

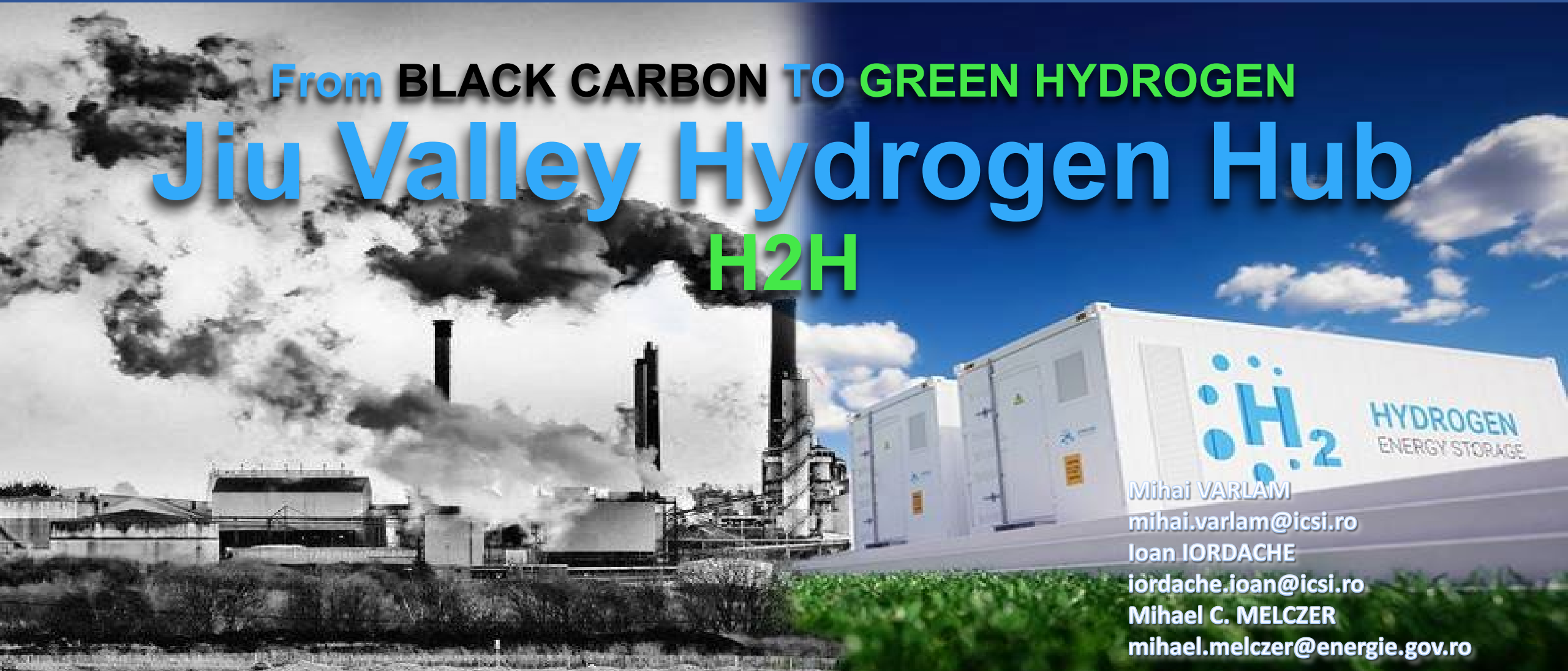


THE MINISTRY OF
ENERGY OF ROMANIA

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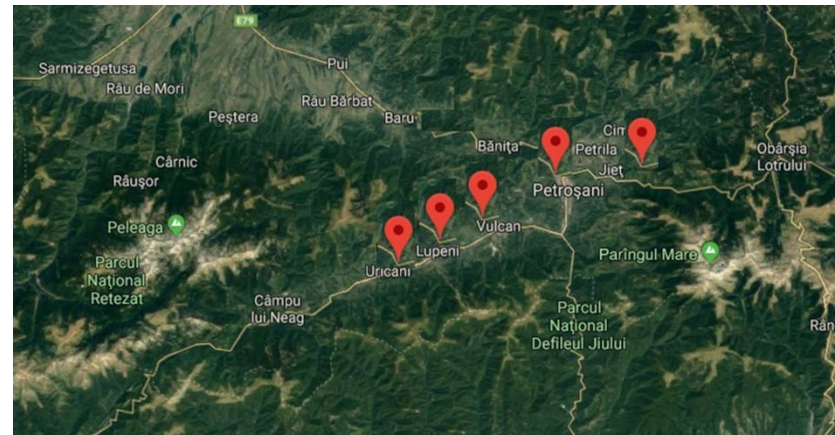
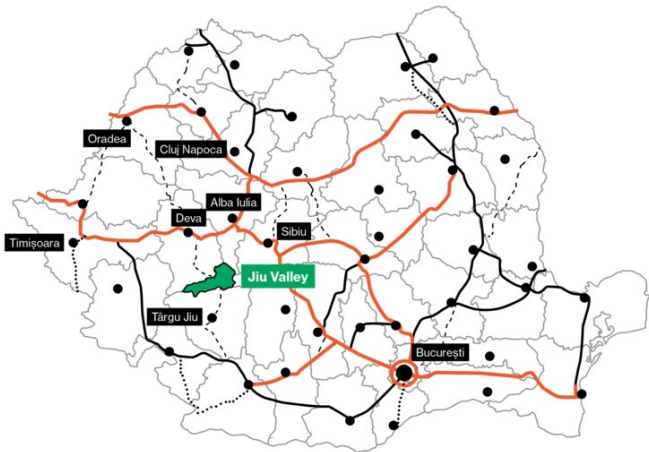
From **BLACK CARBON** TO **GREEN HYDROGEN**
Jiu Valley Hydrogen Hub
H₂H



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H2H – Jiu Valley's potential & resources

- The Jiu Valley, Romania's former largest coal mining area, is nowadays defined by wonderful landscapes, an exceptional river basin, and a very ancient history and culture.
- Its privileged position, the great tourism potential, and the sites for investments left behind by the closure of the mines offer great investment potential in areas such as tourism, industry, urban regeneration, and not only. The Jiu Valley is in a **full re-invention process**, and the companies that will invest in the area will define its future post-mining identity.
- The Jiu Valley has the **opportunity** to replace the former coal mines and energy landscape with a **new sustainable development goal and reason to be** for the former mining community.





Conversion area:

- Architectural transformation of the deactivated infrastructure;
- Exploitation of biomass and methane resources;
- Utilization of underground mineralized and warm waters for heating and balneary/spa purposes;
- Achieving a Hydrogen hub by capitalizing local resources and infrastructure.

What could be more exciting, than going from brown to GREEN ?!?

H2H - Benefits



Financial benefits

The structure of the Hub proposed, clustering around multiple users creates the opportunity for increased volumes, economies of scale and lower energy costs and create jobs.



Strategic benefits - Energy storage

An energy system with the ability to store excess energy creates the flexibility for consumption to take place at different times/places. More tangible is a technical need to better utilization of the existing electricity generation resources, followed by commercial opportunities and benefits.



Environmental benefits

Hydrogen and fuel cells offer a zero particulate, lower carbon emission alternative to coal fuel heat, power and transport technologies. The most significant impacts can be characterised as improving air quality and reducing greenhouse gas (GHG) emissions.

Jiu Valley Hydrogen Hub, WHY?

Europe Union, keynote indicators by 2050:

- 24% of final energy demand by hydrogen, 2 250 TWh;
- reducing about 560 Mt of CO₂ emissions;
- ~EUR 820 bn annual revenue;
- ~5.4 m jobs.

Ambitious scenario
2050 hydrogen vision



~24%
of final energy
demand¹



~560 Mt
annual CO₂
abatement²



~EUR 820 bn
annual revenue
(hydrogen and
equipment)



~15%
reduction of local
emissions (NO_x)
relative to road transport



~5.4 m
jobs (hydrogen,
equipment, supplier
industries)³

¹ Incl. feedstock
² Compared to the Reference Technology Scenario
³ Excl. indirect effects

- ~15% reduction
of local emissions
(NO_x);

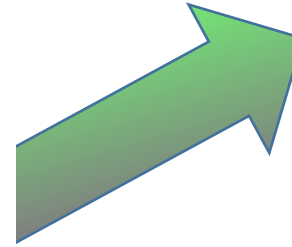


FOTO: Guliver / Getty Images

- Romania and entire Europe faces an unprecedented challenge to meet its obligations on carbon emissions and air quality. We will become more and more dependent on **renewable electricity**.
- Renewable generation tends to be intermittent and the more we have, the harder it is to balance supply and demand. Effective balancing of supply and demand will require **storage of energy** which can readily be turned back into electricity when needed.
- The other big benefit of hydrogen is that it can be readily used to produce heat, electricity or as a fuel for more mundane forms of transport, as convenient and versatile as the fossil fuels that we have all become used to.

H2H - Development phases proposal



- **Strategy development** - The development of Hydrogen Hub infrastructure should allow and promote growth in supply and demand for energy services. Develop and deploy a replicable, balanced and integrated hydrogen economy by facilitating investment into market-ready or under demonstration technology;
- **Collaboration** – Important for the development of a Hydrogen Hub is the collaboration that must take place between elements of the supply chain, civic champions (such as local authorities) and potential end-users;
- **Efficient market design – role for government policy** – In order to create a dynamic and competitive market for hydrogen and fuel cells, policy has a role to play. As discussed hydrogen is a particularly valuable energy carrier with attractive attributes for energy storage;
- **The goal** is to use the local available infrastructure, industry and resources (methane, hard-coal, water, biomass, manpower) for a local competitive hydrogen economy.

Ambition to become a H₂ hub and the vision to create a hydrogen economy in Jiu Valley!

Jiu Valley needs to become green!

H2H - Production, Storage, Utilization

I. Electrolysis, Green & low carbon electricity,



II. SMR of mine methane & Pyrolysis of biomass and residual coal.

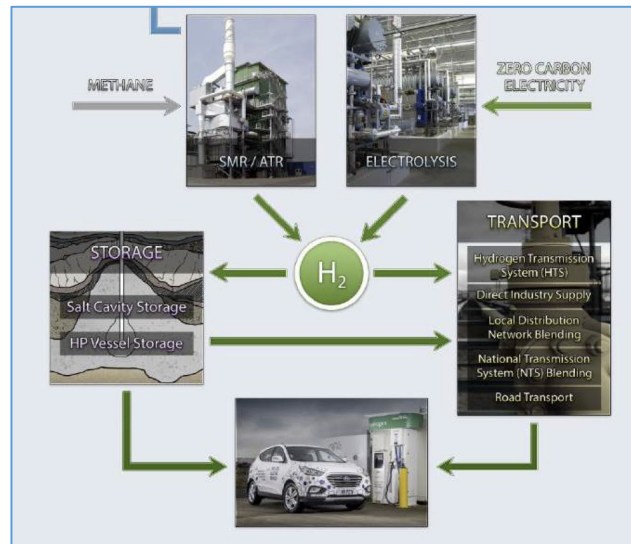


➤ **Versatile production!**

Short time and sessional storage:

- *surface facilities;*
 - *mine voids;*
 - *new underground solutions;*
- Transport & manipulation**
- Public road and railroad;
 - *Industrial railway (~40 km)*

Project thinking



- Electric **grid** management & **balancing**, energy storage;



- **Raw material** in chemical industry;
- Reducing agent in **steel production**;



- **Fuel for zero-emission transport**,
- Merchandise on the market, etc.

➤ **Multiple output streams utilization!**

H2H - Main focus

- The program will develop a **replicable, balanced and integrated hydrogen economy** by facilitating investment into **market-ready hydrogen technology**, FCH JU projects can be a sustainable portfolio of examples;
- The aim is to **use available industrial and energy infrastructures** for sustainable **green or low carbon hydrogen** production, storage and utilization;
- Primarily, the program **will debut with small demonstrative projects** for hydrogen production and utilization, e.g. hydrogen as cooling gas for electric generators or hydrogen for electric mobility, especially local and interurban public transport and must progress, by scale-up, **until large scale hydrogen** production, storage and utilization for industrial or energy purposes will be able to demonstrate its commercial maturity and profitability;
- Attracting **new industries**.

Thank you!