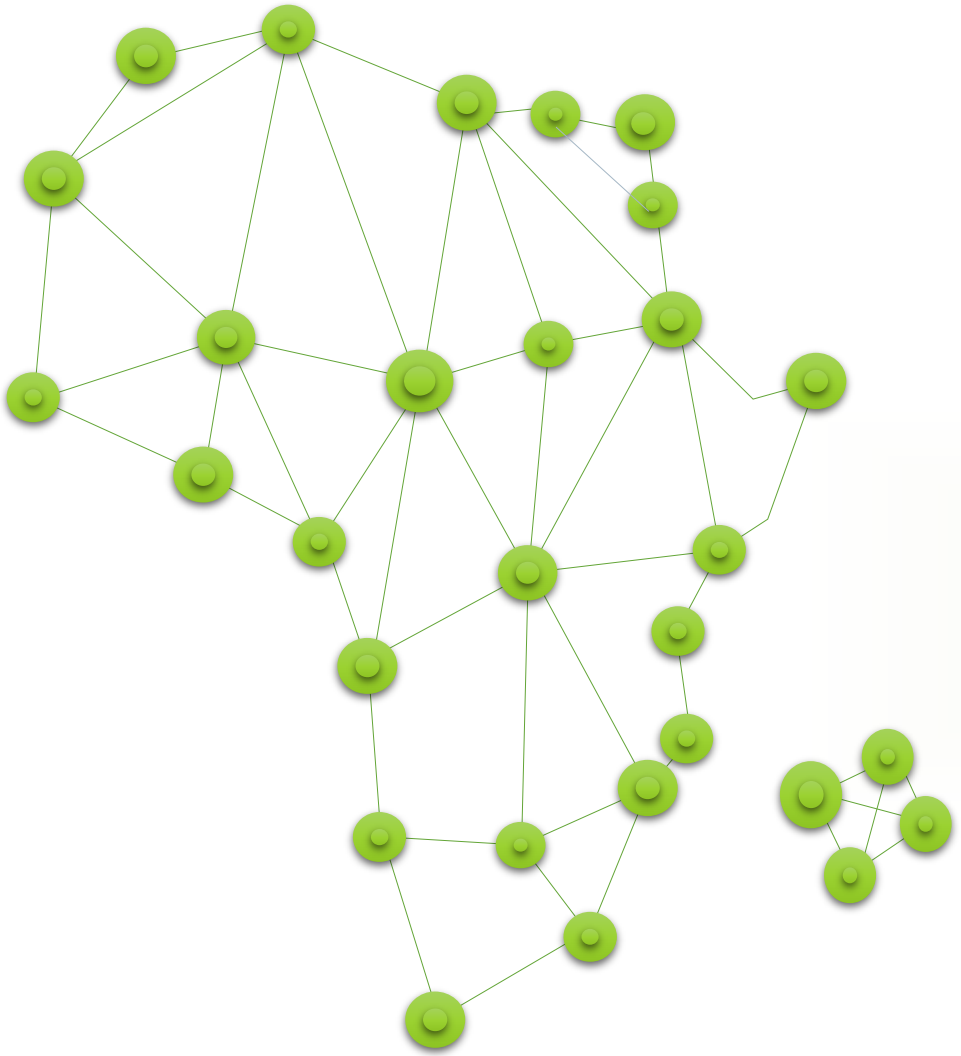

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InfraFair: Infrastructure Cost Allocation – 2nd WS

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1. Recap
2. Applications
3. Q&A

Recap

The problem & objectives

Energy 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.

Facilitate Regulatory decisions

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

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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Getting Started

- Introduction
- Installation
- Quick Start

Examples

- Electricity Networks
- Gas Networks
- Heat Networks

Model Details

- Mathematical Formulation
- Input Data
- Output Results

Help & References

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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 | pypi package 1.1.0 | License AGPL v3 | docs passing | downloads 3k

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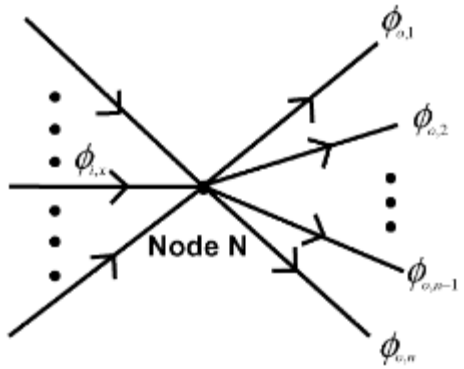
Modelling methodology

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 assumes that the flows reaching a node distribute among outflows proportionally to their magnitude.

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



Modelling methodology

Demand D1 contribute:

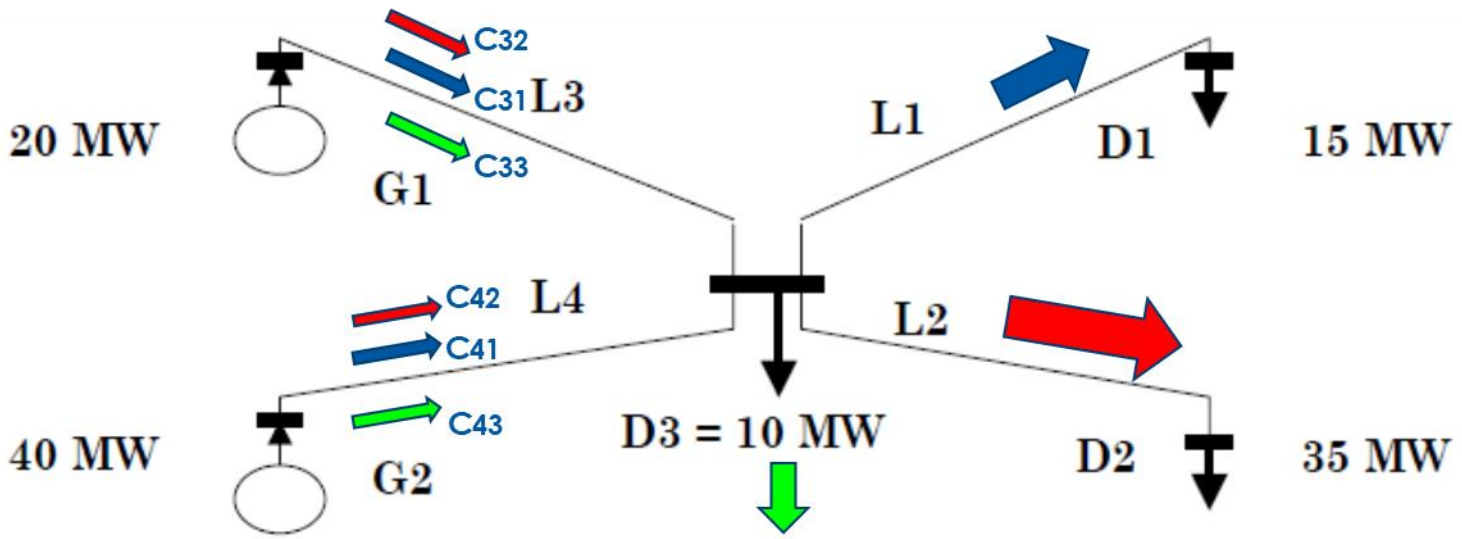
L1	15x20/(20+40) MW	C_{11}
L2	35x20/(20+40) MW	C_{21}
L3	20x15/(10+15+35) MW	C_{31}
L4	40x15/(10+15+35) MW	C_{41}

Demand D2 contribute:

L1	15x40/(20+40) MW	C_{12}
L2	35x40/(20+40) MW	C_{22}
L3	20x35/(10+15+35) MW	C_{32}
L4	40x35/(10+15+35) MW	C_{42}

Demand D3 contribute

L1	nothing	
L2	nothing	
L3	20x10/(10+15+35) MW	C_{33}
L4	40x10/(10+15+35) MW	C_{43}



C_{22}= 23.33 MW

Installation

1. Install Python (3.8 or 3.9) using the **cmd** or **Miniconda** or **Anaconda**.
2. Type:

```
> pip install InfraFair
```

2. Alternatively, download the repository from GitHub and run the source code.

Dependencies

- pandas for storing network data.
- numpy for calculations, such as matrix manipulation.
- matplotlib for aggregating results.

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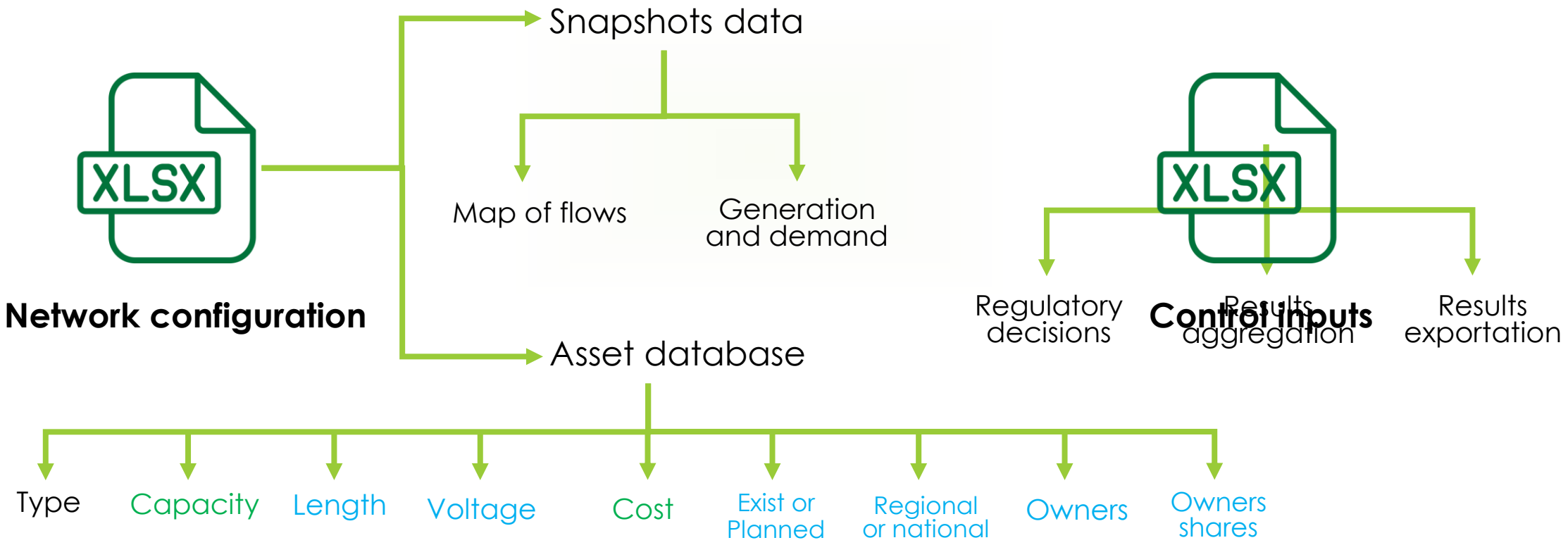
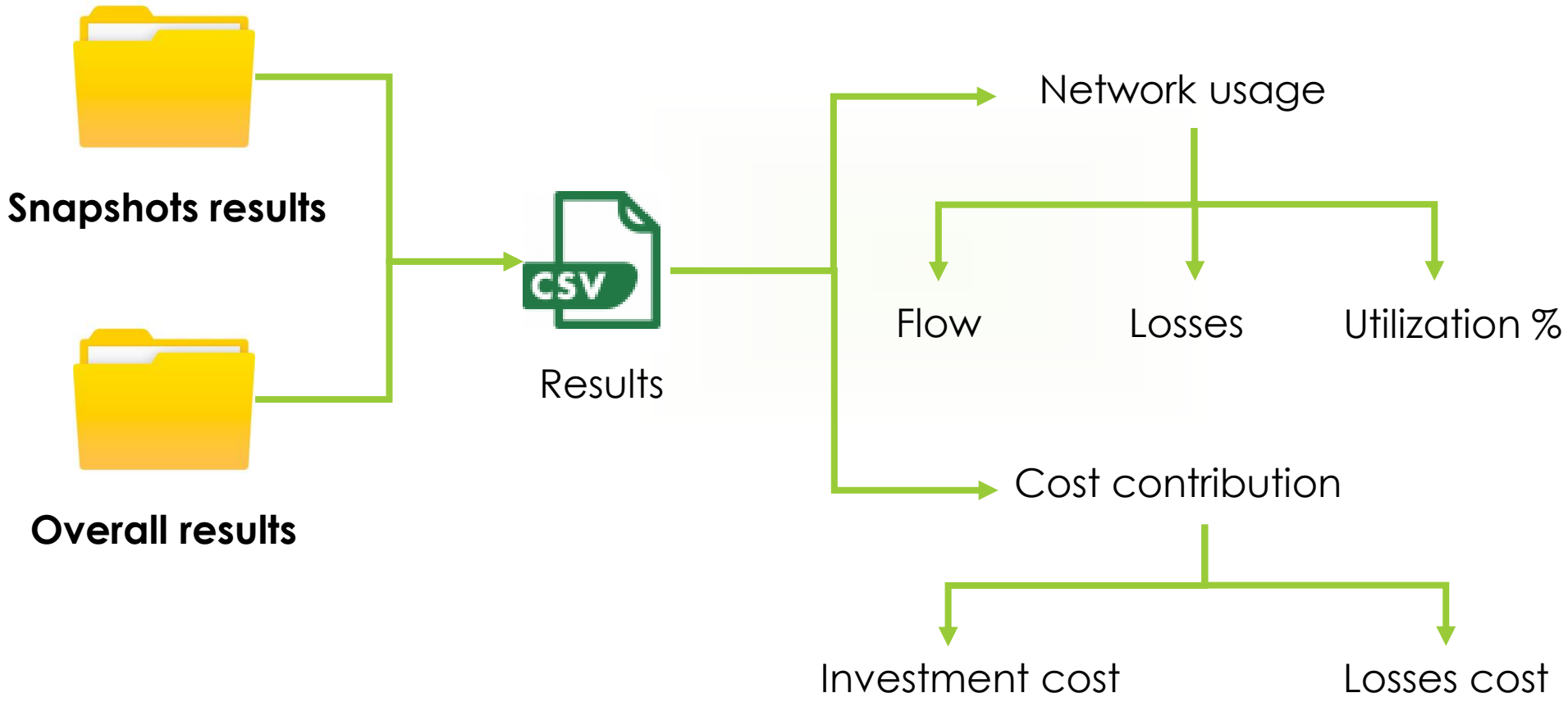
Applications

File structure

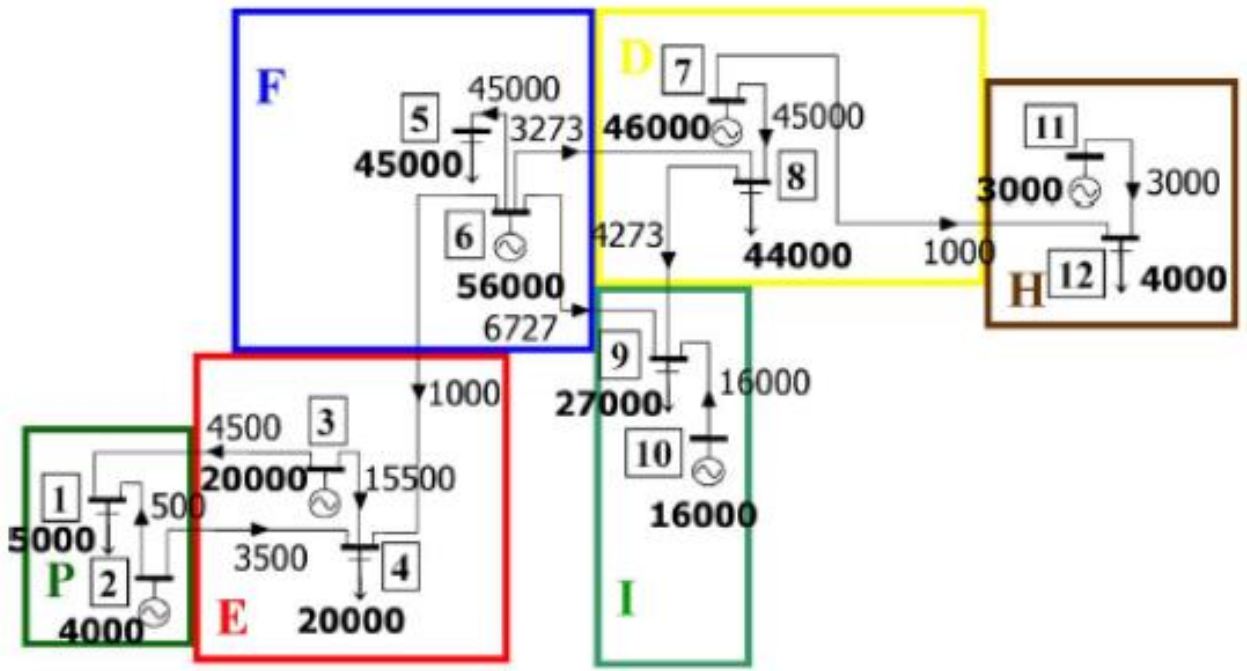


File structure



Small case

- 12 nodes:
  - 6 generators 6 demand
- 13 transmission lines
- 6 countries



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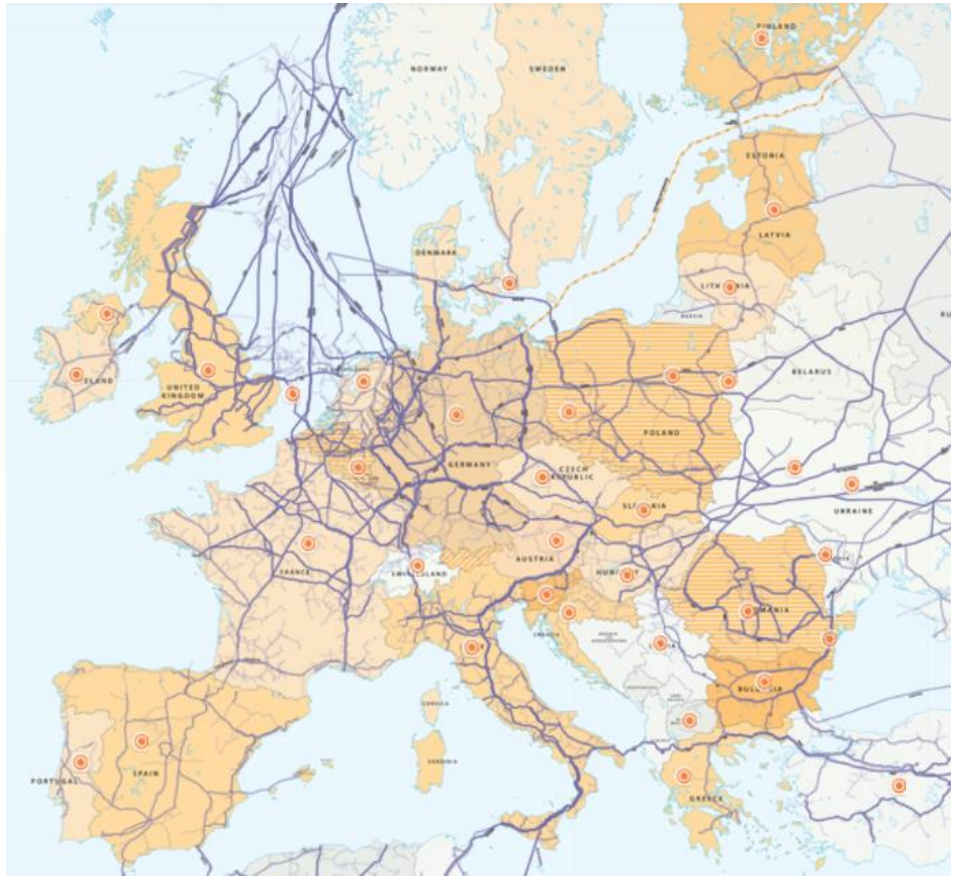
Large case

- 3,383 nodes:
- 5,679 transmission lines
- 18 countries



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Q&A

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Thank you for your attention!

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

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