



# The HyLIFT-EUROPE project and fuel cell powered airport tow tractors

Workshop on aeronautical applications of fuel cells and hydrogen  
technologies

DLR Lampoldshausen, 16 SEP 2015

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# Overview

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- The HyLIFT-EUROPE project in brief
- MULAG's hydrogen powered fuel cell airport tow tractors
- Further fuel cell airport tow tractor activities
- Conclusions and next steps

# HyLIFT-EUROPE in brief



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- HyLIFT-EUROPE – Large scale demonstration of fuel cell powered materials handling vehicles
- FCH JU call 2011 Topic SP1-JTI-FCH.2011.4.1: Demonstration of fuel cell-powered Material Handling Equipment vehicles including infrastructure
- 01 JAN 2013 – 31 DEC 2017
- Total budget: 22.3 Mio €
- FCH JU contribution: 9.3 Mio €
- **Overall purpose:** demonstration of 200 hydrogen powered fuel cell materials handling vehicles

## Partners HyLIFT-EUROPE

Coordinator



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Vehicles



Infrastructure



TCO



Testing



Vehicle Usage



Fuel Cell Systems



Communication



# HyLIFT-EUROPE achievements & challenges



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- Presentation of first vehicles of the current generation at various fairs, conferences, etc.
- Trials of first vehicles at various sites in order to convince potential customers of long-term demonstration readiness of technology
- Elaboration on the identification of vehicle-users and demonstration sites across Europe
- Preparation of the deployment of 28 fuel cell forklifts at a 'green field' logistics environment in France to start operations in SEP 2015 (forklifts not funded)
- Completion of HRS site selection process and initial safety case approval for the installation of an airside HRS at Heathrow airport
- Preparation of a Monitoring and Assessment Framework (MAF) for the assessment of the vehicles and the HRSs to be demonstrated in the project

# FC airport tow tractors in HyLIFT-EUROPE



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- MULAG is the partner to provide hydrogen powered fuel cell airport tow tractors to the project
- Dantherm Power provides fuel cell systems for the tractors
- A dedicated chassis is used for the integration of the fuel cell drive train
- The advantages:
  - emission free, no vibrations, efficient, low noise
  - long driving range and fast refuelling
  - indoor and outdoor operation
- MULAG owns and operates a dedicated, movable HRS which can also be used for trials at customer sites



Source: MULAG



Source: MULAG

# Vehicle development and trials



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- Trials at Cologne/Bonn Airport and Hamburg Airport with a first prototype vehicle disclosed that significant improvements were still necessary with regard to the fuel cell system in order to reach the specified requirements for airport operations
- The improvements included increases to both the battery capacity installed and the amount of hydrogen to be stored in the system
- MULAG showcased the prototype vehicle at the interairport 2013 and will showcase the new vehicle at the interairport in Munich in October 2015



Source: MULAG



Source: MULAG

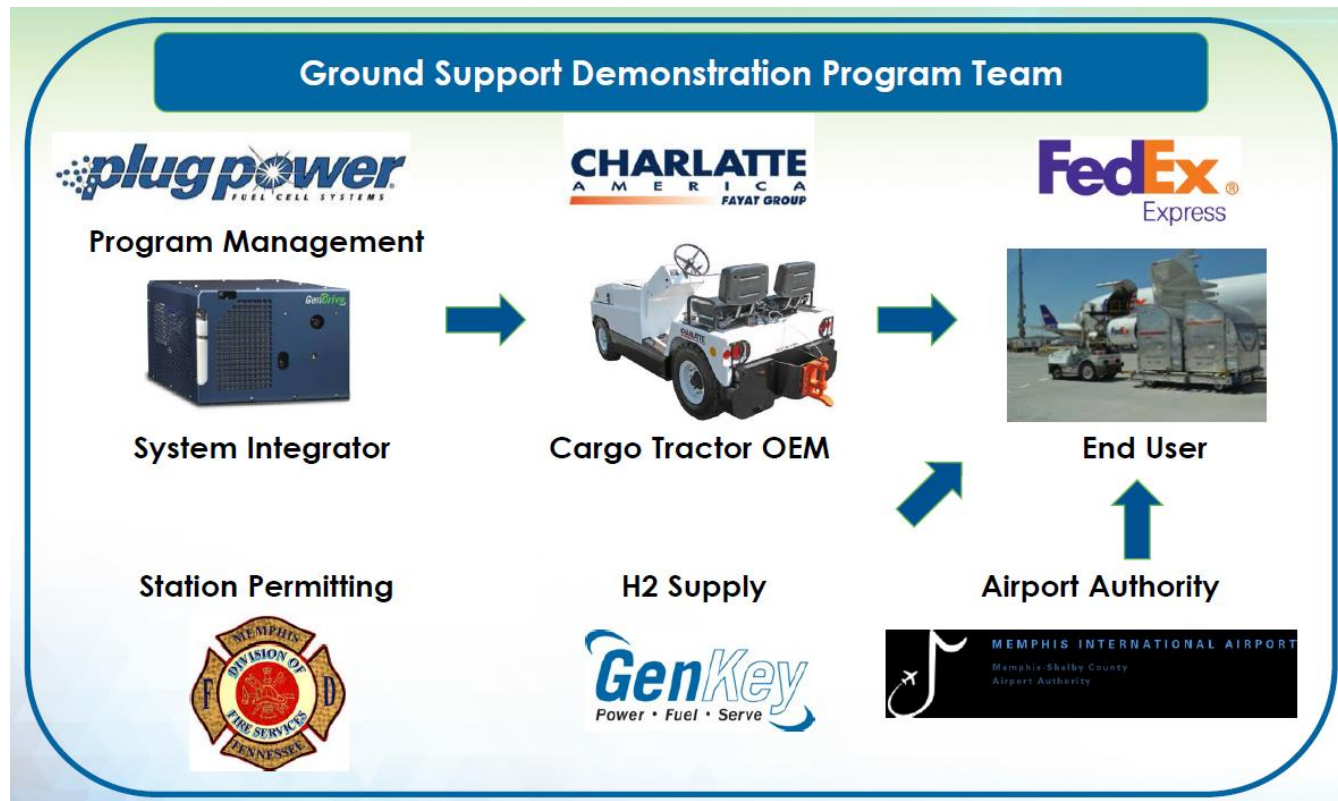


# Fuel cell airport tow tractor activities in the USA



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- DoE funded Ground Support Equipment Demonstration Project started in 2013
- The main project objective is to develop and build 15 cargo tractors and to operate them in a two year demonstration phase in real-world surrounding at the Memphis-Shelby County Airport in Tennessee



Source: Plug Power

# Fuel cell airport tow tractor activities in the USA



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- Demonstration started in APR 2015
- Press event on 09 APR 2015



Source: Plug Power



Source: Plug Power



Source: Plug Power  
Sep-15



Source: Plug Power  
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# Conclusions and next steps



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- In contrast to warehouse trucks, where the USA with about 9,000 fuel cell systems already in operation is clearly in the lead, in the tow tractor segment Europe can still occupy a leading role
- Permitting and approval procedures are still a burning issue as experience and standardization is widely lacking and local authorities e.g. fire marshals need to be educated first
- The next steps related to the tow tractor topic in the project are
  - to present the MULAG tow tractor at the interairport fair 2015 in OCT 2015,
  - to perform a thorough testing program and
  - to start trials at dedicated airports in early 2016
- First contracts are expected to be signed in the first half of 2016 and the demonstration is expected to start in the second half of 2016



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