PROJECT

ECTOS

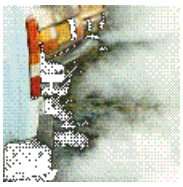
Ecological City Transport System

Evrópusambandsverkefnið

Funding: European (5th RTD Framework Programme)

Duration: Mar 2001 - Aug 2005

Status: Complete with results



Background & policy context:

The government of Iceland had declared its ambitious goal of becoming the first hydrogen society in the world. For that purpose Icelandic New Energy Ltd. (INE) was founded as a public private partnership. INE also became the coordinator of the ECTOS project. ECTOS was involved in running and testing three fuel cell buses on emission free hydrogen for two years and a survey of numerous related parameters. The first two years were used for preparations, building the needed infrastructure, organise training and maintenance, etc.

Objectives:

The overall objective of the ECTOS project is to tackle the problem of local urban pollution, by offering the solution of using hydrogen for powering part of the transport sector that is with hydrogen fuel cell buses. The purpose is to demonstrate and evaluate the hydrogen based infrastructure for public transport vehicles and the operation of pollution free hydrogen buses in a CO2 free environment in Reykjavik, Iceland. The overall defined strategic goal of the project is also clear:

- to prove that it is possible to operate a hydrogen fuel cell transportation system, including hydrogen infrastructure as well as hydrogen vehicles in the city of tomorrow,
- to show that it will have benefits for the society at large to operate the future transport system on hydrogen, including socio-, environmental and economical factors.

Methodology:

Details not available beyond: The impact assessment (socio-economic and environmental studies [so-called non-technical face of ECTOS]) for this miniature study of a 'hydrogen driven society' has three main areas:

- First, the acceptance was estimated on behalf of the operators, bus drivers and the public (achieved through public surveys).
- Secondly, the energy efficiency and environmental effectiveness was estimated and calculated (achieved by calculation of the 'well to tank' efficiency, using official numbers for the energy distribution systems and a set of data from the normal operation-sequence of the hydrogen station. The 'tank to wheel' efficiency has been measured twice during set periods of total data collection from fuel cells, passenger counting, mileage driven and fuel use. The first round led to a few small adjustments to the bus-operation).
- Thirdly, is the cost and benefit at large.

Related Projects:

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Parent Programmes:

FP5-EESD KA4 - City of Tomorrow and Cultural Heritage

Institute type: Public institution

Institute name: European Commission, Directorate-General for Research (DG Research)

Funding type: Public (EU)

Partners:

ECTOS - project group:

- Icelandic New Energy, Coordinator
- DaimlerChrysler
- Shell
- Hydrogen
- Norsk
- Hydro
- EvoBus
- Skeljungur University of Iceland
- Institute for Technological Research,
- Iceland Straeto bs Vinnova
- University of Stuttgart
- Sub-contractor: Raesir hf

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Key Results:

Sustainability Impact Assessment

The outcomes of public surveys indicate that the Icelanders are more interested in seeing the results and show impatience for the hydrogen economy. Passengers and other commuters state that they have a positive attitude towards this new locally made fuel, they connect hydrogen to natural concepts such as water but only 30% would be willing to pay a higher price for their commuting during the introduction phases of hydrogen. The bus drivers are very positive towards the technology and enjoy driving the fuel cell buses. They also claim that the passengers make positive comments about the vehicles. The total fuel efficiency is lower than hoped for but this generation of fuel cell buses was designed for reliability - and some fuel efficiency was therefore sacrificed. Issues such as purging, idling, etc. are being worked on to increase the fuel efficiency. Learning from such issues are currently being worked on and will be addressed in the next FC bus design and development phase along with countless other items. This is a very important learning for future projects. When looking at the overall economics of the project it has showed that the maintenance cost and operation of the hydrogen infrastructure is high. It is evident in a project like this that without EU or governmental incentives it would not have been undertaken. The fuel cell buses performed as planned but the overall maintenance cost and operation of the hydrogen filling station was far higher than expected. Adding the maintenance cost to the capital cost of the filling station resulted in a fairly high hydrogen cost and therefore the price of hydrogen sold only recovered a small fraction of the operation. However other benefits should be mentioned. Compared to diesel buses, the material balance for motor-oil, grease and brake fluids is much lower for the fuel cell buses and therefore both costs and emissions have been saved during the project period.

Bus Operation

The operation of the buses was always considered as the riskiest part of the project. This was due to the fact that the technology was new and the geographical location and climate of Iceland being subject to extreme North Atlantic weather may influence the operation of the vehicles. However, the buses in

Iceland have had extremely high availability with no major incidents and with a very satisfied customer group consisting of the bus company and the passengers.

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Policy implications

Throughout the project it has been shown that social and environmental benefits are very visible. However, the current stage of technology does not yet make it commercially economical. Indications are though that the cost of the new technology will come down in the near future and therefore not far into the future the city of tomorrow will benefit in social, economical and environmental way by using hydrogen instead of fossil fuels.

Documents:
ECTOS_Final_Report.pdf (Final report)

STRIA Roadmaps: Transport electrification

Transport mode: Road transport

Transport sectors: Passenger transport

Transport policies: Environmental/Emissions aspects

Geo-spatial type: Urban