EUSALP AG9 ENERGY SERIES 2021

Alpine regions, large scale initiators of hydrogen mobility

Online event, 18/10/2021
HOW TO USE ZOOM:

Switch off your camera and your microphone

Please use the chat if you have questions
SAVE THE DATE 5th EUSALP Energy Conference

18.10.2021 | 14:00 - 15:30 h | Alpine Regions as Initiators of Hydrogen Mobility (online event)
17.11.2021 | 10:00 - 12:00 h | Local Energy Communities - A Win for All in the Energy Transition (online event)
26.01.2022 | 09:00 - 12:00 h | New European Bauhaus - Perspectives for the Alpine Region. Klimahouse 2022. Bolzano/Bozen, Italy

Join the EUSALP Energy Conference and trigger the change: no energy transition without dialogue.

Stay tuned for further information!

www.alpine-region.eu
AGENDA

Moderator: Patrick Biard, AURA-EE

1. Presentation of the EUSALP Green Hydrogen in the Alps initiative and progress
2. Results of the Alpine hydrogen study
3. European perspectives on policies and funding instruments
4. Discussions
Background for EUSALP elements: proposal from AURA to develop a joint project proposal in order to foster investments in Heavy Duty Mobility Solutions across the Alps. (e.g. urban buses, coaches, trucks, snow groomers, refuelling stations, production of green H2...). It will seek funding from the EU.


9 questionnaires received from 9 regions
Next steps: confirmation of the perimeter, launching of studies end of 2021, proposals to be submitted to the European calls in 2022,

Possible role for the Fuel Cell Hydrogen Joint Undertaking (FCH-JU), achieving wide spread consensus within industry, policy makers and civil society on a definition of green hydrogen and which is currently preparing EU wide implementation. Possibility for a call on trucks.
GREEN HYDROGEN IN THE ALPS

Foster the cooperation between alpine regions/organizations on Hydrogen Project ideas being developed:
1. Territorial approach: from green H2 production to local uses: to be further developed
2. Pre-development assistance for H2 Infrastructure for heavy vehicles
3. Embedding workshop on hydrogen with interested regions (2021)
HYDROGEN REGIONAL STRATEGIES IN EUSALP: A STAKEHOLDER PERSPECTIVE ON BARRIERS AND COOPERATION OPPORTUNITIES IN THE TRANSITION TO A H₂-BASED ECONOMY

Preliminary results from the meta-study initiated by EUSALP Action group 9

Lorenzo Menin, Stefano Piazzi, Daniele Antolini, Andrea Gasparella, Marco Baratieri

Free University of Bolzano (UNIBZ)
BACKGROUND TO THE PROJECT

Expert elicitation study engaging EUSALP stakeholders involved in energy policy planning at regional level

Aims:
1. Understand fundamental hydrogen production and utilization modes envisaged by stakeholders
2. Investigate perception of fundamental barriers and opportunities on the way towards hydrogen development
3. Explore policy priorities identified by stakeholders at regional level
Open questions:

1. Existence and description of ongoing hydrogen development projects

2. Expectations on most promising production pathway

3. Expectations on most promising utilization pathway
PART 1 – QUESTIONNAIRE

Multiple choice and ranking questions:

1. Most important **segments** of hydrogen **supply chain**

2. **Strategic objectives** related to hydrogen development

3. Expected **benefits** of implementation of hydrogen strategy

4. Expected **barriers** to implementation of hydrogen strategy

5. Expected **opportunities** to facilitate the implementation of hydrogen strategy
GEOGRAPHY OF QUESTIONNAIRE RESPONSE

- Austria
  - Niederösterreich
  - Kärnten
- France
  - Rhone-Alpes
- Germany
  - Baden-Württemberg
- Italy
  - Friuli Venezia Giulia
  - Trento
  - Piemonte
  - Valle d’Aosta
PRELIMINARY RESULTS: STRATEGIC OBJECTIVES

Key

Highest scores indicate highest priorities

Score equals cumulative priority rank attributed by interviewees
PRELIMINARY RESULTS: BARRIERS TO IMPLEMENTATION

<table>
<thead>
<tr>
<th>Barrier</th>
<th>Score</th>
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<tbody>
<tr>
<td>Technological risk</td>
<td>50</td>
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<tr>
<td>Policy risk</td>
<td>40</td>
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<tr>
<td>Lack of infrastructure</td>
<td>30</td>
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<tr>
<td>Lack of policy uniformity</td>
<td>20</td>
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<tr>
<td>Insufficient incentives</td>
<td>10</td>
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<tr>
<td>Insufficient competitiveness</td>
<td></td>
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<tr>
<td>Lack of expertise</td>
<td></td>
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<td>Limited public acceptance</td>
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</table>

Key

Highest scores indicate greatest barriers

Score equals cumulative priority rank attributed by interviewees
Preliminary results: opportunities to accelerate

Key

- Highest scores indicate greatest opportunities

- Score equals cumulative priority rank attributed by interviewees
PRELIMINARY RESULTS: PRODUCTION AND UTILIZATION

Most promising production pathway?

**Electrolysis** undoubtedly *most cited* option
Blue hydrogen, biogas reforming and biomass also cited

Most promising utilization pathway?

**Heavy transportation** undoubtedly *most cited* option
Energy storage also cited
PART 2 – INTERVIEWS

Areas of inquiry:

1. Local **policy** priorities

2. **Infrastructural** challenges and opportunities

3. Energy/feedstock **supply** conditions

4. Understanding of **technologies**, efficiencies, costs, decarbonization potential

5. Details on existing **projects**

6. Case-specific questions based on previous answers (questionnaires) and geo-specific conditions
INTERVIEWS: TOPICS CLUSTERING

Expected cross-sector benefits

Decarbonization, air quality, and enhancement of industrial competitiveness
Road infrastructure focus

Common focus on large transnational heavy transportation routes, where heavy road transportation is seen as unanswered decarbonization challenge that hydrogen can help solve.

Key barrier and risk identified in lack of international infrastructural development and planning coordination.
Electrolysis is normally considered the most adequate technology by default, although several interviewees pointed to blue hydrogen as a necessary precursor. However, there is awareness of the threat of blue hydrogen to hinder decarbonization.

On occasion, biogas reforming and biomass sources were cited. Some interviewees see electrolysis and hydrogen as inefficient especially for energy storage, indicating partial skepticism.
INTERVIEWS: TOPICS CLUSTERING

Local industries as transition leaders

Industry is cited most often as the expected transition leader, although geo-specific sectors may represent threat to hydrogen development due to competition for resources (energy/fuel).

Policy schemes directed towards industrial uses are expected to prevail over user-centric applications. These mostly include heavy duty transportation in several forms, while use for heat provision is generally disregarded.

Very limited attention is given to other parts of society (individual users, civil society, governmental institutions).
INTERVIEWS: TOPICS CLUSTERING

Resources and supply chains uncertainty

From the conversations with the stakeholders a clear lack of information emerges relatively to the assessment and planning of the local supply capacity of energy and/or material resources necessary to cover the expected hydrogen demands.
INTERVIEWS: COMMON POLICY PRIORITY AREAS

Expansion of renewable generation capacity
Transnational co-investment and infrastructural coordination
Sharing of knowledge and information
Industrial partnerships
Development of blue hydrogen at scale
Planning and implementation of dedicated electricity transfer across regions
Planning and implementation of hydrogen transfer across regions
INTERVIEWS: MAJOR INFORMATION GAPS ENCOUNTERED

1. Lack of information on expected performances from different types of technologies along the supply chain
2. Lack of information on technological and infrastructural alternatives
3. Lack of information on local availability of resources (energy or feedstocks) necessary to meet projected hydrogen demands
Lorenzo Menin, Stefano Piazzi, Daniele Antolini, Andrea Gasparella, Marco Baratieri

For questions, suggestions, or to state your availability to take part in the questionnaire or interviews do not hesitate to get in touch at:

lmenin@unibz.it, stefano.piazzi@unibz.it

THANK YOU
HYDROGEN IN EU POLICIES

Tomasz Bąk, European Commission
C4 Unit Infrastructure and Regional Cooperation
The energy system today: linear and wasteful flows of energy, in one direction only.

Future EU integrated energy system: energy flows between users and producers, reducing wasted resources and money.
Laying the foundation for a climate-neutral energy system

1. A more **circular and energy efficient** energy system

2. A **deep electrification** of consumption, based on **renewable electricity**

3. The use of **renewable and low carbon fuels** (incl. hydrogen) in hard-to-abate sectors

**Hydrogen Strategy**

A full value chain approach to upscale hydrogen

+ **Clean Hydrogen Alliance**
Why the emphasis on hydrogen?

1. The EU needs to deliver on climate neutrality at the least cost, in line with Green Deal ambitions

2. Hydrogen can be applied to many areas

3. May be produced through a variety of processes, with a wide range of emissions

➔ opportunity to create jobs, ensure security of supply and industrial leadership
The Hydrogen Strategy – a roadmap to 2050

**2024**
- 6 GW of renewable hydrogen electrolysers
- Replace existing hydrogen production
- Regulation for liquid hydrogen markets
- Planning of hydrogen infrastructure

**2030**
- 40 GW of renewable hydrogen electrolysers
- New applications in steel and transport
- Hydrogen for electricity balancing purposes
- Creation of “Hydrogen Valleys”
- Cross-border logistical infrastructure

**2050**
- Scale-up to all hard-to-decarbonise sectors
- Expansion of hydrogen-derived synthetic fuels
- EU-wide infrastructure network
- An open international market with € as benchmark
## Application areas for hydrogen

### Transportation
- Large cars (fleets) and taxis
- Trucks and buses
- Light commercial vehicles
- Trains
- Ships and aviation

### Heating and power for buildings
- Hydrogen blending for heating
- Pure hydrogen grids for heating

### Industry energy
- High-grade heat

### Industry feedstock
- Ultra-low-carbon hydrogen as feedstock for:
  - Ammonia, methanol
  - Refining
- Feedstock in steelmaking (DRI)
- Combined with CCU in production of olefins and BTX

### Power generation
- Power generation from hydrogen
- Flexible power generation from hydrogen

### Relative importance by 2050

<table>
<thead>
<tr>
<th>Segment</th>
<th>Relative importance</th>
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<tbody>
<tr>
<td>Hydrogen blending</td>
<td>2%</td>
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<tr>
<td>Pure hydrogen grids</td>
<td>16%</td>
</tr>
<tr>
<td>Ultra-low-carbon hydrogen</td>
<td>20%</td>
</tr>
<tr>
<td>Ammonia, methanol</td>
<td>50%</td>
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<tr>
<td>Refining</td>
<td>20%</td>
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<tr>
<td>Feedstock in steelmaking</td>
<td>30%</td>
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<tr>
<td>Combined with CCU</td>
<td>30%</td>
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<tr>
<td>Power generation from hydrogen</td>
<td>55%</td>
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</tbody>
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### Complementary decarbonization solutions
- Electrification of heating via heat pumps
- Energy efficiency measures
- Biogas/biomass
- Electrification
- Biogas/biomass capture
- Coke from biomass
- CCS on blast furnaces
- Carbon storage
- Plug-in hybrid electric vehicles
- Electrified trains
- Biofuels and CNG/LNG

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1 In transportation: percent of total fleet; in heating and power for buildings: percent of total heating demand; in industry energy: percent of final energy demand; in industry feedstock: percent of total feedstock for production; in power generation: percent of total power generation and percent of power generated from hydrogen.

SOURCE: Hydrogen Roadmap Europe team
Hydrogen may be produced through a variety of processes, with a wide range of emissions:

- ‘Renewable hydrogen’
- ‘Fossil-based hydrogen’
- ‘Fossil-based hydrogen with carbon capture’
- ‘Low-carbon hydrogen’
- ‘Electricity-based hydrogen’
- Hydrogen-derived synthetic fuels
Hydrogen – an investment agenda

Next Generation EU, Invest EU, Cohesion Policy, CEF-E, CEF-T
ETS Innovation Fund, Horizon Europe

Renewable electricity production
€220-340 BLN

Renewable hydrogen
€24-43 BLN

Hydrogen transport, distribution, and storage
€65 BLN

Transport (HDV)
€13 BLN

Steel
€8 BLN

European Clean Hydrogen Alliance
## Making it happen – an action plan for the Hydrogen Strategy

<table>
<thead>
<tr>
<th>Full value chain approach</th>
<th>Actions oriented towards</th>
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<tbody>
<tr>
<td><strong>An investment agenda</strong></td>
<td>• Create project pipeline through the <strong>Clean Hydrogen Alliance</strong></td>
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<tr>
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<td>• €220-340bln renewable power, €24-42bln electrolysers, €65bln infrastructure</td>
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<tr>
<td><strong>Boosting demand and scale up production</strong></td>
<td>• Comprehensive terminology and EU-wide certification of hydrogen</td>
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<tr>
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<td>• Support schemes and CCfD for renewable and low-carbon hydrogen</td>
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<tr>
<td></td>
<td>• Demand-side policies in end-use sectors</td>
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<tr>
<td><strong>Develop hydrogen infrastructure and markets</strong></td>
<td>• Planning of hydrogen transport and storage infrastructure</td>
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<td>• Rules ensuring competitive markets, enabling infrastructure development (incl. repurposing) whilst retaining integrity of internal gas market</td>
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<tr>
<td><strong>Research and Innovation</strong></td>
<td>• <strong>Clean Hydrogen Partnership</strong> established</td>
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<td></td>
<td>• Scale up electrolysers and develop hydrogen value chain</td>
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<td>• Continue to support innovative hydrogen technologies</td>
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<tr>
<td><strong>The international dimension</strong></td>
<td>• International standards, regulation and definitions for hydrogen</td>
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<td></td>
<td>• Promote cooperation</td>
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The Hydrogen Alliance

- Boosting demand and scaling up production
- Developing hydrogen infrastructure and markets
- Research and innovation
- The international dimension

European Clean Hydrogen Alliance
Kick-starting the EU Hydrogen Industry to achieve the EU climate goals
Energy infrastructure as a key pillar of EU energy policy to deliver the European Green Deal

TEN-E policy: promote interconnections and interoperability of national networks & accelerate the development of Projects of Common Interest (PCIs)

The revision aims at fully aligning with the 2050 climate neutrality objective
Instead of natural gas, focus on infrastructure needed for renewable and low carbon gases:

- New and repurposed dedicated **hydrogen networks**
- **Electrolysers** with a cross-border impact
- **Smart gas grid solutions** to integrate renewable and low-carbon gases, such as hydrogen, into existing gas grid
PROJECTS OF MUTUAL INTEREST (PMIS)

Scope extended to projects connecting the EU with third countries (including possible hydrogen projects) given their expected increasing role in achieving the climate objectives.

Conditions:

➢ **Regulatory alignment** of the neighbouring country with the EU

➢ Impact on at least **two Member States**

➢ Mutual benefit, including through contribution to **EU decarbonisation goals**
Assist in better project preparation and minimising risk factors (*grants for studies*)

Decrease the cost of and improve the access to long term financing (*financial instruments*)

Help overcome the funding gap for commercially non-viable, but needed PCIs (*grants for works*)
THE ROLE OF HYDROGEN IN TRANSPORT

Policy context: Sustainable and Smart Mobility Strategy & Alternative Fuels Infrastructure Regulation

Hydrogen identified as one of the principal alternative fuels with a potential for long-term oil substitution

- Potential for commercial, rail and heavy duty transport

In order to decarbonize transport, we need to boost the uptake of zero-emission vehicles, renewable & low-carbon fuels and related infrastructure.
THANK YOU FOR YOUR ATTENTION
EU possible funds for the EUSALP green hydrogen initiative

Auvergne-Rhône-Alpes ‘s Brussels office

18/10/2021
EU STRATEGY on H2

EU Strategy for Clean Hydrogen
8 July 2020

The EU Hydrogen Strategy will give a boost to clean hydrogen production in Europe. Hydrogen can be used as a feedstock, a fuel or an energy carrier and storage, and has many possible applications which would reduce greenhouse gas emissions across industry, transport, power and buildings sectors.

EU Strategy for Energy System Integration
8 July 2020

provide the framework for the green energy transition.

• more ‘circular’ energy system, with energy efficiency at its core
• greater direct electrification of end-use sectors.
• or those sectors where electrification is difficult, the strategy promotes clean fuels, including renewable hydrogen

Sustainable and Smart Mobility Strategy
9 December 2020

FIT FOR 55 Regulations
EUROPEAN INITIATIVES ON H2

S3 Hydrogen Valleys partnership (May 2019)
- Launch by AURA and co-lead with 3 others european region
- 55 european regions
https://s3platform.jrc.ec.europa.eu/hydrogen-valleys

European Clean Hydrogen Alliance (July 2020)
• Pipeline of investment projects aimed at increasing production and supporting demand for clean hydrogen in the EU
• Policy and regulatory measures aimed at ensuring investor safety, facilitating the use of hydrogen, promoting the necessary logistics infrastructure and networks, adapting infrastructure planning tools and supporting investments

Regional Pillar Hydrogen Europe (December 2021)
EU funding for smart and sustainable mobility

...including Hydrogen!

<table>
<thead>
<tr>
<th>Components</th>
<th>Manufacturing</th>
<th>Infrastructure</th>
<th>Fleets</th>
<th>Clean Fuels</th>
<th>Operations</th>
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<td>RRF</td>
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<td>GEF</td>
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<td>Horizon EU</td>
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<td>InnovFund</td>
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Source: EC, March 2021
Next Generation EU
(EU recovery plan)

- Highlights **hydrogen as an investment priority** to boost economic growth and resilience, create local jobs and consolidate the EU’s global leadership
- **Recovery and Resilience Facility (RRF)**

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<tr>
<th>Grants and loans, directement management via national plans</th>
<th>2021-2027 budget: €672, 5 billion</th>
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ERDF
(EU Cohesion policy)

- Develop renewable energy production capacities (hydrogen), support experimental projects, ...
- **Studies**

<table>
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<tr>
<th>Grants Shared management regions Managing Authority</th>
<th>2021-2027 budget: ERDF €192,4 billion</th>
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EUROPEAN TERRITORIAL COOPERATION

[Interreg Alpine Space]
HE partnership

Clean Hydrogen Joint Undertaking
between Hydrogen Europe & EC

Accelerating the development and deployment of a European value chain for clean hydrogen technologies, thus contributing to the establishment of sustainable, decarbonized and fully integrated energy systems (heavy industries and heavy road transport).

Next call: January 2022

I3 – Inter-regional Innovation Investment

The I3 WP aims at promoting innovation through Smart Specialization and interregional collaboration. The I3 supports stronger interregional cooperation in investments and makes sustainable connections by linking regional ecosystems in shared smart specialisation areas vital to accelerate market uptake of research results and stimulate innovation.

Strand 1 - Financial and advisory support for investments in interregional innovation projects (stand 2: less developed regions) ➔ Call for project to be open soon!
Connecting Europe Facility – CEF

European Program to Support Investment in Infrastructure Projects transport, telecommunications and energy.

CEF – transport

Budget: 25.8 billion€ for 2021 - 2027

Priorities 2021 – 2027:
• Rail and inland navigation – cross-border projects
• Large-scale deployment of alternative fuels infrastructure
• Digitalisation of transport
• Mobility systems through intelligent applications

2 types of support
- Grants: 20 % à 50 % of eligible costs for works and studies
- Loans:
  - 1 à 2 call / year

CEF – 2021 Call Transport: Alternative Fuels infrastructures Facility

**Budget**: 1.5 billion euros between 2021 and 2023

Necessity of a bank loan

**Charging stations:**
- (Publicly accessible on-road charging stations for light (150 kW) and heavy (350 kW) vehicles: Unit financing )
- (Electric for public transport, river or sea boats, port vehicles and equipment and airport logistics)
- **H2 refueling stations for heavy and light vehicles, public transport, river or sea boats, port vehicles and crews, rail (30% subsidy)**

Cut-offs: 19 January 2022 - 7 June 2022 - 10 November 2022 - 13 April 2023 - 19 September 2023

CEF Transport Alternative Fuels virtual info day - Streaming Service of the European Commission (europa.eu)

Fleets of vehicles: EIB (loans)
DISCUSSIONS
EUSEW 2021 - 26/10 at 11.00:
The key role of European regions in kick-starting and advancing the clean hydrogen economy- Organised by S3 Hydrogen Valleys Partnership
Thank you!
Contact:
patrick.biard@auvergnerhonealpes-ee.fr
etienne.vienot@auvergnerhonealpes-ee.fr
sylvain.guetaz@auvergnerhonealpes.fr