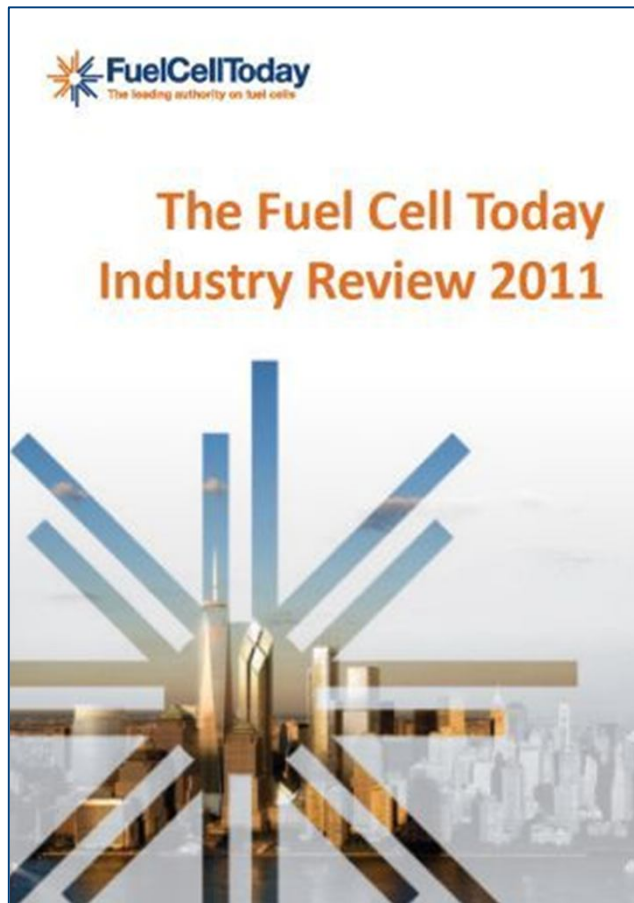


# Fuel Cells: New Commercial pgm Application



Marge Ryan

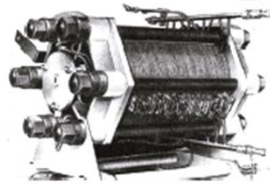
Analyst, Fuel Cell Today

**1801**

Humphry Davy demonstrates the principle of what became fuel cells.

**1889**

Charles Langer and Ludwig Mond develop Grove's invention and name the fuel cell.



**1959**

Francis Bacon demonstrates a 5 kW alkaline fuel cell.

**1970s**

The oil crisis prompts the development of alternative energy technologies including PAFC.

**1990s**

Large stationary fuel cells are developed for commercial and industrial locations.



**2008**

Honda begins leasing the FCX Clarity fuel cell electric vehicle.

**1839**

William Grove invents the 'gas battery', the first fuel cell.



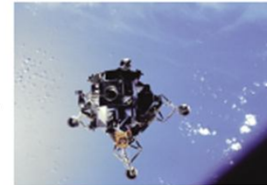
**1950s**

General Electric invents the proton exchange membrane fuel cell.



**1960s**

NASA first uses fuel cells in space missions.



**1980s**

US Navy uses fuel cells in submarines.

**2007**

Fuel cells begin to be sold commercially as APU and for stationary backup power.

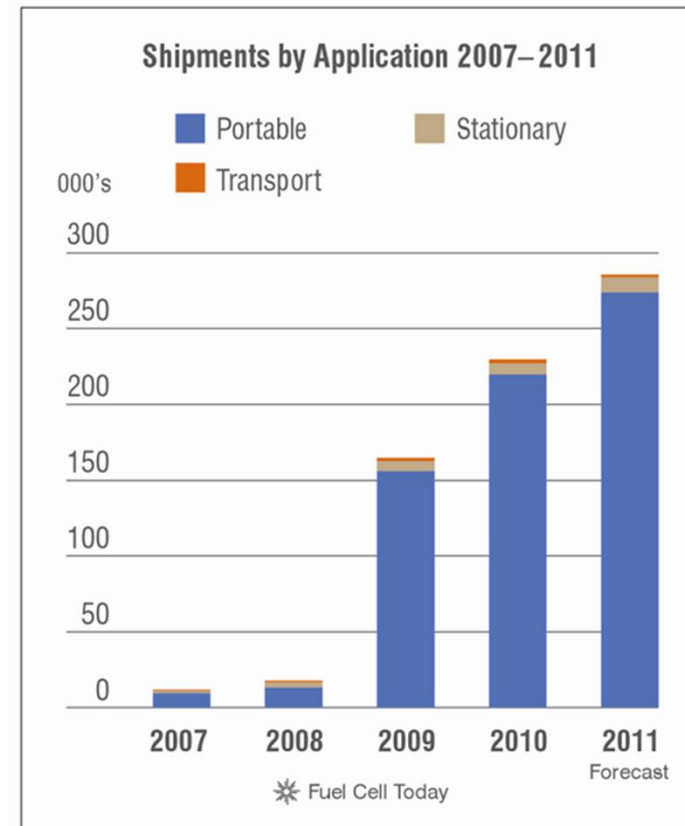
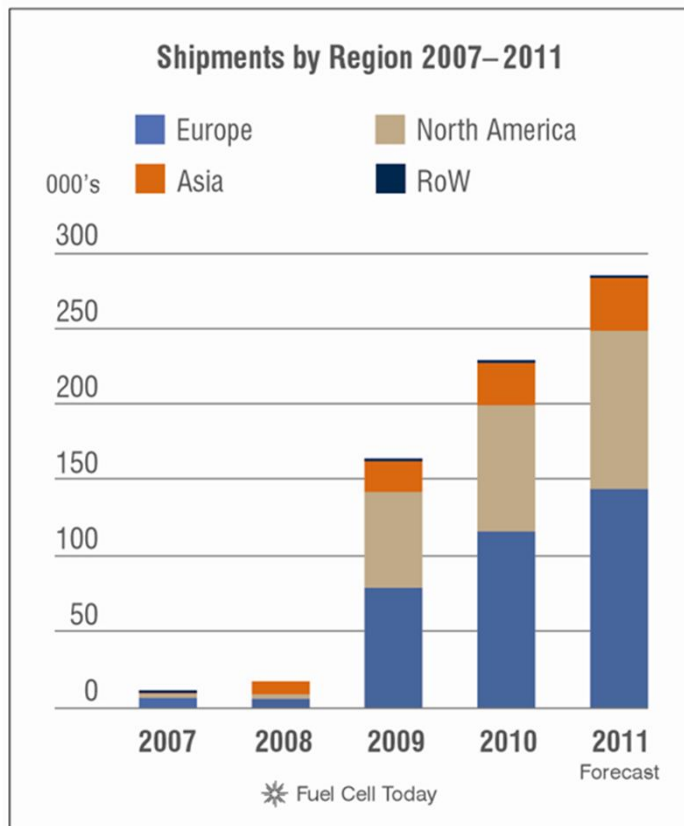


**2009**

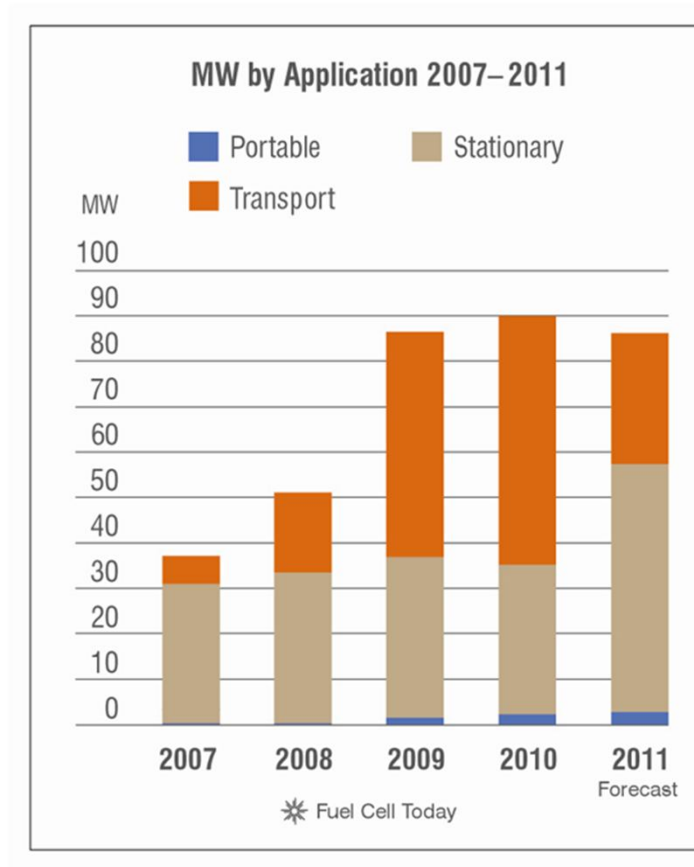
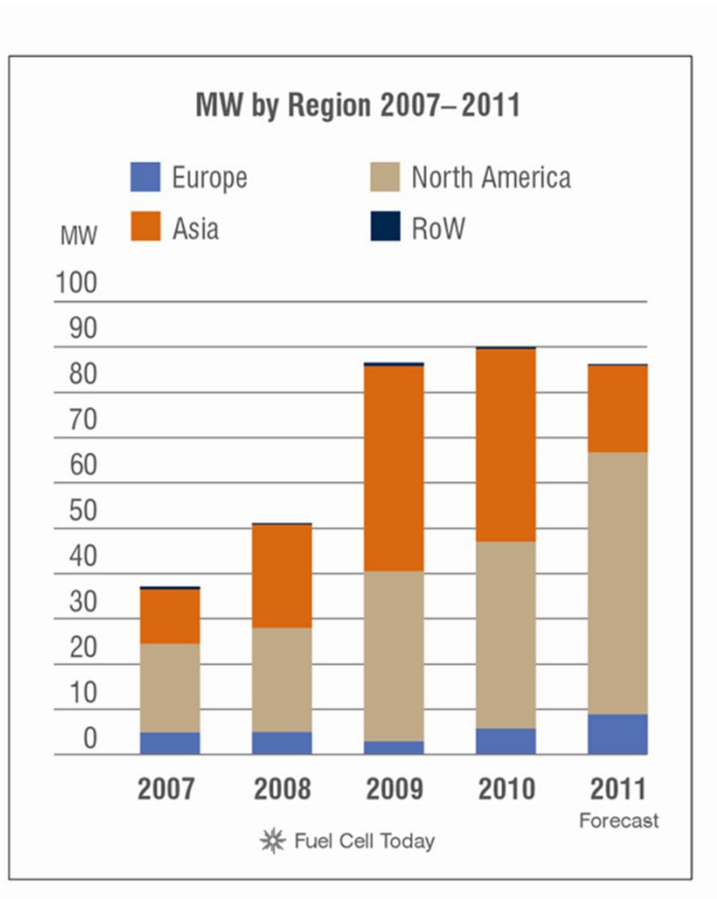
Residential fuel cell micro-CHP units become commercially available in Japan. Also thousands of portable fuel cell battery chargers are sold.



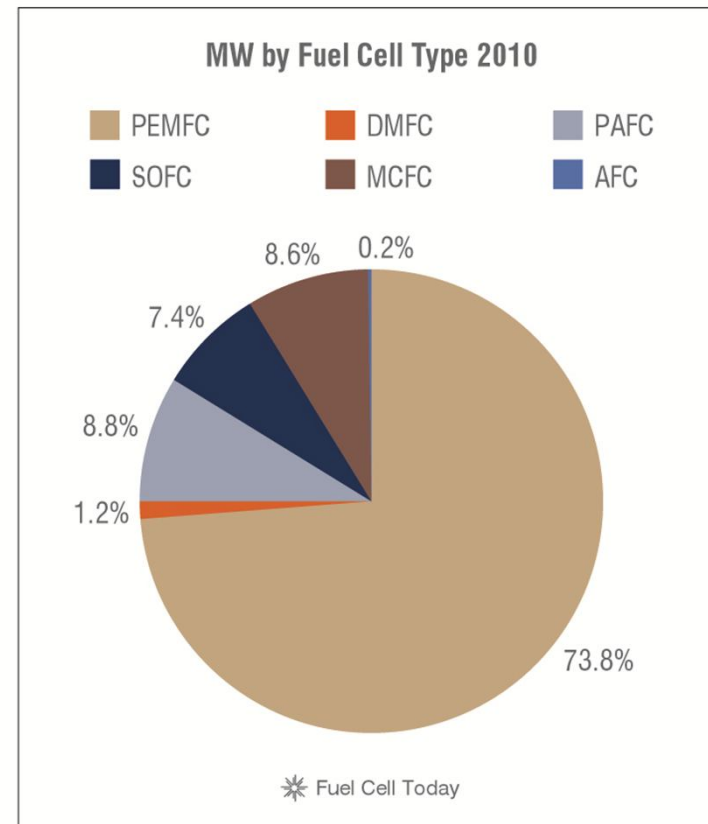
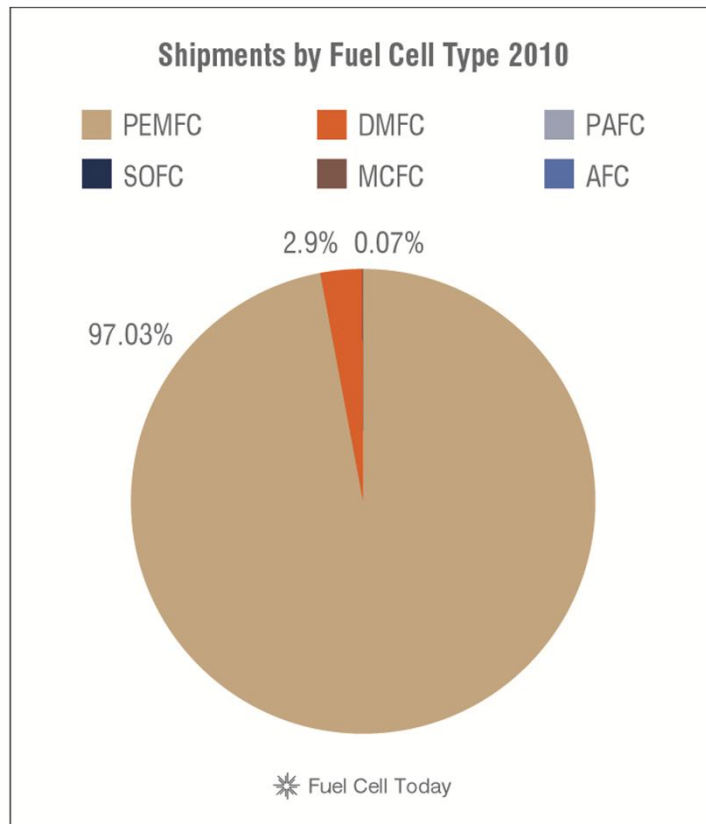
# Key developments



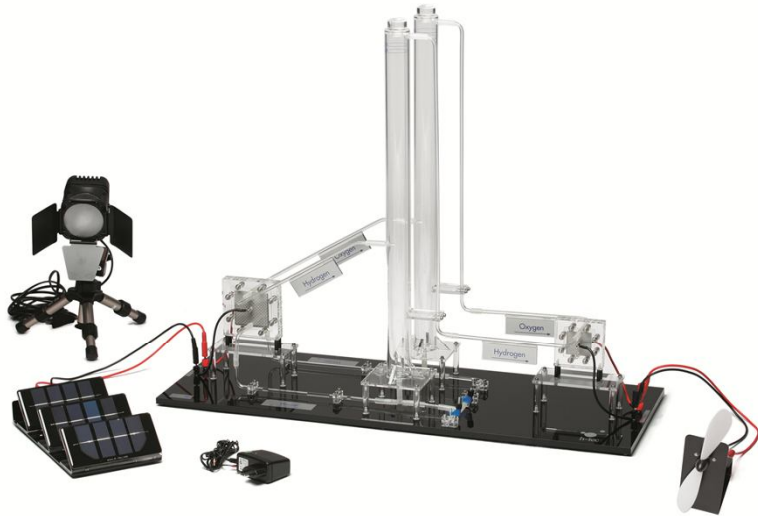
# Key developments



# Key developments



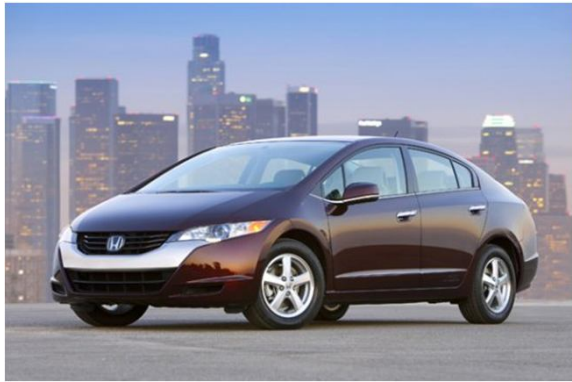
# Portable fuel cells



# Portable fuel cells

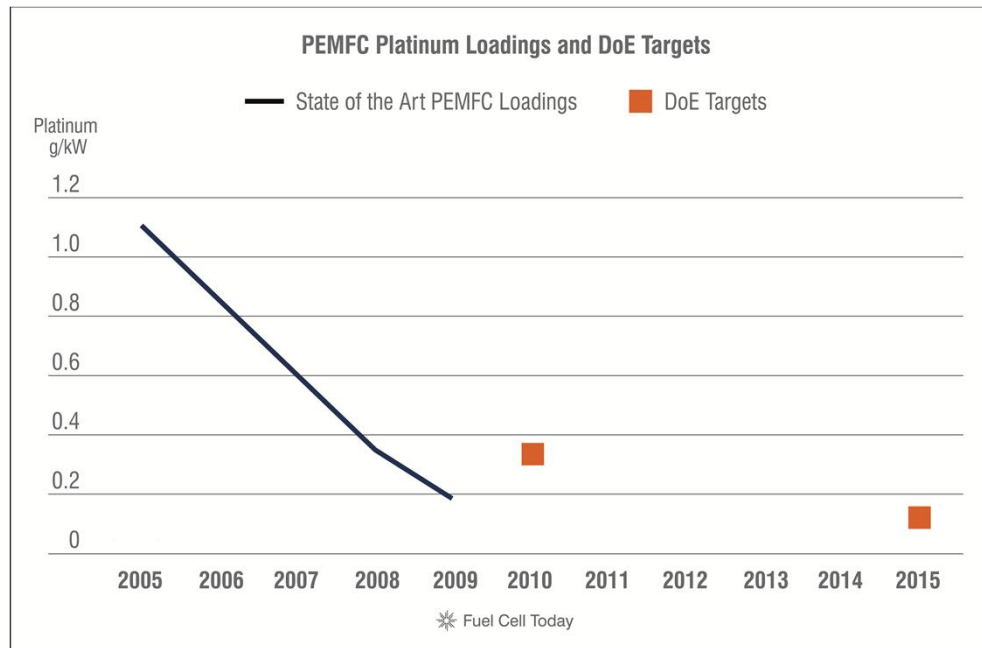


# Automotive development

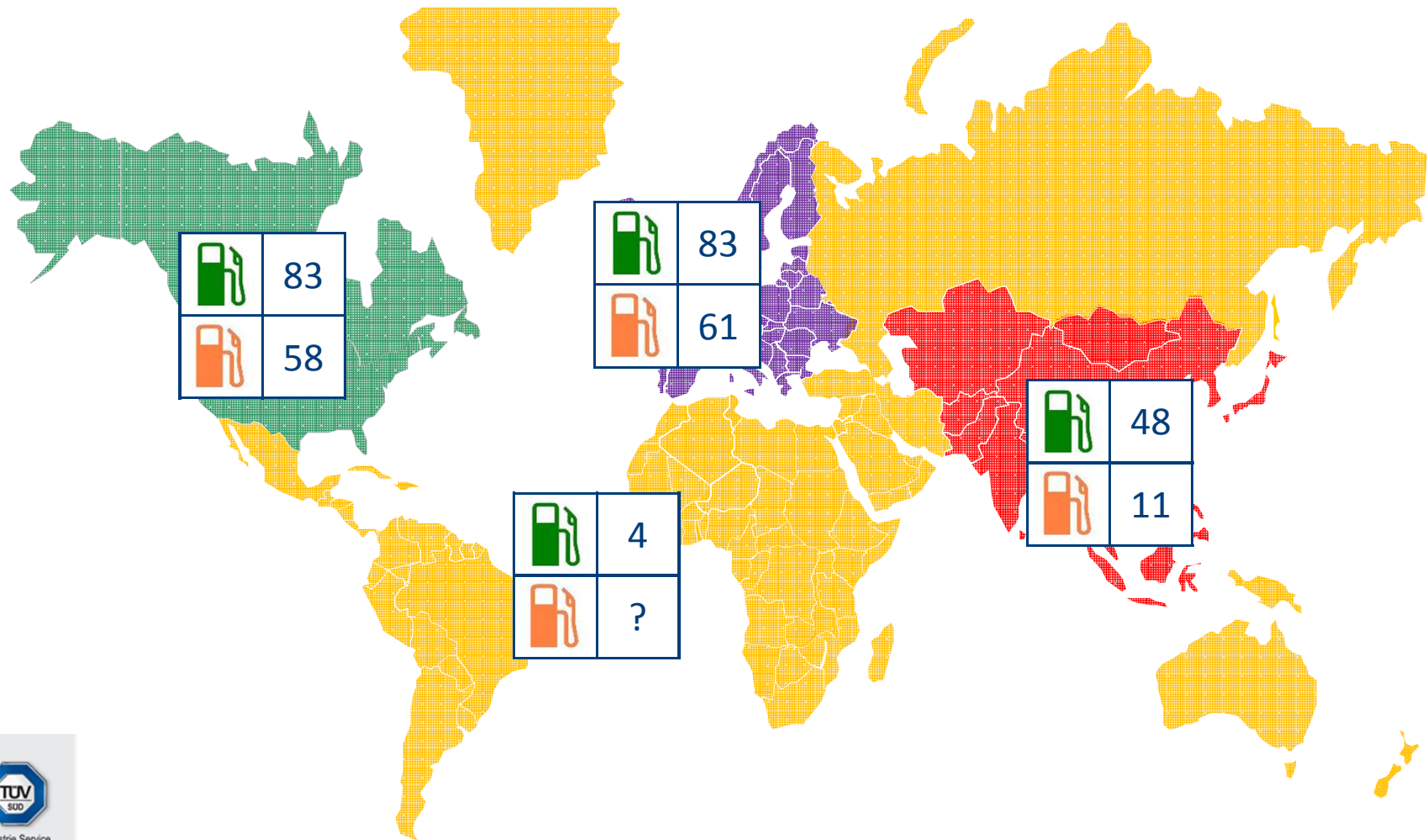




# Automotive development



# Hydrogen Stations

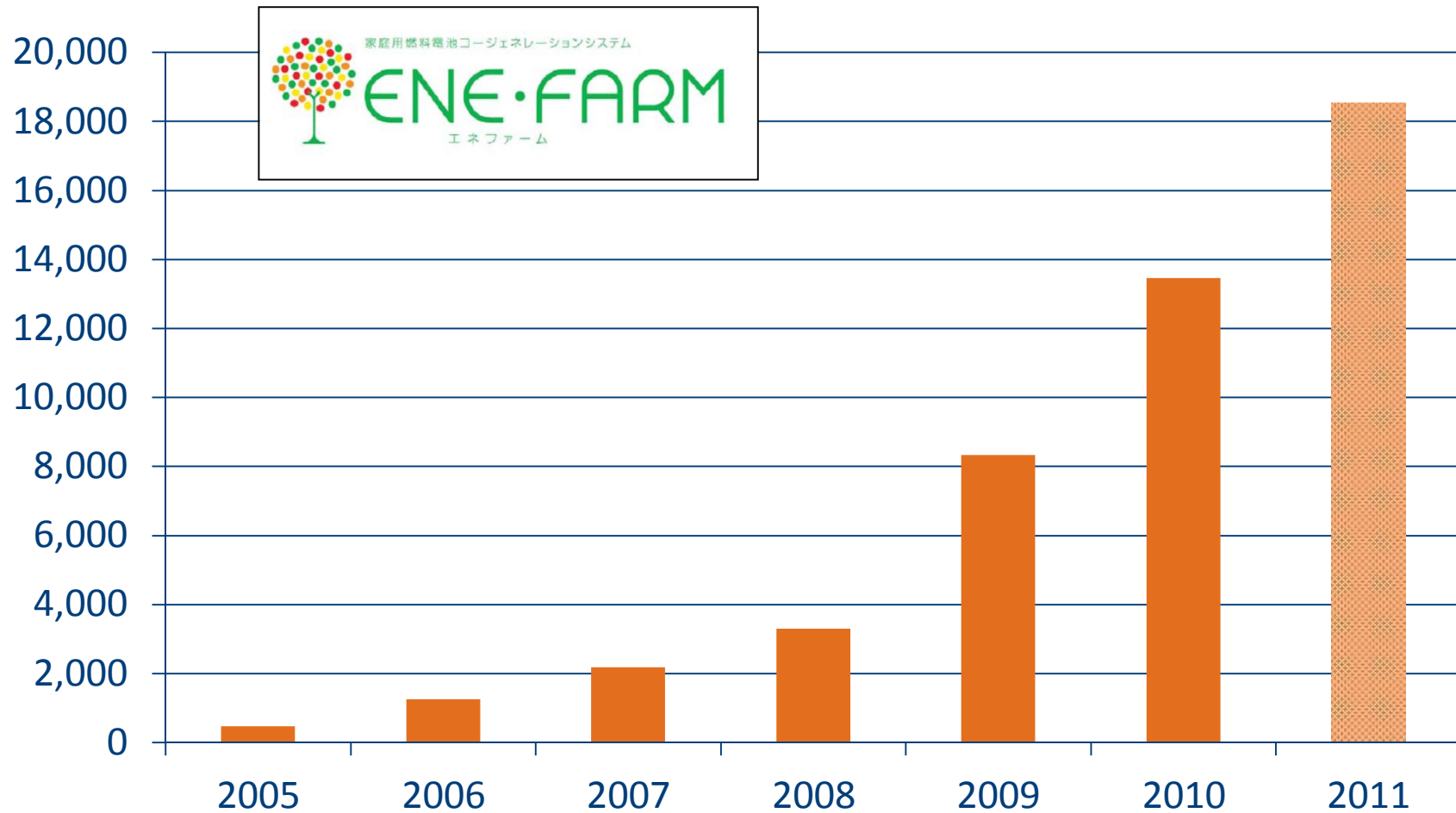


Industrie Service

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Add value.



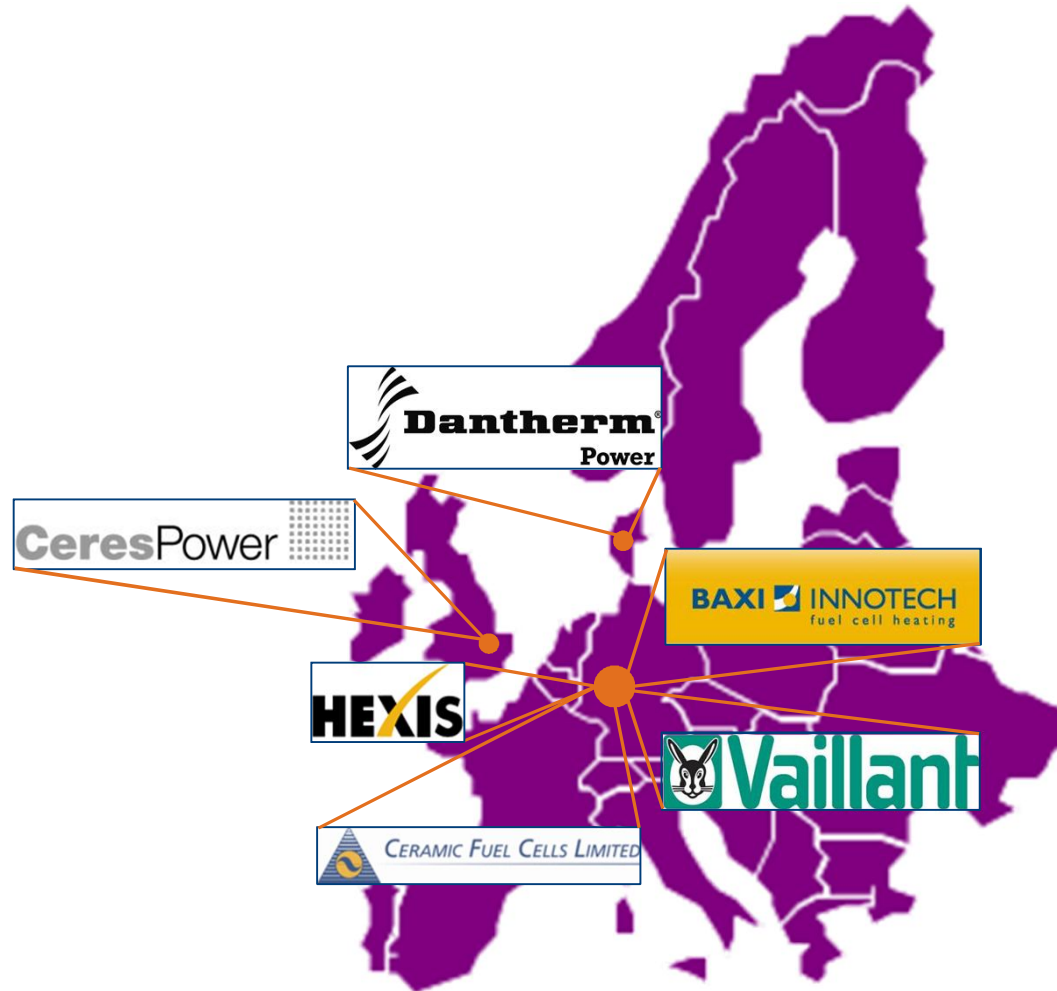
# Residential Stationary fuel cells



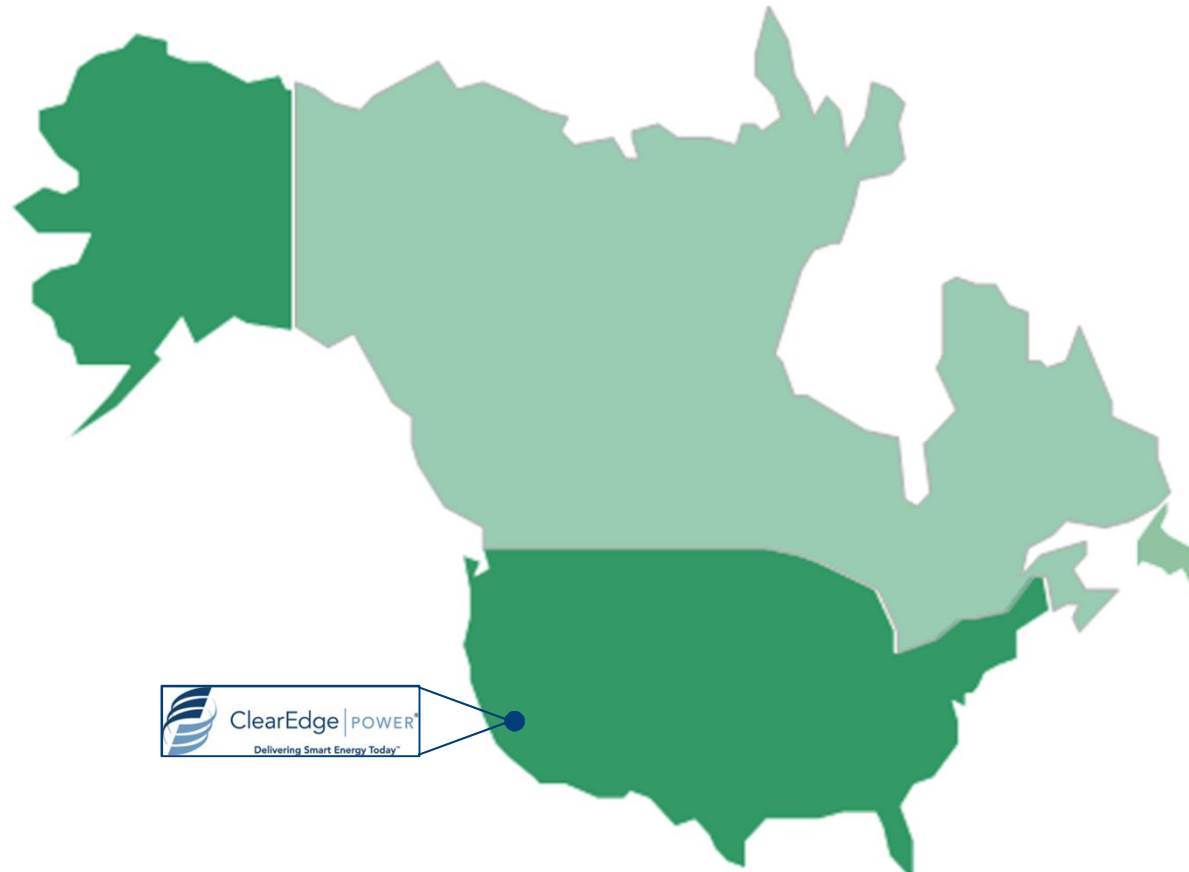
# Residential Stationary fuel cells



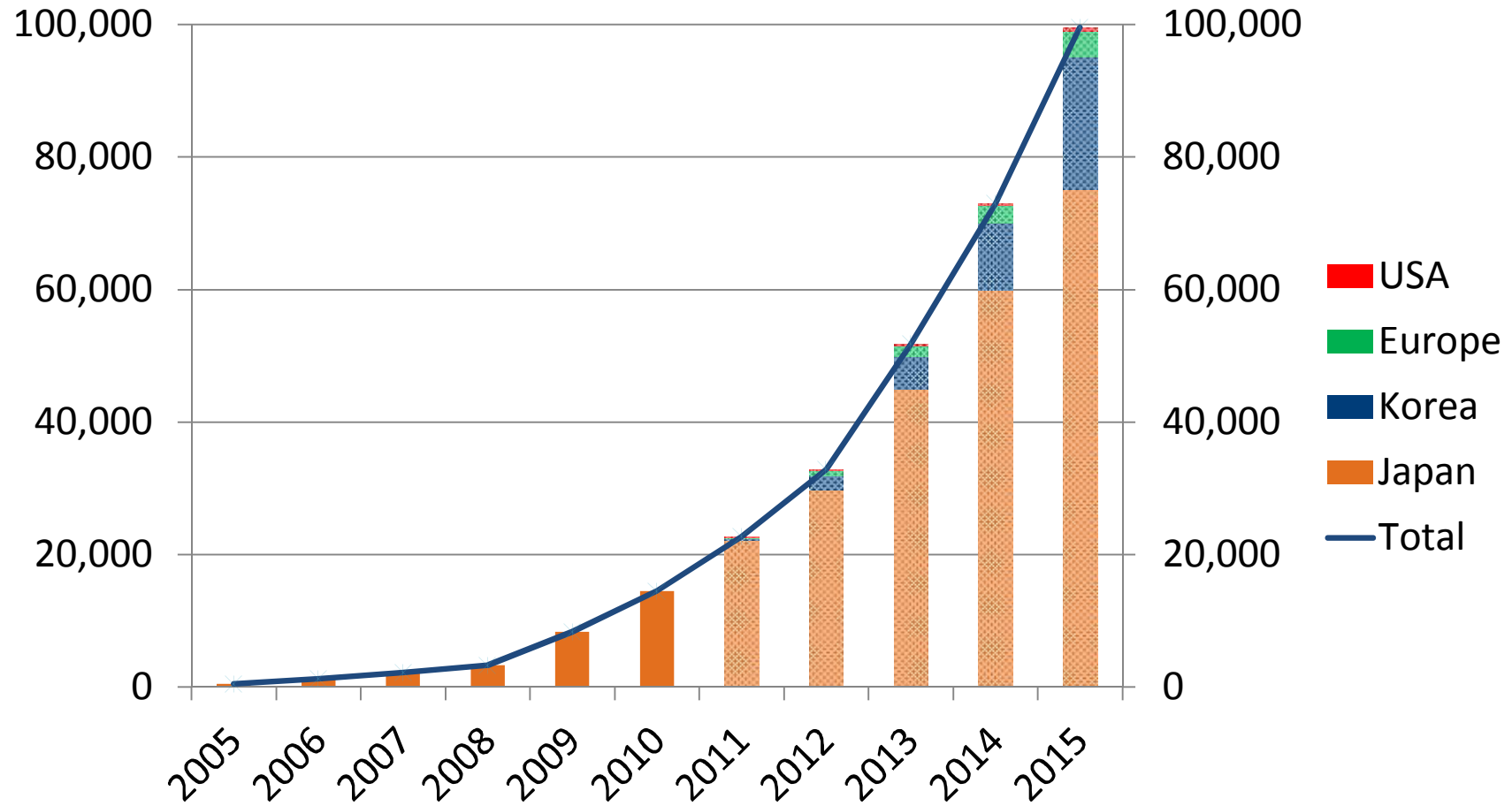
# Residential Stationary fuel cells



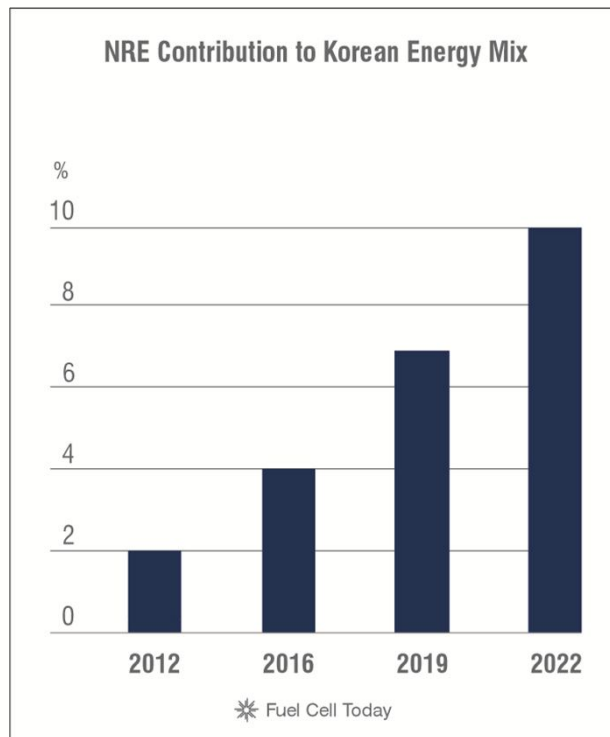
# Residential Stationary fuel cells



# Future growth - residential

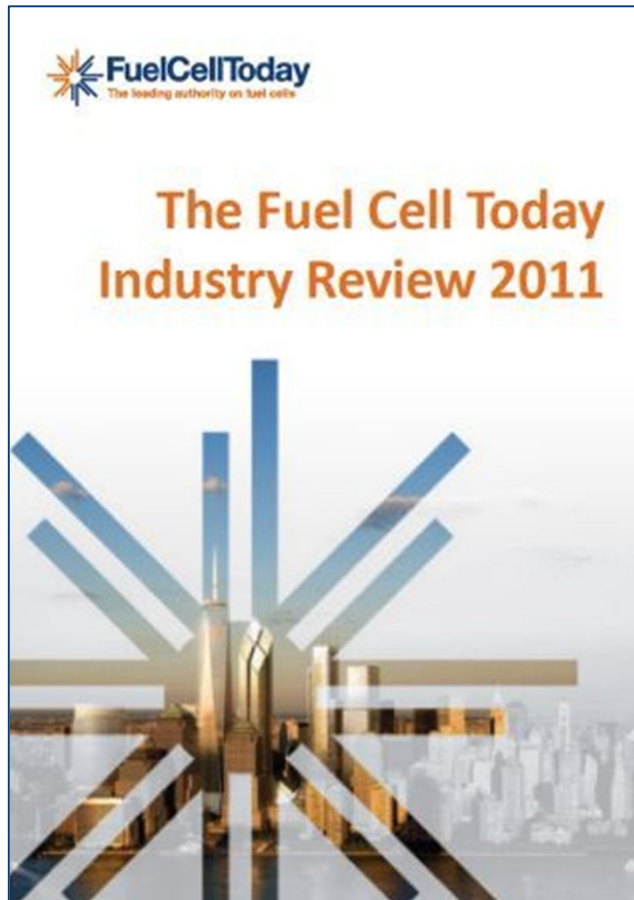


# Large stationary fuel cells





# The Industry Review 2011



Thank you

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