



## HyLIFT-EUROPE

**Large scale demonstration of hydrogen powered materials handling vehicles**

**Fuel Cells and Hydrogen  
for maritime and harbour applications:  
current status and future perspectives in the EU**

**Workshop  
MARGHERA VENEZIA (IT), 14 JUN 2013**

**Hubert Landinger, LBST**





## Fuel cell materials handling vehicles in NA

🚛 ~ 3,500 fuel cell materials handling in operation in North America

### Success factors

- 🚛 Constant operating power
- 🚛 Increased productivity per vehicle
- 🚛 Cheap hydrogen available
- 🚛 Reduced labour cost for hydrogen refuelling instead of battery charging
- 🚛 Reduced cost of infrastructure warehouse space
- 🚛 Funding support from DOE and DLA (Defence Logistics Agency)
- 🚛 Federal tax credit for fuel cell purchases



## Where do we stand in Europe?

- 🚛 HyLIFT-DEMO is one of the leading projects in Europe
- 🚛 11 vehicles to be demonstrated in the project (9 already in operation)
  - 10 forklifts
  - 1 airport tow tractor
- 🚛 Tests, trials and demo operations helped to overcome childhood diseases
- 🚛 Equal TCO difficult to achieve (better performance of conventional vehicles compared to NA, expensive hydrogen)
- 🚛 Batch production of fuel cell systems in place, series production under preparation
- 🚛 Small batch sizes disable significant cost reductions in supply chain
- 🚛 Several vehicles clocked >1,000h of operation at real end-user sites
- 🚛 >1,000 refuelling procedures at corresponding hydrogen refuelling station
- 🚛 Further large scale demos already started or under preparation



## Batch production of fuel cell systems and small vehicle fleets



Source: H2 Logic



Source: STILL



## Lessons learned

- 🚛 Required supply chains able to provide significant numbers at competitive prices are far from being fully established
- 🚛 Customers of materials handling vehicles are operating in a fully commercial and industrial area where Total Cost of Ownership (TCO) is main criteria for purchase decision
- 🚛 Test trials for potential customers are inevitable and therefore easy approaches need to be developed to enable these test trials at potential customer sites
- 🚛 The hydrogen price delivered to the demo sites is of high relevance as this is one of only a few variables to enable cost reductions for the overall package
- 🚛 Deployment support mechanisms are required beyond HyLIFT-DEMO and the upcoming large scale demos and have to be reflected in the FCH JU 2.0 in the context of Horizon 2020



## In action: STILL RX-60-25 – with H2Drive®



Please click

<http://www.h2logic.com/com/still-rx-60-25-fc.asp>



## How to proceed?

- 🚛 HyLIFT-EUROPE (2013 – 2016) follow-up project of HyLIFT-DEMO
- 🚛 STILL and MULAG partners with high commitment
- 🚛 200 vehicles to be demonstrated in real world applications at end-user sites
- 🚛 Opportunities for test trials to be improved
- 🚛 Significant improvements in supply chain to be realised
- 🚛 Cheap hydrogen sources to be identified
- 🚛 Full-service packages with attractive TCO for end-users to be developed
- 🚛 Commercialisation efforts to be strengthened
- 🚛 Further large scale projects to be initiated and started
- 🚛 Deployment support mechanisms to be initiated
- 🚛 Anchoring in FCH JU 2.0 in the context of Horizon 2020 to be secured



## Acknowledgement

The research leading to these results has received funding from the European Union's 7<sup>th</sup> Framework Programme (FP7/2007-2013) for the Fuel Cells and Hydrogen Joint Undertaking Technology Initiative under Grant Agreement Number 303451.



*The project partners would like to thank the EU for establishing the fuel cells and hydrogen framework and for supporting this activity.*