

Icelandic New Energy Newsletter 2007

Dear Friends and HydrogenInterested Parties!

Herby I send you our annual newsletter about the Icelandic Hydrogen initiatives. As you have noticed I have been hesitant to send out any reading material since 2005 to all of you who are drowning in trash mails. But several people have contacted me and shown interest to hear more about our recent activities, and therefore I post it to you whereas you are on our postlist of interested partners. Its still just news, no sales mission.

Please let me know if you don't want to stay on our mailing list. The News letter will only be issued yearly.

*Enjoy or trash!
Maria Maack*



The year 2007 was eventful for the hydrogen community in Iceland, the highlights being the announcement of **SMART-H₂** a new, ambitious demonstration and research project on a larger scale than previous projects, and the receipt of the prestigious Global Energy Prize by Professor Þorsteinn I Sigfusson.

However, the year began by the successful conclusion the bus tests even though nothing was wrong with the FC buses. The project simply came to an end, all data had been collected and

endurance tests completed. The information is of course integrated into the next generation of H₂FC buses. The buses had been participating in HyFleet:Cute, a succession of ECTOS project.



Two of the FC buses were dismantled and used in spare parts in other buses. The third went to a transport museum.

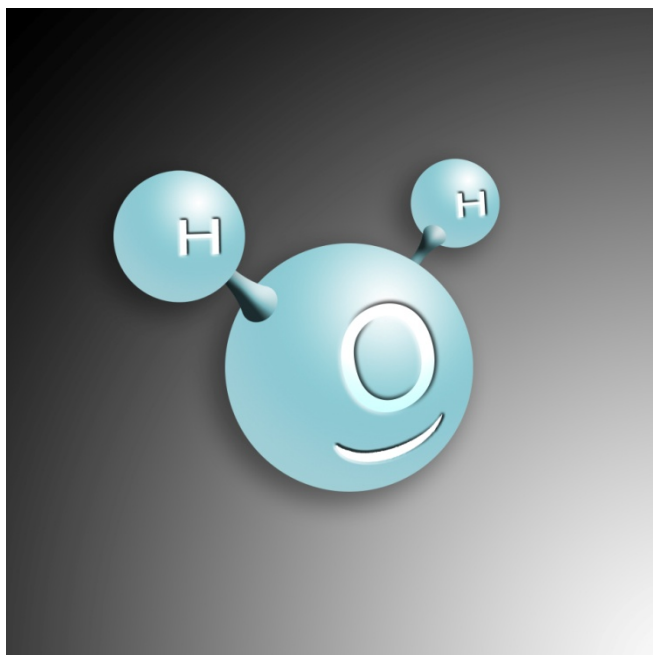
As a preamble for the next demonstration steps the hydrogen station was reopened in Nov 2007 after thorough inspections and announced a licensed public hydrogen station. Then personal vehicles were introduced into the city traffic.



The instructions for users on how to refill your hydrogen vehicle.

INE is now implementing a facilitated market introduction of personal vehicles and use of hydrogen in marine vessels; the SMART-H₂ (Sustainable Marine and Road Transport, Hydrogen in Iceland)

Contracts were made with Icelandic Hydrogen (www.iceh2) to provide an integrated fuel cell system and a small hydrogen refuelling station.



We have begun using the water molecule as a fresh reminder to people that Hydrogen can be made from water and returns to its former state after carrying energy through fuel cells.

- *Doesn't it make your smile clean?*

The SMART-H₂ has three main paths; testing hydrogen personal cars; Designing and using PEM fuel cell equipment as auxiliary power unit (APU) on board a ship and a research path based on the data collected in the bus project as well as the current demonstrations. Two small filling stations are also on the agenda, giving further opportunities for hydrogen filling at the University and at the fishing port. VistOrka (a cooperation platform for eco-fuels) will provide at least 3,5 million US\$ to the SMART-H₂, a project with the total budget of 7-8 million US\$. The foreseen fuel and vehicle types from which performance data is collected are landfill-biogas

cars, plug in battery cars and plug in motor and space heaters for internal combustion hybrid. Cars. The goal is to run them at least for 18 months and use various brands from Europe, USA and Japan. Introducing these 25 passenger vehicles in companies' service fleets means that the customer group will change and the service requirements will differ from those when only providing hydrogen for bus operators. INE/Shell Hydrogen will offer hydrogen on a price that makes the fuel costs for driving a fuel cell car comparable to the costs that incur while driving a gasoline car. Within the SMART-H₂ it is also intended to increase the availability of H₂ in Reykjavik by adding dispensing locations.



Elding the whale watching cruiser demonstrating a PEM-FC hydrogen auxiliary power unit.

The FC system on the boat

The Icelandic team is convinced that hydrogen can be one of the key energy carriers coupled with extensive use of renewable energy in the future and this new initiative will bring Iceland into a pre-commercial hydrogen state.

The Elding, a 125-ton, well equipped 150 passengers' cruiser and a stable ship, originally built in Iceland as a rescue vessel. The Elding will be used as a 'living laboratory' for the project; the prototype will be installed in real conditions and used to replace the current diesel auxiliary engine (which will still be onboard as back-up). The unit should generate electricity for all normal electricity demands of the boat.



The space on board where the hydrogen Auxiliary Power unit is to be set up.

The key components in the hybrid hydrogen auxiliary engine are a Ballard PEM fuel cell, with lots of plugs and buttons, batteries, DC/DC converter and a monitoring/operation system. The goal is to come up with a reliable prototypic hydrogen hybrid engine and prove the concept for classification. The APU hybrid system for the ship is based on a module developed by H2Logic in Denmark and integrated with hydrogen storage and ventilation system designed by Icelandic Hydrogen. The power is 10-15 kW installed to run all electric equipment on a whale watching vessel operating

from Reykjavik that can boost power with the aid of batteries up to 35 kW on demand. The goal is to put the system under test in real marine conditions and understand the implications for H₂ usage in rough and salty sea conditions in the North Atlantic. Barriers are to be evaluated in depth before a marketable product is developed



Agusta Loftsdottir, head of the governmental alternative fuel committee, steps out of the first hydrogen personal vehicle in Reykjavik. This is an A-class that was delivered by Daimler to use within the SMART-H2 conditions.

The SMART-H2 vehicle path

July 11th 2007 the first hydrogen vehicle was handed over to the first customers, two Icelandic power companies. The car was an A-Class Mercedes Benz, FC car, registration number H2-001, and is used by two energy companies in their service fleets. The A-Class was followed shortly by 10 modified Toyota Prius' retrofitted by Quantum in California. Those are Hydrogen hybrid cars with integrated battery system but burn the fuel in internal combustion engines.

The vehicles are imported by Vistorka and leased to companies that are willing to use them in their service operations and fulfil the expected data collection. Icelandic New Energy acts as the project manager, facilitator and

promoter and a go between the users and the equipment. Data formats, information to the public and promotion of the vehicles as well as sustainable transport policies is in the hands of INE. The drivers have to fill out formats on the user interface at the wheel and filling systems but technical data is also collected with the aide of smart cards.

The hydrogen cars are used in service fleets and any member of staff at the municipality energy company and the national power company (Orkuveita Reykjavíkur and Landsvirkjun, respectively) can have training for operating the car and refuelling from the station and use the cars in their commute.



The hydrogen station with the card reader and surveillance camera

The Hydrogen station at Grjótháls that had been inaugurated in April 2003 as a pre-commercial test station, was recertified for continuous operation and officially announced open to the public in November 2007. This was achieved after thorough inspection by Framtak and Hydro Electrolysers after 4 years of quite successful operation. Instructions on careful filling procedures were designed and set up at the nozzle and a short training course held for eventual users. The instructions are in Icelandic and English and function with a smart-card reader that recognises the vehicle and asks for information before filling begins. If the

handling is improper the station shuts down automatically but a surveillance camera helps the inspectors to follow events at the station.

In November, the 10 hydrogen hybrid Prius cars retrofitted by Quantum in California were also leased to the power companies, Orkuveita Reykjavíkur and Landsvirkjun, and the Hertz car rental service. The participation of Hertz means that for the first time in the world the public can rent and use hydrogen vehicles. That is a very important step towards the future as public acceptance is an important factor in the creation of a new energy paradigm.



Hertz car rental in Iceland recieved a special award for its policy for offering lean fuel cars and hydrogen vehicles in their fleet.

People

Hjalti Páll Ingólfsson, who had been working with INE since 2002 moved over to Icelandic Hydrogen, which was founded earlier by Hallmar Halldórs, the owner of Varmaraf. Their mission is to produce small hydrogen standalone systems.

Professor Thorsteinn I Sigfússon, former co-chair of IPHE's ILC committee, was awarded the Global Energy Prize by the Russian president Vladimir Putin in February 2007. The Icelandic team is convinced about the importance of fuel cells in transportation and as

Professor Sigfusson, a board member of Icelandic New Energy (INE) stated when awarded the prestigious Globe International Energy Prize for his research “I’m having a platonic love affair with hydrogen and fuel cells”.



During the coldest spell of the winter some performance difficulties arose in the Prius cars, but after installing plug-in engine and space heaters the cars have been performing very well.



Hy FLEET:CUTE successful

The experimental driving of the three DaimlerChrysler fuel cell hydrogen buses in Reykjavík came to an end in January 2007. The support of EU for the project was of utmost importance but INE decided not to pursue the continuation of the project, however, the University of Iceland is using some of the results as basis for comparison.

For four years the EvoBus/Daimler fuel cell buses, which were introduced in 2003, were operated successfully and safely in Reykjavik. It was simply too expensive to run the hydrogen station, rent a special maintenance bay, keep specialised staff and rent cleaning facility to clean these gentle giants for only three buses

that had already given the lessons we were after. The refuelling station had delivered over 20 tons of hydrogen, to buses and for other hydrogen activities.



INE asked the registration office to set aside possible registration plates that begin with H2. By April 2008 the range H2 001 – H2 013 is already on the streets of Reykjavik, all hydrogen powered vehicles. Actually Jon Björn Skúlason was also considering JB 007. As in my name is Bond...

The learning from the operation has been of high value to all partners not the least on the system]s perspective and made the next step only a straight forward action based on good experience. Some results have already helped to improve the next generation of hydrogen buses, of which a new prototype is expected to be ready from Daimler in 2009. We wish that hydrogen buses will be integrated in the public transport system of Reykjavik in the near future on a commercial basis where as they have been proven reliable. For historic and educational purposes one of the buses is now on display at Skógar, museum in southern Iceland.

But the HyFLEET:CUTE is still going on in other countries such as Germany and China. If you want to read about the global hydrogen bus demonstrations then check out: www.global-hydrogen-bus-platform.com/ but news on other projects that INE is participating in are described on our home page www.newenergy.is