



# The Energy and Industry Geography Lab

Mapping and Modelling Europe's Energy Future

Andreas Uihlein  
Energy Transition Insights for Policy  
28 April 2025

Joint  
Research  
Centre

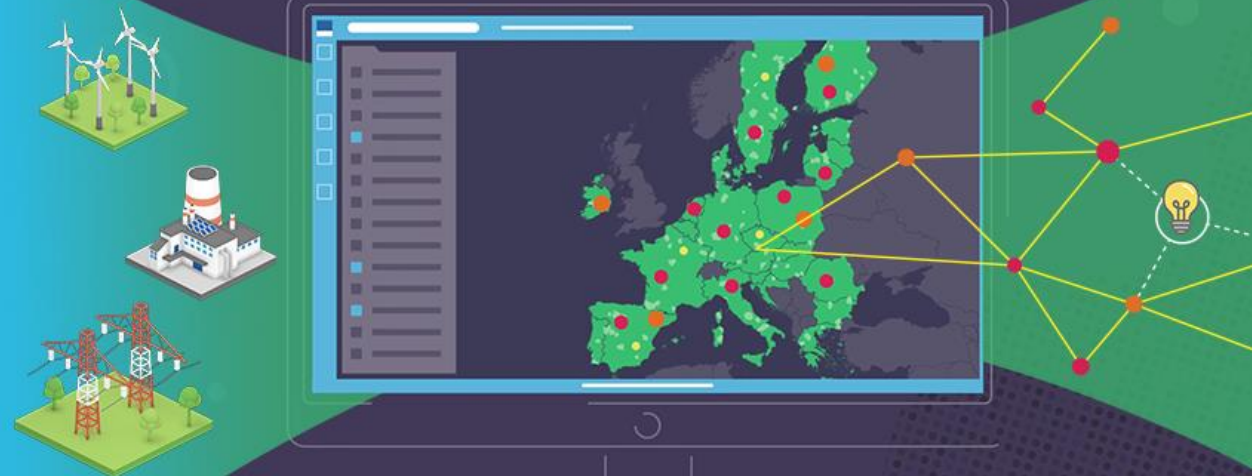
# Agenda

- Introduction and background
- Demo of the Energy and Industry Geography Lab
- Case studies and examples
- Hydrogen related data
- Q&A

THE

**ENERGY & INDUSTRY  
GEOGRAPHY LAB**

BY THE JOINT RESEARCH CENTRE



# The European Commission's Joint Research Centre: Science for policy



ANTICIPATE



INTEGRATE

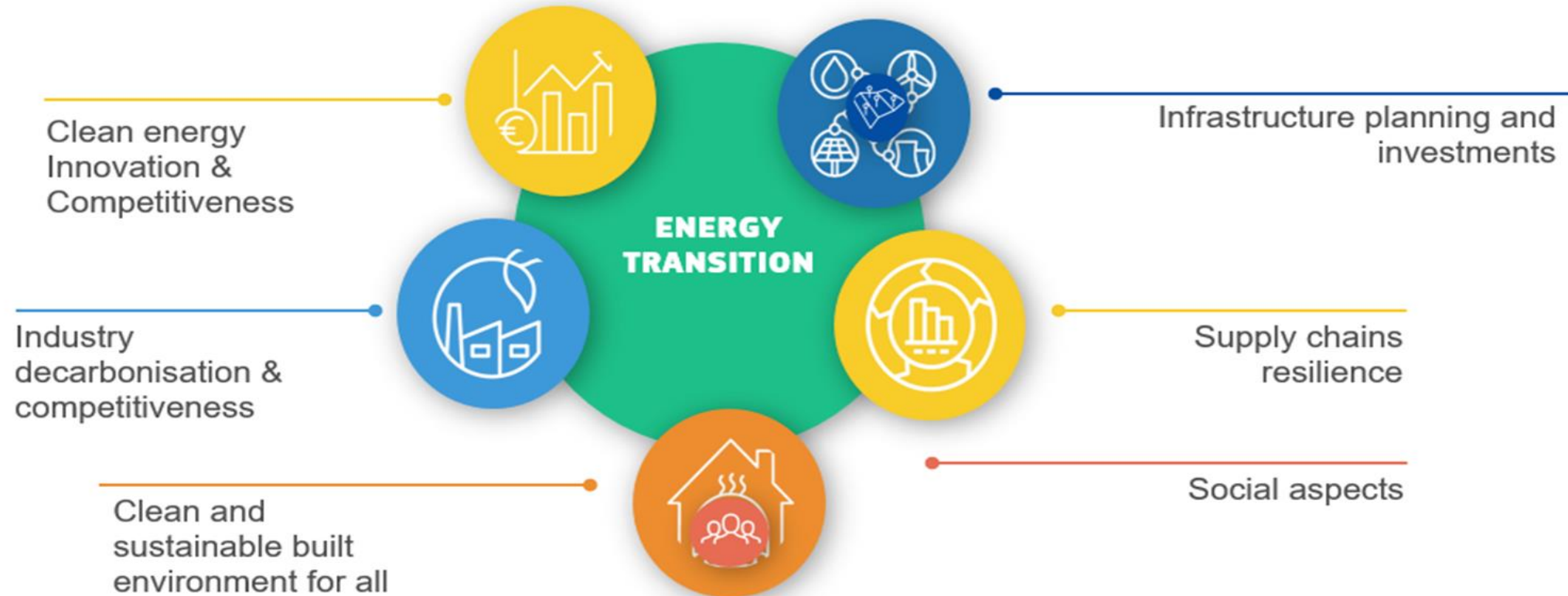


IMPACT

## Our purpose

The Joint Research Centre provides independent, evidence-based knowledge and science, supporting EU policies to positively impact society.

# JRC.C.7: Energy Transition Insights for Policy



# What is the Energy and Industry Geography Lab?



# Introduction & background

- **European Green Deal:** a clean, circular economy and zero carbon
- **Massive changes needed** in energy and industrial infrastructure
- We need to know:
  - Where will we produce clean energy in future (green electricity, hydrogen)?
  - Where is this energy needed (industry, energy sector, households)?
  - How do we transport it from producers to users (gas and H<sub>2</sub> network, power lines)?
- Support development of the **infrastructure needed for a clean energy system** by providing spatial insights and analysis



# EIGL in a nutshell

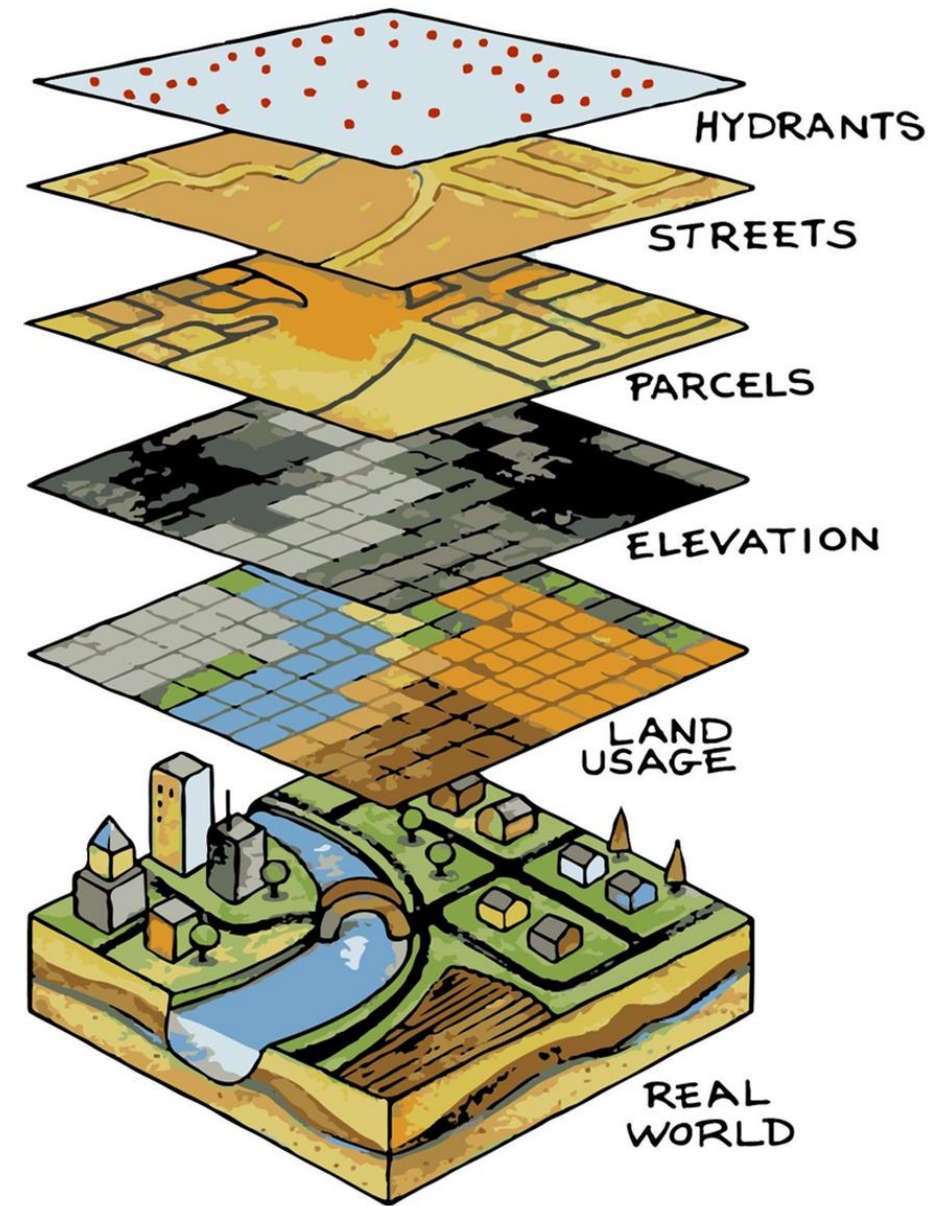
- Support policy making by providing spatial analyses
- Information hub for collection, validation, sharing, visualisation of spatial data
- Direct support to the Commission, Member States and industrial stakeholders (REPowerEU, industrial strategy)
- Publicly available





# GIS and (geo)spatial data

- Geospatial data = data that represents objects on the Earth's surface
- GIS = **Geographic Information System**
  - Store, analyse, and visualise data for geographic positions on Earth's surface
  - It helps us understand **what is where** e.g. where are industrial clusters?
- The Energy and Industry Geography Lab is a **WebGIS**





LAYERS LEGEND SELECT FILTER

Search map & databases

Map navigation icons: zoom in, zoom out, home, full screen, share

### Legend

#### Energy infrastructure - production

Power plants - installed capacity in MW (GEM)

- coal
- oil/gas
- nuclear
- hydropower
- solar
- wind

0  
2,000  
4,000  
6,000

#### Resources and raw materials

Waste heat and heat sources

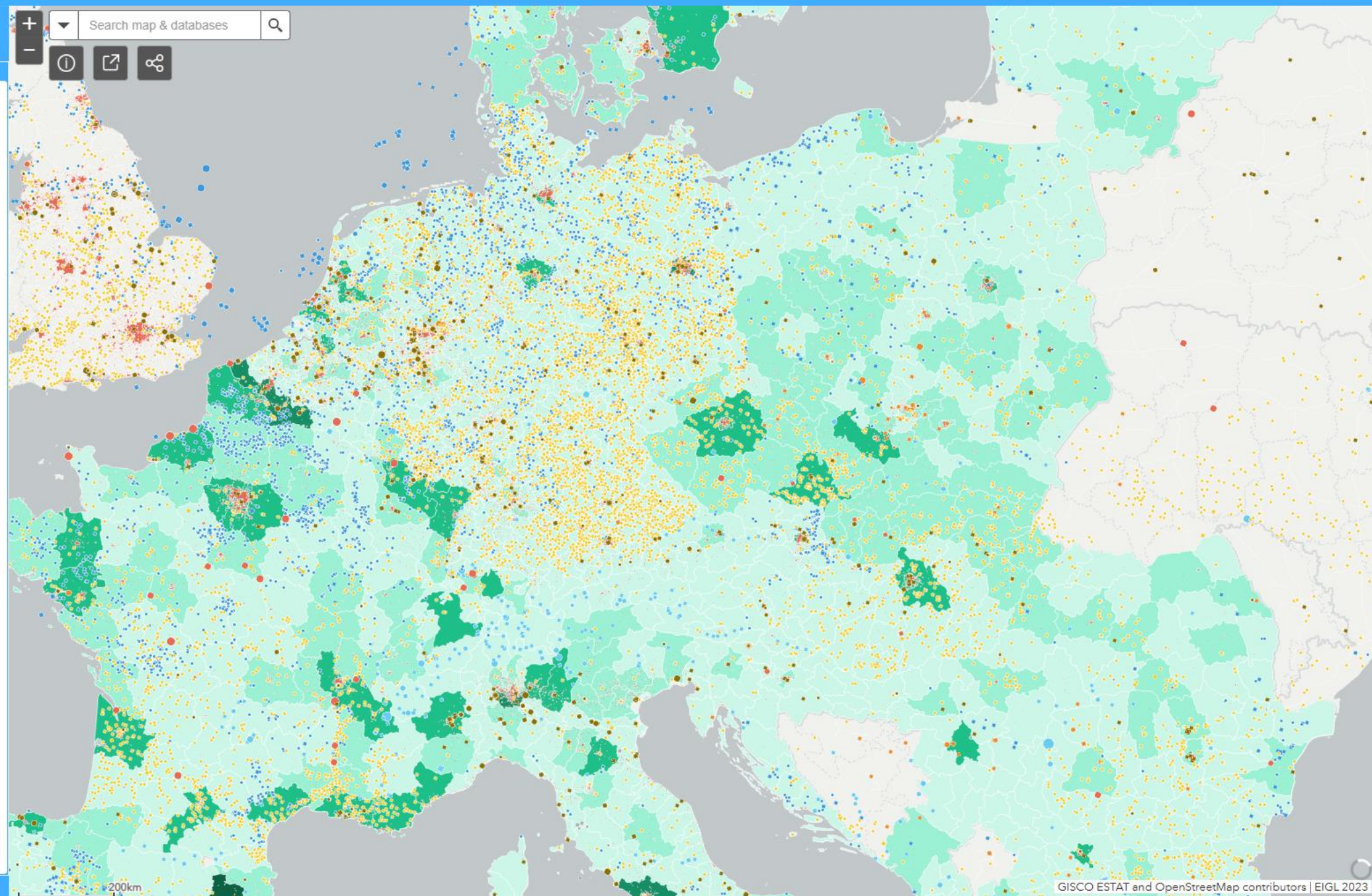
District heating areas (sEnergies)

Socio-economic data

Population

2023 population at NUTS3 level

- ≤ 500 000
- > 500 000 - 1 000 000
- > 1 000 000 - 2 500 000
- > 2 500 000 - 5 000 000
- > 5 000 000 - 15 910 000

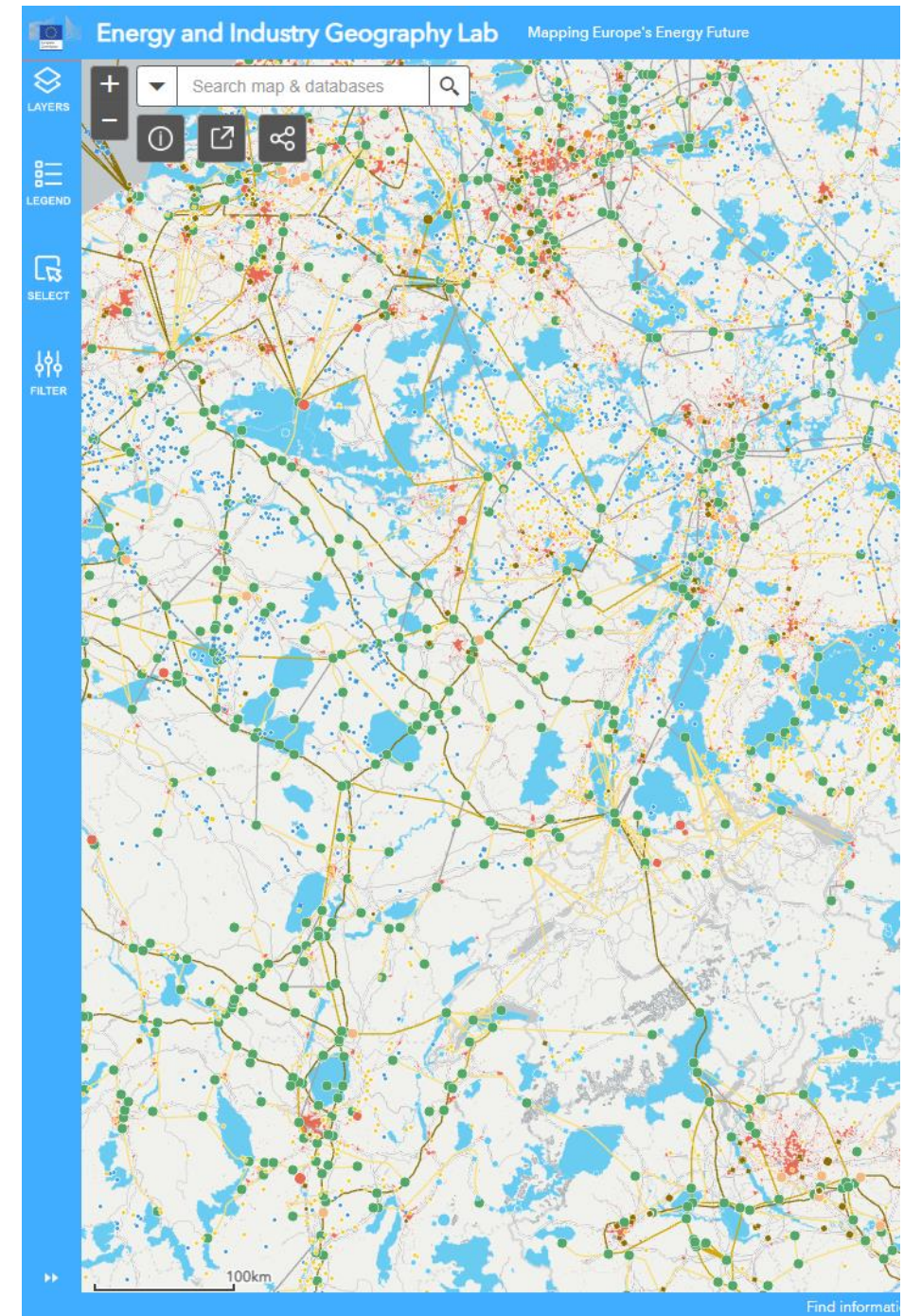




# Wide range of data

## 120+ map layers

- Energy infrastructure (power plants, gas pipelines, power lines)
- Industrial infrastructure
- Hydrogen and CCS/U infrastructure
- Renewable potential (solar, wind, biomass)
- Environmental data (emissions, climate)
- Socio-economic data (employment, population density)



# Functionalities

Search within layers

Share link to map/export image

Metadata/Tutorials

Select and filter data

Switch map layers (on/off)

View data (pop-up/table)

Export data

Energy and Industry Geography Lab Mapping Europe's Energy Future

Search map & databases

Layer List

- Layers
- Borders and regions
- Energy infrastructure - production
- Energy infrastructure - networks
- Industrial infrastructure
- Hydrogen infrastructure
- Hydrogen production facilities
- CCS/U infrastructure
- Transport infrastructure
- Areas for solar and wind
- Renewable energy potential
- Communication infrastructure
- Future projects and scenarios
- Clean technology projects
- Green steel tracker
- Cement innovation projects (Cembureau)
- Clean hydrogen alliance project pipeline (no of projects)

Planned hydrogen production facilities (JRC): Heide, Hemmingstedt

id_eigl	297
public data	YES
country	Germany
name	Heide, Hemmingstedt
location	Heide, Hemmingstedt
company	Raffinerie Heide GmbH
capacity_mwe	30.00
start year	2024
eigl process	Other or unknown
eigl text lon	9.075
eigl text lat	54.15639999999999

Power plants - installed capacity in MW (JRC)

id	eic_p	eic_g	name_p	name_g	capacity_p	capacity_g	type_g	country	nuts2	status_g	year
1	54W-KOMAN0000066	54W-KOMAN-G2008E	KOMANG	KOMANG2	600.00	150.00	Hydro Water Reservoir	Albania	AL01	COMMISSIONED	0
2	11W0-0000-0043-Z	11W0-0000-0044-W	Datteln	Datteln 4	1,052.00	1,052.00	Fossil Hard coal	Germany	DEA3	CONSTRUCTION	2,020
3	54W-	54W-KOMAN-	KOMANG	KOMANG1	600.00	150.00	Hydro Water	Albania	Al 01	COMMISSIONED	0

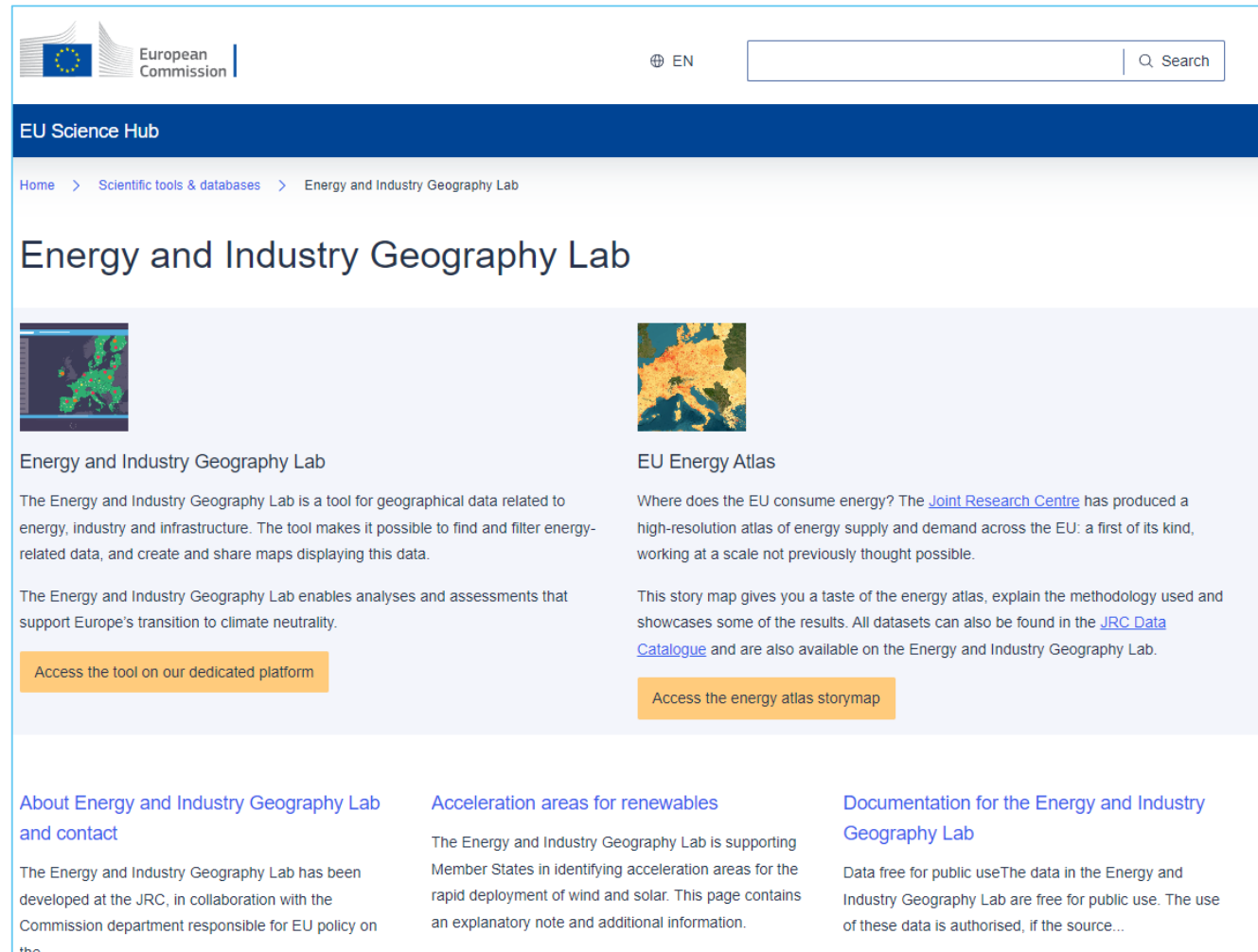
7117 features 0 selected

# Full documentation

- Quick start guide and tutorials
- Documentation of datasets and metadata information



- <https://ec.europa.eu/energy-industry-geography-lab>



The screenshot shows the website for the Energy and Industry Geography Lab, part of the EU Science Hub. The page features a navigation bar with the European Commission logo, a search bar, and a breadcrumb trail: Home > Scientific tools & databases > Energy and Industry Geography Lab. The main heading is "Energy and Industry Geography Lab". Below this, there are two featured sections: "Energy and Industry Geography Lab" and "EU Energy Atlas". Each section includes a small map thumbnail, a title, a brief description, and a call-to-action button. The "Energy and Industry Geography Lab" section describes a tool for geographical data related to energy, industry, and infrastructure, and includes a button "Access the tool on our dedicated platform". The "EU Energy Atlas" section describes a high-resolution atlas of energy supply and demand across the EU, and includes a button "Access the energy atlas storymap". At the bottom of the page, there are three columns of text: "About Energy and Industry Geography Lab and contact", "Acceleration areas for renewables", and "Documentation for the Energy and Industry Geography Lab".

# Demo of EIGL



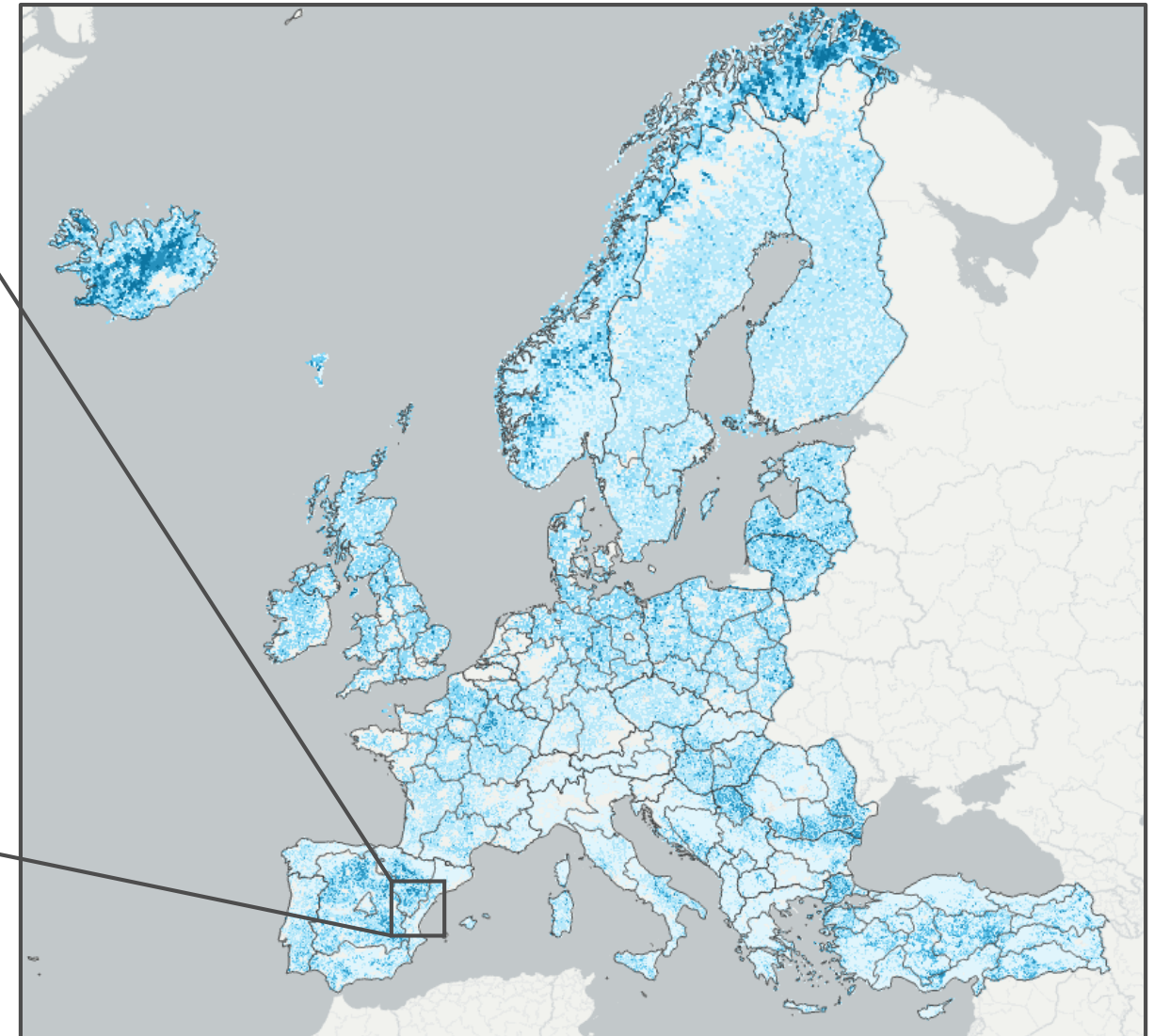
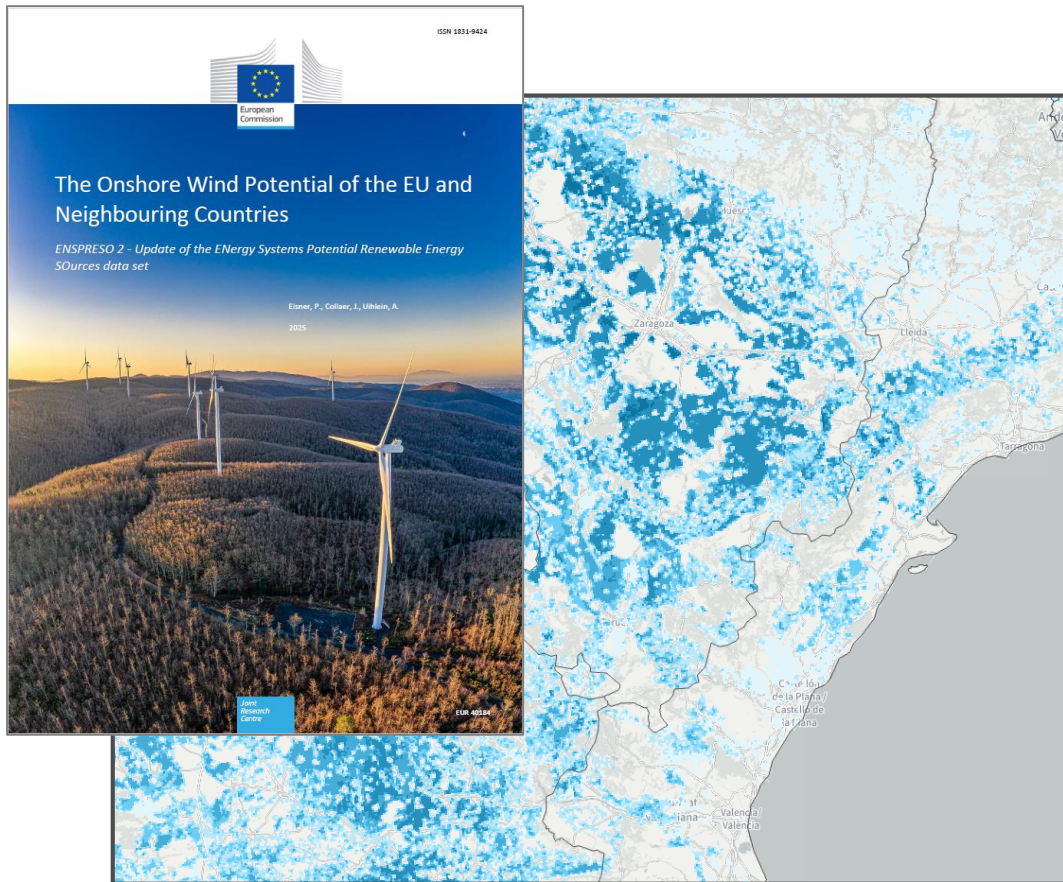
# Topics

- User interface and functionalities
- Switch layers on and off
- Legend
- Pop-up, attribute table & export
- Filter
- Other functionalities



# Case studies and examples of recent work

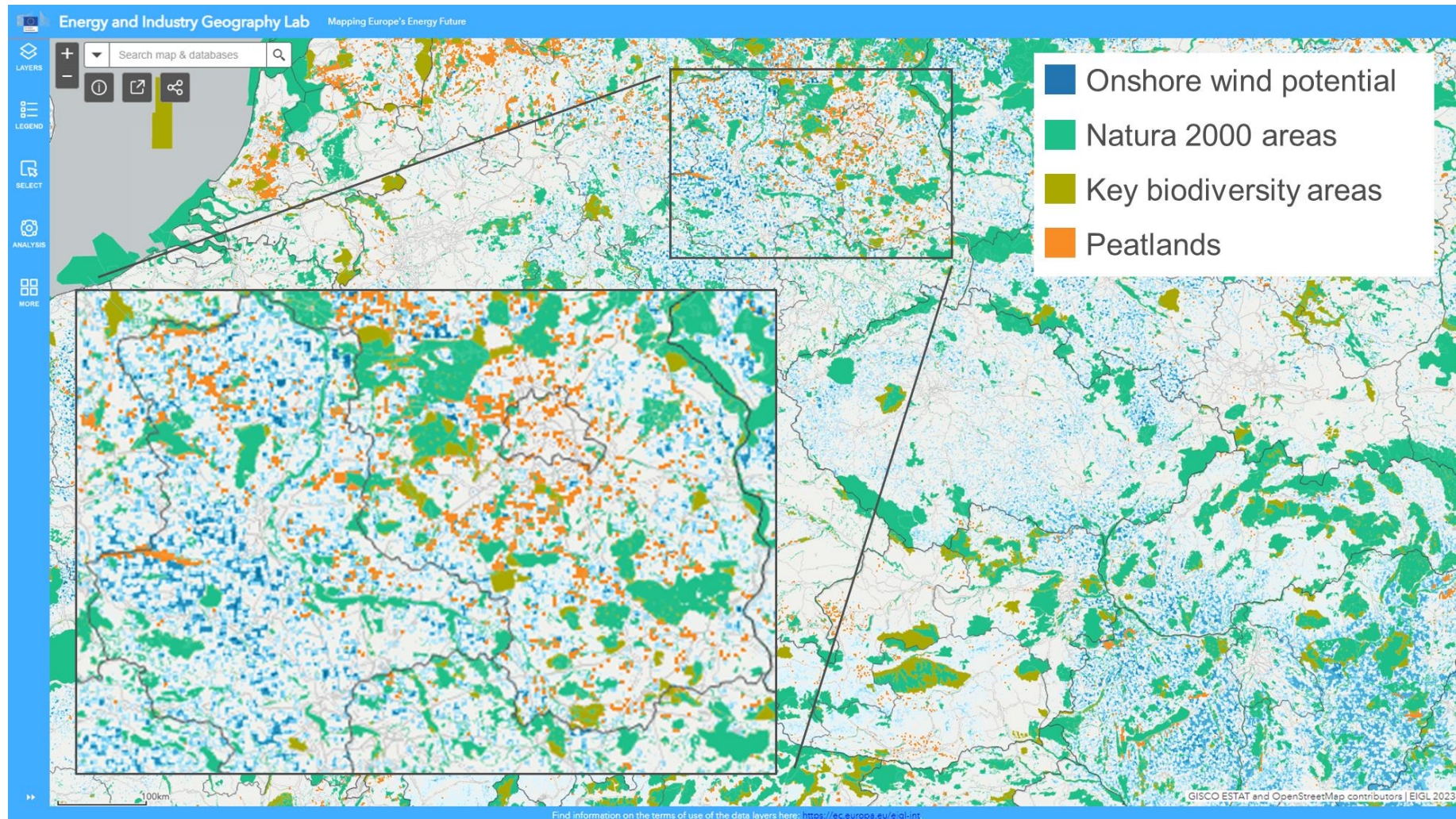
# ENSPRESO 2 onshore wind potential



Onshore wind potential at 1 x 1 km resolution  
Offshore wind and PV will follow soon

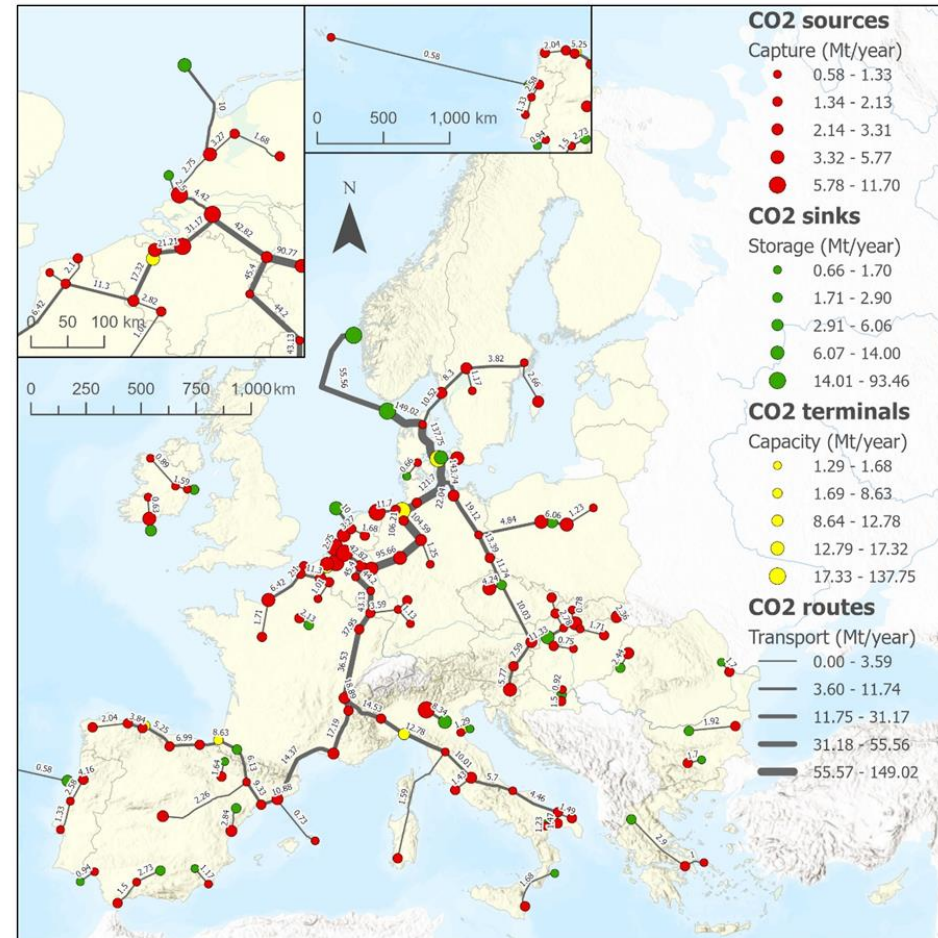
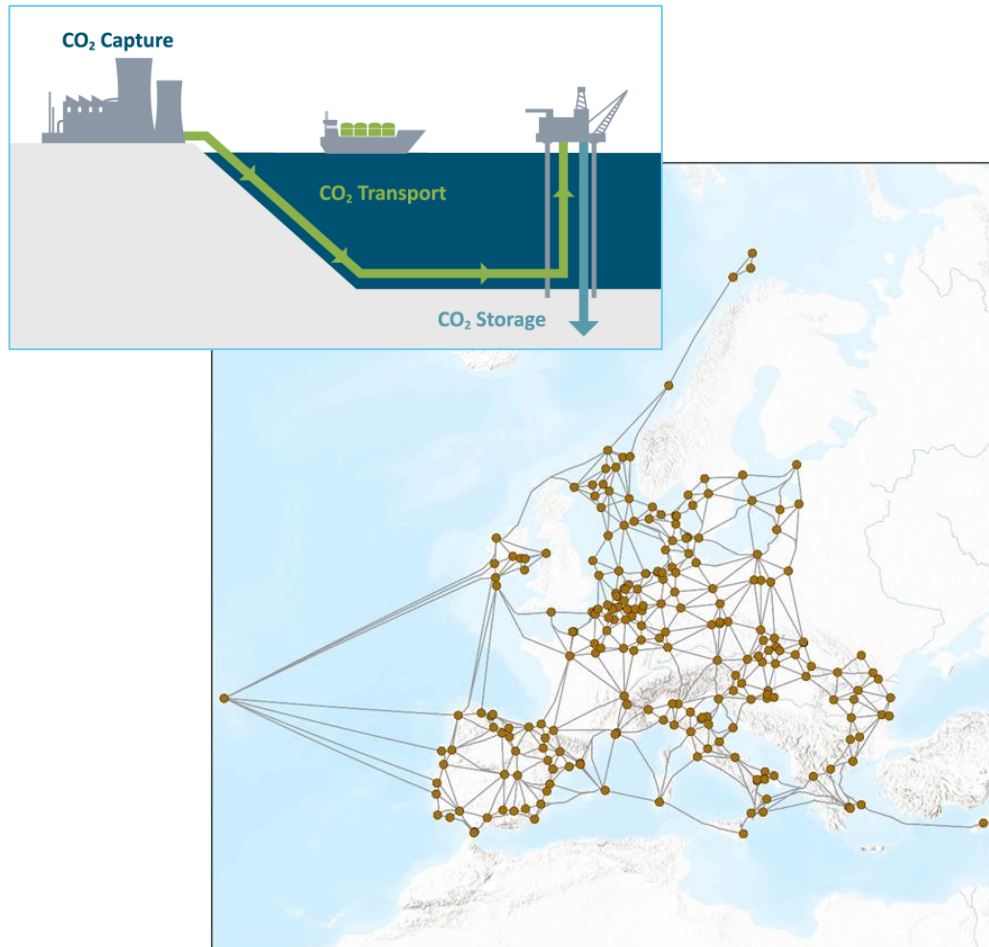


# Identification of acceleration areas





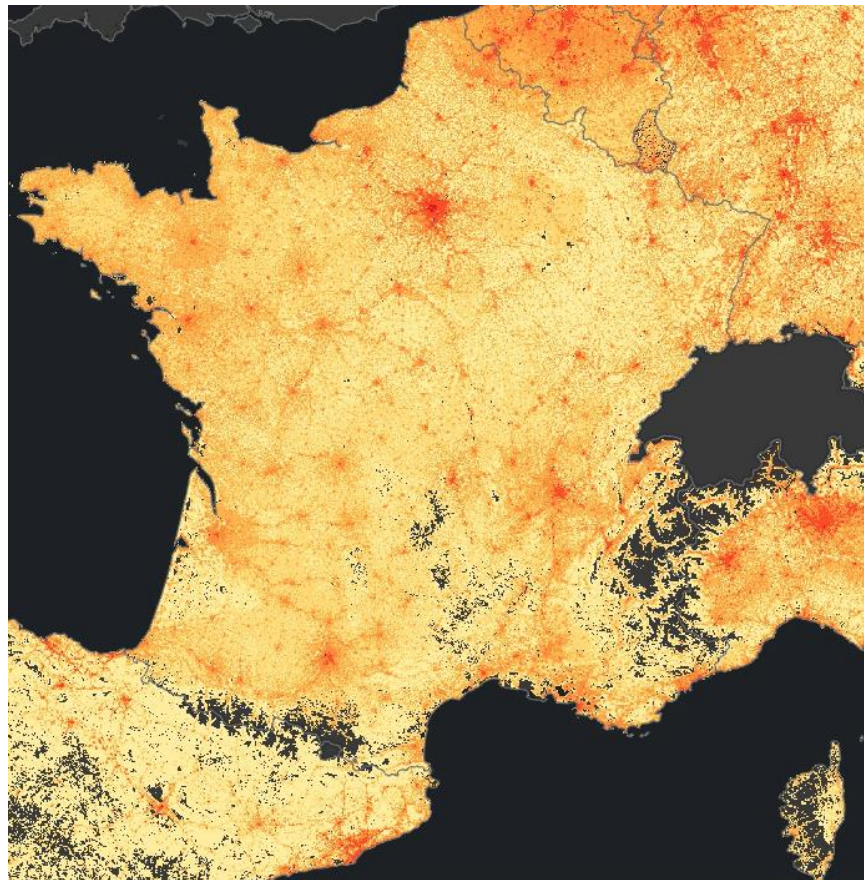
# Optimal CO<sub>2</sub> transport infrastructure



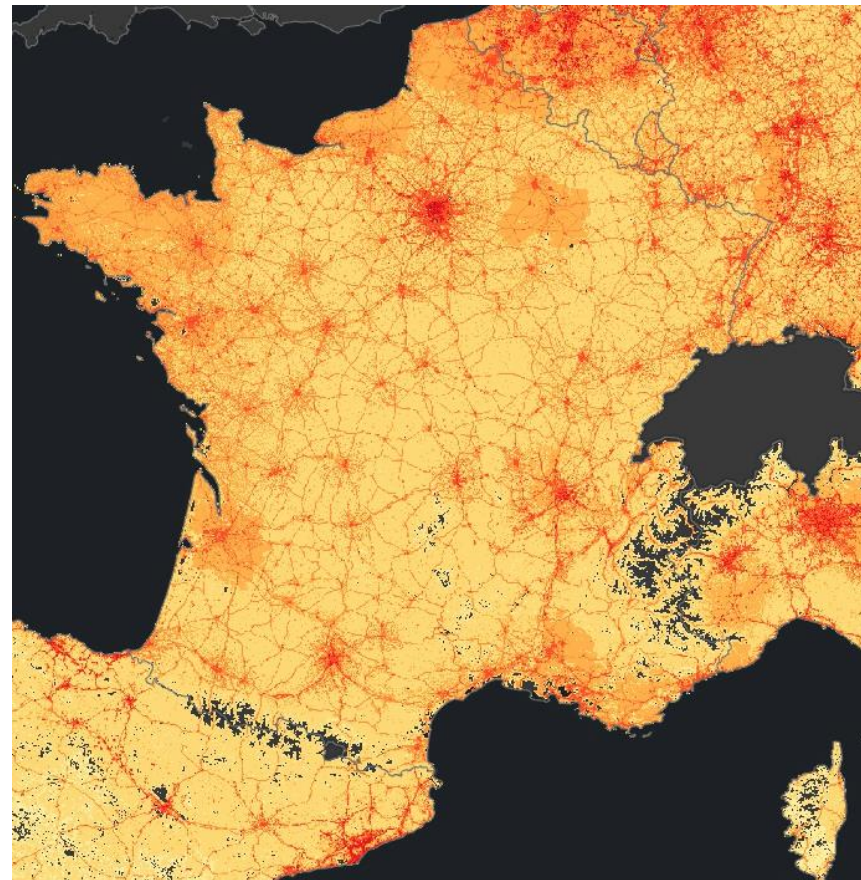


# EU Energy Atlas

Energy supply and demand from national energy balances to 1x1 km grid

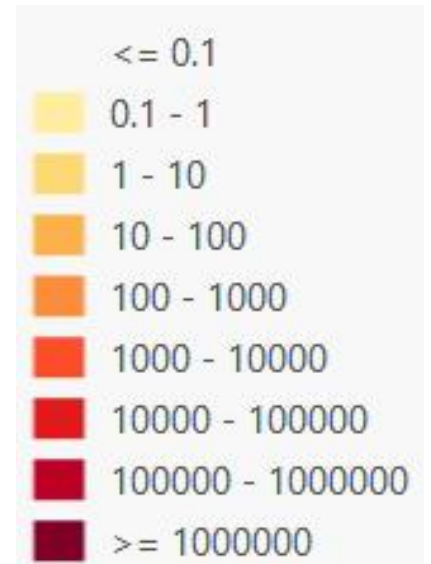


Natural gas, total demand, 2019



Oil and petroleum products, total demand, 2019

Tonnes of oil equivalent



# Hydrogen-related layers in EIGL



# Hydrogen infrastructure

- Hydrogen production
- Hydrogen transport
- Hydrogen storage
- Manufacturing of components and cells
- Mobility applications for hydrogen

***Feedback and input wanted!***

## Data sources

- Innovation Fund
- IPCEI
- PCI list
- ECH2A
- Other publicly available data

## Data gaps

- Completeness of projects
- Status of projects
- Technical information (capacity, size)
- Lack of GIS data (pipelines)

## Hydrogen infrastructure

### Hydrogen production

- Announced/planned
- FEED & Permitting
- FID
- In construction
- Operational
- Unknown
- 400
- 800
- 1,200
- 0

### Hydrogen transport

#### Hydrogen pipelines

Hydrogen pipelines (lines)



Hydrogen pipelines (points)



Compressor stations



Terminals



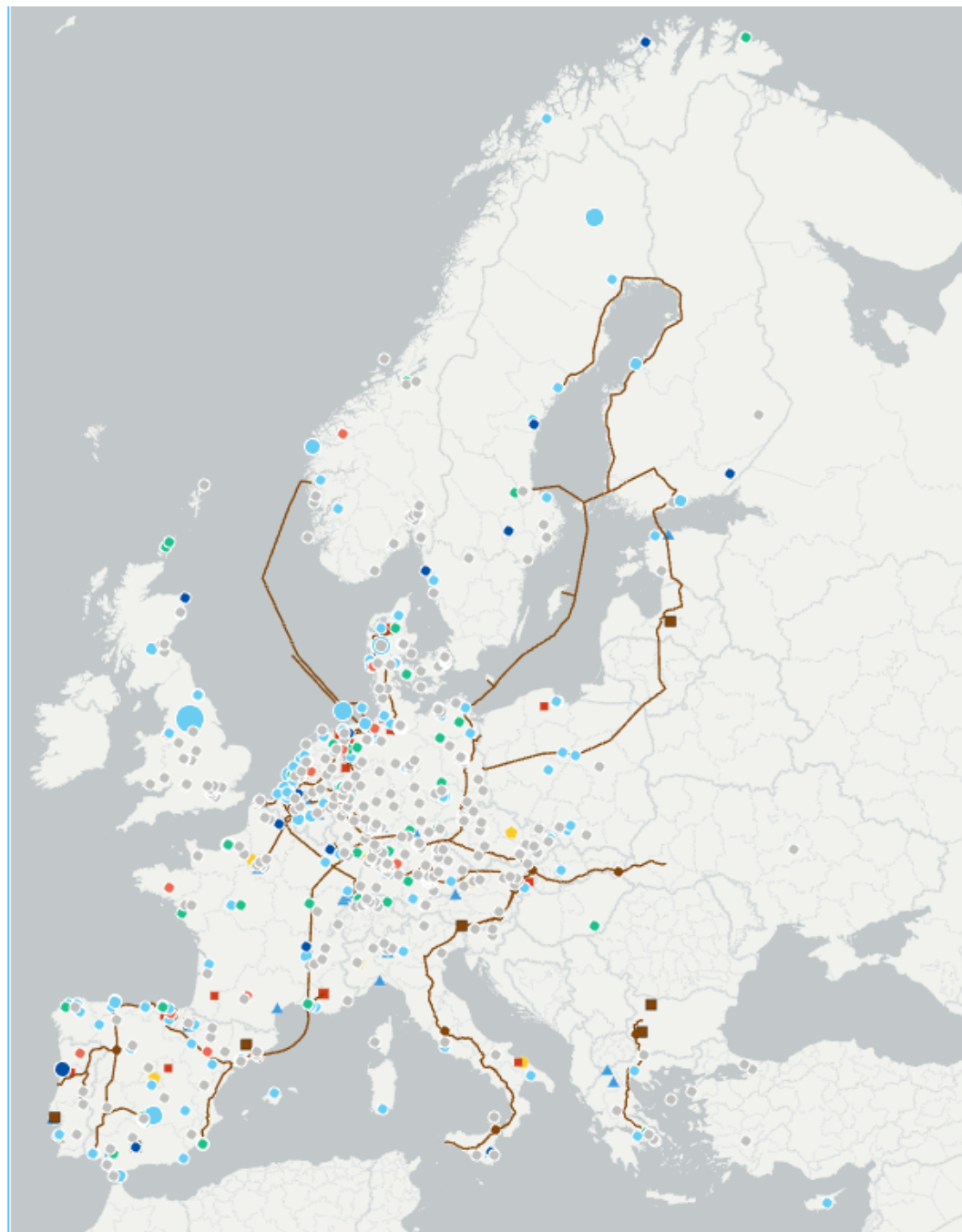
### Hydrogen storage

- 200
- 500
- 800
- 1,100

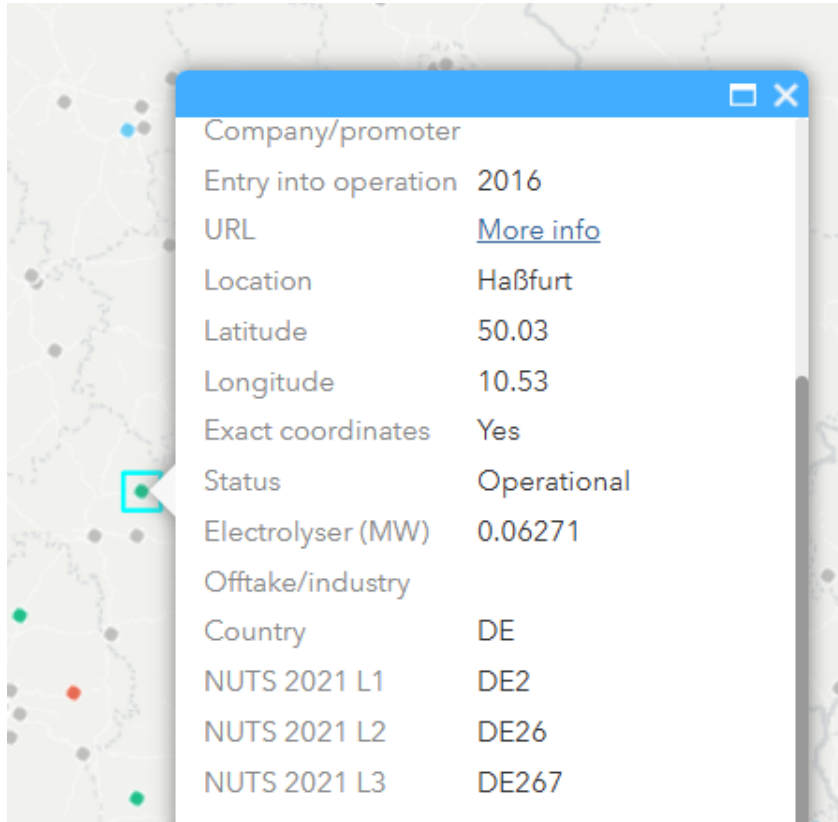
Manufacturing of components and cells



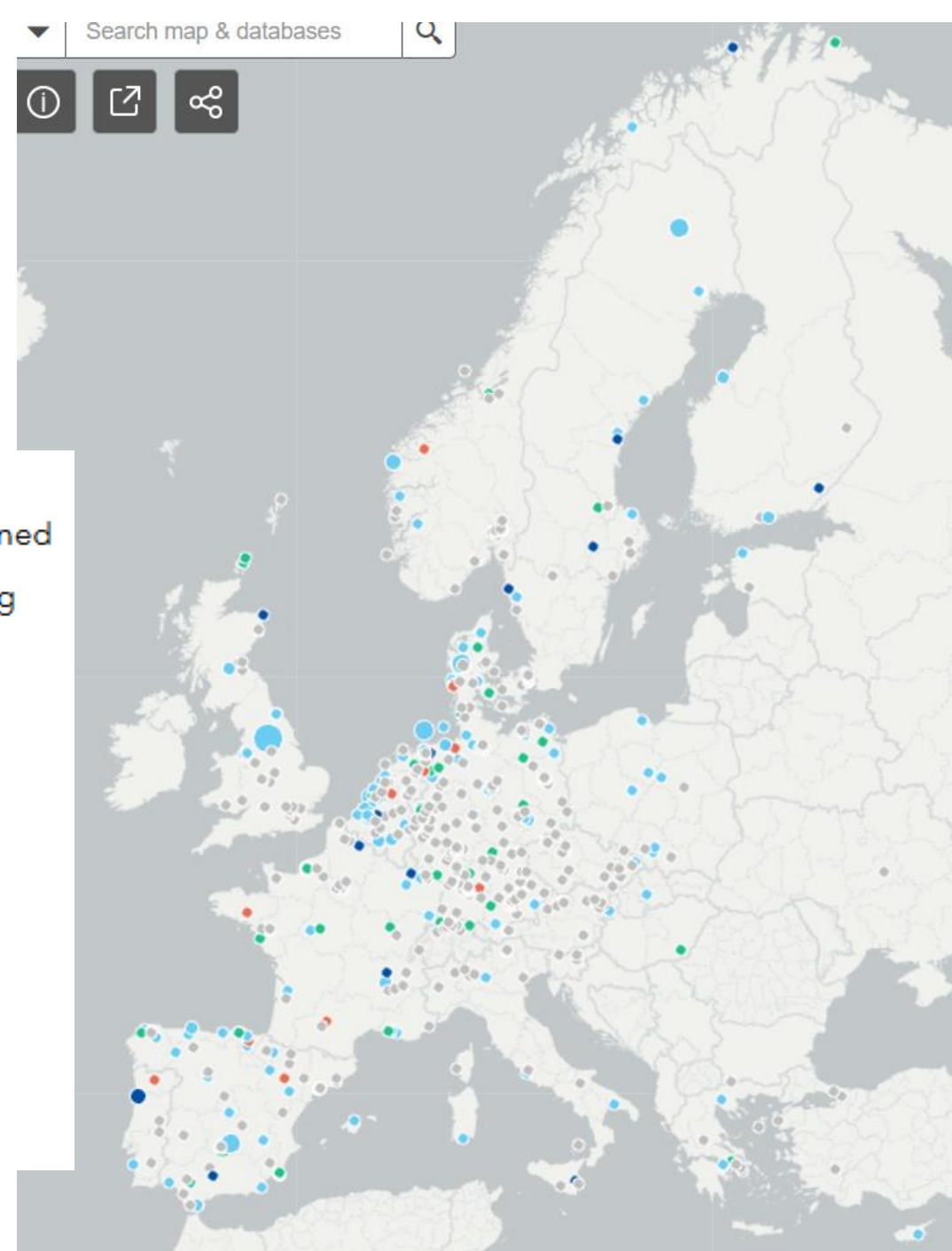
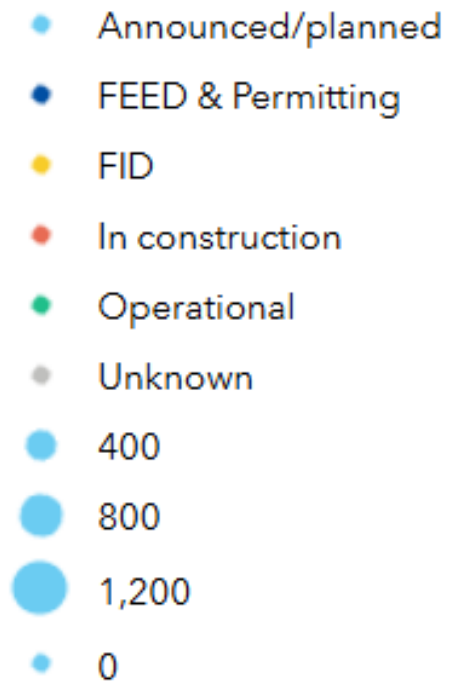
Mobility applications for hydrogen



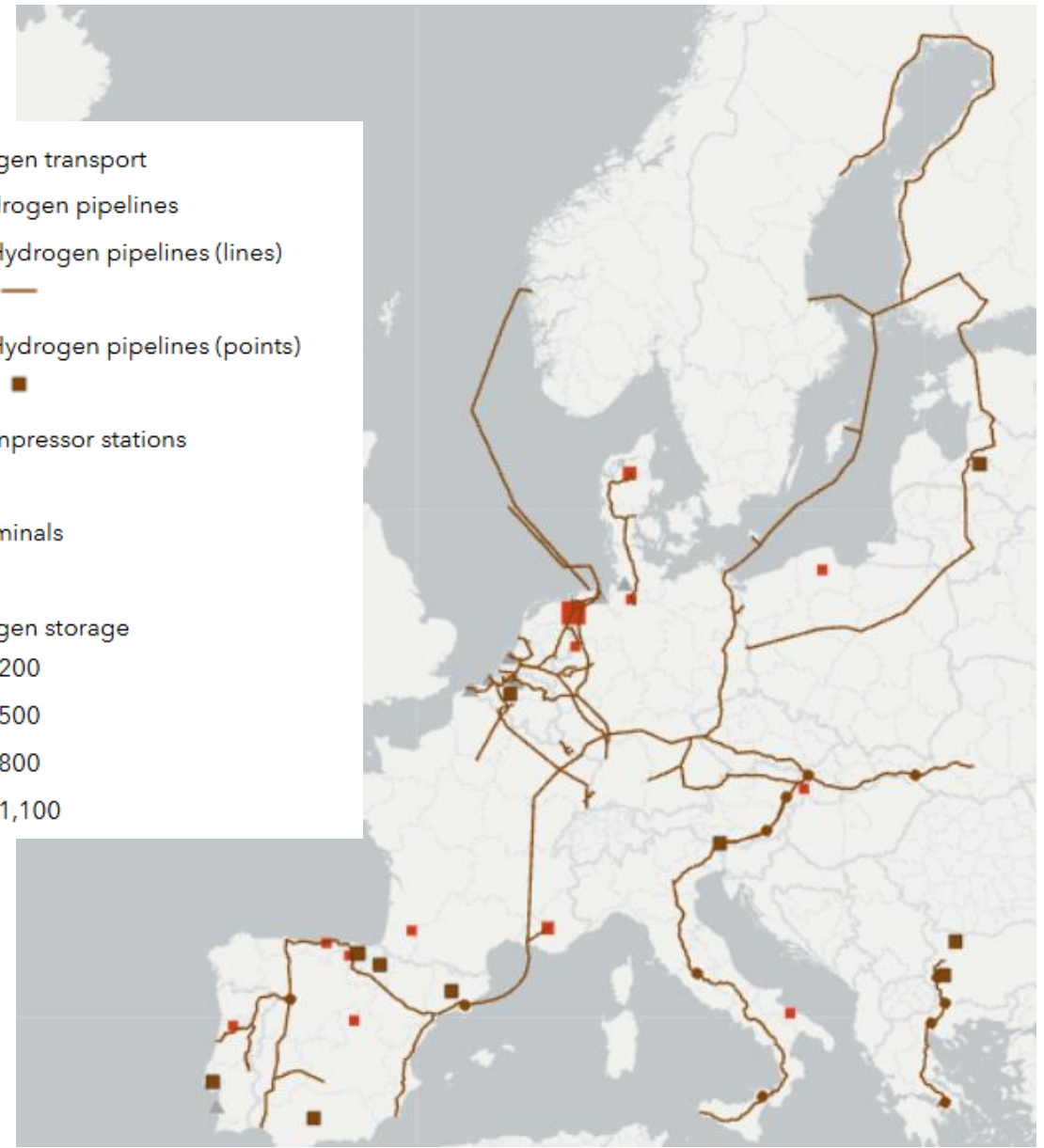
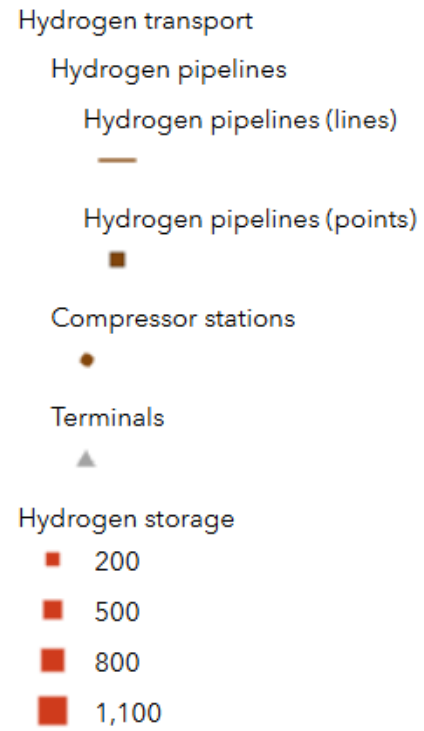
# Hydrogen production



## Hydrogen production



# Hydrogen transport and storage



# Components, cells and mobility applications

## Hydrogen infrastructure

Manufacturing of components and cells



Mobility applications for hydrogen





# Funding schemes/programmes

Energy and Industry Geography Lab Mapping Europe's Energy Future

LAYERS LEGEND SELECT FILTER

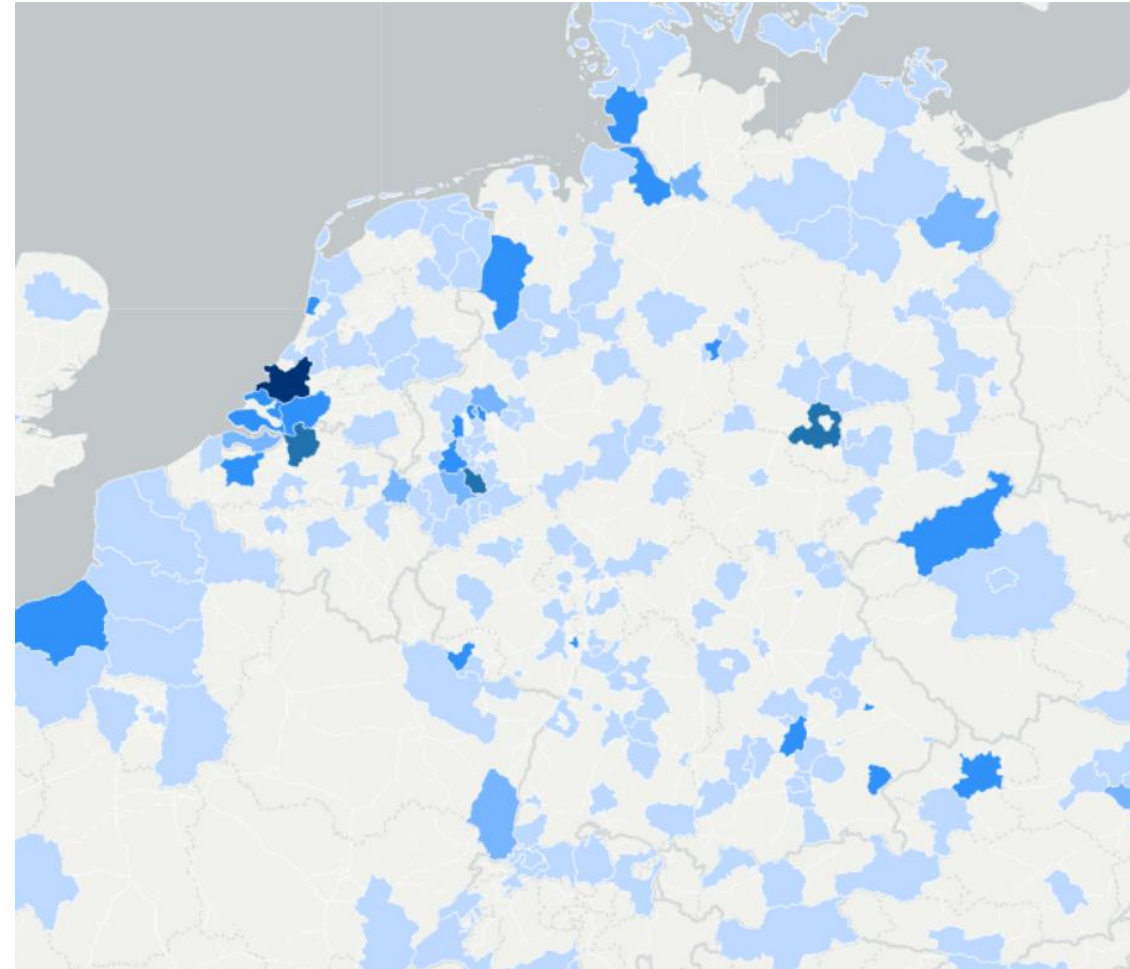
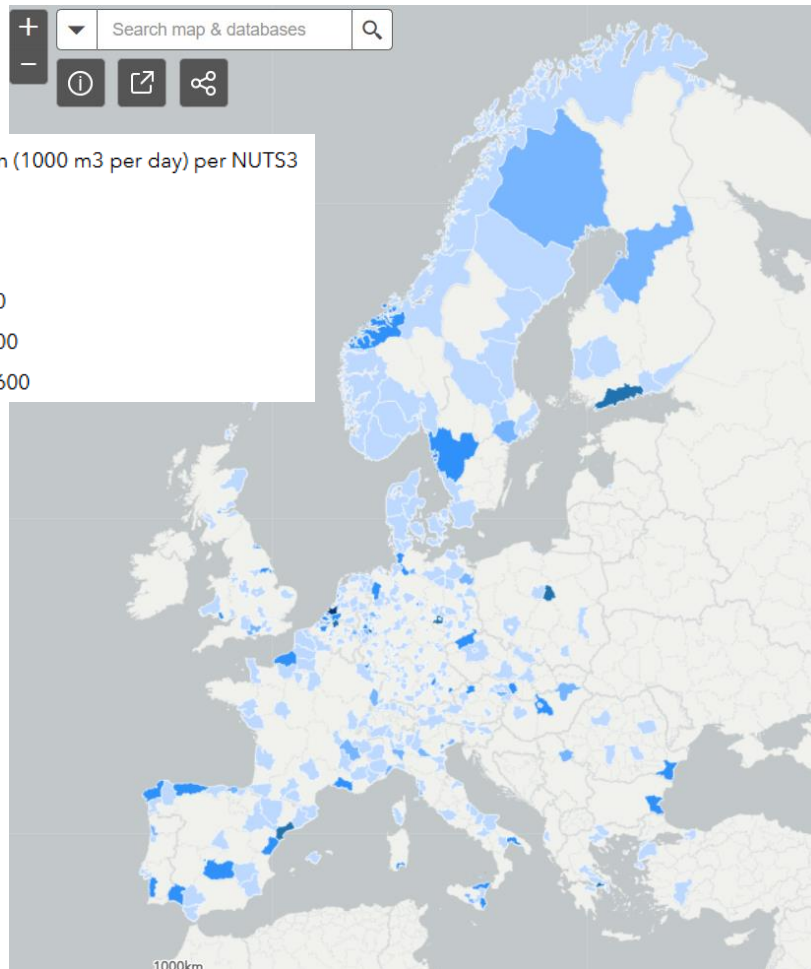
Layer List

- Hydrogen production ...
- Hydrogen transport ...
- Hydrogen storage ...
- Manufacturing of components and cells ...
- Mobility applications for hydrogen ...
- Funding schemes and programmes ...
- ECHA projects ...
- Hydrogen production ...
- Hydrogen transport ...
- Hydrogen storage ...
- Manufacturing of components and cells ...
- Unknown project type ...

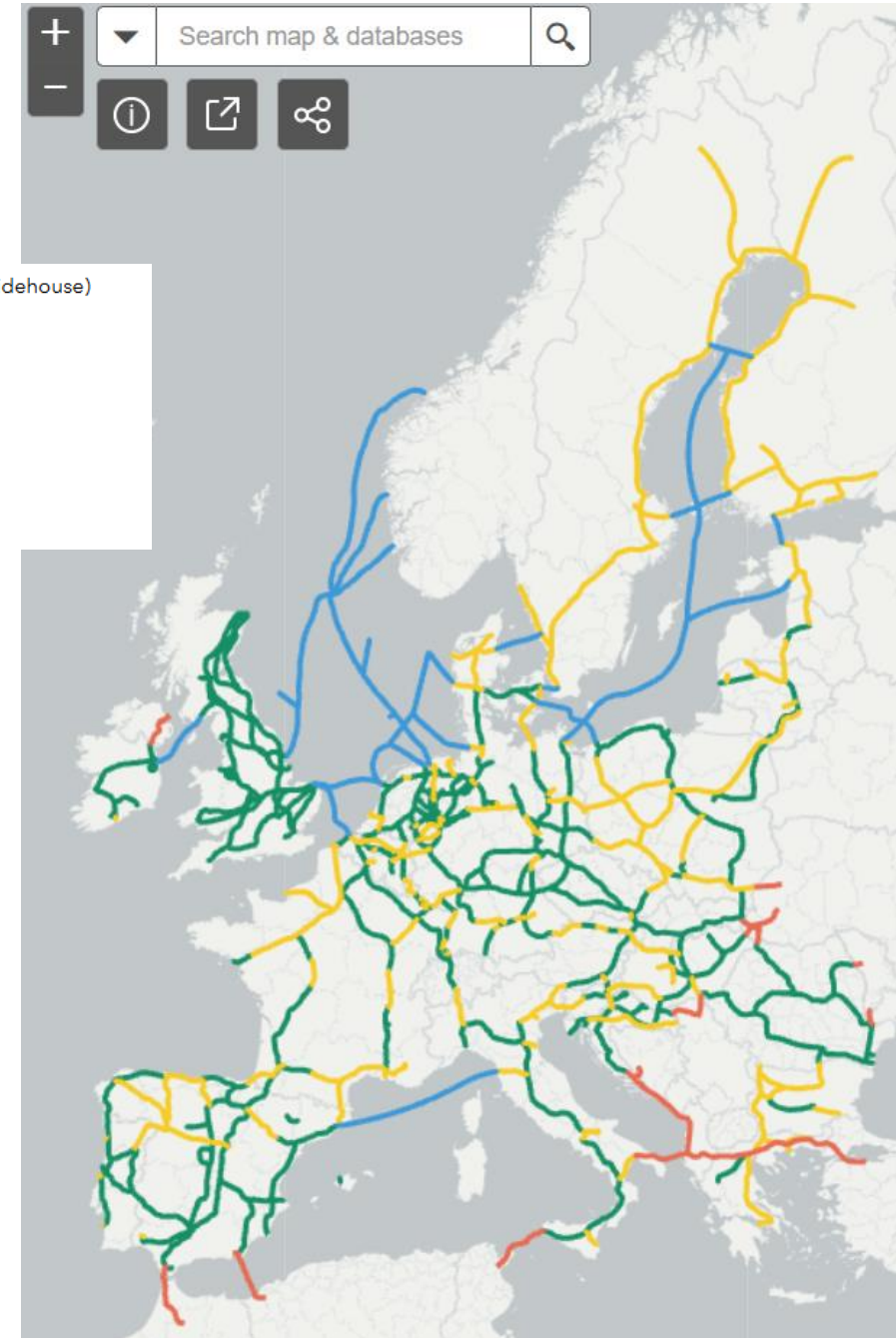
Search map & databases



# Hydrogen production per NUTS3 region

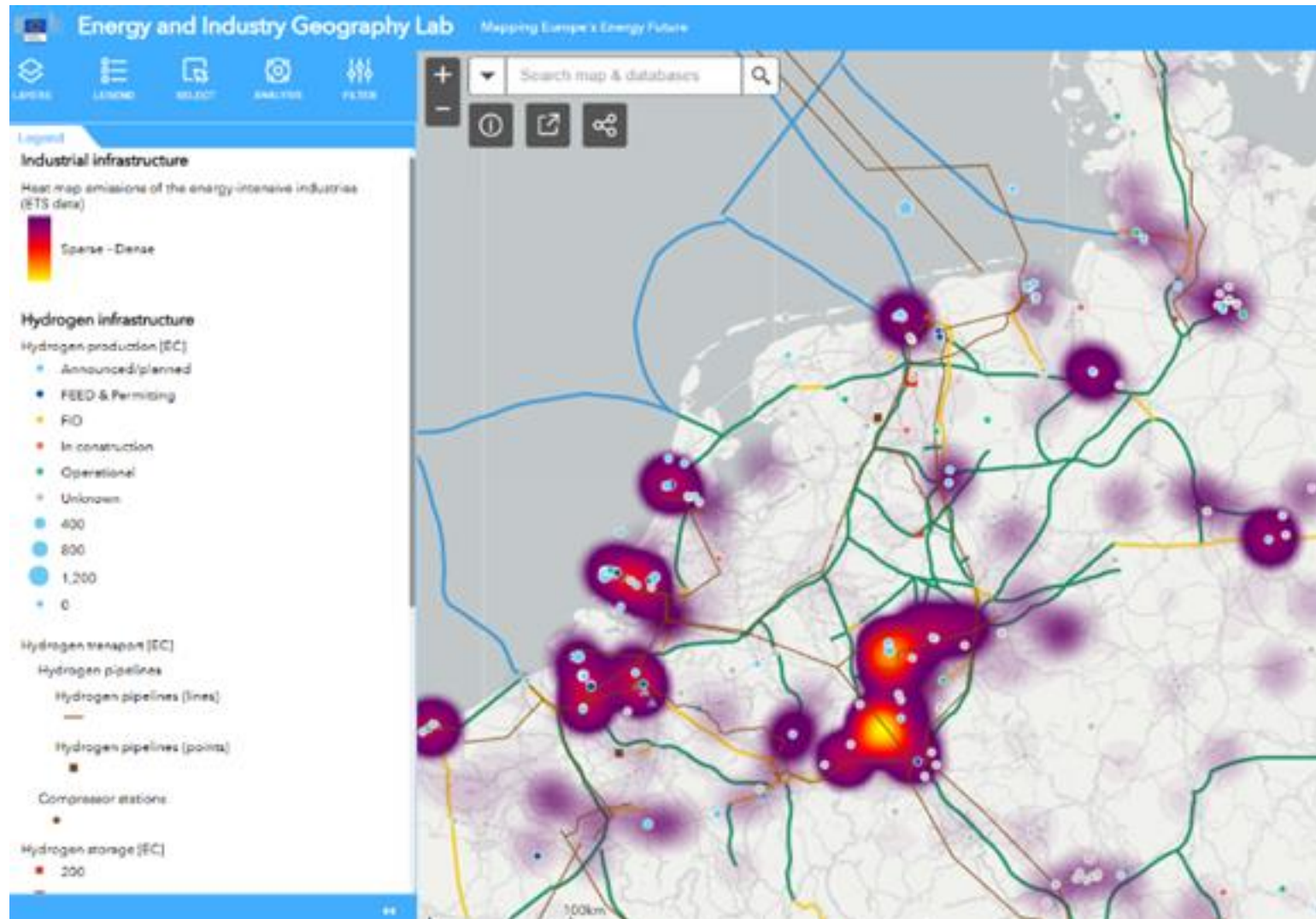


# European hydrogen backbone





# Industrial GHG emissions & hydrogen projects



# Conclusions

- Mapping of hydrogen projects was performed in the overall context the of Clean Transition Dialogue on hydrogen
- Hydrogen sector can benefit of this mapping exercise, it offers added-value for the planning of future hydrogen infrastructure and facilities
- EIGL is only useful if we get information from projects and it is of collective interest for all to provide comprehensive information
- The EIGL will keep the layers updated and looks forward to data input and suggestions
- Information needed from projects promoters:
  - GIS information (coordinates, GIS shape files)
  - Status

# Thank you!

Functional mailbox: [JRC-EIGL@ec.europa.eu](mailto:JRC-EIGL@ec.europa.eu)



© European Union, 2025

Unless otherwise noted the reuse of this presentation is authorised under the [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/) license. For any use or reproduction of elements that are not owned by the EU, permission may need to be sought directly from the respective right holders.

Slide 8: VectorMine



**EU Science Hub**  
[joint-research-centre.ec.europa.eu](https://joint-research-centre.ec.europa.eu)