# Hystories; European database of aquifer and depleted field $H_2$ storage candidates

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Hydrogen Storage in European Subsurface

**Acknowledgment**

The Project is co-founded by European Union

Clean Hydrogen Partnership

# Outline

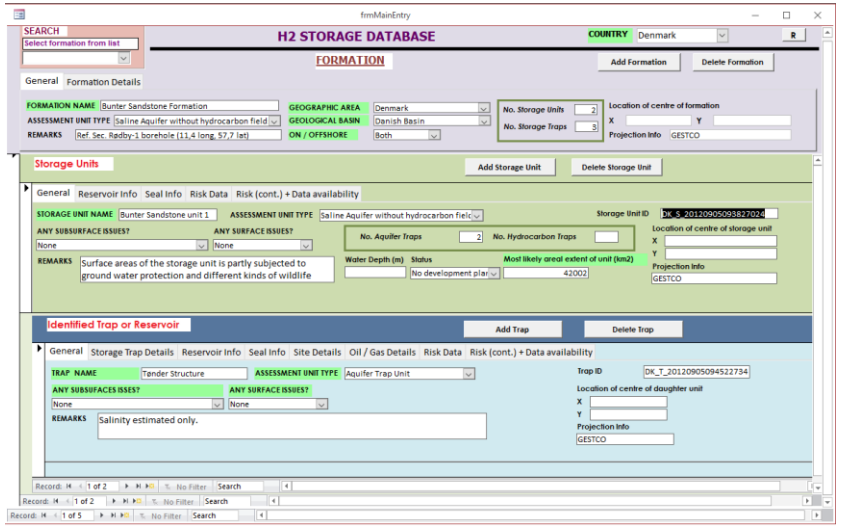
- Database structure
- Data availability
- Database and Geographical Information System
- Summary

# Workpackage 1

**Key aim** = produce a European database and Geographic Information System collating data relevant to geological storage of hydrogen in porous media in Europe

**Main activity** = collate publicly available data on where geological storage of hydrogen in depleted fields or saline aquifers might be possible

Database feeds into Hystories work on modelling capacity and provides data to support geochemical and microbiological work in Hystories



# Hystories database

The aim of the database is to highlight regions and sites that may be suitable for development into geological storage sites for hydrogen, from a geological perspective.

This significant effort from Hystories partners has produced a comprehensive database with a broad coverage of almost the whole Europe

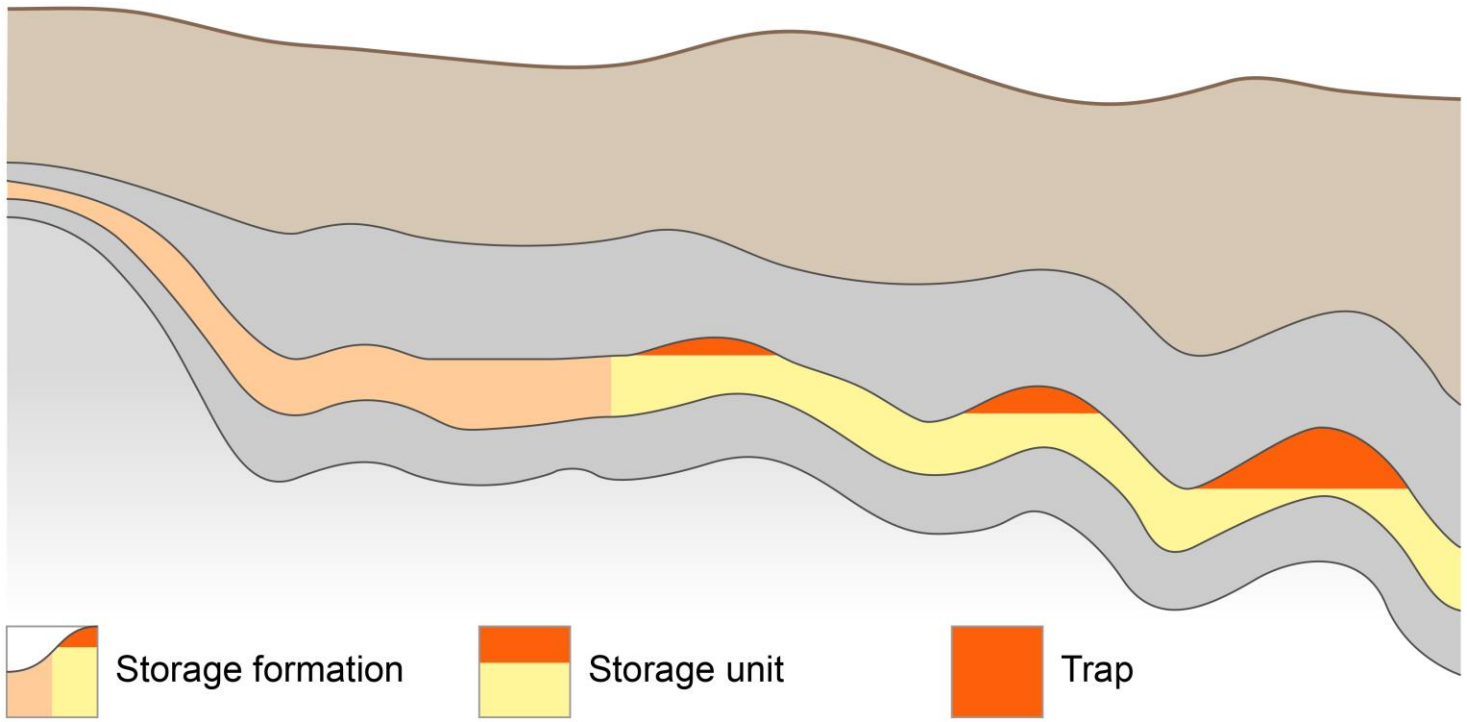
Hystories database advances the level of knowledge for hydrogen storage in Europe by

- Making available the latest relevant geological data
- Including hydrogen-specific criteria supporting assessment of geochemical and microbiological impacts

This improved database will enable more accurate assessments of the potential future for green hydrogen storage in Europe

# Database structure and content

Three tier storage database to accommodate heterogeneous data availability:




Some caveats on the database:

- The database only contains publicly available data
- Data entry format is constrained for some data fields to make the database searchable
- Variable presentation of data and data collection bias – e.g. focus on zones with hydrocarbons
- Geological interpretation is interpretation!

# Database content - traps

Storage unit name/identifier

Basic geological data – depth (average), area, thickness, permeability, porosity, age, lithology

More geological data – pressure, temperature, depth to top, net:gross, environment of deposition, geological models, seismic/well data availability

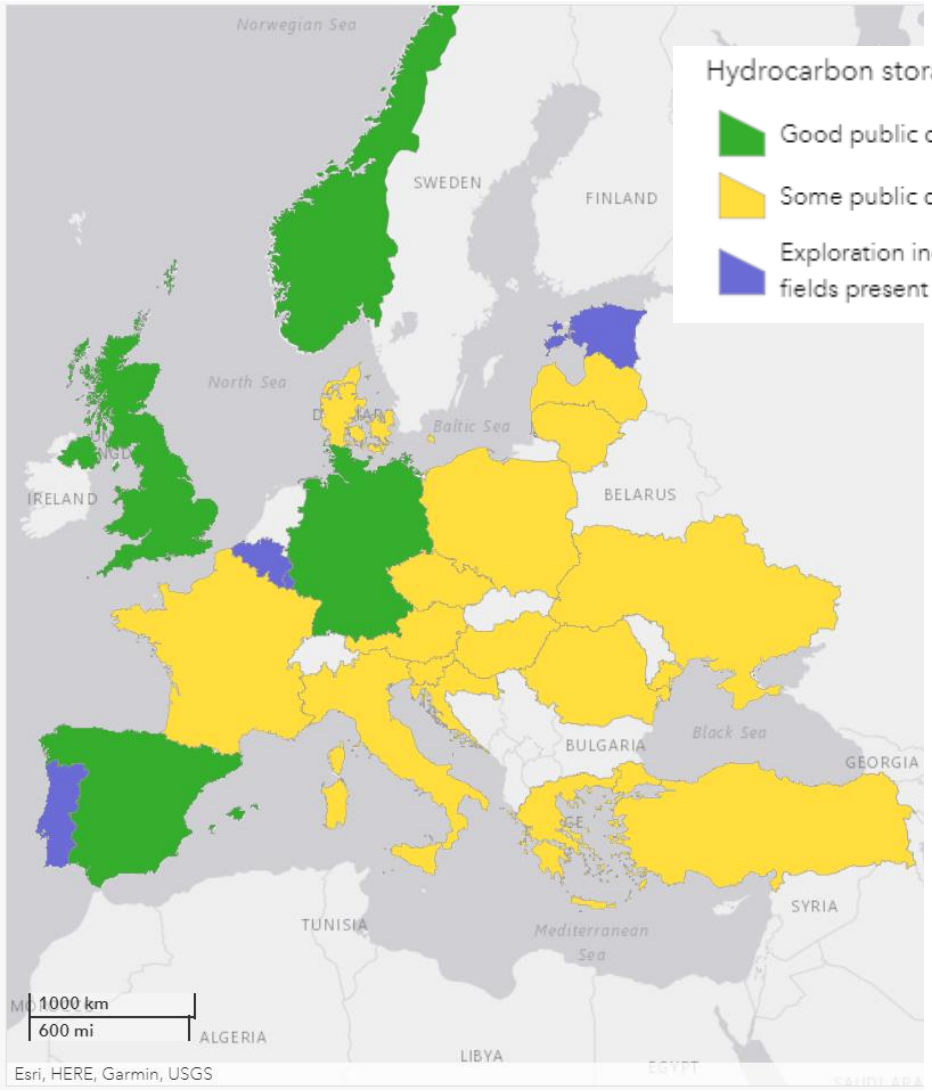
Geochemistry – mineralogy, iron, sulphates/sulphides, $CO_2$, oil/gas/condensate and pore water salinity

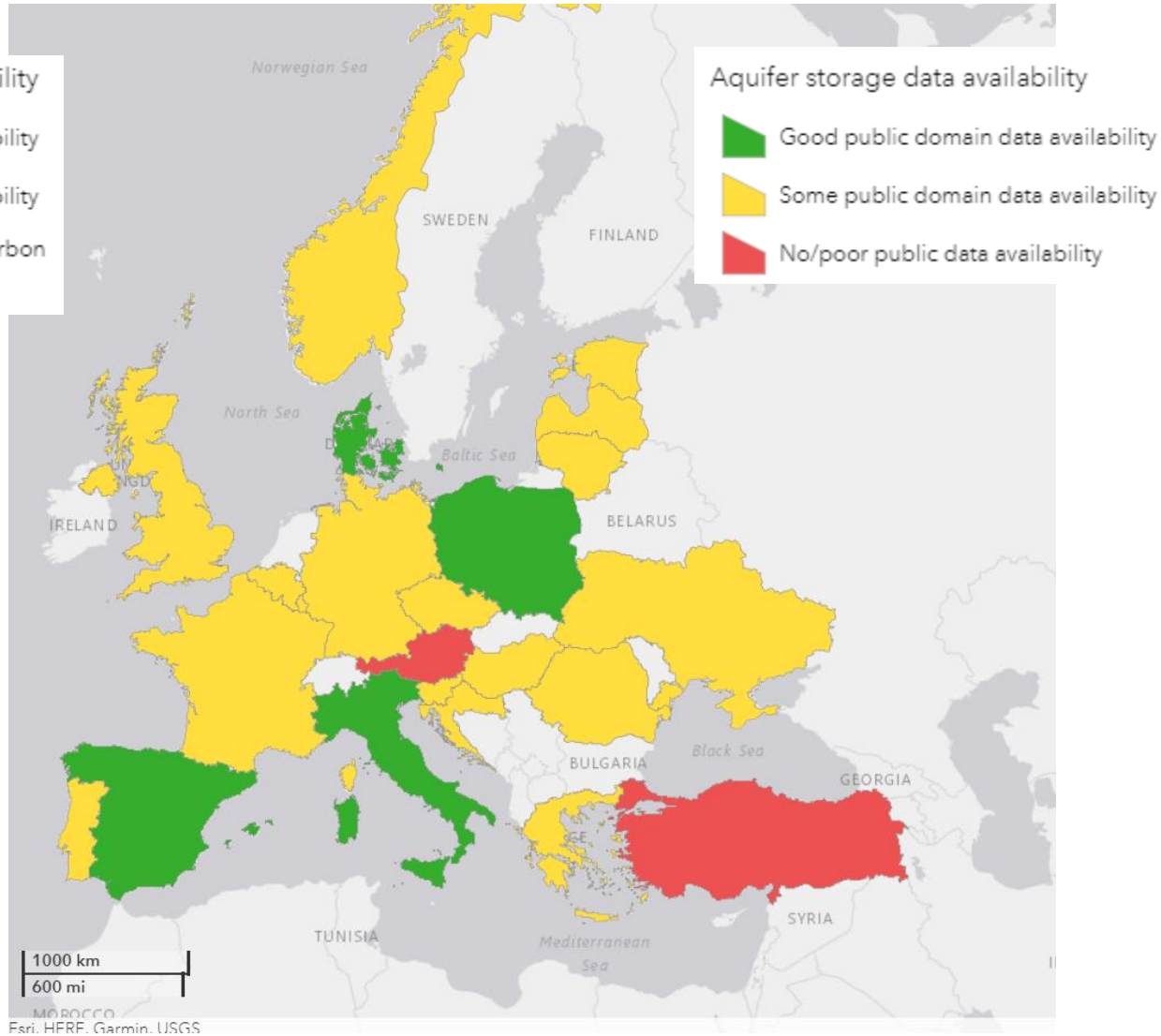
Leakage risks – caprock, faults, depth to top

Operational – owner, production years, wells and vintage, status/planned development

New Hystories hydrogen-specific criteria

# Data availability to identify potential storage sites (1)



# Data availability to identify potential storage sites (2)

- Sufficient data were available to identify geological traps in 20 of the 22 countries assessed by Hystories.
- There was significantly more data available for hydrocarbon fields
  - Four countries declaring good public data availability and all other countries indicating at least some public domain data
- And fewer data for saline aquifers
  - Four countries declaring good public data availability, two countries declaring no or poor data availability, and the remaining countries declaring some public data availability
- Detailed data, such as well logs and seismic data, to further assess potential for hydrogen storage are available in several countries but are not always free to access or publish.

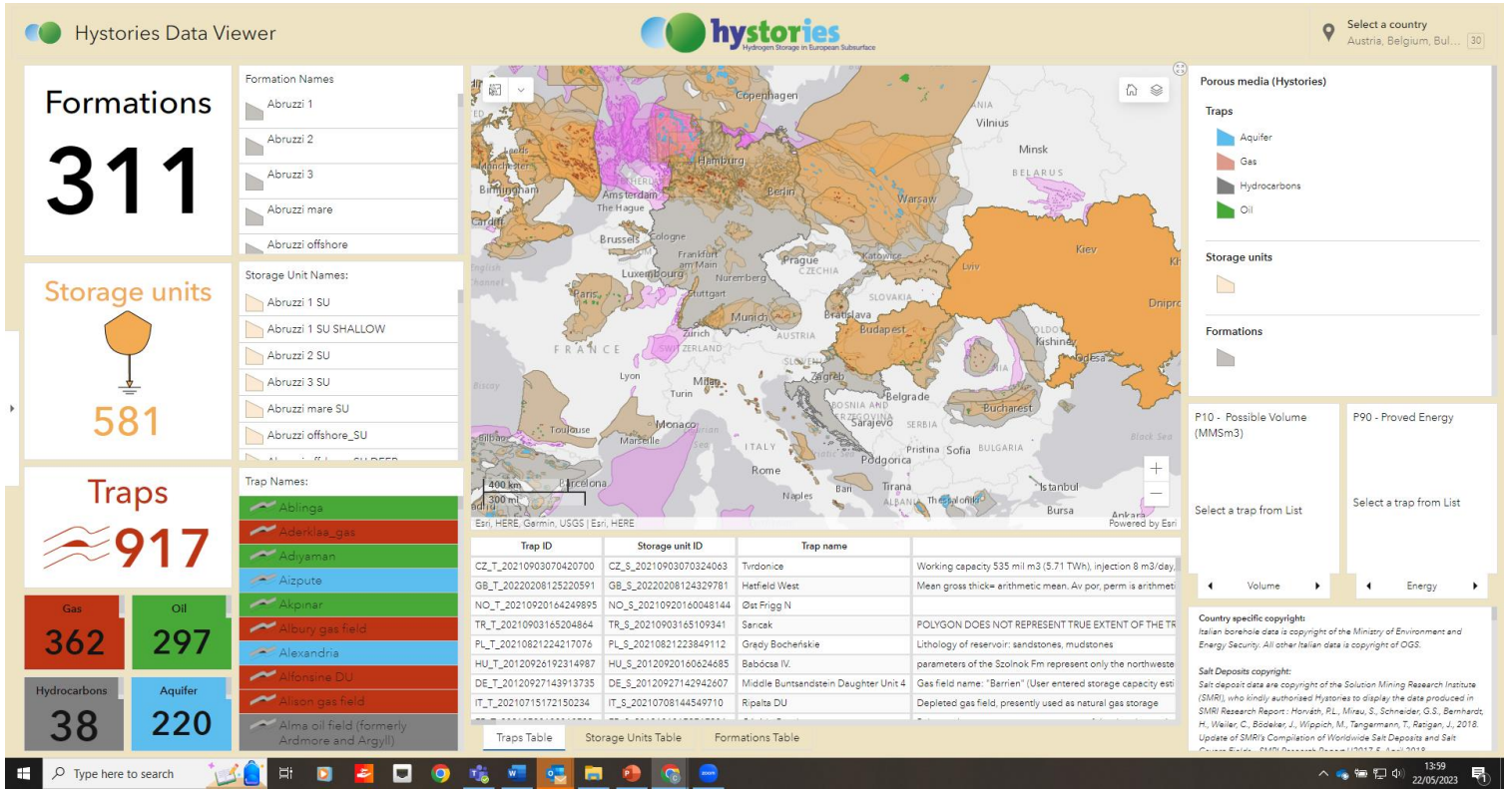
# Geographical information system

Hystories ‘traps’ = 917
(See map)

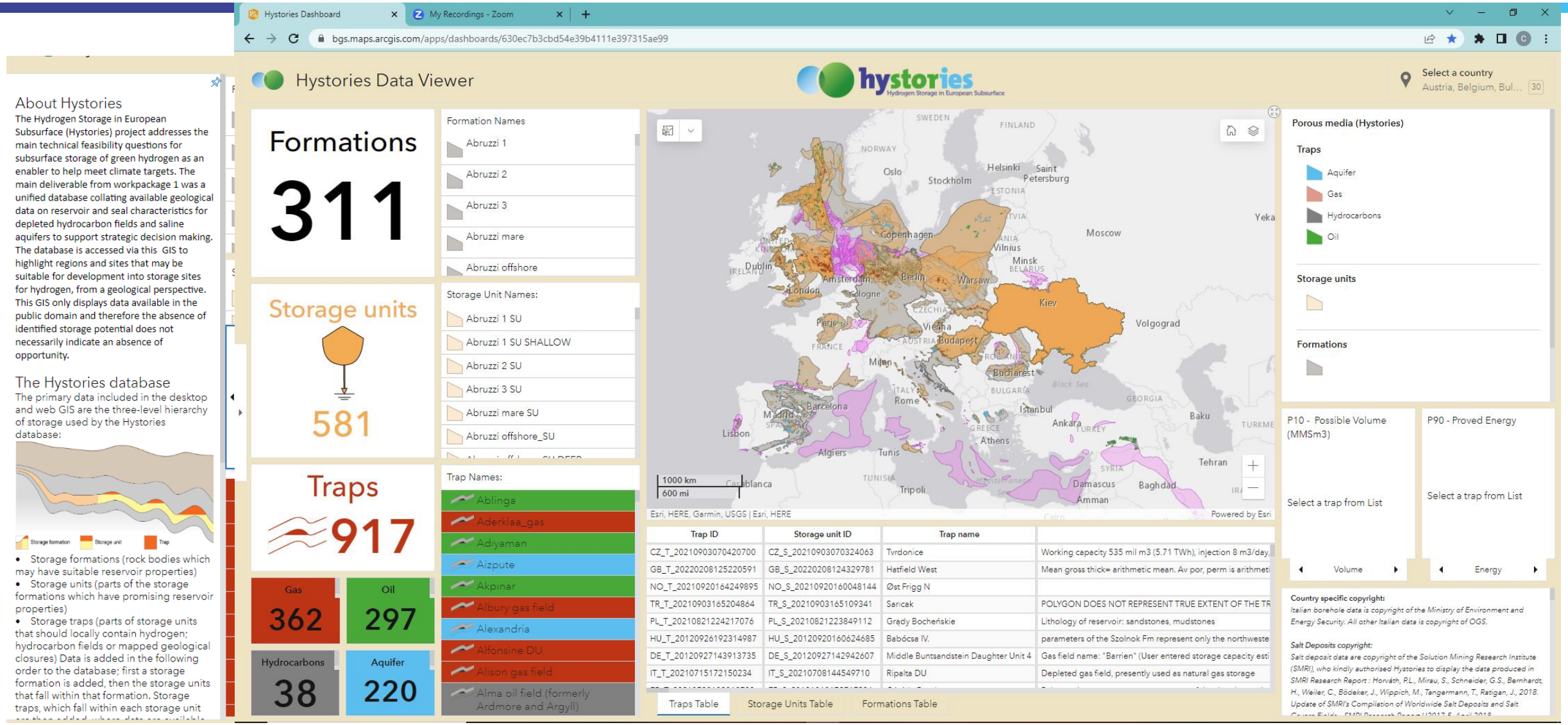
units = 581

formations = 311

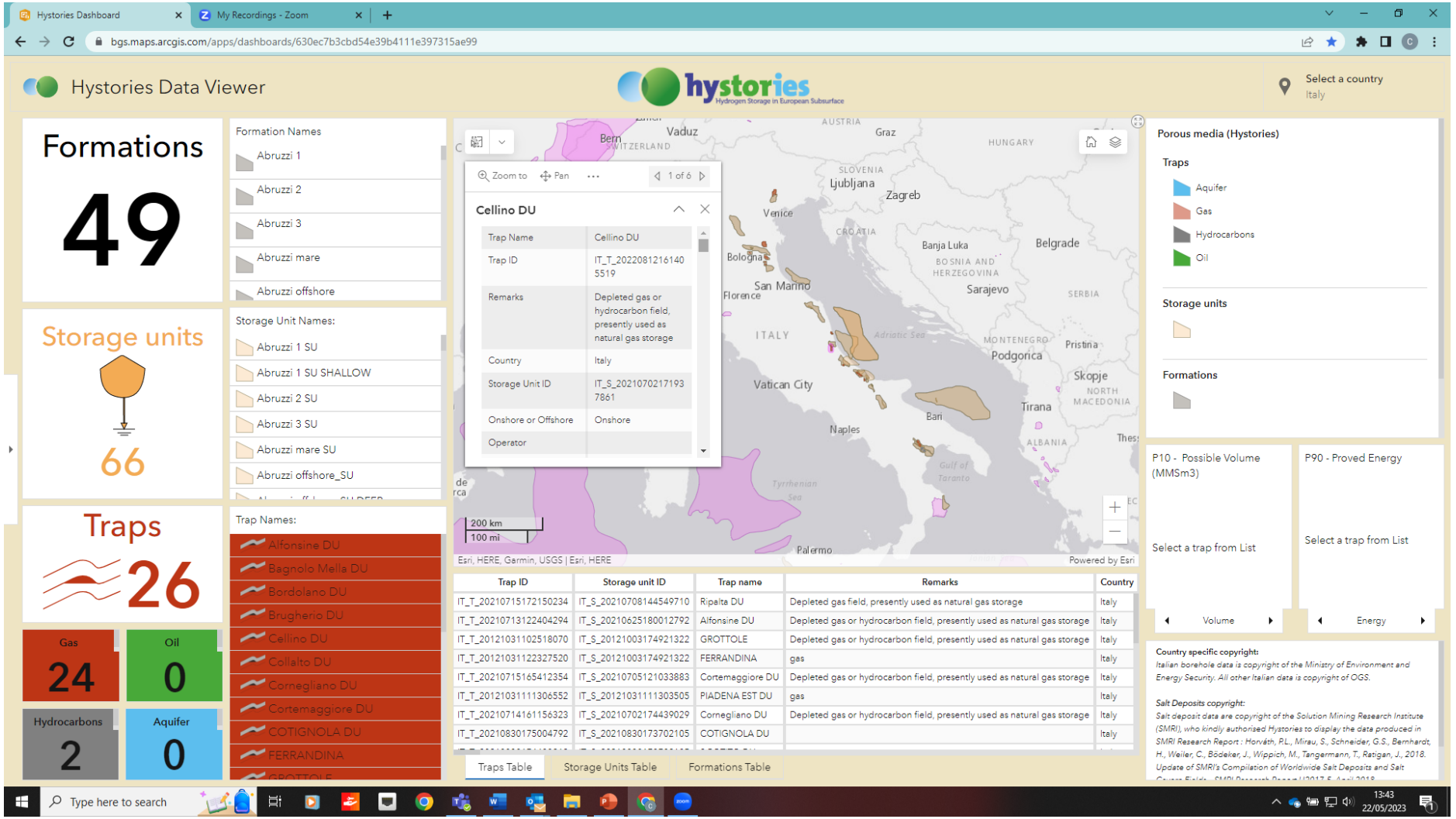
Note: These are the traps that could be identified using publicly available data, therefore, **an absence of identified traps does not necessarily indicate an absence of storage potential**



# Online database viewer (1)



# Online database viewer (2)



Hystories Data Viewer

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Select a country
No category selected

Selection required on one or more elements

Formation Names

Selection required on one or more elements

Selection required on one or more elements

Storage Unit Names:

Selection required on one or more elements

Selection required on one or more elements

Trap Names:

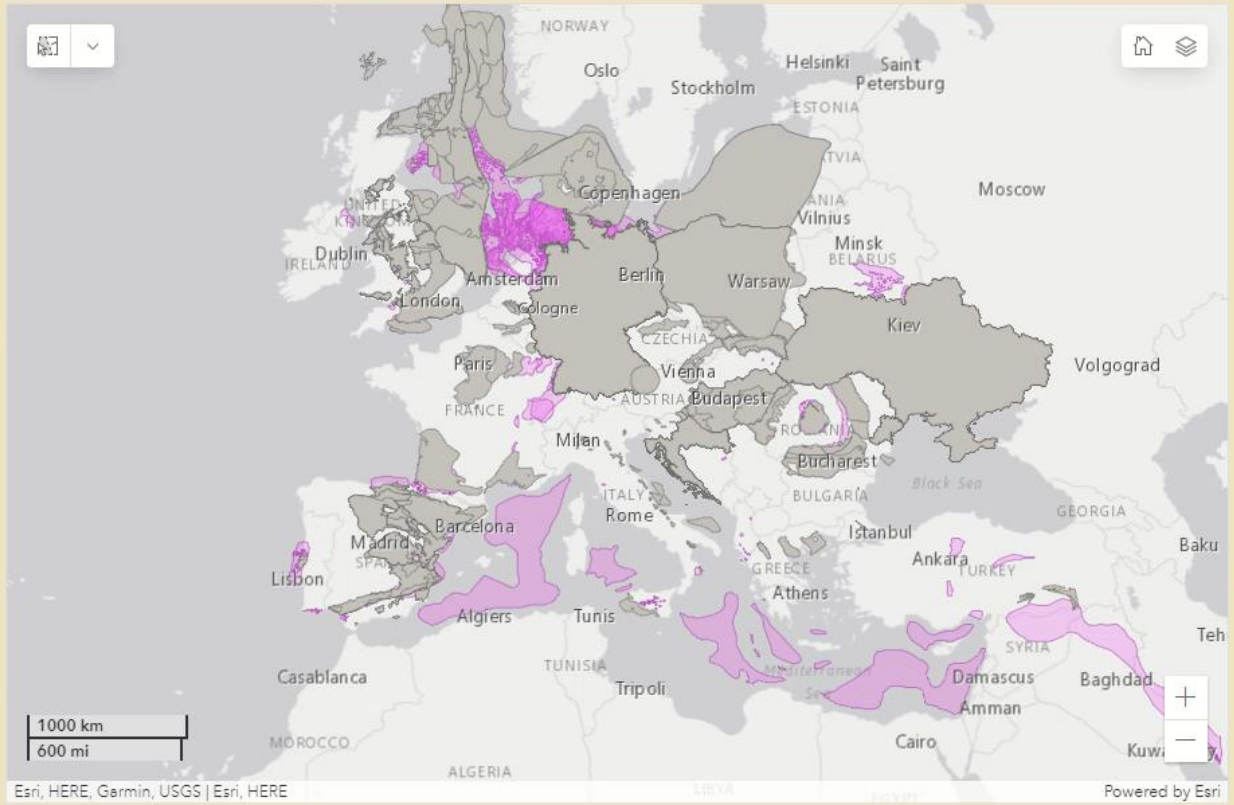
Selection required on one or more elements

**Gas**
Selection required on one or more

**Oil**
Selection required on one or more

**Hydrocarbons**
Selection required on one or more

**Aquifer**
Selection required on one or more




Selection required on one or more elements

Traps Table | Storage Units Table | Formations Table

**Porous media (Hystories)**

**Traps**
- Aquifer
- Gas
- Hydrocarbons
- Oil

**Storage units**

**Formations**

P10 - Possible Volume (MMSm3)

Select a trap from List

P90 - Proved Energy

Select a trap from List

Volume | Energy

***Salt Deposits copyright:***

*Salt deposit data are copyright of the Solution Mining Research Institute (SMRI), who kindly authorised Hystories to display the data produced in SMRI Research Report : Horváth, P.L., Mirau, S., Schneider, G.S., Bernhardt, H., Weiler, C., Bödeker, J., Wippich, M., Tangermann, T., Ratigan, J., 2018. Update of SMRI's Compilation of Worldwide Salt Deposits and Salt Cavern Fields - SMRI Research Report U2017-5, April 2018.*

# Database results (1)

- Geodata is key in making strategic decisions on the role for the subsurface in meeting energy and climate demands. Having access to data and the knowledge on how to process, manage and manipulate this data will have a wide-ranging impact on the capacity for strategic decision making.
- Where geological data are available in the public domain, it is possible to identify opportunities where the subsurface could play a role in meeting climate targets
- The wealth of data collated during the Hystories project indicates that there is significant potential for geological storage of hydrogen in depleted hydrocarbon fields and saline aquifers across Europe.

# Database results (2)

- Where the required data are available for assessment, geological traps which could be used to store hydrogen have been identified.
- All countries, with the exception of Estonia, were able to identify formations and storage units for potential hydrogen storage
- However, storage opportunities are not evenly distributed and will require varying amounts of effort to realise.

# Next steps

- The geological traps identified through the Hystories project will require further assessment to confirm their suitability for storage of hydrogen
  - Acquire detailed data (either purchase/collect)
  - Site specific investigation and business case
- Additional data collation could be undertaken in a new project to improve pan-European understanding of storage opportunities
  - Additional resource to purchase and interpret seismic and well data
  - New data collection, especially to better understand opportunities offered by saline aquifers

# Summary - Hystories workpackage 1 on European porous media storage database

Hystories Work Package 1 generated a **comprehensive, cross-border, database of potential opportunities** for geological storage of hydrogen. The database represents a significant new knowledge deliverable

Public **availability of data varies** between countries and for different trap types. An absence of identified traps does not necessarily indicate an absence of storage potential

The wealth of data collated indicates there is **significant potential for geological storage of hydrogen** in depleted hydrocarbon fields and saline aquifers across Europe. Storage opportunities are not evenly distributed

Traps identified through Hystories require **further investigation** to confirm site-specific suitability of specific sites for H2 storage. Development time will vary

# Hystories project consortium

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# Thanks to all WP1 participants


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# Thank you !

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