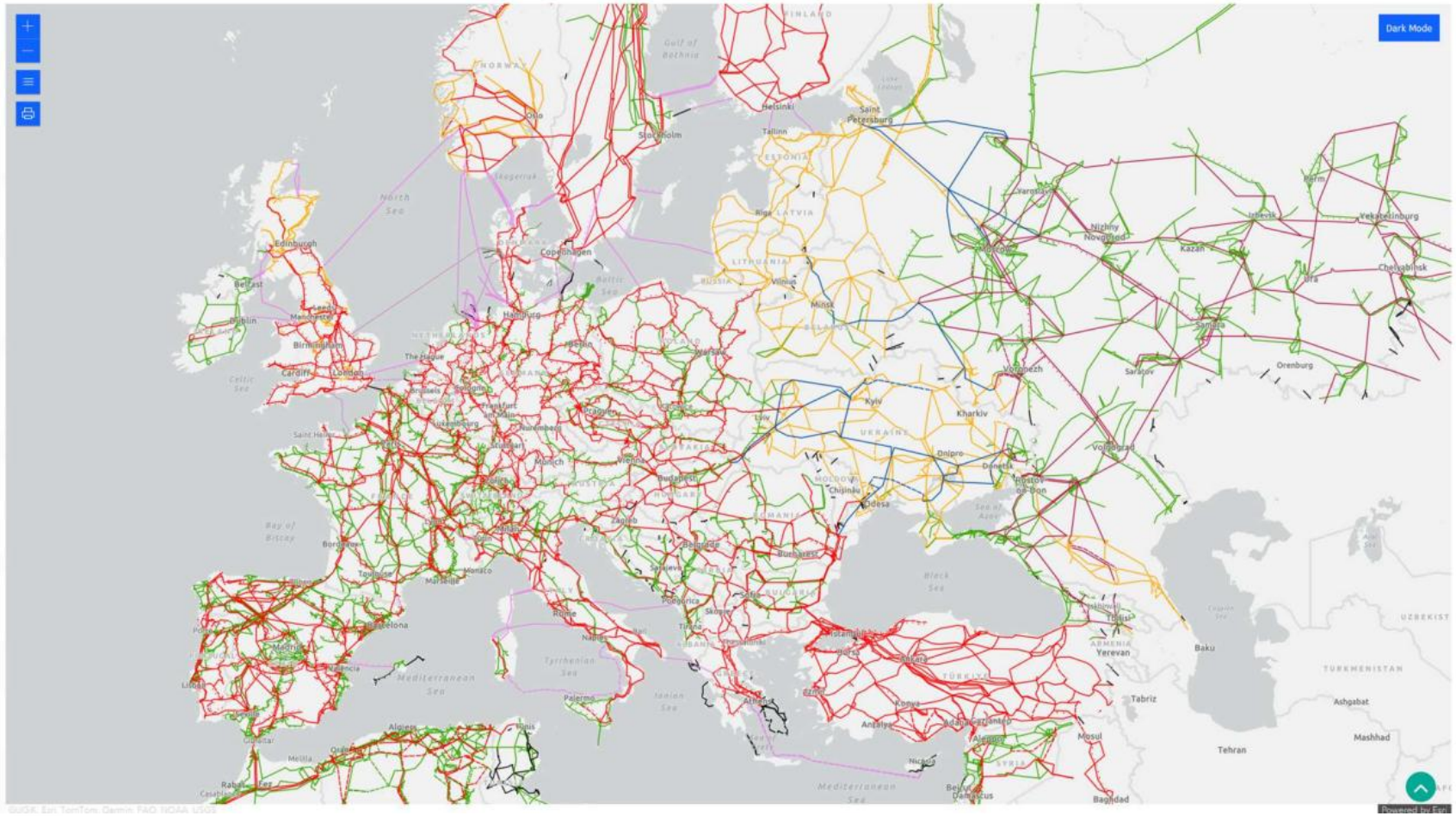
The modelling tool employs the **Average Participations Method (APM)**, which allocates the cost based on the usage that each user makes of each infrastructure asset as a reasonable proxy to the benefits.

The basic intuition behind the **APM** is that energy consumed by demands and produced by generators, as well as the responsibility for causing energy flows, can be assigned by employing a **simple heuristic rule** that only uses the actual pattern of flows in the infrastructure network.

$$C(\phi_{(i,x)}, \phi_{(o,y)}) = \phi_{(i,x)} \frac{\phi_{(o,y)}}{\sum_{j=a}^{n} \phi_{(o,j)}}$$



Geographical representation

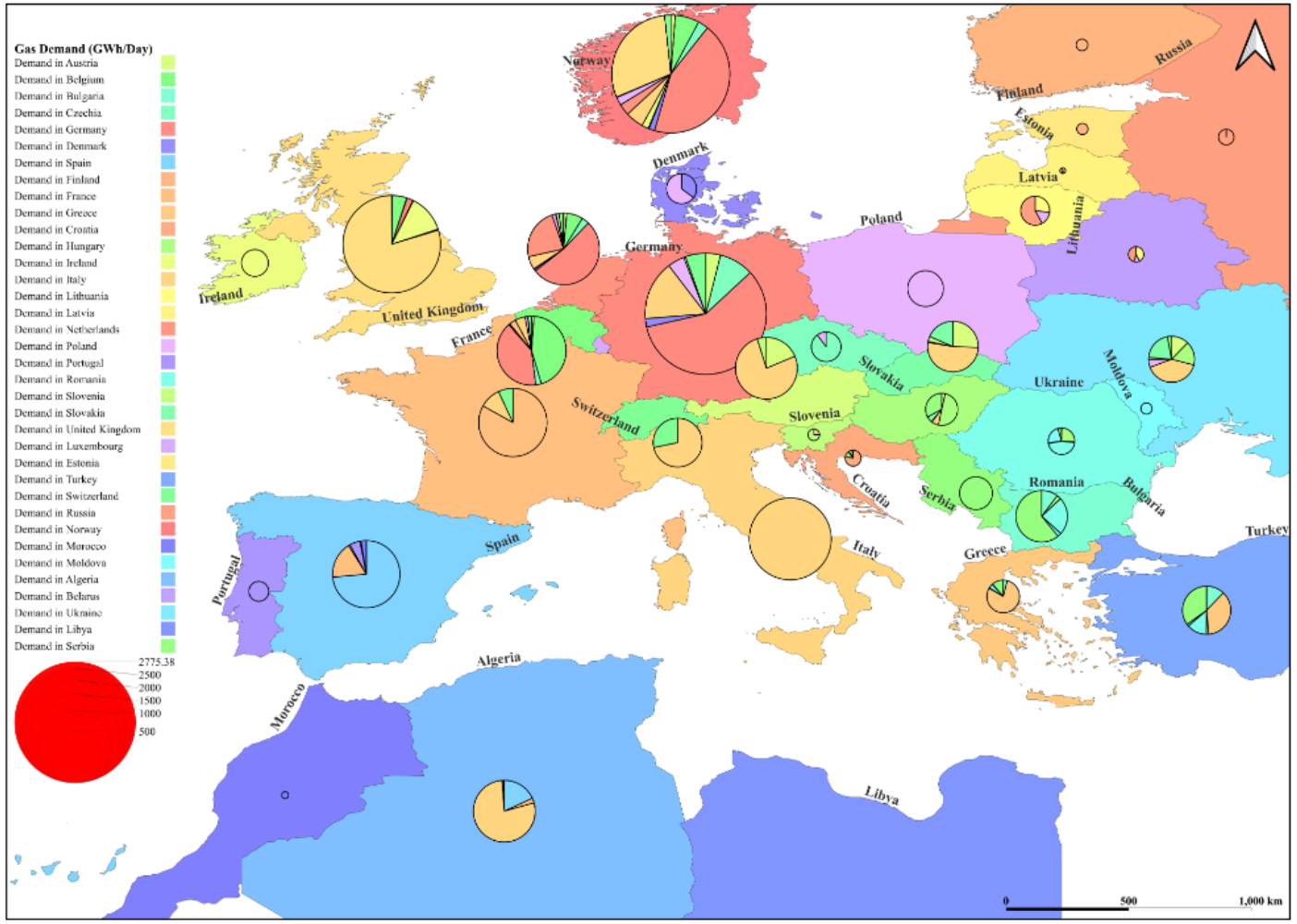


Functionality

When provided with hourly representative snapshots, **InfraFair** can calculate (per snapshot and overall annual weighted average):

- Individual agent or country flows, losses and cost contributions to each asset in the network.
- Individual agent or country utilisation of each asset in the network.
- Individual Agent or country flows, losses and cost contributions to similar aggregated assets.
- Individual agent or country utilisation of similar aggregated assets.
- Individual Agent total cost contribution to be paid.
- Individual agent or country utilisation of the whole network.
- Country flows, losses and cost contributions made of the use of each other country.
- Country total flow and cost contributions made of the use of the rest of the network.
- Country flows, losses and costs incurred from the use made by the rest of the countries.

Output results



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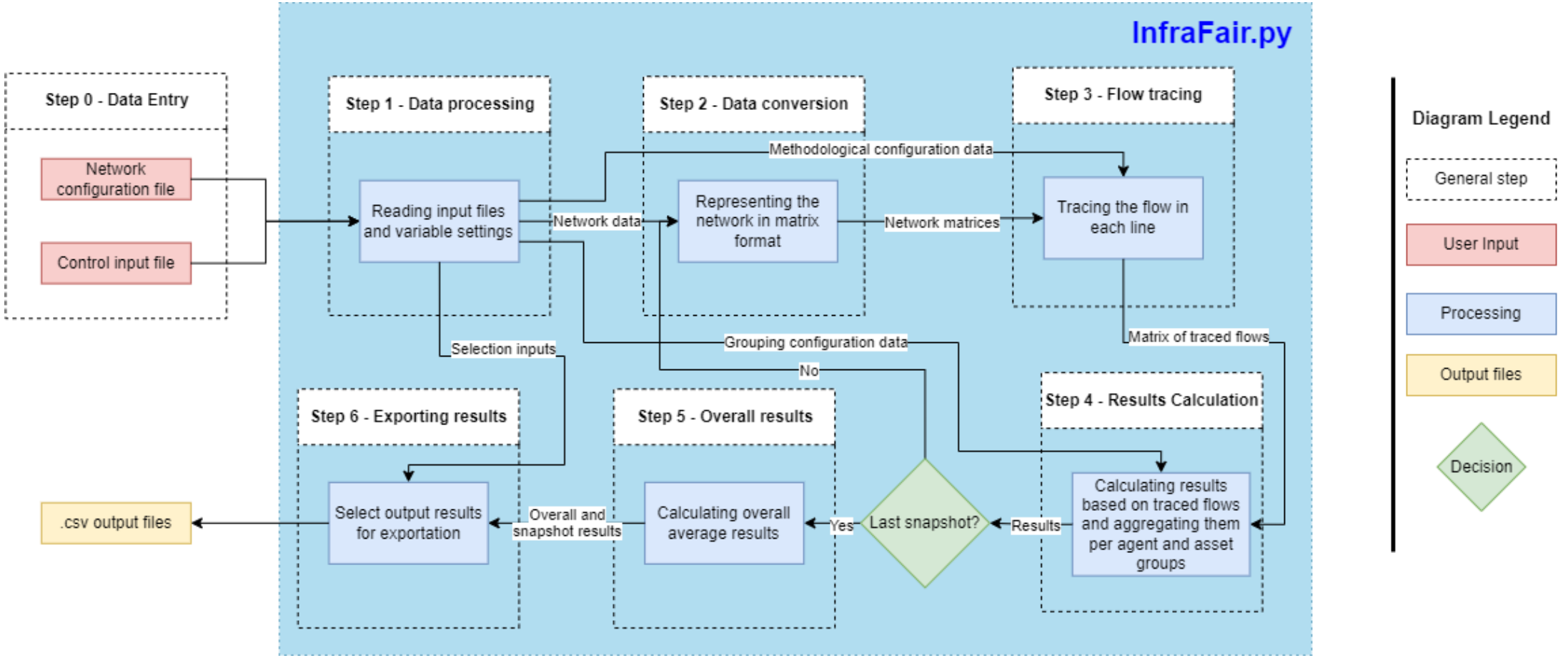
InfraFair structure



Case studies

Research projects

The model has being used in these research projects:

- Quantitative assessment of Regional Cost Allocation Methods in the West African Power Pool developed for CESI S.p.A. July 2023 - July 2024. L. Olmos, M.A.E. Elabbas, S. Gómez Sánchez

  > It aims to apply and evaluate several methodologies for the computation of electricity transmission tariffs to allocate the cost of the regional transmission grid in the West Africa Power Pool (WAPP) to derive regulatory and policy recommendations.

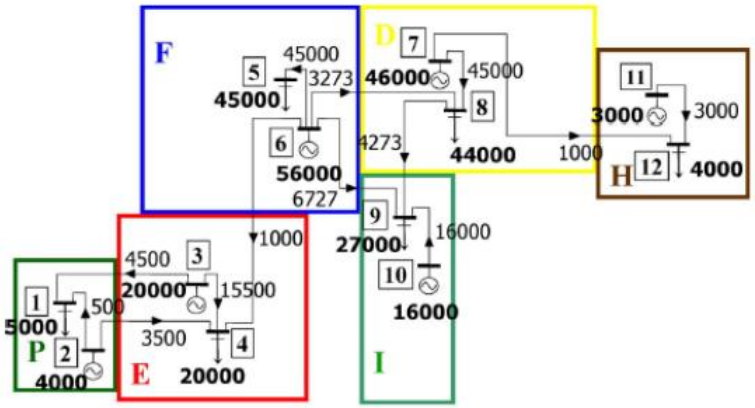
Citation:

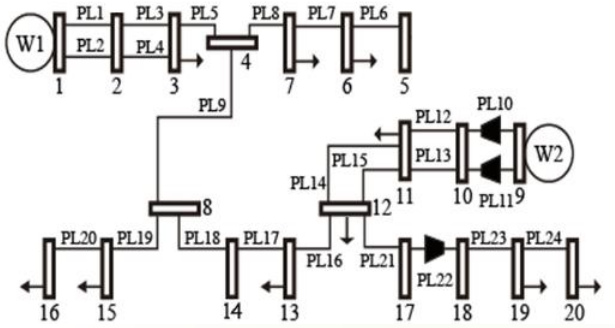
- Mohamed A. Eltahir Elabbas, Luis Olmos Camacho, Ignacio Pérez-Arriaga, InfraFair: Infrastructure cost allocation, 2025, SoftwareX, Vol. 29, pp. 102069-1 - 102069-9, DOI:10.1016/j.softx.2025.102069

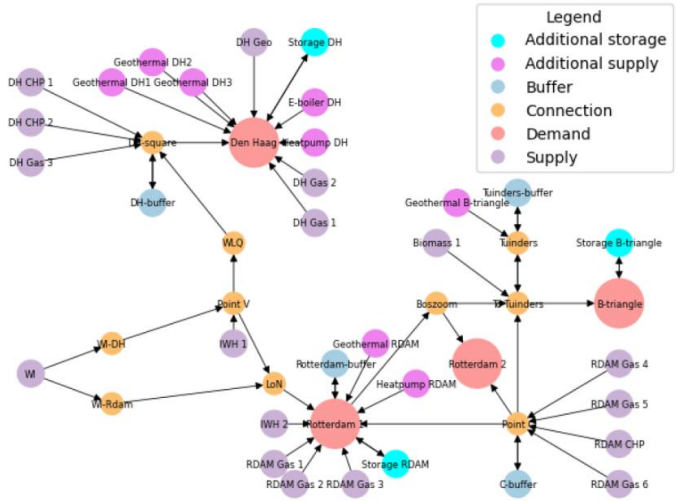
Case studies

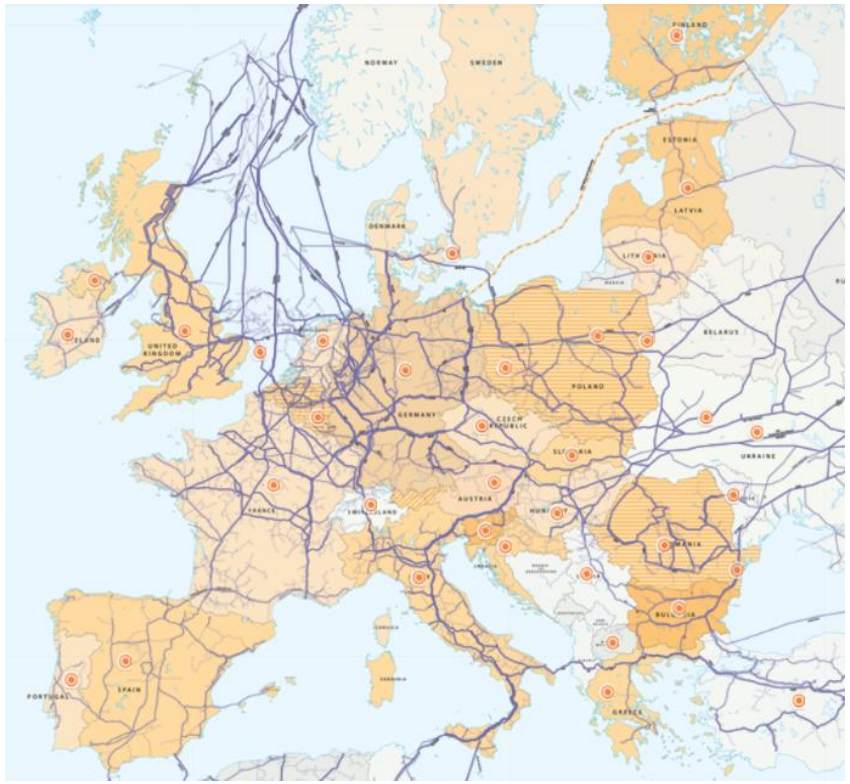
Examples

- Electricity Networks
- Gas Networks
- Heat Networks









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Thank you for your attention!

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https://infrafair.readthedocs.io/en/latest/#

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