

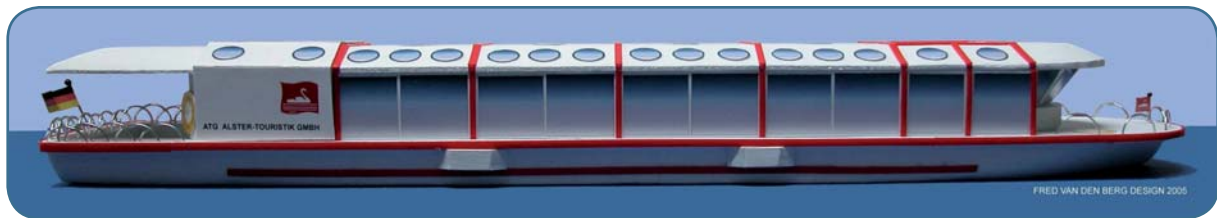


## Zemships-Newsletter

No. 1 – 2008/07

Being a partner in the Zemships project we are pleased to present you the first Zemships newsletter. It is our intention to inform you on a regular base, as an interested party in the use of maritime hydrogen technology, about the progress that is being made. Consequently you are always on the cutting-edge of this exiting project.

Furthermore you have access to more detailed information by visiting the Zemships homepage via [www.zemships.eu](http://www.zemships.eu).



The Zemship model.

### What is Zemships?

Zemships is a project for the realization of the first fuel cell powered passenger ship world wide in the category of up to 100 passengers. The project is financially supported by funds of the EU-LIFE program. The idea was born to operate a fuel cell passenger ship in the city of Hamburg in 2005. Zemships stands for “zero emission ships”. The fuel cell passenger ship will be operated on the Alster lake, which from a ecological perspective is a very sensible part of the inner city of Hamburg. Therefore operating a passenger ship without emitting any CO<sub>2</sub> has been a major objective of the project. Two fuel cell stacks manufactured by Proton Motor power the ship, offering a total output of 50 KW each. Further more the ship has a total carrying capacity of up to 100 passengers.

Guided by the Ministry of Urban Development and Environment of the Free and Hanseatic City of Hamburg nine project partners have brought the idea of Zemships to life. The EU funded Project is conducted by the following partners:

- ATG Alster-Touristik GmbH
- Germanischer Lloyd AG
- Hamburger Hochbahn AG



- hySOLUTIONS GmbH
- Ministry of Urban Development and Environment of the Free and Hanseatic City of Hamburg
- Nuclear Research Institute Řež plc (UJV)
- Proton Motor Fuel Cell GmbH
- The Linde Group
- University for Applied Sciences

All partners contribute with their specific technology knowledge to the project and its results. Through the successful process of concentrating these skills the project has been enabled. By visiting [www.zemships.eu](http://www.zemships.eu) a detailed overview of the project task responsibilities of each individual partner can be recognized.

## Which progress is currently being made in the Zemships project?

### Proton Motor completes manufacturing process of fuel cell stacks

At the moment the second fuel cell stack is being tested on the test bench in Puchheim – the headquarter of Proton Motor near Munich. After the tests are finished it will be delivered to Hamburg and mounted into the ship.

With the PM basic A 50 maritime Proton Motor provides an efficient and robust hydrogen-fuelled fuel cell system, especially designed for the use in ships and boats. Its packaging and its functional design has been specifically adapted for maritime use, following the guidelines of Germanischer Lloyd for the use of fuel cells on board of ships and boats. The Germanische Lloyd has already performed the Factory Acceptance Test on the first system.



The ZEMships fuel cell system on the test bench at Proton Motor (May 2008).

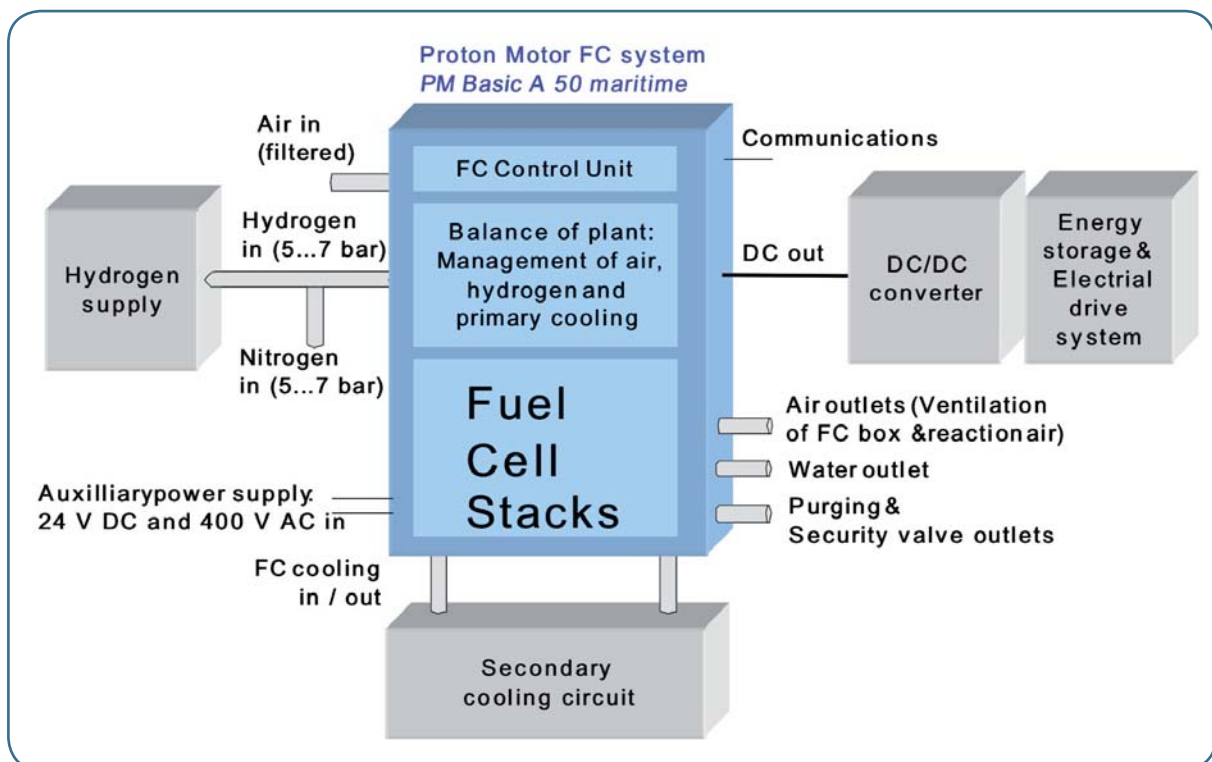
With this milestone Proton Motor is able to provide the first fuel cell system world-wide in this power range, that is specifically optimised for maritime applications.





The system does not only consist of the fuel cell stacks but contains all of the plant components which are vital for a safe and efficient operation of the fuel cell system. The air feed system with compressor, the pressure reduction for hydrogen as well as the full primary cooling circuit are part of "PM Basic A50 maritime"

Thus the number of external interfaces is minimised and the integration into the ship can be performed very efficiently.



Schema PM Basic A 50 maritime.

The fuel cell system delivers 50 kW (gross) of electrical energy from hydrogen – with an efficiency level close to 50 %. The only emission is water vapour.

Besides operating with zero emissions and being very quiet, the fuel cell system functions typically almost twice as efficient as a conventional diesel-powered engine – taking the chemical energy of the fuel as a basis.





Anno Mertens, the project manager at Proton Motor, is looking forward to the next step in the Zemships project: “Up to now one could see the ship construction being finalised at the shipyard and at the same time here at Proton the fuel cell engine being tested – it is now that we are reaching the fascinating phase where both parts come together”.

### **The Zemships hydrogen filling station positioned at the HOCHBAHN facility Hellbrookstraße is completed by the Linde Group.**

In April the Linde Group has completed construction work at the Zemships filling station. Further more technical tests have been conducted to ensure operation ability.

The liquefied hydrogen (LH<sub>2</sub>) is delivered by trailer and filled into a super insulated storage tank at minus 253°C (minus 423°F). During the fuelling process, a vaporizer converts the hydrogen from liquid to gaseous, then it is compressed to 25 bar (360 psi) by a rotary screw compressor.

The second compression stage with a pressure of up to 450 bar (6,500 psi) uses a completely new compression system, the so called ionic compressor. Instead of a conventional mechanical piston an ionic liquid is used for the pressurizing process. Major advantages of this compressor design are excellent and highly energy efficient delivery rates, no contamination of the hydrogen gas (very important for fuel-cell applications), less moving parts, strong reduction of heat build-up and a reduced noise level below 65 dB(A).

The fuel cell passenger ship can be refuelled with 50 kg compressed hydrogen (CGH<sub>2</sub>) in about 12 minutes.



Zemships filling station at Hellbrookstraße





## **The first Zemships conference takes place in Hamburg in October 2008.**

On the 23rd of October the first Zemships conference is going to take place in Hamburg. It is held within the international H2EXPO fair.

On the conference for the first time detailed insight will be provided concerning the daily operation procedures and handling experiences of the ship and the hydrogen filling station:

- The role of fuel cells in ship operation
- Security and classification procedures of fuel cell ships
- The fuel cell system and future ship projects
- Construction and design of the ship and the filling station
- Hydrogen infrastructure

For an overview of the complete conference program please take a look at the download area of the Zemships homepage, where a pdf invitation is ready to be downloaded. Furthermore as a conference participant you will have the opportunity to gain a first hand impression of the fuel cell passenger ship while joining in on an optional trial cruise.

Interested? You can participate in the conference for free. Registration is however mandatory. We are looking forward to your visit! Please register online via the following link [http://www.hamburg-messe.de/H2Expo/h2\\_en/zemships\\_registration.php](http://www.hamburg-messe.de/H2Expo/h2_en/zemships_registration.php).

## **What are the next steps?**

The critical phase of project realisation is on its successful way to completion. The next newsletter will review the ship naming ceremony and the fuel cell passenger ship trial cruise in Hamburg.

## **Questions or inquiries about the newsletter**

For further questions and inquiries do not hesitate to contact Tarik Hammou via phone Tel. +49 40 32 88-44 75, or E-Mail: [karim-tarik.hammou@hysolutions-hamburg.de](mailto:karim-tarik.hammou@hysolutions-hamburg.de).

We are looking forward for your questions and inquiries.

