



Topsoe Fuel Cell

Topsoe Fuel Cell is dedicated to development, production and marketing of solid oxide fuel cells (SOFCs). The company is a subsidiary of Haldor Topsoe.

Reduction of CO₂ emissions has top priority in relation to the protection of the global environment. Moreover, reliable energy supply plays a major role as world resources of fossil fuel are running out.

The SOFC technology is a highly efficient technology resulting in low CO₂ emission. SOFC technology converts fuel – e.g. natural gas and biofuel – directly to electricity and heat. Therefore, the development and commercialisation of SOFCs are crucial to finding sustainable solutions to the world's energy and environmental challenges.

The company seeks to establish partnerships, collaborating to integrate the fuel cell into complete systems for the commercial market.

The potential of SOFCs

A fuel cell converts the chemical energy contained in fuel directly into electricity with high efficiency. SOFC technology is based on ceramic materials and can be produced at low cost. Combining a large number of cells makes it possible to reach a commercial power output. SOFCs are also known as high-temperature fuel cells. The high temperature is of specific interest for combining power and heat generation.

SOFCs hold great potential; both in the form of cleaner energy production technology and reduction of CO₂ emissions and in the form of business opportunities in exports and increasing employment rates. Widespread use of SOFCs with their higher efficiency will also increase Denmark's energy security, as dependence on imported energy will be reduced in the long term.

FACTS

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Management

Claus Olsen
CEO

Number of employees

120 employees



Business areas

Topsoe Fuel Cell focuses on three primary market segments, which each represent very substantial markets:

Micro combined heat and power units for private houses

An SOFC micro combined heat and power unit generates heat and power for the household and thus replaces the conventional natural gas or oil-fired furnace. As electricity is generated more efficiently than at central power plants and as transmission losses are eliminated, an SOFC micro combined heat and power unit is an environmentally sound solution for households while also reducing cost for the house owner.

Auxiliary power units

An SOFC fuel cell can provide power for heavy duty trucks, yachts and other leisure purposes. Heavy duty trucks need power for the "hotel load" – air conditioning, TV and coffee maker, when the driver takes a break. High efficient power generation for yachts and recreational vehicles increases the range for self sustainability and reduces fuel consumption as well as CO₂ and NO_x emissions.

Distributed generation

SOFCs can provide power for hospitals and supermarkets etc., which will eliminate dependence on utility supplied electricity. Moreover, the power is generated locally instead of centrally at conventional power plants; therefore, transmission losses are minimised and CO₂ and NO_x emissions are reduced.

Commercialisation

SOFC fuel cells are still undergoing intensive development, and at the same time testing and demonstration activities are being carried out. The SOFC technology is expected to be ready for initial commercial application between 2012 and 2015. Topsoe Fuel Cell expects the markets for SOFC micro combined heat and power and auxiliary power units to be among the first markets.

Current projects

Topsoe Fuel Cell is involved in a number of demonstration projects:

Demonstration of micro combined heat and power unit with Danish fuel cells

Topsoe Fuel Cell, together with a number of Danish companies, participates in a project aiming at demonstrating micro combined heat and power generation based on fuel cells. During the second phase of the project, which runs from 2008 to 2010, two SOFC micro combined heat and power units will be constructed and tested by professional users. During the third and final phase of the project, the plan is to install a total of 75 micro combined heat and power units to be tested by ordinary users in their own homes. The project is supported by the Danish PSO and EUDP funds.

20 kW prototype with Wärtsilä

Topsoe Fuel Cell has a strategic cooperation with the Finnish company Wärtsilä aiming to develop a 250 kW SOFC unit to be used for distributed power generation. As part of reaching 250 kW, a number of prototypes will be built and tested. In 2007 a 20 kW prototype running on natural gas from the Finnish grid was taken into operation. In 2008, another 20 kW unit running on biogas was demonstrated. The projects are supported by the Danish PSO funds and the EU, among others.

Cell and stack production facility

Topsoe Fuel Cell has received a grant of close to 5 million Euro for the construction of a 5 MW cell and stack production plant at the company's site in Lyngby, north of Copenhagen, Denmark. With the increased production capacity, Topsoe Fuel Cell will be able to meet the need for SOFC fuel cells for future test and demonstration activities, which are a very important step towards a commercial product. The production facility started up at the end of 2008 and production cost reduction is ongoing. The project is supported by the EU LIFE Environment programme.

SPONSORS

Topsoe Fuel Cell research, development and demonstration activities are funded by a number of sponsors:

PSO funds

The Danish state's ForskEL programme provides PSO funds for research and development in environmentally friendly electricity production technologies.
www.energinet.dk

EFP funds

The Danish EFP funds provide funding for energy research, development and demonstration projects.
www.ens.dk

Danish National Advanced Technology Foundation

The foundation supports strategic and advanced technological priorities within research and development of technologies with considerable commercial potential.
www.hoejteknologifonden.dk

EU

A great number of research and development programmes are available within the EU. Topsoe Fuel Cell has received grants under the Sixth and the Seventh Framework Programme as well as the LIFE Environment programme.



Topsoe Fuel Cell milestones

1980 - 90's	Haldor Topsøe fuel cell investigation started in the late 80's.
2000	Focus on solid oxidefuel cells - SOFC.
2001	Strategic agreement with Risø DTU on the development of SOFC fuel cells.
2004	Establishment of Topsoe Fuel Cell as a subsidiary owned by Haldor Topsøe. Cooperation agreement with Finnish Wärtsilä on the development of SOFC applications. Testing of stack 13.000
2005	5 kW unit tested with Wärtsilä
2007	20 kW unit tested with Wärtsilä 1 kW micro CHP unit tested with Dantherm Power
2008	Start up of new production facilities
2009	Topsoe PowerCore™ type 1 for micro CHP developed.