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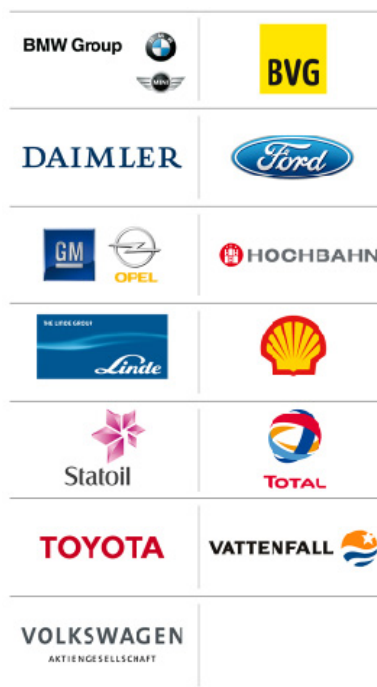
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# The Clean Energy Partnership – A Successful Cooperation Model

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## 1 The Partnership

The Clean Energy Partnership (CEP) emerged from the „Transport Energy Strategy VES“, and was established in December 2002 as a joint political initiative lead-managed by the German Ministry of Transport and Industry. Its focus is clean mobility for the future – quiet and emission-free. The international cooperation of 13 partners – combining the car manufacturers, energy and technology companies and bus operators - GM/Opel, Berliner Verkehrsbetriebe, BMW, Daimler, Ford, Hamburger Hochbahn, Linde, Shell, Statoil, Total, Toyota, Vattenfall and Volkswagen – test the system compatibility of hydrogen in everyday use.



**Figure 1**

This includes the continuous operation of efficient hydrogen vehicles, their fast, safe refuelling, the clean and sustainable production of hydrogen, and its transport and storage in both its liquid and gaseous states. The increasing integration of renewable energy sources for hydrogen production is a clear objective of the CEP.

The Clean Energy Partnership is the beacon project of the National Hydrogen and Fuel Cell Technology Innovation Programme (NIP) in the transport sector. The NIP is implemented by NOW GmbH (National Organisation for Hydrogen and Fuel Cell Technology). The Clean

Energy Partnership is one of the biggest demonstration projects in Europe in the field of hydrogen technology.



**Figure 2**

## **2 The Leading Companies**

The project is concentrating on validating technology in everyday conditions testing a broad variety of technologies. The partners participating in the clean energy partnership are competing enterprises in “real life” or work in totally different sectors without any common interest. In the CEP project they come together to jointly tackle the challenge of introducing clean transport technologies into society. The common interest in participating is their awareness that an accelerated development and demonstration of the innovative hydrogen technologies is necessary to come up with a successful solution for a clean transport. Each company on their own would not be able to progress in the way they do together. By sharing their knowledge and cost of development the learning curve can thus be followed faster as the experiences of the past years prove:

Already in 2004 a hydrogen filling station for both liquid (LH<sub>2</sub>) and gaseous hydrogen (GH<sub>2</sub>) has been integrated in a conventional public filling station for the first time in Germany. Offering LH<sub>2</sub> and GH<sub>2</sub> requires both, the delivery of trucked in hydrogen as well as the production on site. Several components in this project like compressors and liquid hydrogen pumps have been applied for the first time. Meanwhile the partnership has already travelled a distance of 837,000 kilometers by hydrogen - nearly 21 times around the world. Currently 44 hydrogen cars and 8 Hydrogen busses are being fueled at two stations.

### 3 Seven Steps for Clean Mobility:

1. The CEP is investing in infrastructure – 5 Hydrogen filling stations are planned till the end of 2011
2. The CEP is developing new vehicles – e.g. Daimler F-CELL B-Class, VW Tiguan HyMotion, Caddy Maxi HyMotion, Audi Q5 HFC, GM/Opel HydroGen4
3. The CEP is growing – new partners are Toyota and North Rhine-Westphalia
4. The CEP is a trailblazer in technological development – 700 bar refueling, State-of-the-art electrolysis technology, Hydrogen production using biomass
5. The CEP is increasingly relying on renewable energy – Increase the share of renewably produced hydrogen to 20%, hydrogen from a hybrid power plant and from biogenic waste, first CO<sub>2</sub>-free fuelling station at Berlin Brandenburg Airport
6. The CEP is spreading to other cities – e.g. talks with Baden-Württemberg.
7. The CEP pursues international alliances – exchange with the California Fuel Cell Partnership (CaFCP) on standardization processes and research results, networking with HyNor and Scandinavia



Figure 3

### 4 The SMEs Behind

Leading energy companies and OEM suppliers are in the visible partners in this project. However, the success of the necessary technology developments based to a great proportion on the support and the innovative power of small or medium sized enterprises (SME). It is their know-how and innovative power that was of great supportive value to this project.

A successful cooperation model enables an acceleration of the innovation process:

Big enterprises take the risk and provide the financial support to small and medium enterprises to develop and implement new innovative technologies. The knowledge remains with the small and medium enterprises who concentrate on their core competences as well as the big enterprises. Due to the diversity of technology suppliers and the emerging competitive environment, cost of the hydrogen technologies is expected to remain fair in the future. An example for the successful cooperation within the clean energy partnership is the technology development cooperation between Statoil and TOTAL as CEP partners and the

SMEs Andreas Hofer and SME Hexagon Composites, who developed and delivered the dry piston compressor and the storage units implemented at the TOTAL hydrogen station Holzmarktstraße in Berlin. The German wind energy company ENERTRAG has been integrated into the project by supplying hydrogen from wind energy that has been generated from electricity surplus. Here new business models have been developed and successfully tested and show the potential of co-operations between big and small enterprises in regard to technology innovation.

## **5 Outlook**

CEP will enter the third phase from 2011 until 2016 focusing on market preparation for commercial hydrogen-powered vehicles. It will be a challenge to develop an overall infrastructure of hydrogen production and fuelling with relevant shares of renewable energy as well as the implementation of a significant number of vehicles – involving the effort of SME and leading companies.