



European demonstration of hydrogen powered fuel cell forklifts – HyLIFT-DEMO (Grant agreement number 256862)

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HyLIFT-DEMO

Project and partnership description



European demonstration project on fuel cell forklift trucks and supporting hydrogen refuelling stations

Main objectives

- Demonstration of > 30 hydrogen powered fuel cell forklift trucks
- Ensuring commercial market deployment from 2013 on

HyLIFT-DEMO support



HyLIFT-DEMO partners





Fuel cell forklift trucks

- Target: demonstration of at least 30 units
- 2 prototypes available; 9 H2 drive systems under production
- Certification: first fuel cell system certified by TÜV SÜD; overall fuel cell forklift truck certification expected for end NOV
- After certification:
 - Prototype(s) available for short-term trials at potential customer sites
 - Start of small series production of fuel cell systems and forklifts
- Critical issue: bankruptcy of DanTruck

HyLIFT-DEMO





Hydrogen refuelling stations (HRS)

- Target: demonstration of 3 (new) units
- HRS concept ready: dump-of; 4 MPa input pressure; 30 kg/d (17 refuellings)
- Construction of HRS to start after signing of contracts with end-users
- 3 small HRSs available at H2 Logic to support test trials and to bridge potential delays in HRS construction



Total Cost of Ownership (TCO) calculations

- For each potential customer a specific TCO calculation has to be performed
- This TCO calculation compares fuel cell forklift trucks with conventional technology currently operated at customers site applying real world data
- Enabling end-user attributes (to achieve TCO calculation beneficial for fuel cell forklift trucks):
 - Fleet sizes of more than 10 forklifts intensely used at least 2,000 h/a
 - High LPG/diesel prices
 - Access to low cost hydrogen



End-user contracts

- Target: Demonstration contracts signed with forklift end-users by JUL 2011
- Signatures of contracts still pending due to delayed delivery of 1st fuel forklift truck to be used for short-term real-world trials at potential end-user sites
- 204 potential customers identified and evaluated
- 50 of high relevance for HyLIFT-DEMO
- 36 end-user specific TCO calculations performed with beneficial results for fuel cell forklift trucks compared to LPG / diesel trucks
- 32 end-users waiting for fuel cell forklift truck trials
- 2 end-users positively tested LPG forklift and waiting for FC forklift truck trials
- 2 end-users: withdrawal based on management decision



Fuel cell system testing – vibration, shock and climate tests

- Target: final results available in JUN 2012
- Test equipment booked and ready at JRC Petten
- Test procedures and specifications fixed and agreed on with H2 Logic
- Tests to be performed from DEC 2011 to JAN 2012

Fuel cell system testing – accelerated durability tests

- Target: final results available in DEC 2012
- Installation of test equipment under preparation at SINTEF Trondheim
- Test procedures and specifications fixed and agreed on with H2 Logic
- Tests to be performed from JAN 2012 on



Demonstration monitoring

- Target: data acquisition & analysis system available in NOV 2011
- Specific performance indicators for fuel cell forklifts and hydrogen refuelling stations based on the HyLights Monitoring and Assessment Framework (MAF) proposed by LBST
- Specific confidentiality levels of each performance indicator and methodology for data collection and handling still needs to be defined
- Review and discussion process ongoing; agreement expected for NOV 2011



Securing & planning commercialization

- Target: successful initiation of commercialisation should be supported by “Suggestions for deployment support mechanisms” (JUN 2012 / preparation started), “Guidelines for regional fuel cell forklift projects” (AUG 2012 / preparation to start late 2011) and a “Commercialisation Plan” (DEC 2012 / preparation to start early 2012)
- Next step for a commercial introduction of fuel cell forklift trucks in Europe: a fleet of 200 fuel cell systems will enable H2 Logic and its supply chain partners to ramp-up production and assembly lines towards series production. The project proposal HyLIFT-EUROPE prepared for AIP 2011 is dedicated to increase the number of vehicles to be demonstrated to 200



Correlation of the project with the corresponding Application Area (MAIP/AIP)

- Targets Application Area “Early Markets”:
 - 2010: 20 industrial and off-highway vehicles
 - 2015: 500 industrial and off-highway vehicles
- HyLIFT-DEMO: at least 30 fuel cell forklift trucks and preparation of commercialisation (series production)
- Target “Better integration of SMEs”: SMEs are not only directly involved via project partnership (H2 Logic, DanTruck) but also via the various supply chains



Project activities & results / achievements versus MAIP/AIP targets

- AIP 2009 targets:
 - Total cost fuel cell system < 4,000 €/kW ▶ achievable
 - System lifetime > 5,000 h ▶ to be validated in project
 - Refuelling time < 5 min ▶ 3 min envisaged
 - Hydrogen price at pump < 13 €/kg ▶ achievable
 - Demo of at least 10 vehicles at 1 demo site ▶ under preparation
 - HRS functionality and end-user acceptance ▶ to be demonstrated
 - Certification procedures ▶ prerequisite for demos



Gaps / bottlenecks in RTD&D proposed by MAIP/AIP documents

- Project proposal processing is too slow and projects are too complex and bureaucratic to attract end-user participation (They are used to periods of ~3 months from decision to operation start of vehicles)
- Program optimized for research and development, not for demonstration; funding rates OK for demonstration, too low for supporting activities such as coordination activities or project management
- Project funding options unclear after 2013



Priorities and topics possibly under/over-estimated in the AIPs in terms of technical challenge

- From today's perspective the priorities and topics are well set in the AIPs. The technical challenges are addressed appropriately in the light of the material handling sector



Training and Education

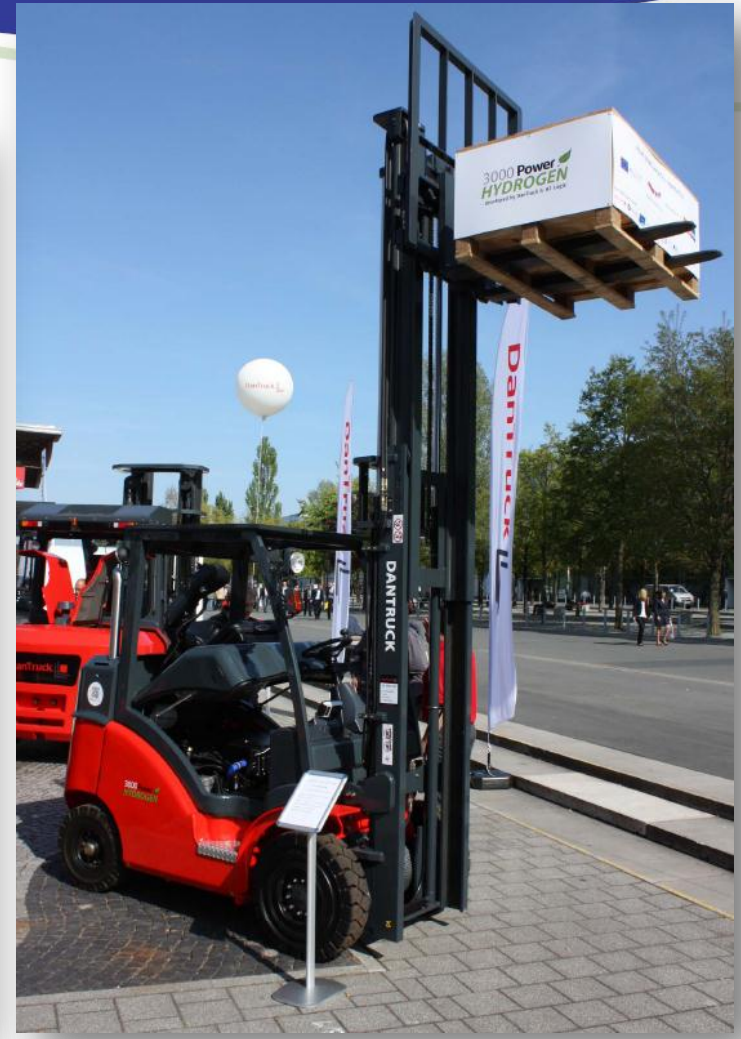
- No training and education activities are foreseen in this project

Safety, Regulations, Codes and Standards

- In principle sufficient RCS is in place to get certifications for fuel cell systems, fuel cell forklift trucks and hydrogen refuelling stations. However, standardisation is required to enable reduced efforts for certification procedures on a European and a global level

Dissemination & public awareness

- FC forklift truck presented at material handling fair CeMAT in May 2011
- Presentations and posters at several events (EUSEW, EP Thematic Session, HFC in Nordic Countries, FCH JU SGA, EC visit (Barroso) at JRC, etc.





Technology Transfer / Collaborations

- Very tight cooperation with second FCH JU project on material handling SHEL enabled by the partners HyRaMP-EHA and JRC IET. No further projects on material handling contracted by FCH JU so far
- Close contact to national and regional activities via HyRaMP and coordinator (e.g. NIP / NOW in Germany) existing
- Coordination with various material handling industrial associations e.g. the European Federation of Materials Handling and Storage Equipment (FEM) under preparation



Project Future Perspectives

- This project, with about 30 units, is an important but not the last step towards commercialisation of hydrogen powered fuel cell material handling vehicles. The next step needs to see figures in the hundreds of units as proposed e.g. in HyLIFT-EUROPE (200 units)
- In parallel authorities at all levels (European, national, regional) are asked to implement dedicated support mechanisms enabling a rapid market uptake in time. A specific task in HyLIFT-DEMO will propose appropriate measures
- The project enables the key partners to establish contacts to potential end-users which are currently not ready to enter in a contract (e.g. because of a less beneficial TCO) but might adopting the technology as soon as the next step towards maturity has been taken



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