

SciGRID_gas – A Topological Open Source Model of the European Gas Transport Network



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What is SciGRID_gas?

The European gas network is maintained by approximately 40 Transmission System Operators (TSOs) which generally do not freely provide access to the network data.

SciGRID_gas is a three year project at the DLR Institute for Networked Energy Systems, which aims at building and making available a **customizable open source model of the European gas transport network** for a wide range of stakeholders.

SciGRID_gas Deliverables

Open source data (license):

- Collection of European gas transport data sets (CC-BY 4.0)
- Collection of combined network models (CC-BY 4.0)
- Hourly EU gas demand data on NUTS3 level (CC-BY 4.0)

All data is published in a standardized CSV format and additionally in GeoJSON format.

Open source python based tools:

- Visualization library for **SciGRID_gas** data
- Accessing online data platforms to update data sets
- Heuristic and Logic Methods for **attribute generation**
- Creation of **network models** from different data sets
- European gas pipeline data extraction from **OpenStreetMap** (OdB)

Data Sources

The **SciGRID_gas** project provides the following data sets on the project webpage:

- **SciGRID_gas** online research (INET)
- **TSO Data for Norway (NO)** and **Great Britain (GB)**
- **Gas Infrastructure Europe [1]** (GIE)
- **Gas Storage Europe [2]**(GSE)
- **The International Gas Union (IGU)**
- **LKD-EU [3]**
- **Digitalization of the 2020 ENTSOG map [4]** (EMAP)
- **OpenStreetMap [5]** (OSM)

All provided data is either published under CC-BY 4.0 license or made accessible via the provided open source Python tools.

OpenStreetMap Data Download Tools

OpenStreetMap is a free, editable map of the world that is being built by volunteers mainly from scratch and released under the open database license.

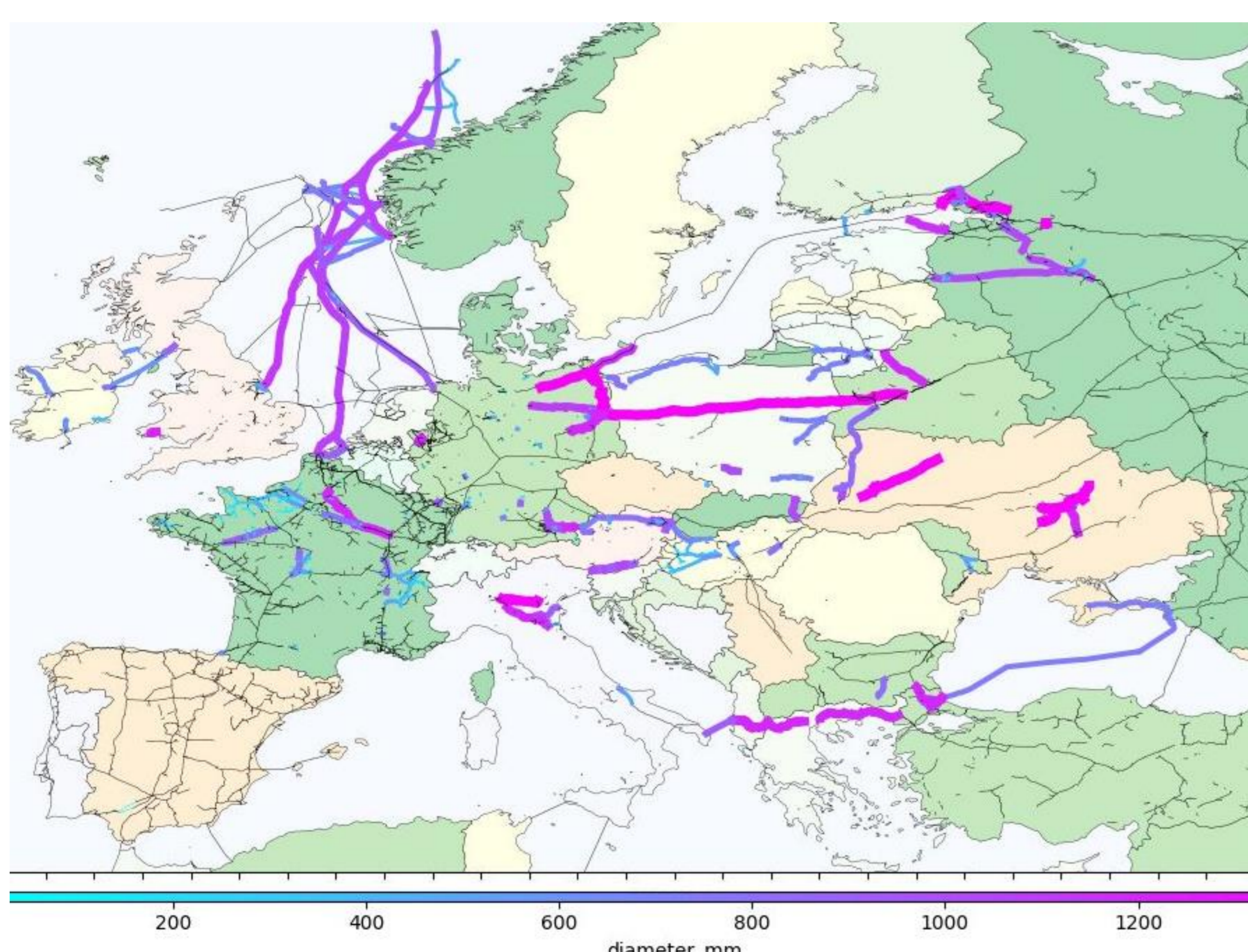


Fig. 1: Topological gas transport pipelines and diameter values extracted from OpenStreetMap, status January 2021.

SciGRID_gas provides automated processes (tools) to create gas pipeline datasets from OSM. The information within OSM is constantly growing which will make this data more valuable over time.

Gas Network Components

SciGRID_gas classifies gas network data from different sources into independent sets of network components. Each component holds relevant attribute data. The user can **choose which components will be merged to the network model**.

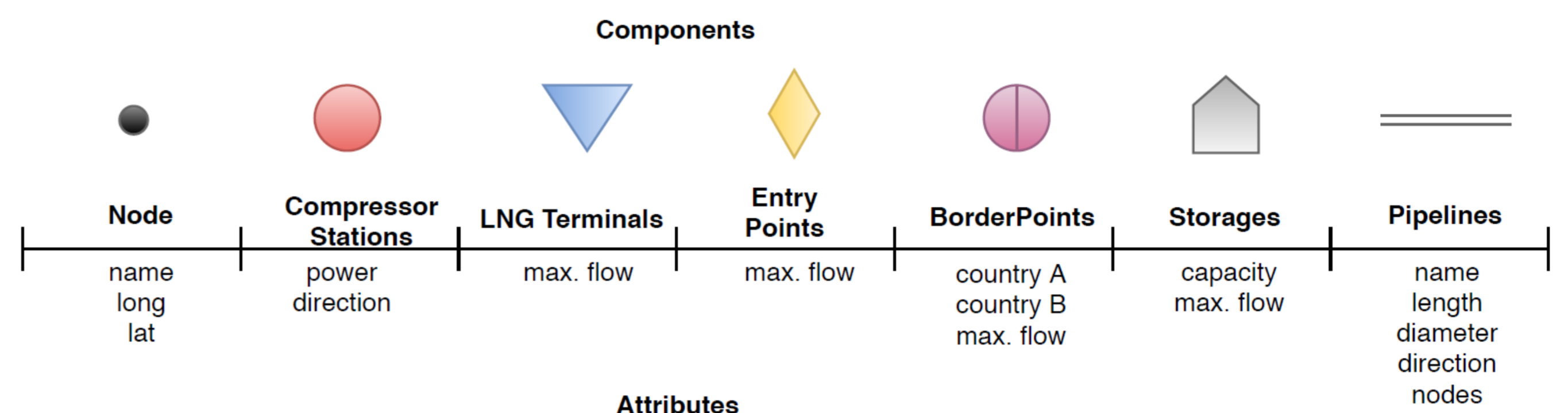


Fig. 2: Different gas network components with examples of the most relevant attributes.

Heuristic Methods

The collected network data can be automatically processed with heuristic methods in order to:

- Match components
- Estimate attributes
- Merge pipelines

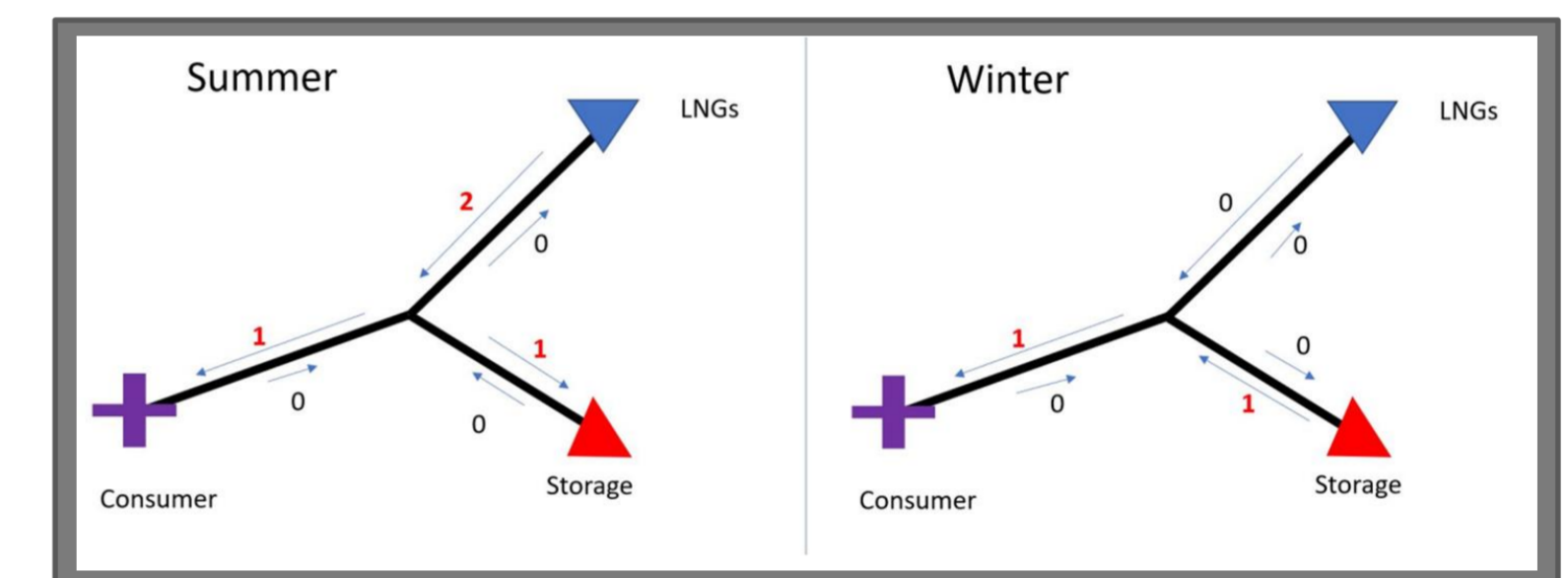


Fig. 3: Heuristic estimation of the flow direction using the "Numpath" method.

All methods can be **modified or replaceable** by the **SciGRID_gas** user.

Data Network Model

A **SciGRID_gas** network model is created by combining **different datasets** and with the help of **customizable heuristic methods**.

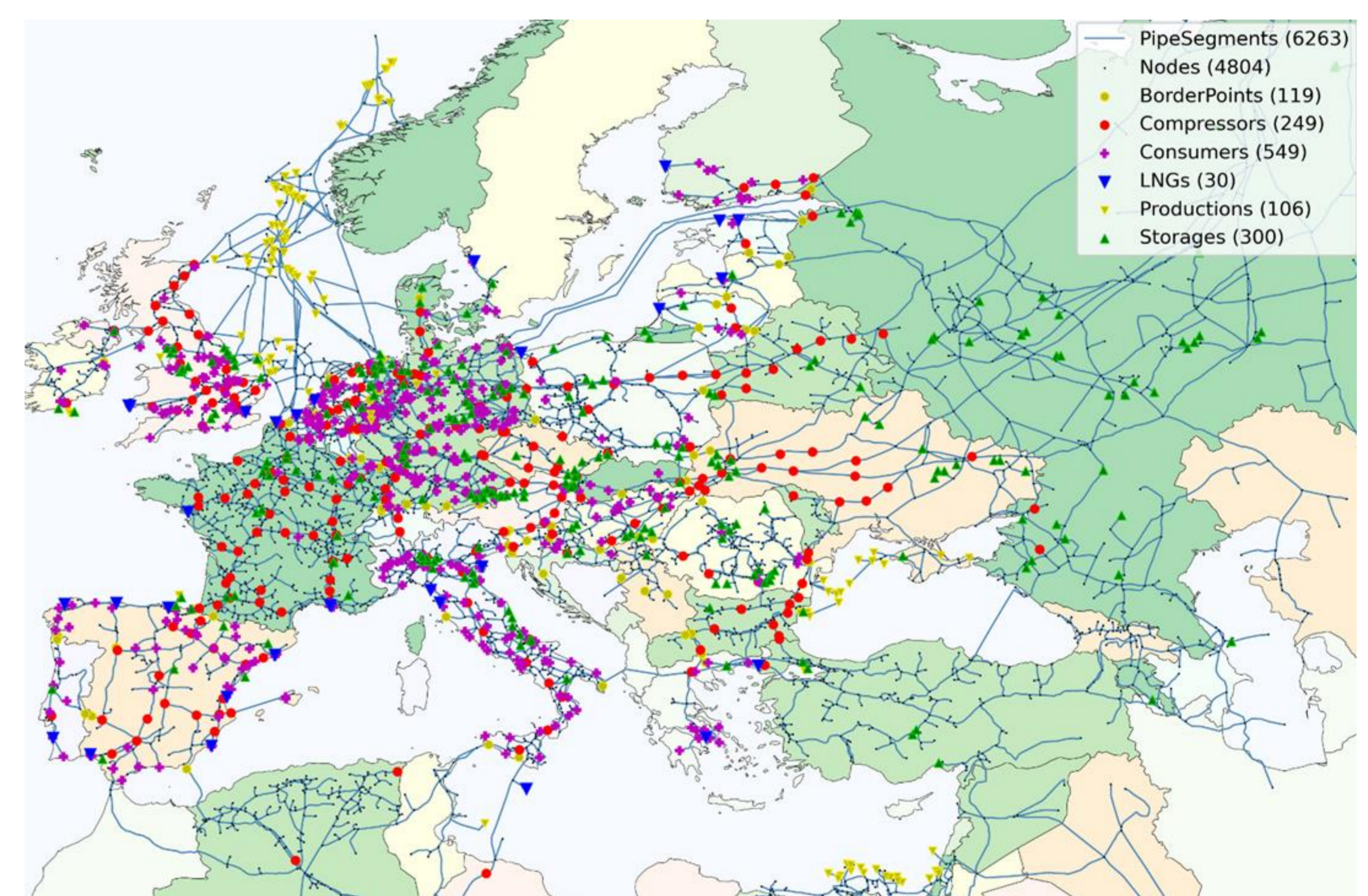


Fig. 4: The IGGIELGN network model with components.

The **IGGIELGN** model (Fig.4) has been compiled by the **SciGRID_gas** team by merging the data sets of INET, GIE, GSE, IGU, EMAP, LKD, GB and NO.

It contains data about **241.000 km** of European transport pipeline network as well as **storages, production, LNG terminals and compressors**.

Acknowledgement

Further information on the **SciGRID_gas** project is available at <http://www.gas.sciGRID.de>.

SciGRID gas is funded by the German Federal Ministry of Trade and Industry(BMWI) (funding code 03ET4063).



[1] <https://www.gie.eu/>
[2] <https://transparency.entsog.eu/>
[3] https://www.diw.de/sixcms/detail.php?id=diw_01.c.574115.de

[4] <https://www.entsog.eu/maps#>
[5] <https://www.openstreetmap.org>