

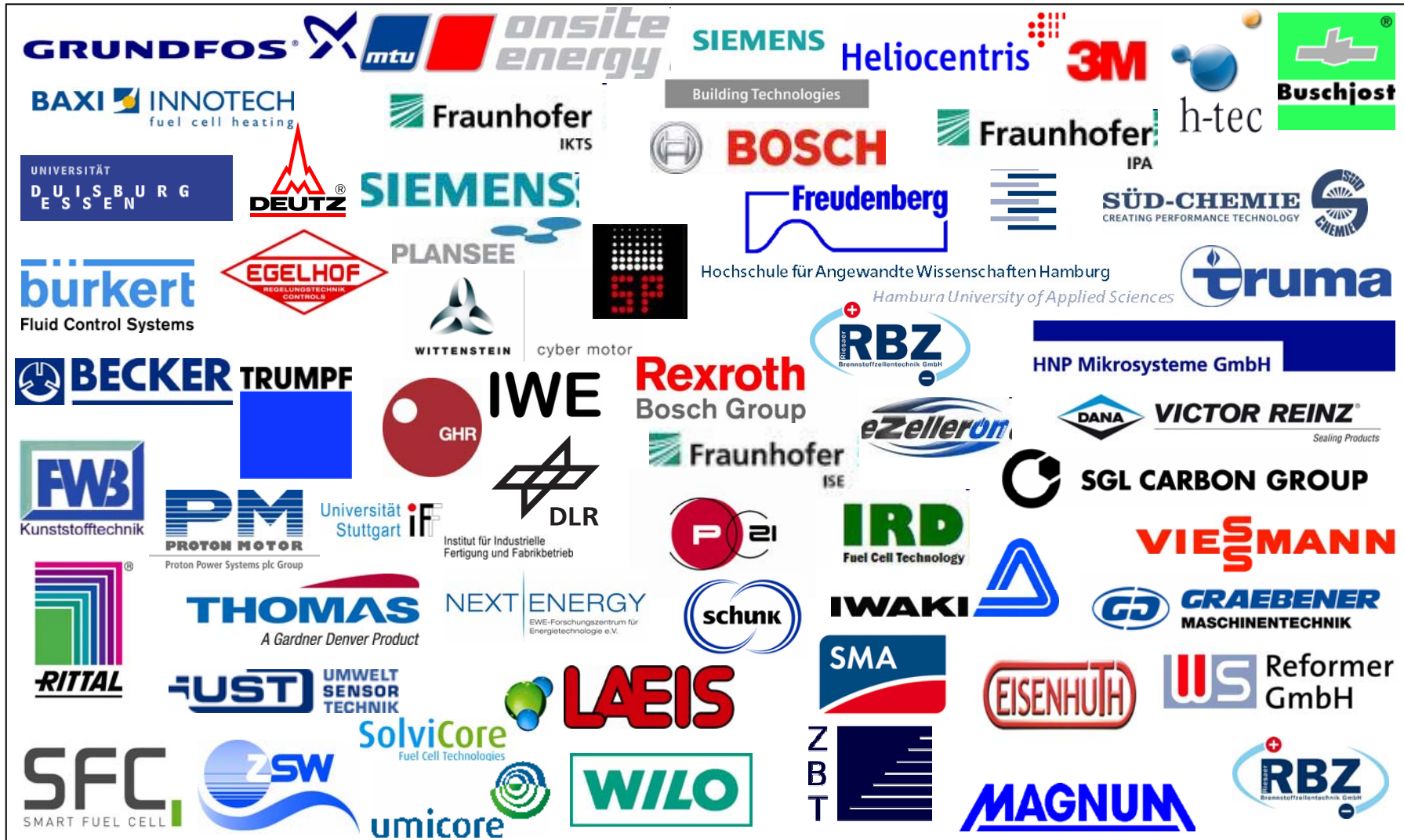
Fuel Cells from Germany



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VDMA Fuel Cells

Hanover Fair, 19. April 2010

VDMA Fuel Cells is representing the Fuel Cell Industry from Germany



Fuel Cell Markets and Applications

Early Markets
 10W – 15 kW;
 Fuel: H₂, Methanol



Stationary Markets
 1-5 kW + > 200 kW
 Fuel: Natural Gas/ Biogas



Mobility Markets
 > 30 kW;
 Fuel: H₂

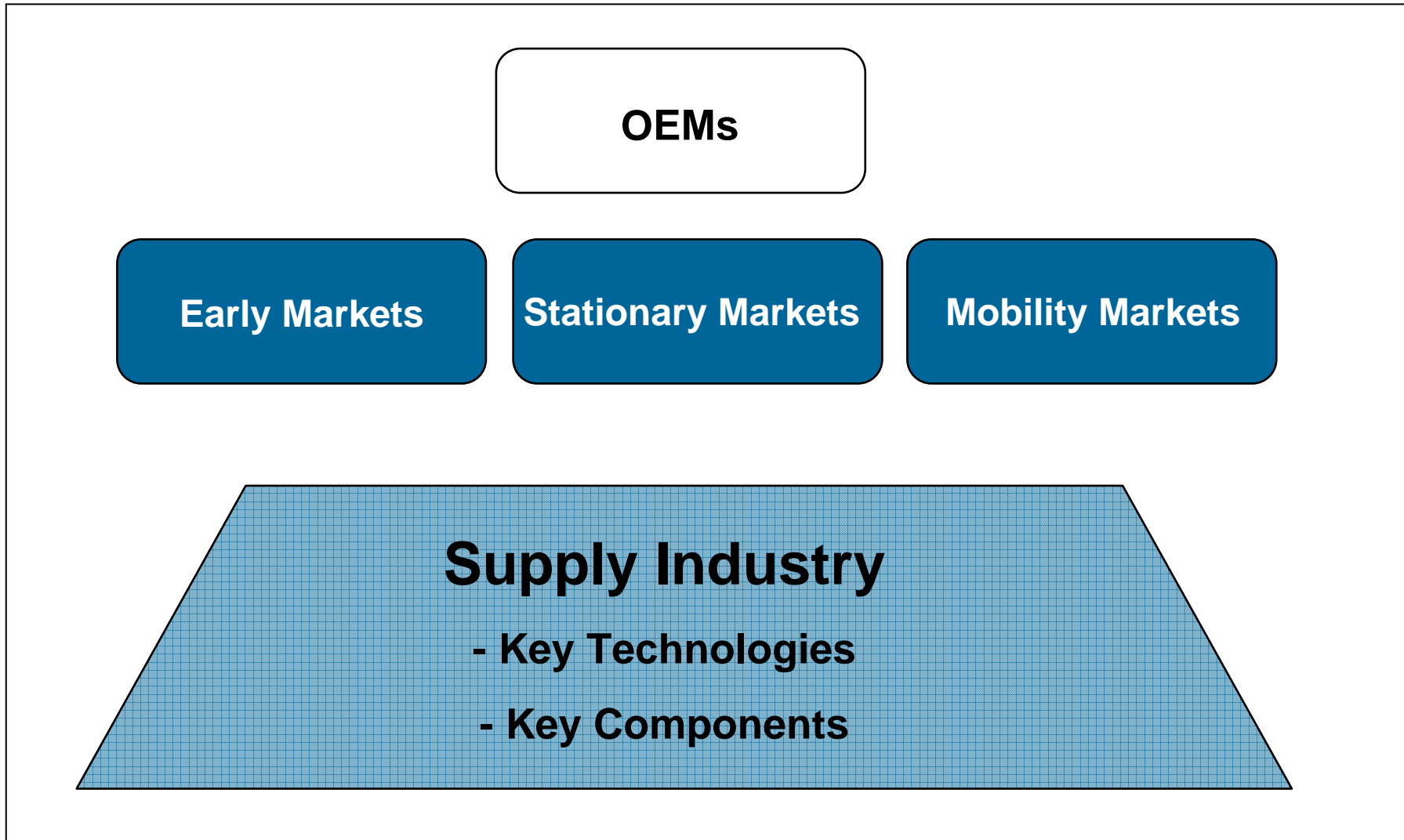


System Manufacturers – worldwide

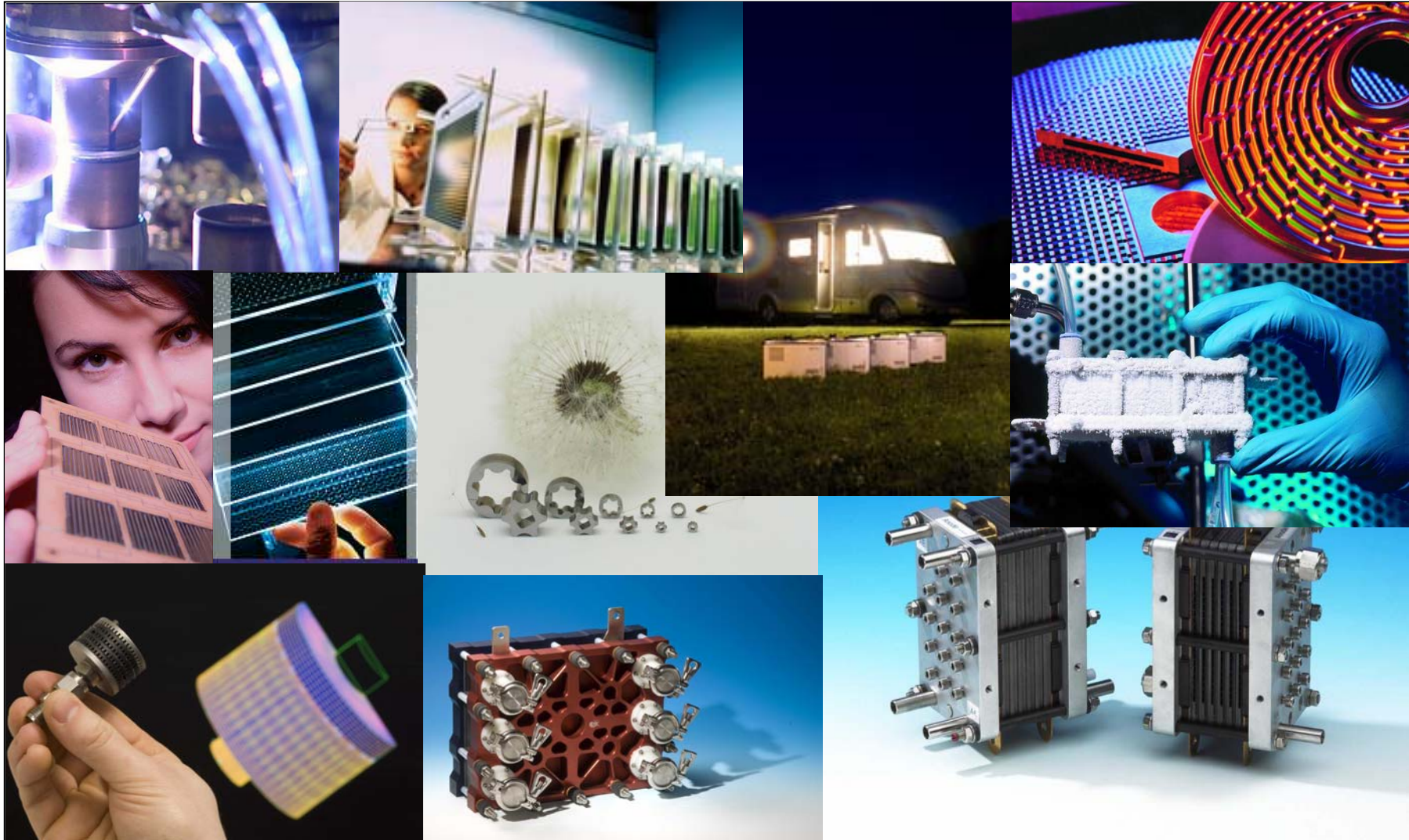
Region	Fuel Cell Systems		
	Early Markets	Stationary	Transport
Asia	Hitachi - bikes Panasonic Energy Samsung Sharp Toshiba MFC / R&D	ENEOS Celltech LG Caltex Panasonic Toshiba FCP	China - automotive Honda Hyundai Nissan Motor Toyota Motor
Europe	P21 Proton Motor SFC Rittal Truma Heiztechnik Volvo	Baxi Innotech Hexis Inhouse Engineering IRD MTU Onsite Energy Vaillant	Daimler Ford Opel Peugeot VW
North America	Hydrogenics Idatech Oorja Plug Power Protonex Relion	FuelCell Energy Idatech UTC Power	General Motors UTC Power

Fuel Cell Supply Industry

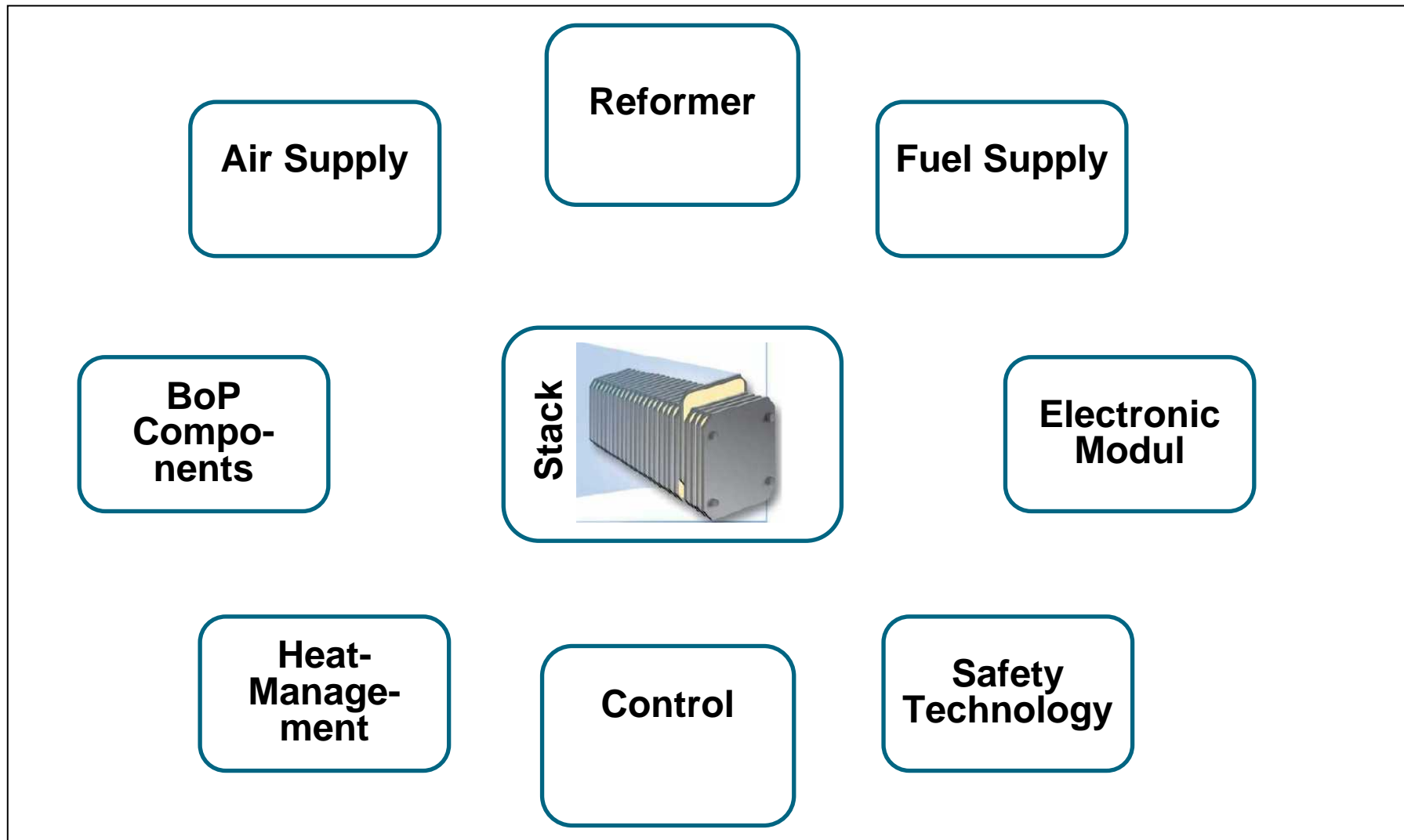
Base of the value creation chain



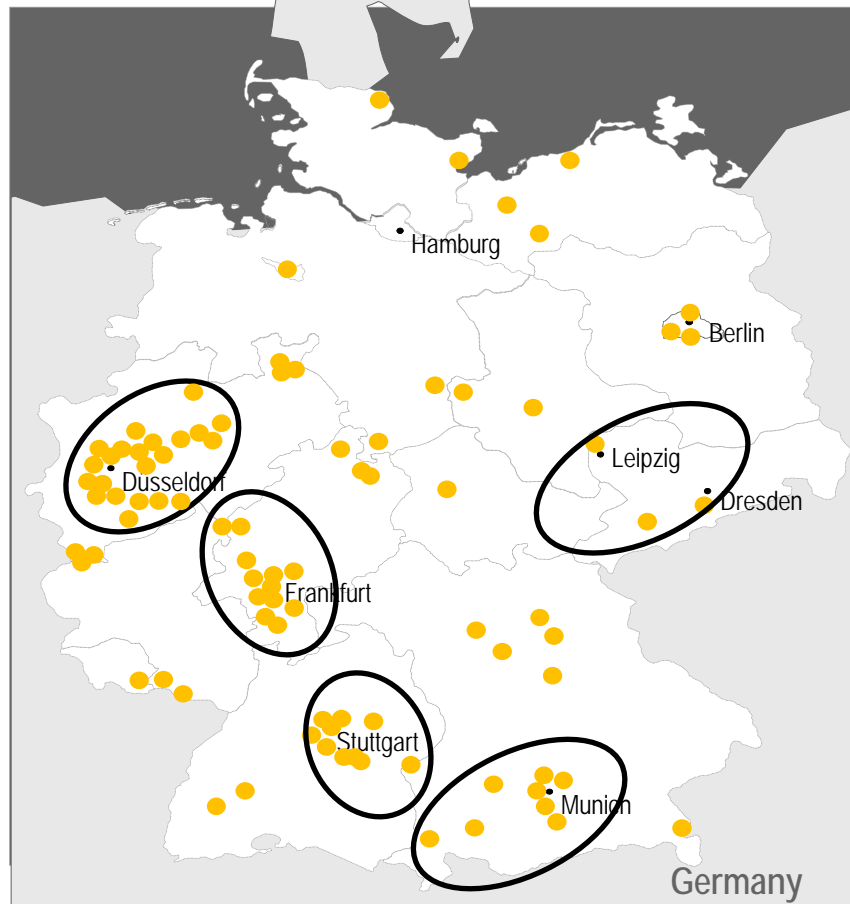
Fuel Cell Technologies from Germany



Main Components



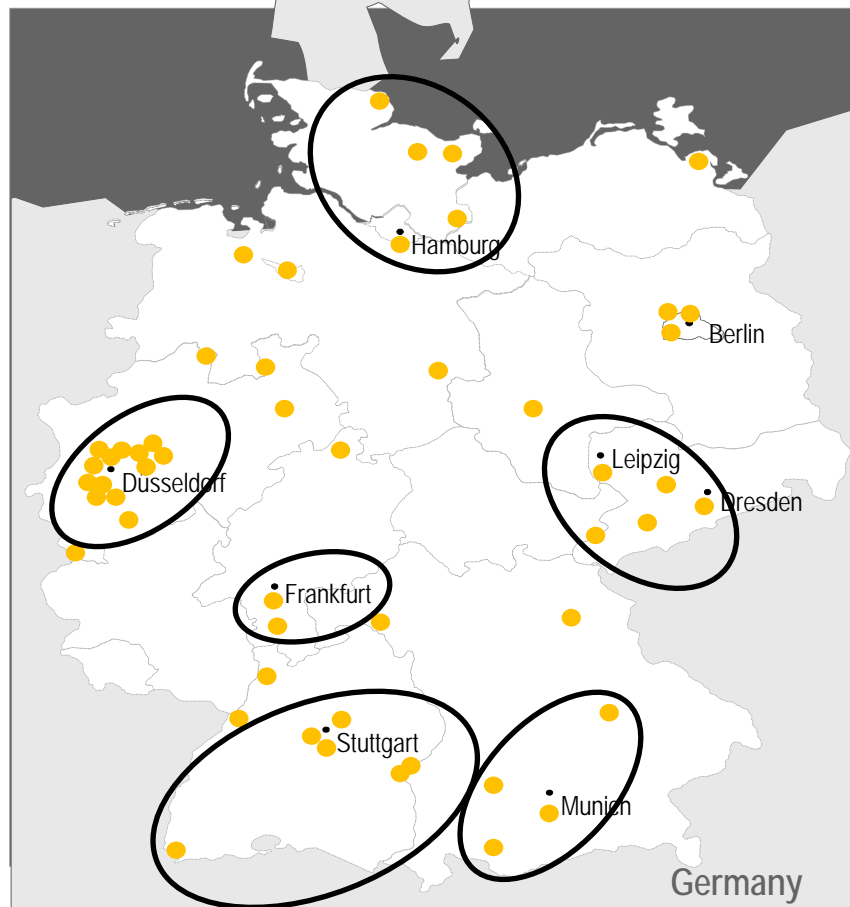
Fuel Cells - Industry in Germany



Origin: IIG Research, 2007

- **200 manufacturers of fuel cell systems & components are active in Germany**
- **Half of them focus as small manufacturers or suppliers their activities on fuel cells**
- **The other half are big companies with fuel cells as one element of a larger product portfolio**
- **Fuel cell clusters in federal states such as NRW, BaWü**

Fuel Cells – Research in Germany

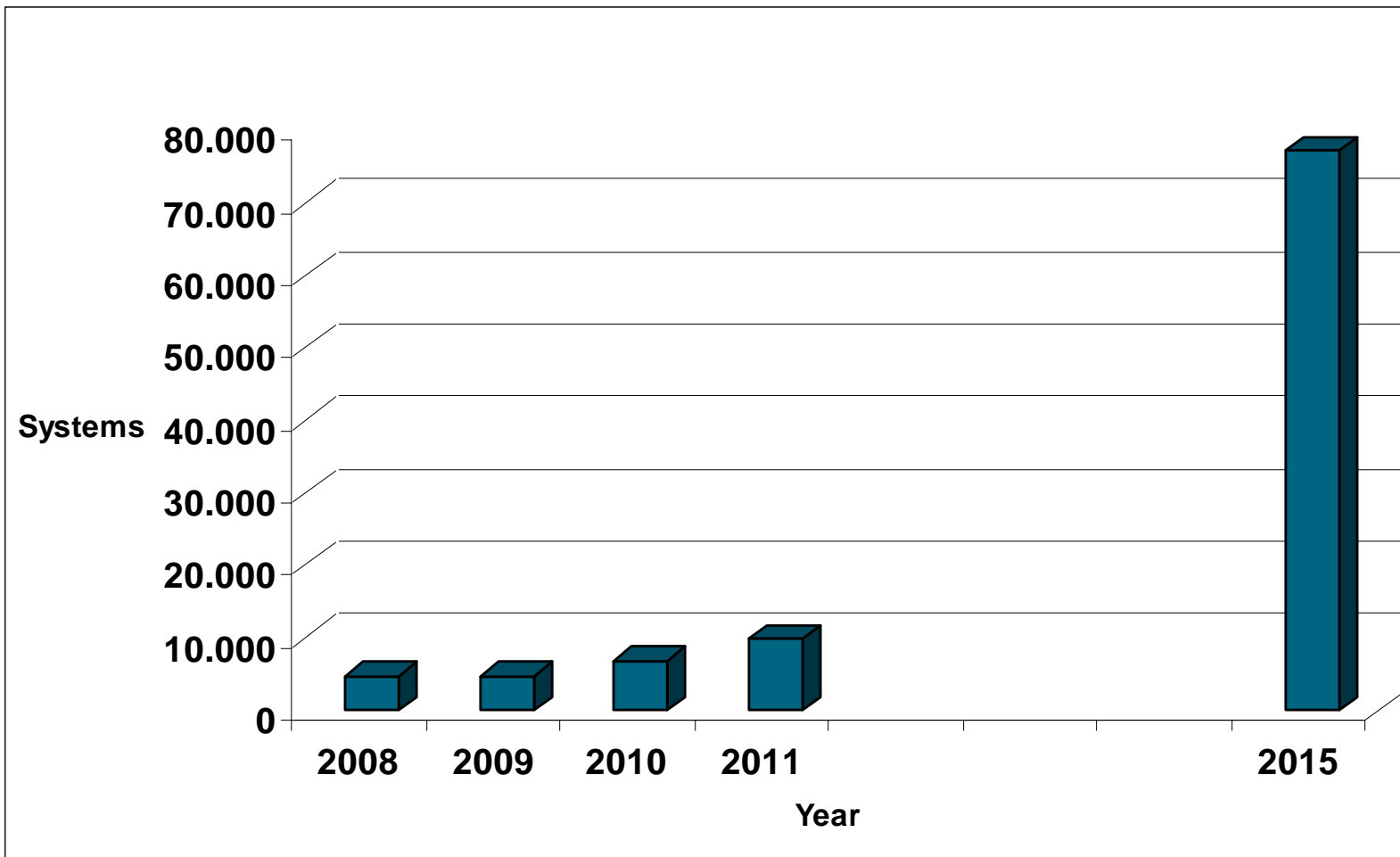


Quelle: liG Research, 2007

- > 60 research institutes are active in the field of fuel cell technologies
- Most research institutes are part of an University and highly specialized
- The majority of R&D institutes are organised in clusters in NRW and BaWü
- Smaller cluster are organised in Bavaria, Hesse, Hamburg und Saxoni

VDMA Fuel Cells Survey 2009

Fuel Cell Systems from Germany*



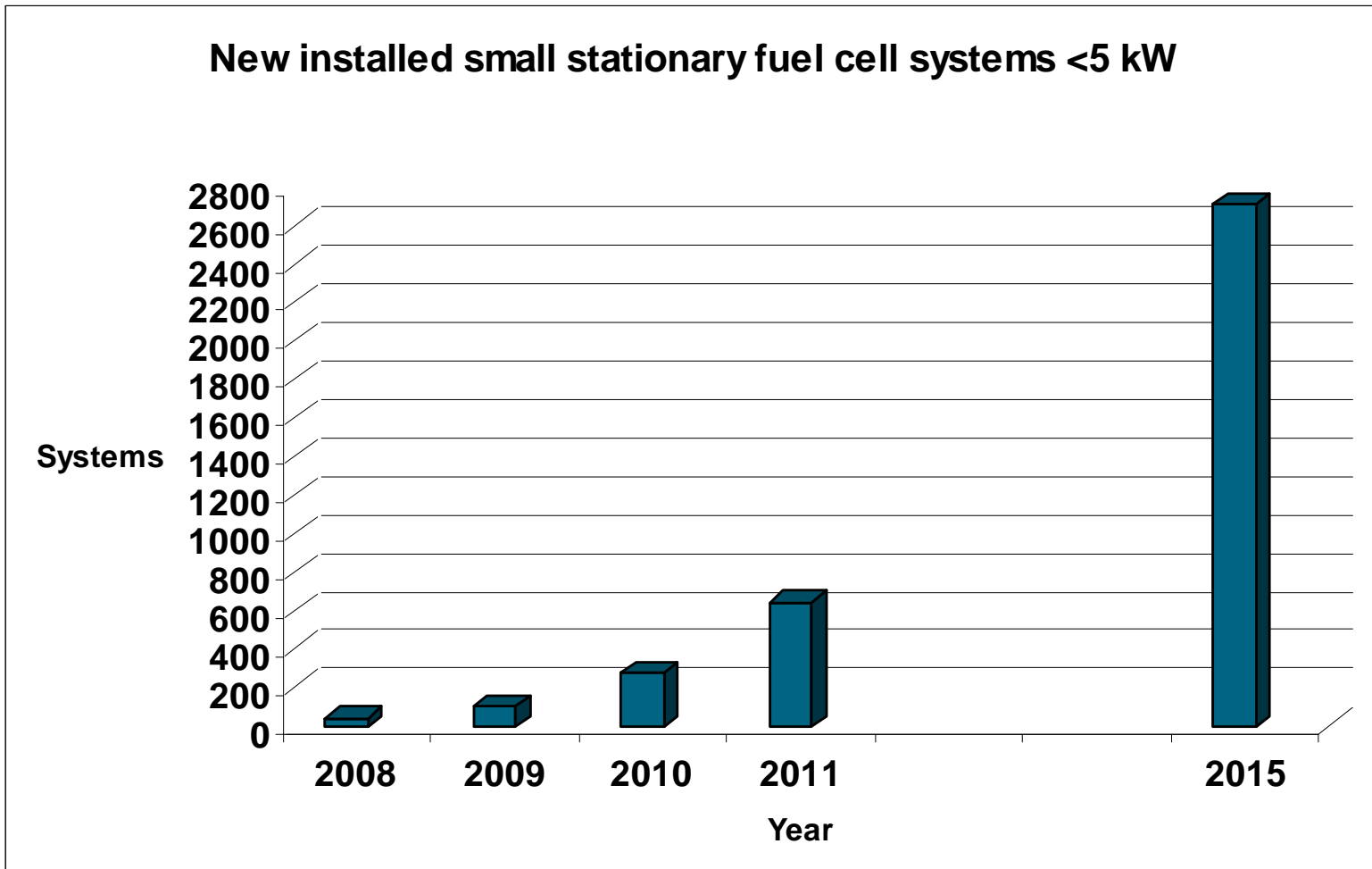
* Actual figures are higher (return of answers) – strong growth tendency

VDMA Fuel Cells Survey 2009

Fuel Cell Heating Systems from Germany



New installed small stationary fuel cell systems <5 kW

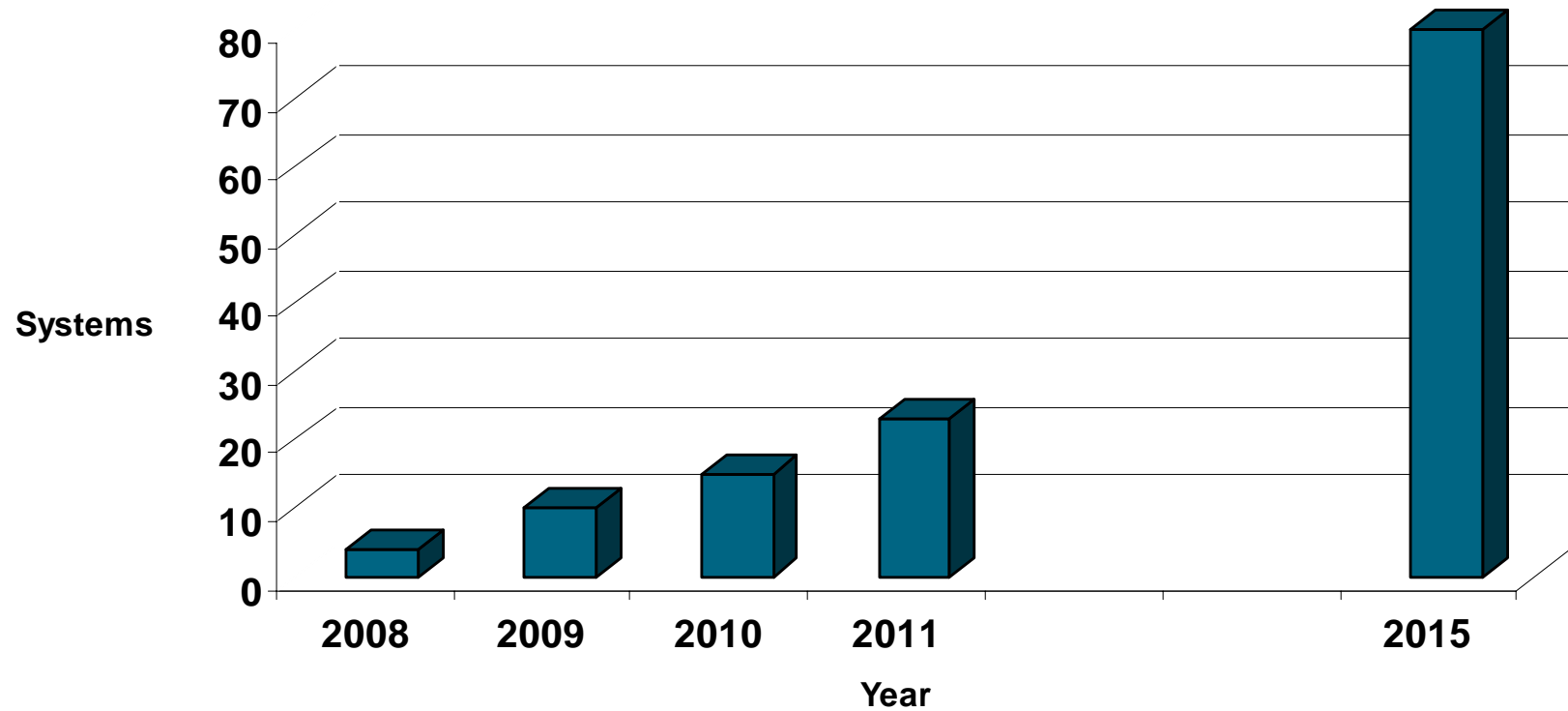


VDMA Fuel Cells Survey 2009

Large Fuel Cell Systems from Germany

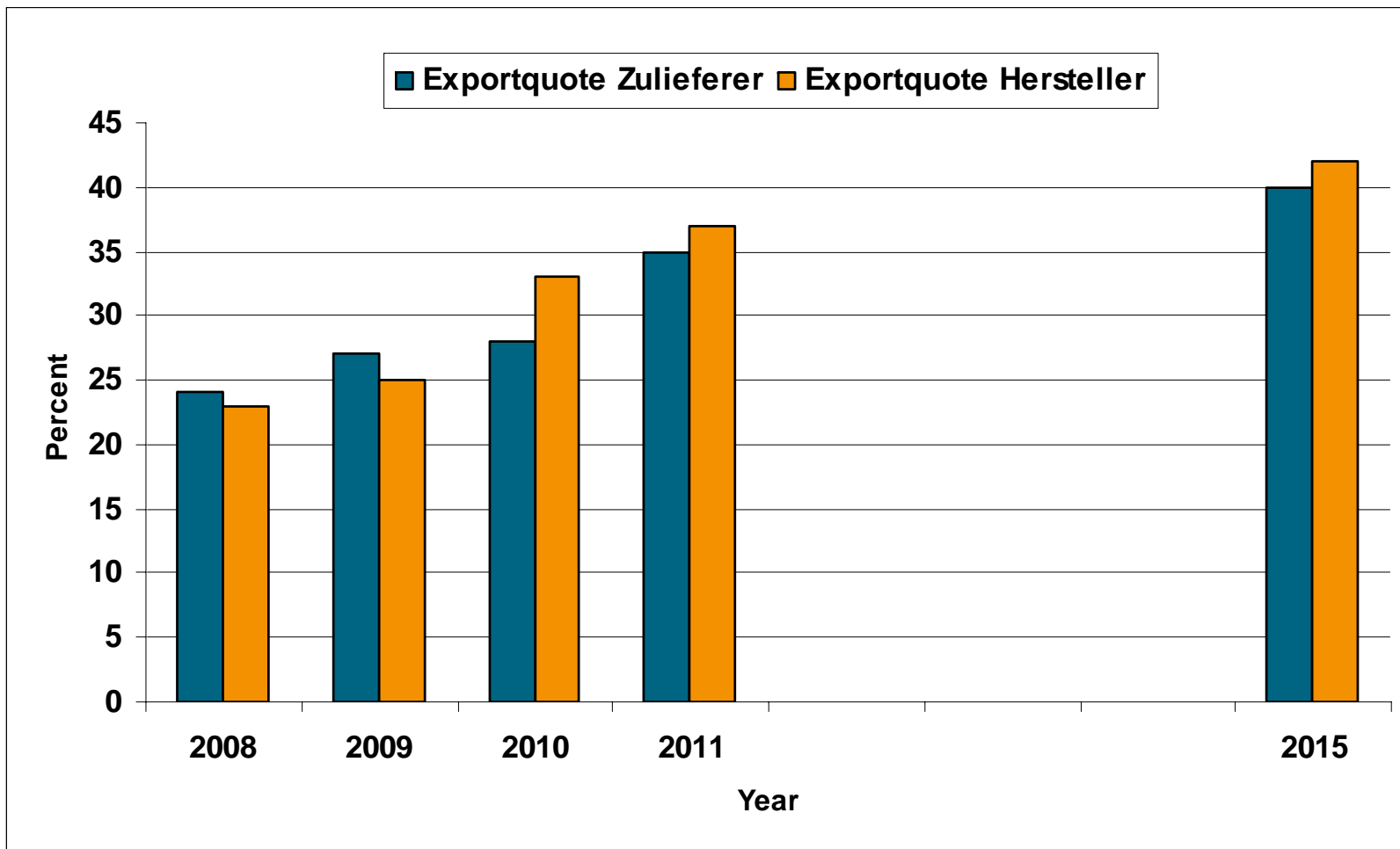


New installed large stationary fuel cell systems >100 kW



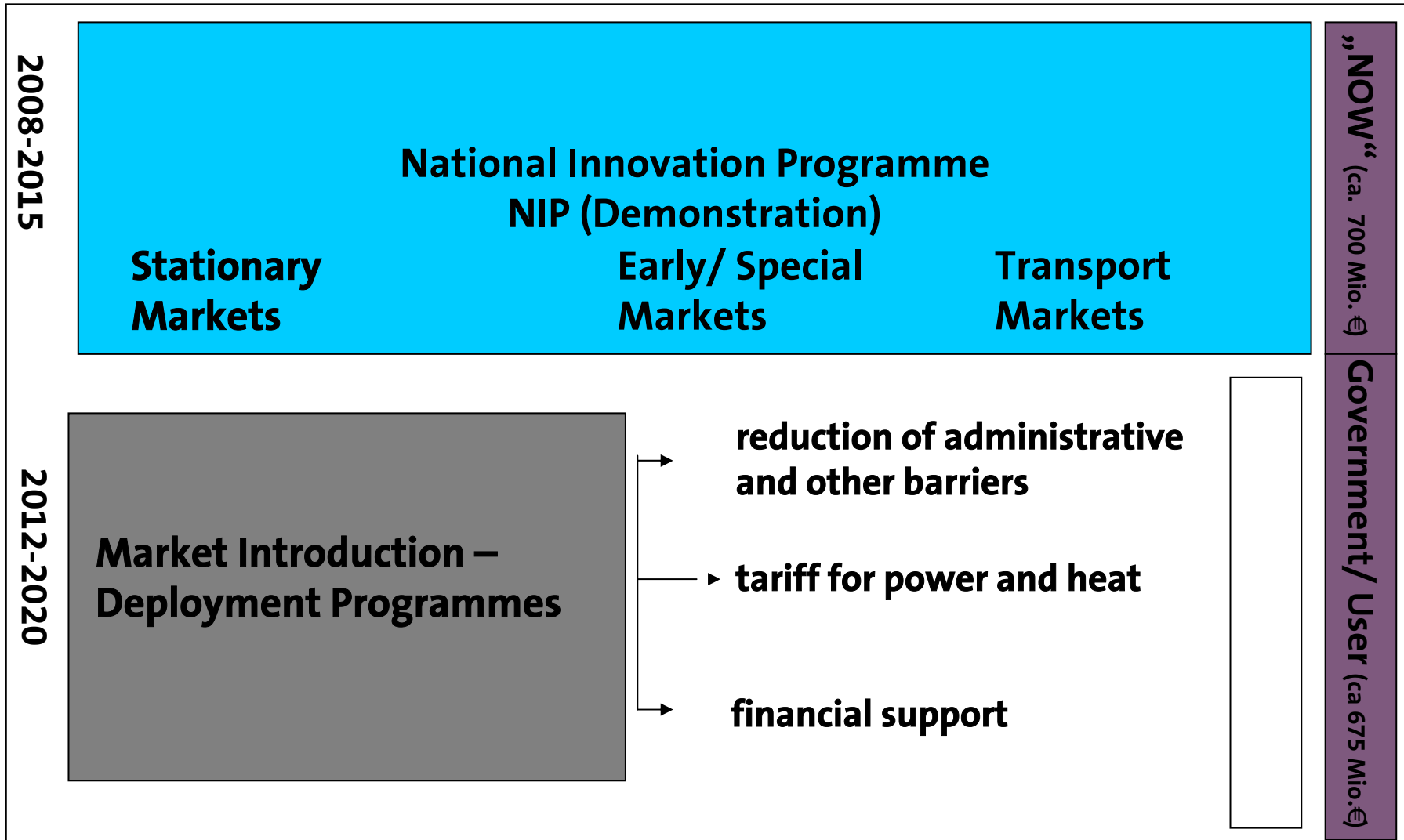
VDMA Fuel Cells Survey 2009

Export Quota in Percent

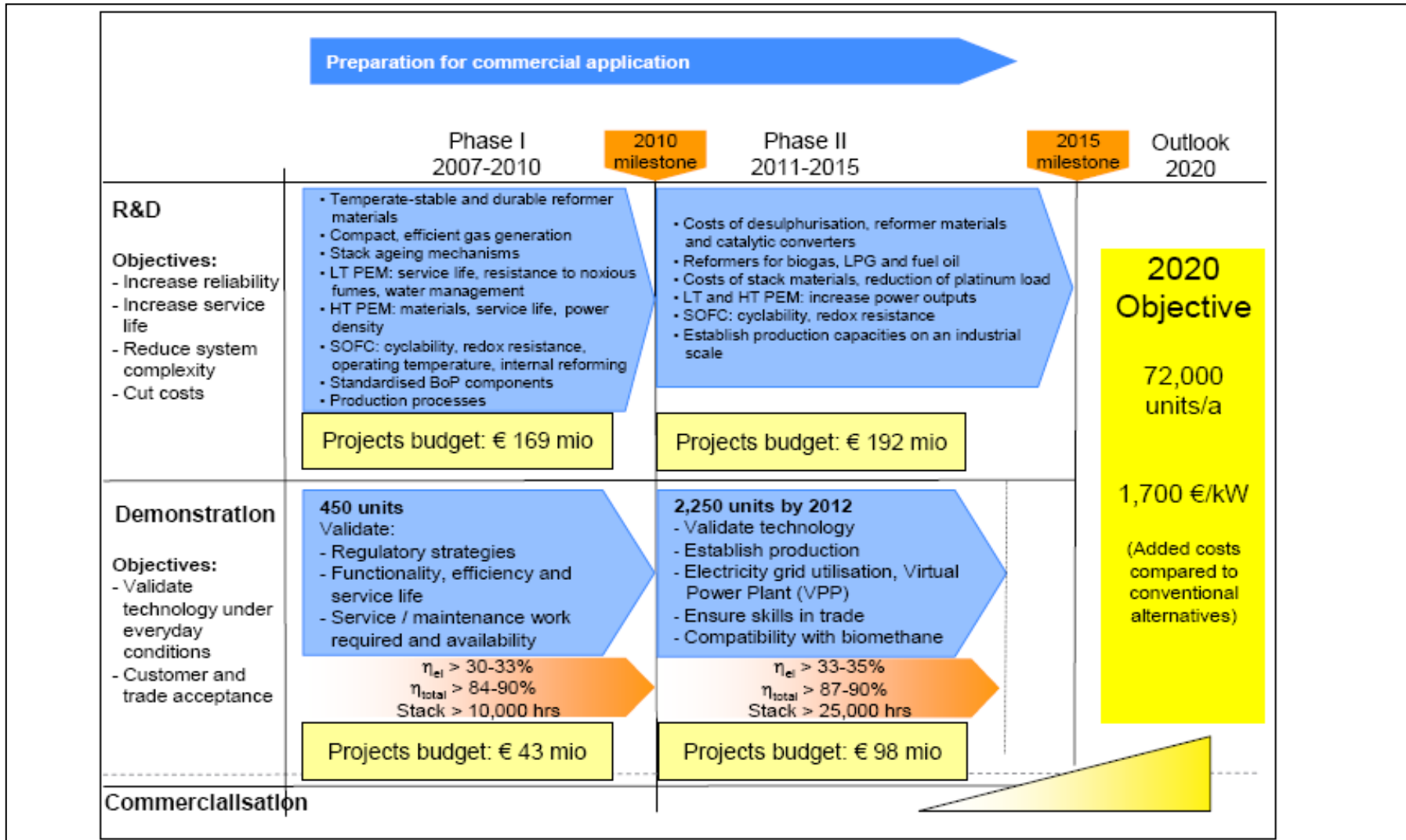


Export Quota is rising constantly towards 40 Percent

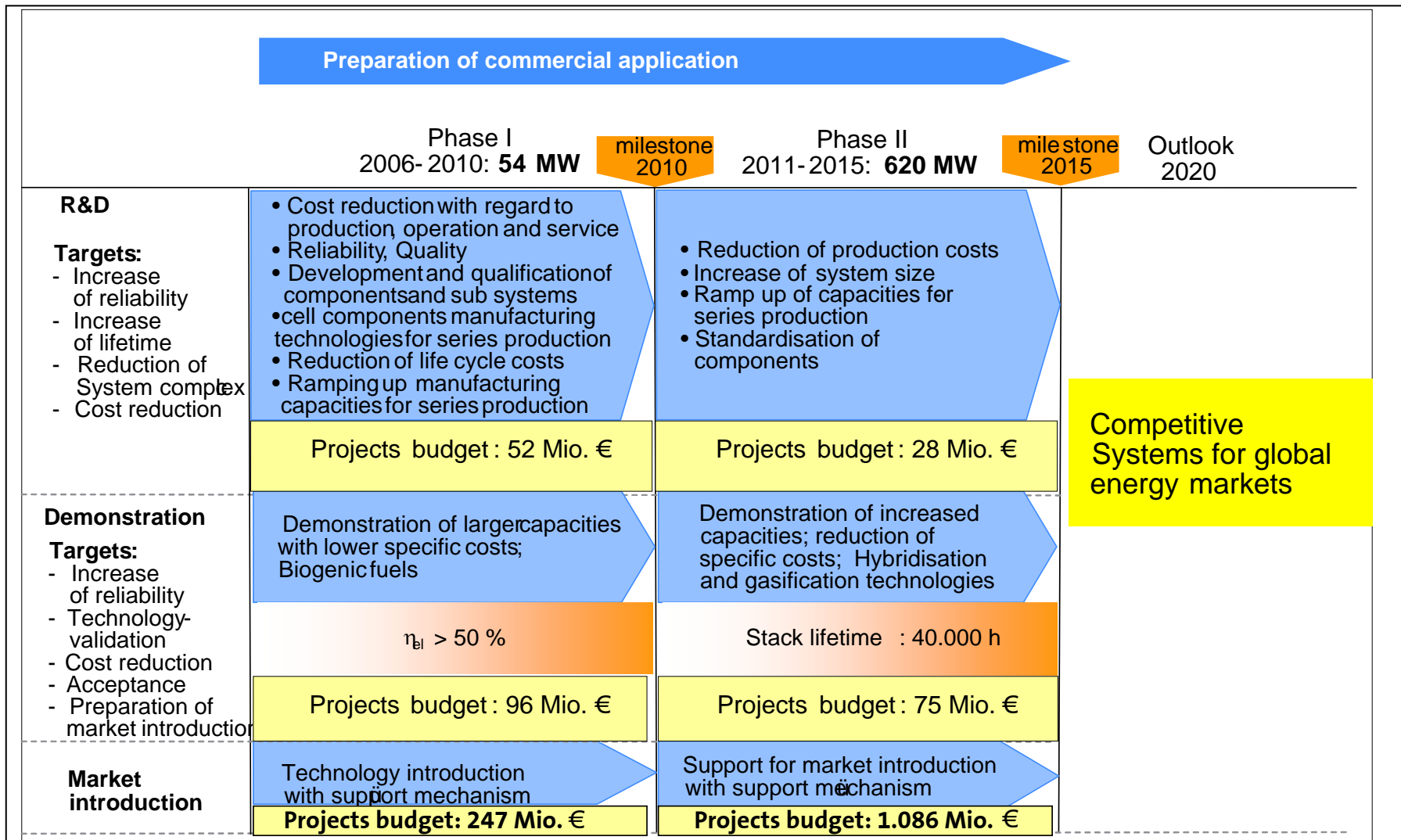
Market introduction of fuel cells – demonstration and deployment



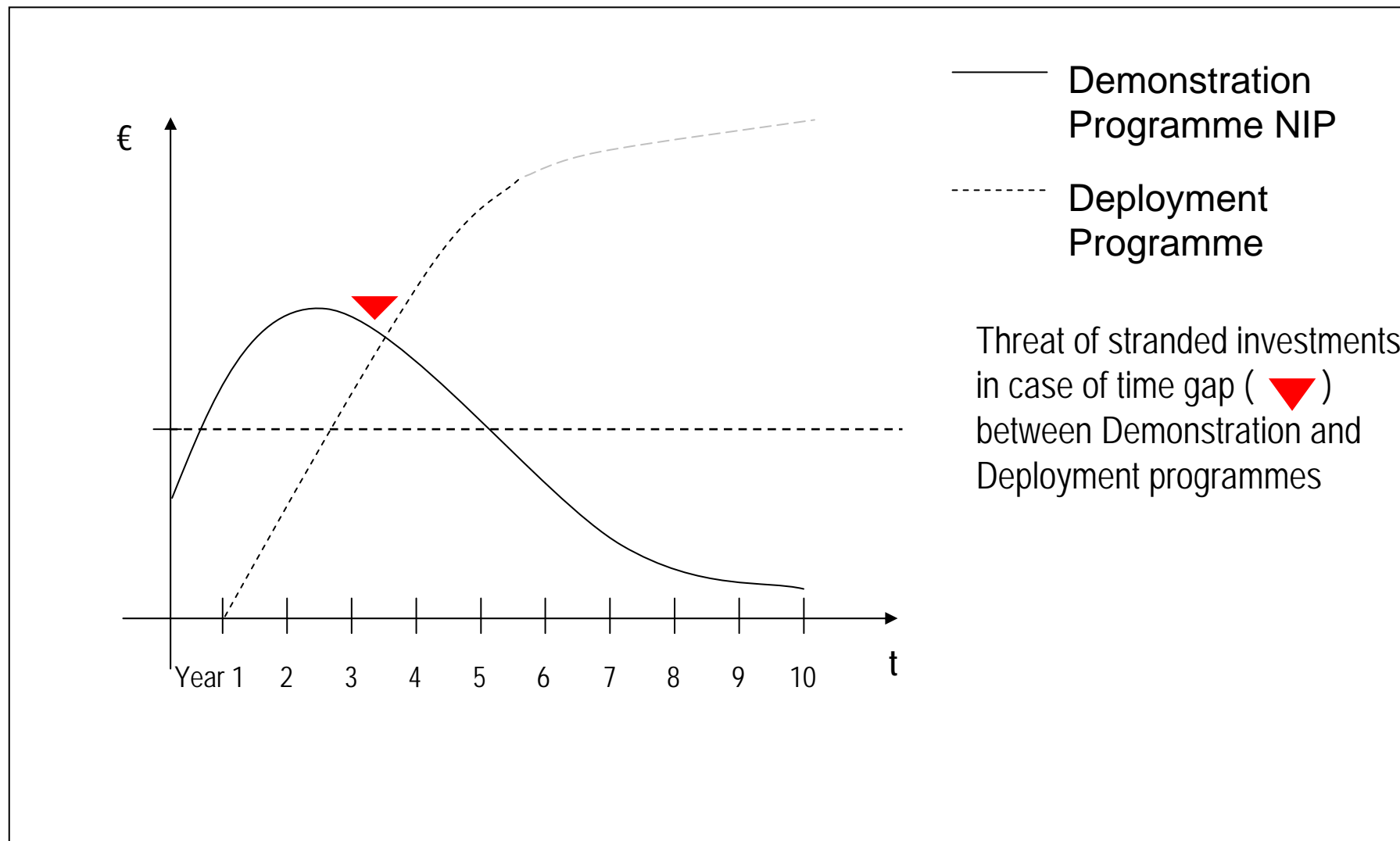
Market introduction of fuel cells – small stationary fuel cells plan



Market introduction of fuel cells – large stationary fuel cells plan



Market introduction of fuel cells – demonstration and deployment



Market introduction of fuel cells – deployment programmes necessary



- **Germany and Europe are competing with North America and Asia for series production of fuel cell technologies**
- **With R&D and demonstration only the German fuel cell industry can not compete with Japanese fuel cell industry**
- **R&D and demonstration programmes in Germany are insufficient for market introduction of fuel cells**
- **Administrative and other barriers have to be mastered for market introduction and series production of fuel cells**
- **For the successful deployment of fuel cells effective instruments are necessary for a certain period of time**
- **Economic benefits outweigh the costs**

Summary



- **Fuel cell technologies will finally succeed globally due to technological, economic and ecological benefits**
- **German fuel cell system developers are technological leaders in Europe**
- **The fuel cell supply industry is the base of the value chain**
- **Germany has strong suppliers of key technologies and components for fuel cells**
- **Market introduction of fuel cells reduces emissions, increases security of supply, creates revenues and jobs**
- **Deployment programmes are necessary for market introduction and serial production in Germany**
- **Fuel Cells are coming either from Germany or to Germany!**

We supply the Fuel Cell Industry



Thank you!

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