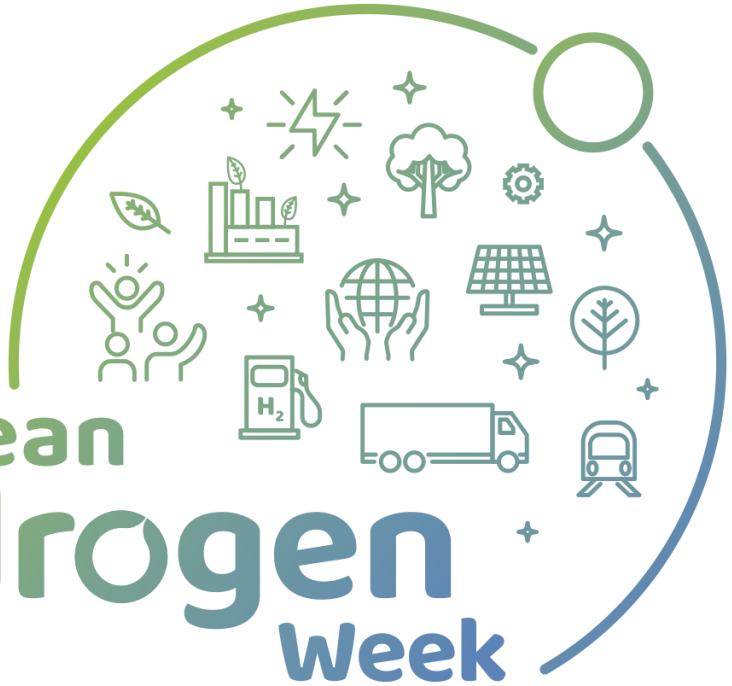
EVERYWH2ERE

Making Hydrogen affordable to sustainably operate Everywhere in European Cities



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#PRD2020
#CleanHydrogen

European Commission

Project Overview

- Call year: 2017
- Call topic: FCH-02-10-2017 - Transportable FC gensets for temporary power supply in urban applications
- Project dates: [start date – end date]
- % stage of implementation 01/11/2020: 40%
- Total project budget: 6 762 324,46 €
- FCH JU max. contribution: 4 999 945,76 €
- Other financial contribution: - €
- Partners: VTT, PCS, FHA, GENPORT, ENVI PARK, THT Control, MAHYTEC, LINDE Gas Italia, D1, ICLEI ES, ACCIONA, FRIEM

Project Summary

TRL 8 – Plug and Play – Reliable

0 emission – 0 Noise

Interesting for Cities and Events' Organizers

Project Objectives

MO1: Capitalize EU FC industry expertise and close to market products in automotive/backup power communication sectors, towards the design of reliable, easy to use transportable FC gensets (WP1)

MO2: Realization and demonstration of eight PEMFC transportable gensets (4x25 kW and 4x100 kW) integrated with pressurized H2 storage (WP2-3-4) – **2 gensets realized**

MO3: Leverage demonstration campaign for the future techno-economical replicability of the FC gensets (WP5-6) – Realization of a Logistic Decision Support tool

MO4: Demonstration of economic viability, safety and environmental sustainability of the novel solutions (WP5-6) – Realization of replication feasibility studies and an E-Handbook for replication

MO5: Communication, dissemination and preparation of the future deployment of the new EVERYWH2ERE gensets through public and private stakeholders engagement (WP7) – Stakeholders and City Groups

Design and Realization of the Prototypes
WP1 (completed) - WP2 - WP3 - WP4 (on going)

Achievement to-date

First of its kind FC based genset

25% 50% 75%

CAPEX: up to 5500 €/kW
Efficiency >50%
Lifetime up to 20000 hrs

- **CAPEX:** project quite aligned with the target value. Potential scale up costs can achieve up to 1500-2000 €/kW (without storage)
- **Efficiency - LIfetime:** first gensets ready and under validation in FRIEM headquarters (end of the year)
- **Storage:** MAHY bottles designed and TPED tested and certified – integrated in 3x and 9x bundle
- **Hydrogen conditioning and management:** use of standard components, not large effect

CHALLENGES:

1. Usage in grid connected mode with other gensets
2. "A puzzle" of 6 partners components (CE Marking aspects – O&M Manual Drafting)
3. Optimization of the cost and of integration time for next gensets
4. Early 2020 lockdown slowed a lot integration process (frozen from Feb-2020 to Jun-2020)

Design and Realization of the Prototypes
WP1 (completed) - WP2 - WP3 - WP4 (on going)

First batch ready

Demonstration Campaign towards future marketability
WP4

Achievement to-date

Demonstrate FC Gensets in festivals and construction sites

25% 50% 75%

Two years of events and operation

- **Analysis of permitting and regulatory aspects:** a) Starting of a CE marking procedure; b) Realization of a DEMO kit including a mini-HSE analysis and other relevant documents to study the permitting at local level
- **First demonstration opportunities** (summer festivals engaged) canceled due to COVID-19
- **Interaction on-going with some relevant stakeholders** (Energy utility and Rental companies) also for studying contractual aspects both for demonstration campaign and future replicability

CHALLENGES:

1. PERMITTING ASPECTS: every demosite is affected by local Fire Department acceptance (same procedure of ICE, but….)
2. Demonstration management: we have to work like a “rental company”, but none of the partners is a rental company!
3. Hydrogen storage re-fill issue

European Hydrogen Week

Demonstration Campaign towards future marketability

Festivals engaged but canceled

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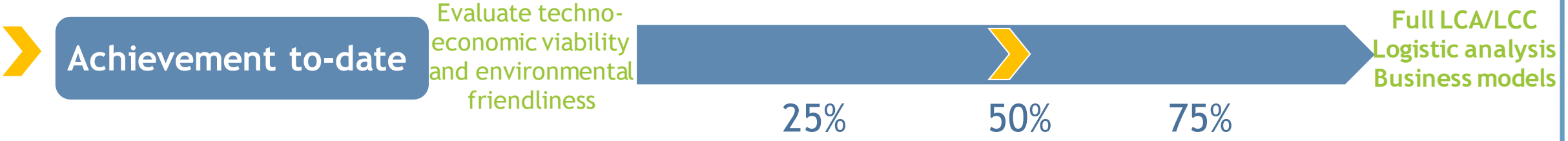
Economic and Environmental Impact Assessment
WP5 – WP6



- **LCA:** first LCA realized by VTT on the 25 kW genset (Aspects related to Hydrogen origin are crucial)
- **Short term rental is the market!** (>40% of cost is logistic/shipping whose costs are equal in case of hydrogen or diesel, CAPEX impact on a contract around 15%, LCOE around 1€/kWh is acceptable)
- **Mapping of hydrogen supply point:** refuelling is a crucial aspect in terms of costs and emissions
- **Importance of Green Hydrogen for short term business models**
- **BUSINESS MODELS: one more rental company oriented (who will purchase Hydrogen externally), one more energy utility oriented (own hydrogen)**

CHALLENGES:

1) Project Exploitation To be Discussed: No "end-user" in the consortium - Rental companies cannot accept to purchase a genset that cost more than 1000-1200 €/kW as CAPEX

2) Short term rental is techno-economically viable (different drivers than cost-only), but what about long term?

3) CE marking process

Economic and Environmental Impact Assessment
WP5 - WP6

CGT Edilizia

CAT THE Rental STORE

ENGIE

Puertos del Estado

Interaction with stakeholders is crucial both for demonstration and replication

Risks, Challenges and Lessons Learned

TECHNICAL CHALLENGES

- First of its kind system: a puzzle of 6 partners components
- End-users requires high reliability (fast start-up/flexibility) and something as much similar as possible to diesel in terms of flexibility of operation (no major environmental constraints, grid connection flexibility, easiness to transport/mobilize etc.)
- COVID-19 slowed down gensets integration and blocked travels and “hands on job” mutual inter-exchange for gensets finalization

NON TECHNICAL CHALLENGES

- Not having in the consortium a rental company/gensets “business end-user” for exploitation purposes
- Permitting and regulatory aspects are difficult to be managed by demosites (not always experts)
- A CE marking procedure has been promoted (also with a stakeholder support) to facilitate permitting.

Risks, Challenges and Lessons Learned

REPLICATION AND MARKETABILITY CHALLENGES

- The technical more difficult aspect to compete with diesel genset is storage size and handling! (…and permitting)
- Hybrid Diesel+battery are the competitors! (CAPEX around 500€/kW)
- Events are asking GREEN HYDROGEN: how to bring it to them cost effectively?
- Permitting aspects: absence of regulation is a big issue, as all gensets (also ICE ones) have to be allowed time by time by local fire department for temporary events. For construction sites, aspects related to pressurized storage on site is not trivial! *(CE Marking and compliancy to EN12100 can help? Or do we miss a specific normative?)*
- Stakeholders are super interested to FC gensets and are ready to pay more for short term rental, but… who will take care of CAPEX? How to handle higher CAPEX?
- Policy to promote 0 emissions gensets in urban areas: this could facilitate FC genset penetration

Exploitation Plan/Expected Impact

Exploitation

Exploitation plan of the gensets to be discussed

Not an easy job as “puzzle” of 6 partners inputs, but partners are motivated to valorize the efforts spent so far also “having felt” the market

Preliminary KERs exploitation strategy/TRL9 roadmap defined

Currently interacting with HRB

Impact

First of its kind 0 emission genset

Promote FCH technologies to wide audience via “everyday” visible components

Opening an entry niche market for FCs

Reduce the emission impact of temporary events

Dissemination/Communication

- Engagement of Music Sector thanks to D1: EU events want sustainability and talk about H2 now
- New sectors and market discovered (ports/movie): Cannes Film Festival 2019 and Berlinale 2020
- EUSEW 2019 Dedicated Stand also to connect to city oriented projects
- Strong interest from Cities and Regions: physical and digital workshops organized by ICLEI
- Weekly interactions/interviews with potential demos

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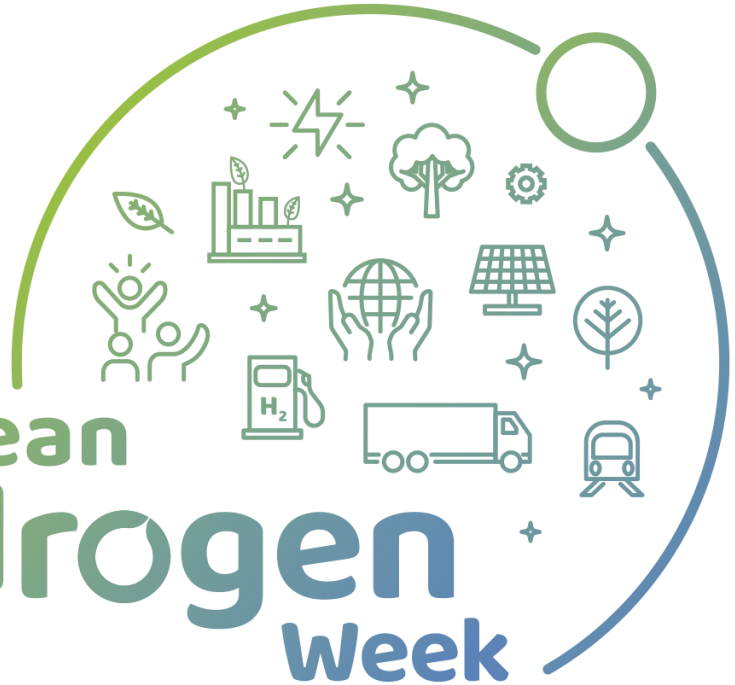

Thanks for your time!

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