

PRESS RELEASE: (For release 10:00 CET, March 30th 2017)

New Bus Refuelling for European Hydrogen Bus Depots

European project demonstrates that hydrogen refueling at a very large scale is technically and economically viable for serving large hydrogen fuel cell electric bus fleets

Hydrogen as a fuel for buses and other vehicles is considered as one of the best options for removing emissions of both air pollutants and carbon dioxide from our transport needs. The technology is developing fast and we have seen early deployments of small fleets of buses and cars. One of the big remaining questions has been how well this technology could scale up to meet the demands of mass scale transportation. This is particularly acute for buses, where busy bus depots can require huge quantities of fuel and there has been a question of how easily the technology can be scaled up.

The findings of a major European project have been published today and provide a definitive answer to this question. The answer is clear - Large scale hydrogen refueling is both commercially and technically feasible. Whilst work is required to develop and mature the technology and associated codes and standards, there are no show-stopping barriers which will prevent the large scale uptake of the technology.

The project was based on a consortium of 10 of Europe's leading technology providers of hydrogen production and refuelling equipment. These industry players worked with 12 bus operators in Europe to develop bespoke designs for large scale refueling systems for their bus depots. In each location, a suitable design was developed in consultation with bus operators and local regulators. As a result, a wide range of engineering solutions was developed involving different supply modes (liquid/gaseous trailer delivery and on-site production from electrolysis and methane reformation) covering hydrogen demands between 1,000 and 5,000kg of hydrogen per day, corresponding to around 50 to up to 260 buses per depot investigated. Each of these technical solutions was able to meet the original design requirements defined within the case studies, demonstrating that hydrogen refueling at these large scales can be:

- **Affordable** - The cost for hydrogen is dependent on location, but solutions exist which can lower costs below €6/kg even using today's technology, which is below the cost required for parity with (taxed) diesel fuel
- **Reliable** – stations can achieve 100% reliability as demanded by bus operators, e.g. using redundancy of equipment – this becomes considerably easier at a large scale

Space efficient – Solutions exist which require as little as 400 m² of footprint, which is easily accommodated in a bus depot (these tend to be based on delivered liquid hydrogen). On-site production of hydrogen comes with a larger footprint, which may require some operational reconfigurations at the bus depots in the most dense locations. A series of recommendations for cities looking to deploy large scale hydrogen fueling facilities, as well as for the hydrogen industry and policy makers are made in the reports which are available for download from the websites

Project coordination

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www.newbusfuel.eu and www.fuelcellbuses.eu. The results will be used by industry and operator partners in further project development and dissemination activities towards the bus and public transport sector.

“The NewBusFuel project is an important step for the sector in that it demonstrates that there are no major technical or commercial obstacles to hydrogen refuelling at a large scale,” said Ben Madden, Director, Element Energy the project coordinator for NewBusFuel. “As the hydrogen bus sector looks to scale up its activities, it is comforting to know that even with today’s technology there are reliable and cost effective solutions which will ensure that even the largest bus depots can be refuelled using hydrogen.”

Madden continued; “We are pleased to have helped bring together Europe’s leading players in the sector to demonstrate the versatility of their technical solutions. The project makes a series of useful recommendations to industrial and political players to help to optimise and prepare for large fuelling stations of the future and we look forward to working on these as the sector continues to develop.”

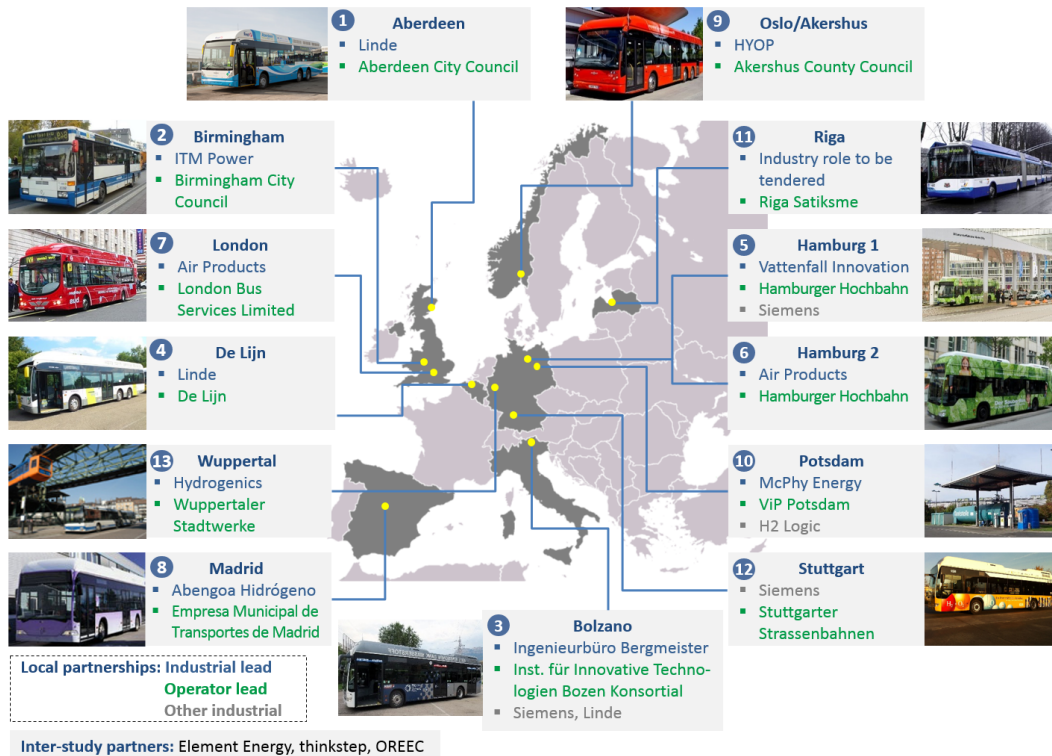
Commenting on the project, Bart Biebuyck, Executive Director Fuel Cells and Hydrogen Joint Undertaking, said: “NewBusFuel has provided new and strengthened know-how on industry approved design criterias for more robust large scale refuelling infrastructure. This comes for the benefit not only for buses, but also other upcoming heavy duty hydrogen fuel cell transport applications in Europe. This increased industry knowledge base is timely and essential as we are now ramping up for commercialisation of heavy transport zero emission solutions. NewBusFuel has contributed to bridging the gap between small-scale, small-fleet demonstration projects to robust large scale infrastructure, which is essential if hydrogen powered public transport is to be deployed in significant volume in the transportation sector. “

The NewBusFuel project was funded under the FCH-JU under the European Union’s Horizon 2020 Programme under Grant Agreement nr. n°671426. This Joint Undertaking receives support from the European Union’s Horizon 2020 research and innovation programme, the New European Research Grouping on Fuel Cells and Hydrogen (“N.ERGHy”) and the Industry Grouping Hydrogen Europe.

FCH JU project info: www.fch.europa.eu/project/new-bus-refuelling-european-hydrogen-bus-depots

PROJECT PARTNERSHIP:

The project was coordinated by Element Energy and the technical analysis was carried out by Thinkstep, who authored the reports which analyse the results across the engineering studies. The broad industry and city partnership are described in the diagram below:



BACKGROUND

NewBusFuel is a study funded by Fuel Cells and Hydrogen Joint Undertaking which had the goal of resolving the knowledge gap for establishment of large scale hydrogen refuelling infrastructure for fuel cell buses – silent electric buses with long driving range and with zero local emissions. The study commenced in summer 2015 and assessed the central technology- and engineering solutions required for the refuelling of a large number of hydrogen fuel cell buses at a single bus depot. Large scale bus depot refuelling imposes significant new challenges which had not yet been tackled by the hydrogen refuelling sector:

- Scale – throughputs in excess of 3,000kg/day are expected and there is considerably larger than the 1-200kg/day expected for current FCEV stations – there is a question over the viability of solutions of this type
- Availability - 100% available supply is needed for the public transport networks which will rely on hydrogen as the only fuel source at bus depots
- Short refuelling window – buses will be refuelled in a short overnight window, leading to rapid H2 throughput
- Footprint – the refuelling units need to be reduced in size to fit within busy urban bus depots
- Volume of hydrogen storage – which can exceed 10 tonnes per depot and leads to new regulatory and safety constraints
- Cost – understanding how scale affects prices and requires new business concepts leading to competitive fuel prices