



November 14th, 2023  
Brussels, Belgium

# PUBLIC PERCEPTION AND BUSINESS MODELS JOINT EVENT

Organised by the Carbon Capture,  
Utilisation and Storage (CCUS) &  
Alternative Fuels Horizon 2020/  
Horizon Europe CLUSTER projects

Supported by CINEA - European Climate,  
Infrastructure and Environment Executive Agency

**Joint event for CCUS & Alternative fuels CINEA cluster projects organised by:**

Martina Fantini [fantini@eucore.eu](mailto:fantini@eucore.eu) (CLEANKER, CALBY2030 & HERCCULES);

Jose M. Serra [jsalfaro@itq.upv.es](mailto:jsalfaro@itq.upv.es) (eCOCO2); Laura Almar [lavallia@itq.upv.es](mailto:lavallia@itq.upv.es) (eCOCO2);

Ana M. García C [amgarcia@itq.upv.es](mailto:amgarcia@itq.upv.es) (eCOCO2)

.. PROTECTED 関係者外秘

November 14th, 2023  
Brussels, Belgium



# Considering societal issues related to innovative solar H<sub>2</sub> Technologies

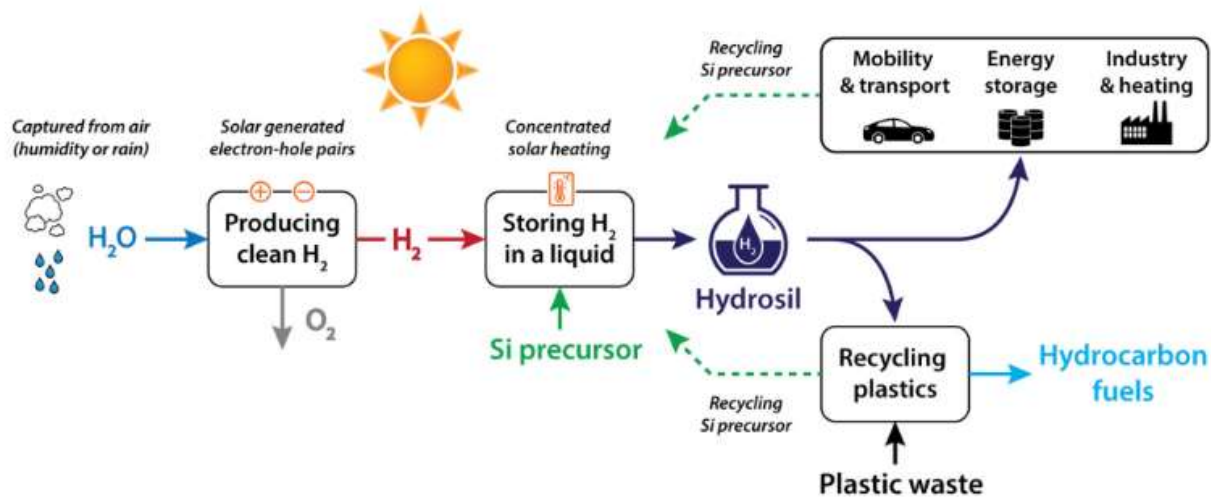
---

Jonas PIGEON



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 883264

# Baseline



Technologies developed in the Sun To X project are relatively low:

- TRL 4 for photoelectrochemical  $H_2$  production
- TRL 4 for storage of  $H_2$  in HydroSil through thermochemical reaction

**According to this context considering societal acceptance is a challenging issue**

# Methodology

## Consider societal acceptance through an understanding of technological expectations.

- To consider technological innovation at early-stage, scientists from Science and Technologies Studies field focus on technological expectations.
- As defined by Wüstenhagen et. al.(2007) Social acceptance of renewable energy has three dimensions:
  - Socio-political acceptance
  - Community acceptance
  - Market acceptance
- Expectations can be characterized through narrative analysis surrounding technologies or public policies

**To consider social acceptance of Sun to X project we therefore understand the gaps between expectations of projects developers and those from market and socio-political stakeholders in French and European context.**

*“Technological expectations can more specifically be described as real-time representations of future technological situations and capabilities”*

Borup et. al. 2006, p. 286

### Methodological approach : qualitative survey

- A documentary survey (n=34)
- A qualitative interview survey (n=5-6)

# Summary

## Narrative promoted by Sun to X developers

| Current issues  | Current Limitations  | Sun-To-X solutions  |
|---|--|---|
| Increase of electrification of uses and PV & Wind power             | <ul style="list-style-type: none"> <li>Increasing need of raw critical material</li> </ul>   | <ul style="list-style-type: none"> <li>Limited use of critical material uses to design PEC panel</li> </ul>   |
| Hydrogen production through electrolysis                            | <ul style="list-style-type: none"> <li>Critical need of pure water sources</li> </ul>  | <ul style="list-style-type: none"> <li>Using ambient air humidity</li> </ul>                                  |
| Energy transportation and storage To manage renewable intermittency | <ul style="list-style-type: none"> <li>Insufficient capacity of batteries</li> <li>Toxicity or difficulties to handle current Liquid Organic Hydrogen Carrier</li> </ul> | <ul style="list-style-type: none"> <li>HydroSil is a non-toxic and easy to handle hydrogen carrier</li> </ul> |

- Sun To X Developers aims to produce hydrogen with a lower environmental impact (water and raw material resource use) and develop technologies to store and transport it safely*

## Narratives from Socio-political and market side

| Current issues  | Socio-political narrative  | Market narratives   |
|---|--|---|
| Increase of electrification of uses and PV & Wind power             | <ul style="list-style-type: none"> <li>EU and national policies that encourage the increase of renewable energies</li> <li>A policy designed to improve the circular economy</li> </ul>  | <ul style="list-style-type: none"> <li>A support of established renewables energies technologies.</li> </ul>  |
| Low carbon Hydrogen production                                      | <ul style="list-style-type: none"> <li>Main support expressed in roadmaps to existing technologies</li> <li>An emerging initiative on solar fuels</li> </ul>   | <ul style="list-style-type: none"> <li>Main support to Blue Hydrogen or Renewable + electrolysis technology</li> </ul>                                      |
| Energy transportation and storage To manage renewable intermittency | <ul style="list-style-type: none"> <li>Depending on the State Strategy e.g., France strong reliance on network to store energy (energy penalty of conversion)</li> <li>Uncertainties related to Liquid Organic Hydrogen Carriers.</li> </ul> | <ul style="list-style-type: none"> <li>Various competing existing options enabling hydrogen storage. E.g., green ammonia, salt cavern, networks.</li> </ul> |

- Despite emerging narrative on solar fuels current sociopolitical and market narratives mainly support the development of existing technologies without considering yet issues revealed by Sun to X developers.*

# Policy impact

According to the current stage of Sun to X technologies:

- First issues to consider are the market and socio-political acceptance to improve the upscaling and the development of such type of technological devices
- Then, considering and targeting territories sharing similar involvement on circularity, hydrogen needs, and water scarcity can be relevant to position the first pilot combining PEC technologies and HydroSil storage.
- Finally, as for all infrastructure project the expectations of local communities must be understood, and local communities must be involved when demonstration projects will be settled.



November 14th, 2023  
Brussels, Belgium

# Thank You

## For Your Attention

### GET IN TOUCH

 ENGIE Lab CRIGEN - 9 rue Josephine Baker  
93240 Stains - FRANCE

 +33 6 47 47 56 76

 <https://www.researchgate.net/profile/Jonas-Pigeon>

 E-mail: [jonas.pigeon@engie.com](mailto:jonas.pigeon@engie.com)