

## GERMANY

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[%]	2007	2008	2009	2010
Average Annual GDP Growth (price adjusted)	3.5	1.0	-4.8	3.8

Figure 1: Average Annual GDP Growth

[PJ]	2008	2009	2010
Mineral Oil	4904	4635	4678
Natural Gas	3058	2937	3075
Hard Coal	1800	1496	1714
Lignite	1554	1507	1512
Nuclear	1623	1472	1533
REN	1147	1201	1322
Others*	130	180	209
Total	14216	13428	14044

\* including external trade electricity

Figure 2: Primary Energy Structure

[PJ]	2007	2008	2009	2010
Hard Coal	202	207	141	168
Hard Coal Products	173	150	145	205
Lignite	5	5	5	6
Lignite Products	70	80	72	78
Biomass/ Renewable Waste	472	435	443	496
Non Renewable Waste, Waste Heat	31	65	76	95
Other Renewable Energy	21	31	34	38
Transportation Fuel (Mineral oil)	2480	2481	2469	2474
Heating Oil	742	1017	876	879
Other Mineral Oil Products	14	20	19	19
Natural Gas	2110	2101	2042	2097
Other Gases	155	165	139	165
Electricity	1894	1887	1783	1859
District Heat	441	452	446	480
Total	8813	9127	8692	9060

Figure 3: Final Energy Consumption

## VITAL STATISTICS

EU Member State

## Population

2010: 81.6 Million

## Territory

2010: 357,041 km<sup>2</sup>

## Capital

Berlin

## GDP/capita

Gross domestic product per capita, current prices

2010: 40,670 US\$ p.c.

## Average Annual GDP Growth

See Figure 1

Source: International Monetary Fund  
 – Germany: 2011 Article IV Consultation  
 – Staff Report: Publication Notice on the Executive Board Discussion; and Statement by the Executive Director for Germany

## Primary Energy Structure

See Figure 2

## Production

## Final Energy Consumption Electricity

## Production

## Imports

Gross Electricity Production

2007: 637.2 TWh

2008: 637.1 TWh

2009: 592.4 TWh

2010: 628.1 TWh

## Electricity Imports

2007: 44.3 TWh

2008: 40.2 TWh

2009: 40.6 TWh

2010: 42.2 TWh

## Electricity Exports

2007: 63.4 TWh

2008: 62.7 TWh

2009: 54.9 TWh

2010: 59.9 TWh

Source: AG Energiebilanzen;  
 www.ag-energiebilanzen.de; March 2010



[PJ]	2007	2008	2009	2010
Hard Coal	1259	1083	923	992
Lignite	1475	1416	1369	1367
Biomass, Renewable Waste	111	112	113	128
Non-Renewable Waste, Waste Heat.	84	82	88	86
Heating Oil	71	72	77	66
Other Gases	7	6	5	7
Natural Gas	515	594	543	573
Hydro, Wind, PV	460	514	549	726
Nuclear Energy	1533	1623	1472	1533
Total	5636	5606	5205	5566

Figure 4: Energy Camers for Electricity Production

## INTRODUCTION AND BACKGROUND

The German Research, Development, and Demonstration Activities are combined in the bundle “National Hydrogen and Fuel Cell Technology Innovation Programme (NIP).” The period of the program is from 2006 to 2016. The funding budget is around 700 Mil € in addition to 700 Mil € coming from industry for R&DD work. Governmental sponsors of the programme are the Federal Ministry of Transport, Building, and Urban Affairs; the Federal Ministry of Economics and Technology; the Federal Ministry of Education and Research; and the Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety. The share of funding according to application sector for the year 2010 can be found in the following Figure.

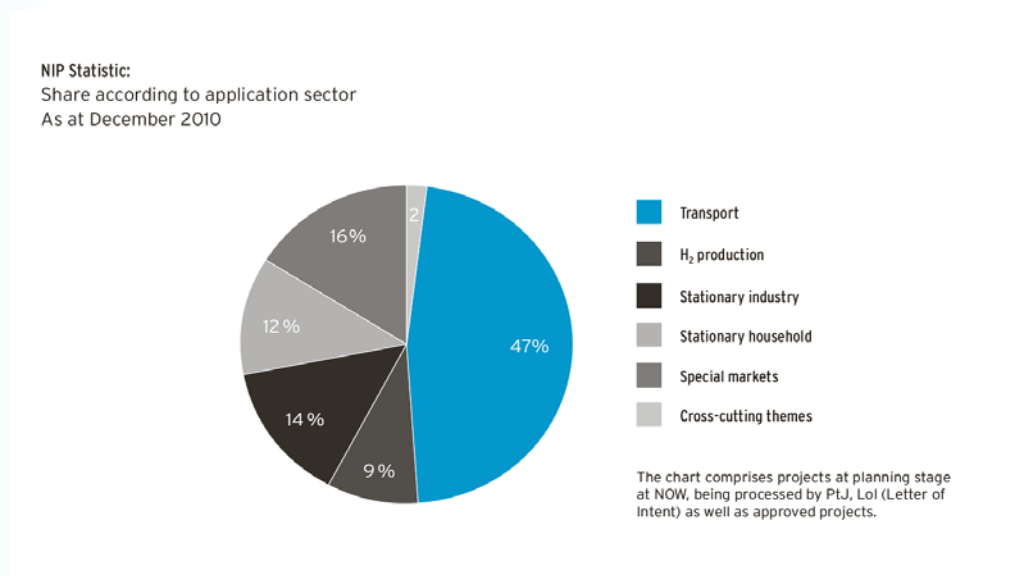


Figure 5: NIP Statistic

Further activities are added by pure industrial efforts, programmes of Federal States and European cooperation, which are not included in NIP. Besides large-scale demonstration projects, NIP also focuses on research and development projects. For more detailed information about the NIP please reference Endnote number one.<sup>1</sup>

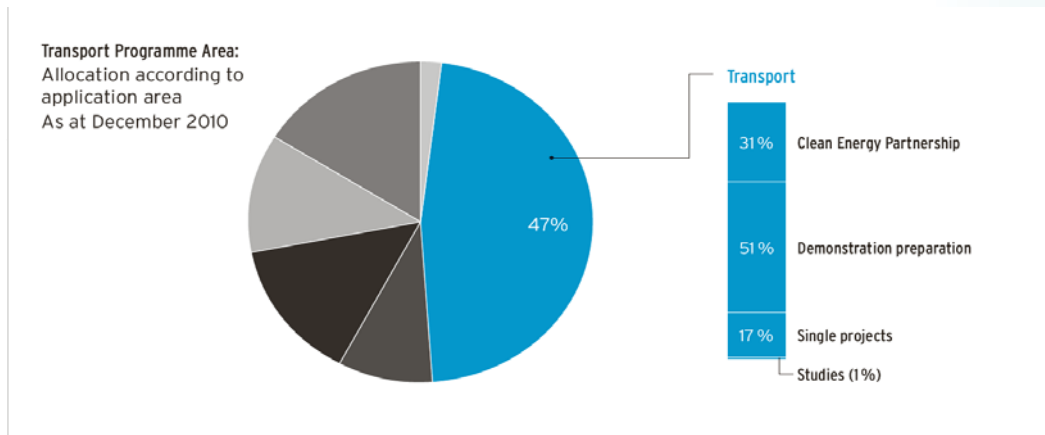


Figure 6: Transport programme area allocation - Transport.

The “Clean Energy Partnership” (CEP), demonstrates the production, handling and use of hydrogen as a fuel for road transport. It is one of the largest demonstration projects of hydrogen technology worldwide. In this project, a number of technical and political boundary conditions and economic issues are clarified, e.g., safe refuelling of vehicles, hydrogen storage and low-cost production. CEP is intended to demonstrate the production of fuels from renewable sources. The fuel cell vehicles in the project have already surpassed the million mark in everyday use, covering a distance of exactly 1,010,773 kilometres. The CEP has been the lighthouse project of the NIP in the transport area since 2008. Industry partners involved (2010): GM/Opel, Berliner Verkehrsbetriebe, BMW, Daimler, Ford, Hamburger Hochbahn, Linde, Shell, Statoil, TOTAL, Toyota, Vattenfall, and Volkswagen.<sup>1</sup>

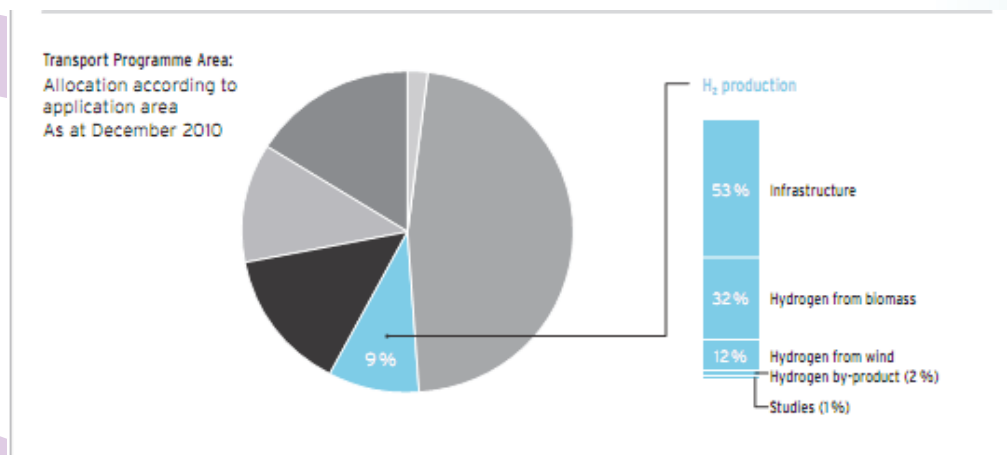


Figure 7: Transport programme area allocation - H<sub>2</sub> Production

The main focus of the “Hydrogen Production” part of the NIP is the replacement of fossil fuels by renewable hydrogen industry and transport. A substantial share of the budget of the transportation sector of the NIP is allotted to infrastructure for H<sub>2</sub> production, storage, and distribution. The goal of the projects is to demonstrate the production, transport, and distribution with different infrastructures of hydrogen as a fuel.<sup>1</sup>



## Stationary and Household Applications

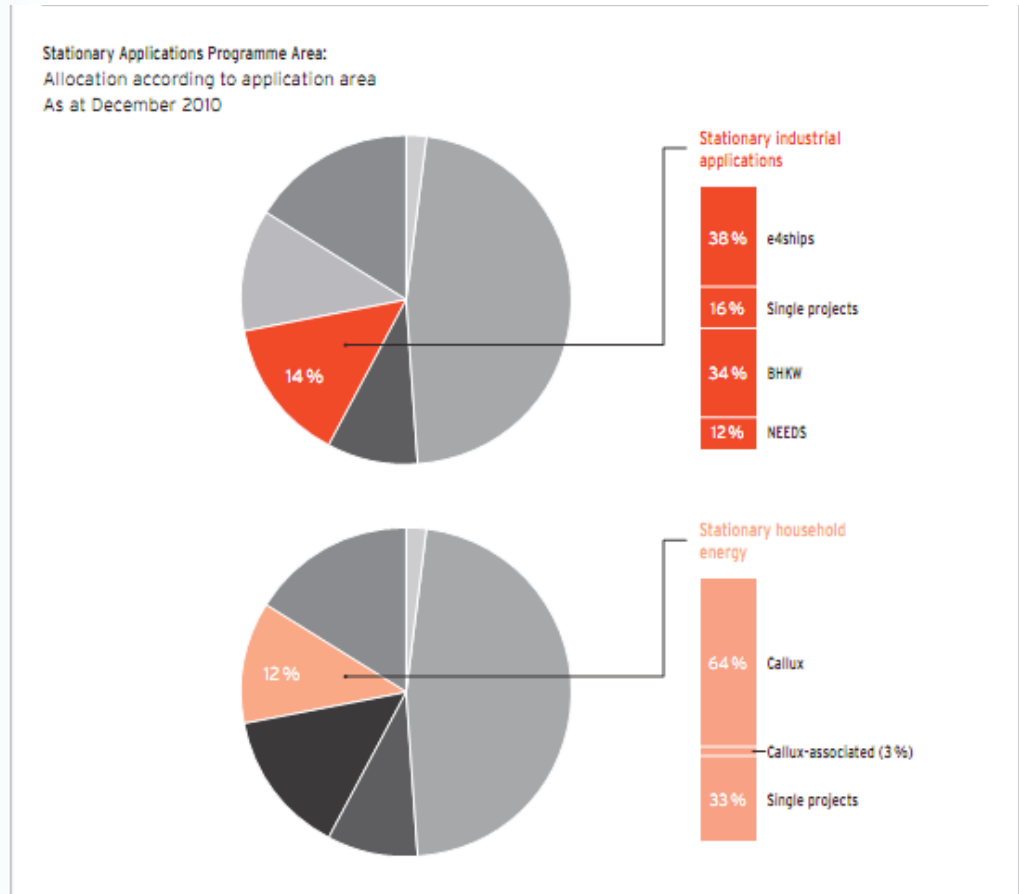


Figure 8: Stationary Applications Programme Area

In lighthouse project “e4ships” shipyards, shipping lines, fuel cell manufacturers, and classification societies are developing and testing new technologies to replace conventional ship aggregates for on-board power supply with Fuel Cells.

In lighthouse project Callux 800, fuel cell heating appliances will be in operation up to 2015 to supply households with electricity and heat. The goal of the Callux project is to further the development of existing technologies towards reliable and everyday life-suited systems by acquisition, installation, and operation of a larger number of fuel cell heating appliances.<sup>1</sup>

## Special Markets

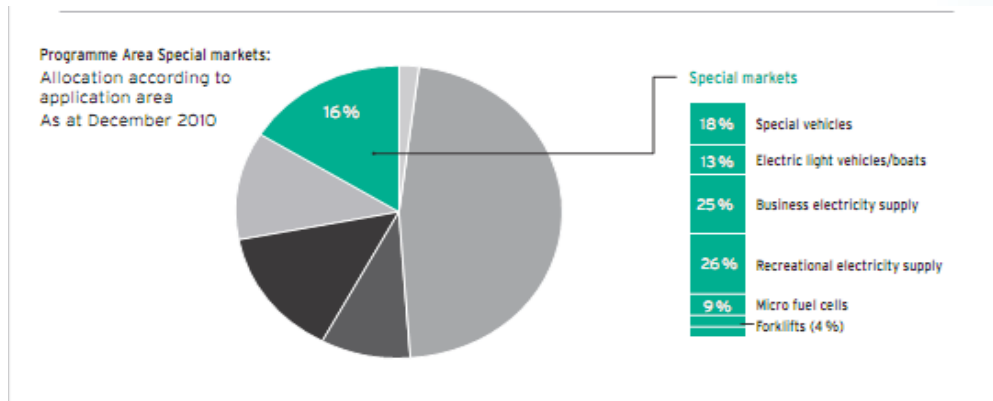


Figure 9: Programme Area Special Markets.

In the Special Markets programme, essential goals are market preparation and launch, the demonstration of practical suitability, and transition to series production. The projects in the Special Markets area are divided into application segments. Opportunities to reach the goals are optimisation of components and systems, integration developments, and refuelling infrastructure, as well as approval issues. <sup>1</sup>

## Industry Activities



Figure 10: First German Wasserstoff (Hydrogen) public service station at Shell's Sachsendamm station in Berlin

The Shell Germany Oil Corporation opened its first hydrogen pilot plant located at the Shell petrol station at Sachsendamm in Berlin, Germany. The petrol station was established within the “Clean Energy Partnership” (CEP) and is the third public hydrogen filling station in Berlin. The aim of the hydrogen pilot plant is technology testing and acquiring knowledge concerning expenses, consumer behaviour, safe storage of hydrogen, and refuelling of different vehicles with hydrogen. The demonstration station in Berlin has the capacity to fill about 250 hydrogen-fuelled vehicles per day. However, the service station will predominantly be used for demonstration and research purposes, and for the time being an average of about 20 vehicles are to be filled there per day. <sup>2</sup>



The Clean Energy Partnership (CEP) continues to enlarge the industry consortium of the project. In 2011, Air Liquide and Honda will joined the partnership. They are involved in the construction of new filling stations and a steadily expanding fleet of vehicles. The CEP has 15 industry partners on board in 2011.

The Daimler AG in cooperation with the Linde Group pushes the development of a hydrogen fuelling infrastructure in Germany. They announced the installation of additional 20 hydrogen stations across the nation from 2012 to 2014. The stations will be located in Stuttgart, Berlin and Hamburg as well as along two routes: one that runs North-South and one that crosses Germany in the East-West direction. The construction of the fueling stations will cost around 20 Mil €. The background of this activity is the planned market launch of the Mercedes-Benz B-Class F-Cell in 2014 and the need for an expansion of the existing hydrogen fuelling infrastructure. This initiative links in with the existing H<sub>2</sub>Mobility and Clean Energy Partnership activities.

Figure 11: Hydrogen Installations  
courtesy of Linde AG <sup>3</sup>

## ENDNOTES

- 1] NATIONAL ORGANISATION HYDROGEN AND FEUL CELL TECHNOLOGY  
Annual Report 2010, <http://www.now-gmbh.de>
- 2] CLEAN ENERGY PARTNERSHIP [www.cleanenergypartnership.de](http://www.cleanenergypartnership.de)
- 3] LINDE AG Linde Technology 1 | 2010, [www.linde.com](http://www.linde.com)