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# FCS Alsterwasser – Lessons learned and Outlook



Gefördert durch die EC / Financial Support given by the EC

## A brief overview : company and vessels

- in business since 1977
- ATG is a subsidiary company of Hamburger Hochbahn AG
- tourist- and charter trips on the Alster Lake and its canals as well as on the River Elbe
- seasonal operations from April to October
- 45 employees
- about 430,000 passengers p. a.

## Fleet

- 16 conventional vessels with diesel engines (40 kw – 225 kw)
- In operation between 1,800 and 3,000 hours a year
- 1 solar ship "Alstersonne"
- 1 FCS "Alsterwasser" since August 2008

- Policy of ATG is to ensure preservation of the sensitive Alster area in the heart of Hamburg.
- Therefore we always commission vessels with a high technical standard and low emission levels.
- The first example is the solar ship “Alstersonne”, the world’s largest solar catamaran

- Positive experience with the solar catamaran
  - no emission
  - low operating costs
  - high popularity with passengers

served as the basis for a new project with other renewable energy.

## Basics and Objectives > ZERO EMISSION SHIP

**ZEMSHIPS** should

- prove fuel cell propulsion for ships is possible
- arouse great interest in Hamburg's residents and passengers
- reduce noise and other emissions
- operate both on a lake (like the Alster) as well as on a tidal river (like the Elbe)

## Technical Specifications > ZEMSHIPS FCS Alsterwasser

- passenger capacity 100
- draught max. 1.20
- length max. 25.5 m
- height max. 2.63 m (low bridges)
- with a roof which lowers to 2.3 m above the waterline
- operable on Alster Lake and its canals and also HafenCity (River Elbe / port)
- high recognition value as a special ship

## Technical Specifications > ZEMSHIPS FCS Alsterwasser

- only fuel cell (no auxiliary diesel-engine / generator)
- more space under deck for tanks etc.,
- only one step when boarding via hydraulic platform for barrier-free access
- traditional open deck at the back
- 2 sliding glass hatches in the roof
- fresh- and black water tanks
- toilets, pantry

## A comprehensive overview : the Zemships project



**ZEMSHIPS** Post-Project Phase:  
FCS Alsterwasser from May 2010  
to April 2012

## Results

- The ship was built at the dockyard of SSB Spezialschiffbau Oortkaten GmbH from November 2007 to August 2008
- The new technical components were tested by all project partners between July and August 2008
- The Fuel Cell Ship (FCS) was launched on 29th August 2008 and named FCS "Alsterwasser"

## Results

- ATG's skippers and maintenance staff (21 employees) learned a lot about this new technology:
  - knowledge of hydrogen
  - how to refuel the vessel at the fuel-cell station
  - all the new technical components of the vessel
  - how to operate the new vessel
  - how to react to operational failure or damage

## Operational experience – our company's viewpoint (1)

- FCS Alsterwasser operated in 2008 from September to the end of the year, and in 2009 during the whole season on trips on the Alster Lake
  - operation period: 124 days
  - number of trips: 397
  - average journey time per day: 4 hours
  - passengers: approx. 14,000

## Operational experience – our company's viewpoint (2)

- FCS Alsterwasser's main area of operation was the Alster round trip
  - this trip lasts about 50 minutes
  - 9 trips a day
  - from 10 am to 6 pm
  
- the average operating time per day covers a period of 1 hour to 10 hours
  
- on 35 days the vessel was chartered

## Operational experience – our company's viewpoint (3)

### Operational Problems

- the heating installed was not designed for a ship with a retractable roof
  - therefore we upgraded the heating system
- refueling the vessel is very time-consuming; including the trip to the fuel-cell station this process takes 2.5 hours
  - problem solved by reduction of fueling periods

## Operational experience – our company's viewpoint (4)

### Operational Problems

- software problems – require a calm and effective reaction by the staff
  - learning by doing, keeping in practice
- technical problems with the fuel cell system cannot be eliminated by ATG maintenance staff

## Operational experience – staff's viewpoint (5)

- FCS Alsterwasser is extremely popular with skippers
- the vessel is easy to maneuver
- modern design
- good working conditions
  - the ship is very quiet, no engine noise
  - excellent lighting
  - no exhaust

## Operational experience – passengers' view point (6)

- passengers are very enthusiastic
  - no emission
  - very quiet
  - modern and simple design
  - open harbour
  - accessible for wheelchair users
  
- a highlight is the retractable roof with descending doors
  
- interest in the new technology is very high

## Conclusion

Results after a 20-month testing phase:

- fuel-cell propulsion is a good alternative to a conventional diesel-engine
- this vessel can operate both on a lake and on a tidal river
- company demands are mostly fulfilled
- our passengers accept the new technology

## Outlook (1)

- For ATG the project has been
  - very labour intensive
  - instructive
  - not exactly inexpensivebut on the whole very successful.
  
- Operation of the vessel FCS Alsterwasser in the next two years: In principle the decision depends on approval of funding by the City of Hamburg.

## Outlook(2)

- Cooperation with Proton Motor, Linde and Germanischer Lloyd will continue.
- In May 2010 FCS Alsterwasser will be an attraction at the WHEC in Essen.
- Provision of advice and support to encourage other companies to build and operate vessels with fuel-cell propulsion

Thank you

