
Fuel Cells Competence-Network North Rhine Westphalia

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Outline

- ❖ Background:
 - Company valuations; closer to reality
 - The balance sheet and access to capital; A huge European problem

- ❖ The Supply Chain
 - Core Technology Ventures' view
 - Europe is not short of components manufacturers
 - But falls down on systems developers and access to funding

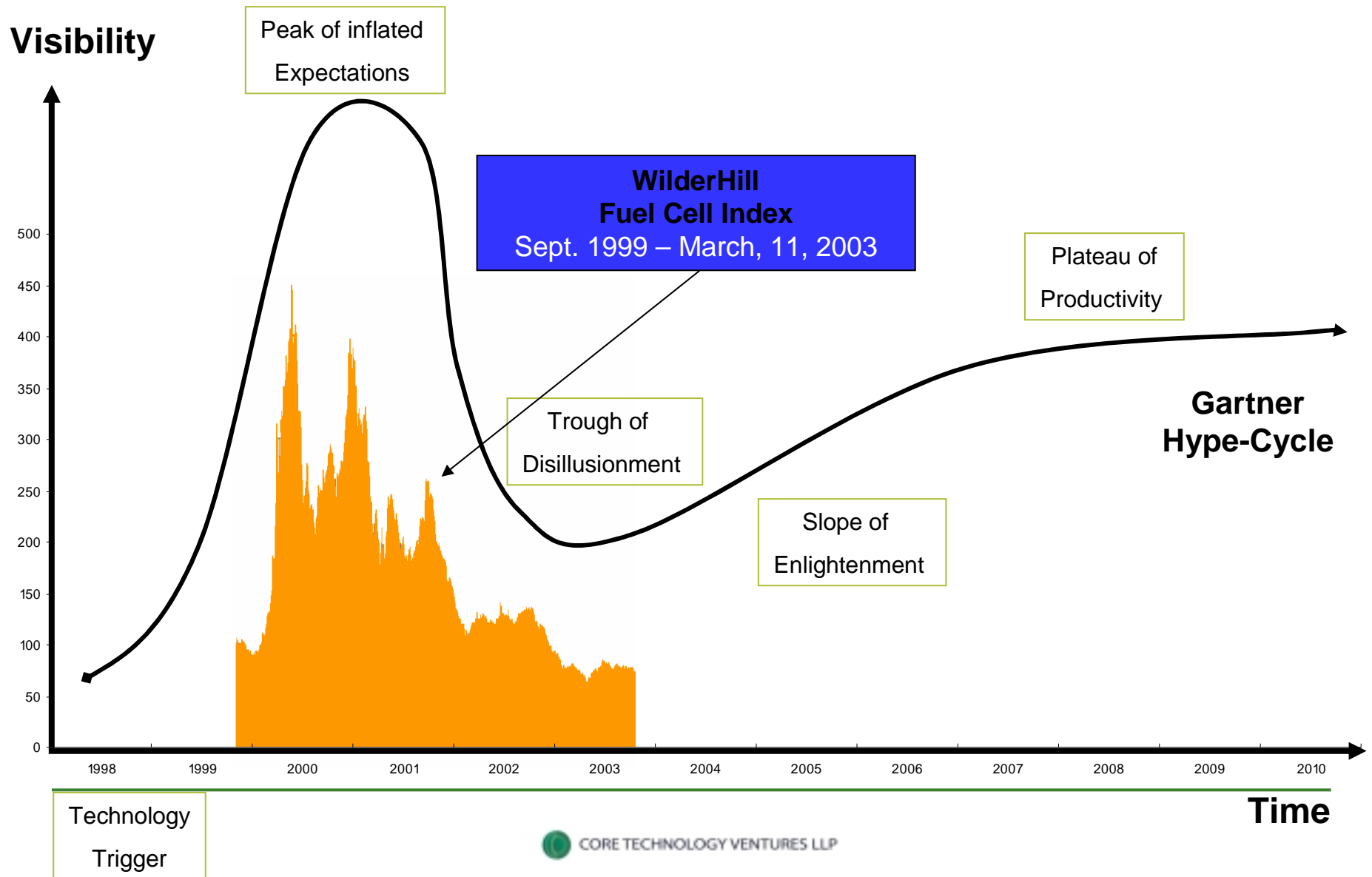
- ❖ The Structure of Europe's Non-Quoted Fuel Cell Players
 - Aggregate data
 - Electrolytes and components

- ❖ Demonstrations: Europe Germany and the US

- ❖ Finance and Policy
 - Financial & regulatory support: the US versus Europe
 - The problem of policy risk/uncertainty to investment
 - Europe's greatest potential asset: A multiplicity of policy drivers

- ❖ Conclusions

Company Valuations: Using the Gartner Hype Cycle



Access to Capital

**Source of Funds:
The Balance Sheet**

Debt

Equity

**Subsidised
Loans**

**Bank
Debt**

**Issue
Bonds**

Public

Private

**Stock
Markets**

**Venture
Capital**

**Business
Angels**

**Pre-production/
Stock market
listing**

**Prototype/
2nd round
funding**

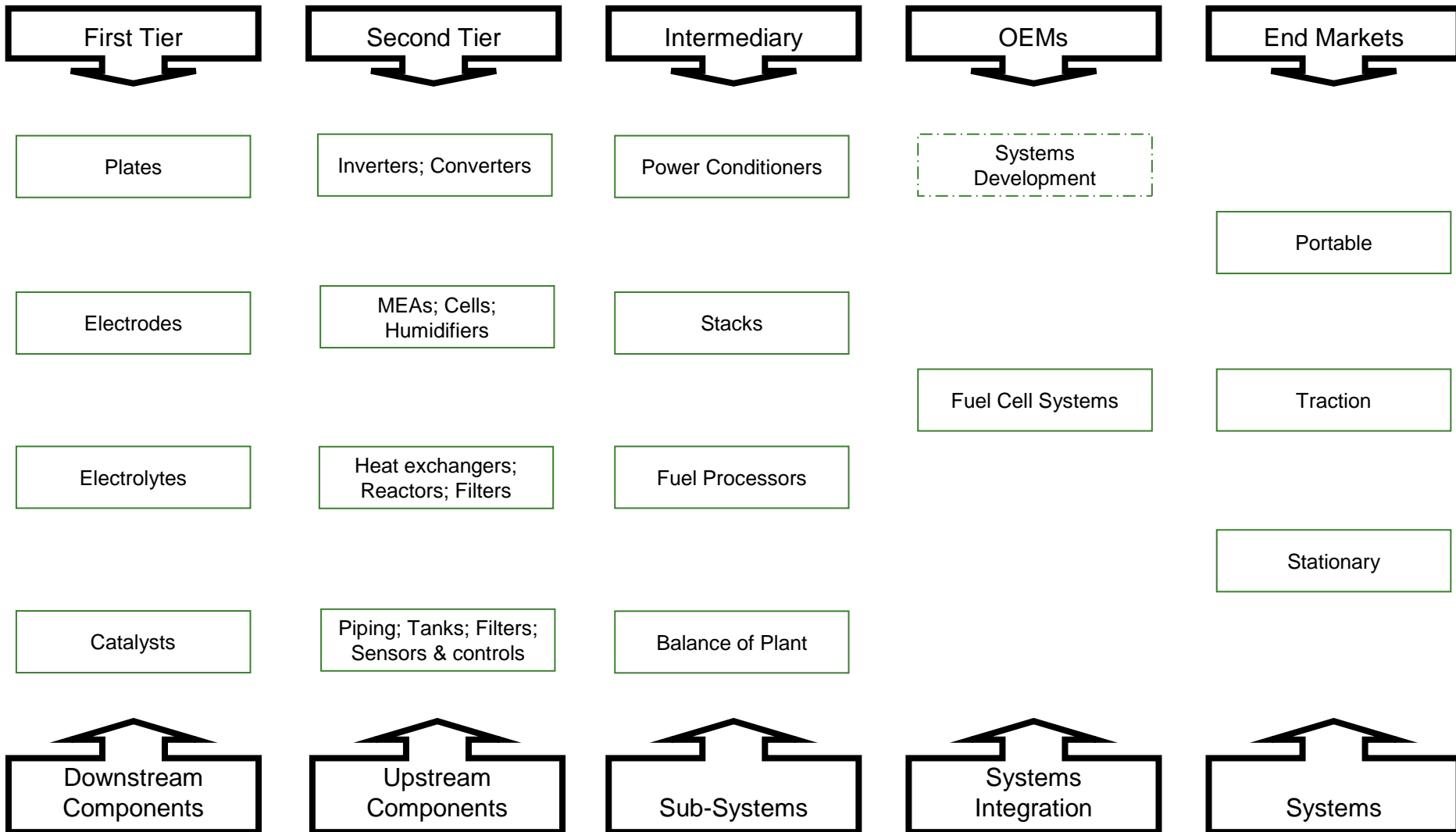
**Incubator/
seed-corn
funding**

Start-up companies are essentially limited to seed and early-stage financing.

European fuel cell companies are financially disadvantaged relative to US companies, in part owing to a shortage of private finance and the essential skills and disciplines financiers bring to seed and early-stage companies.

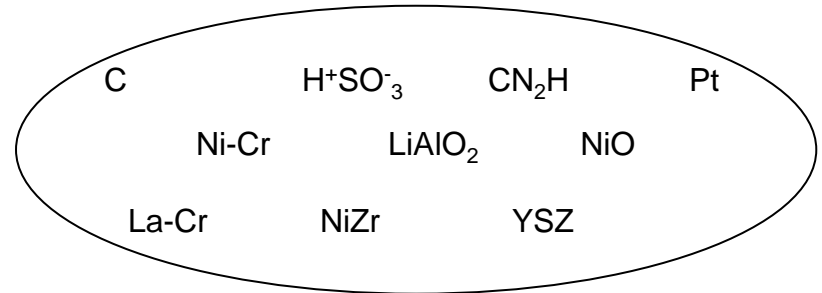


Simplified Fuel Cell Supply Chain: Technology Risk

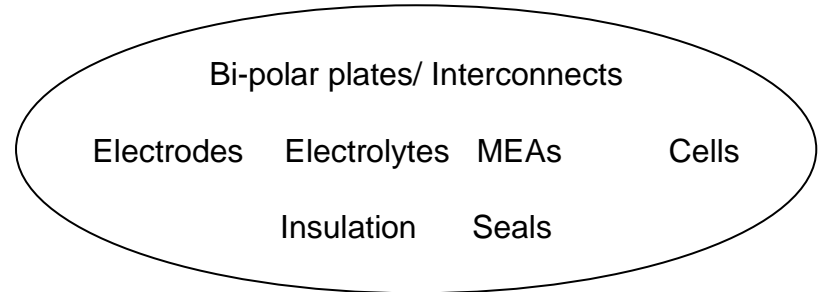


A Supply Chain: Temporal risk

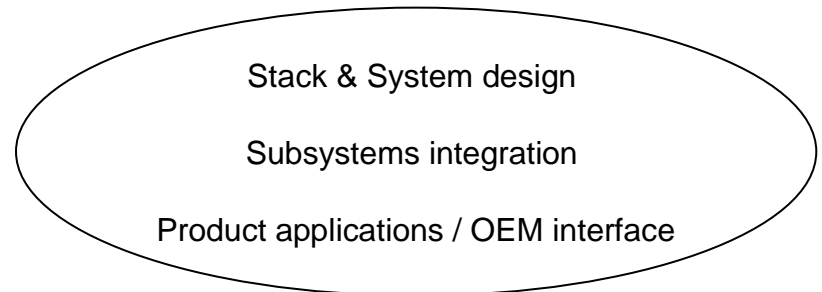
If basic materials
form the letters



And components
form the words



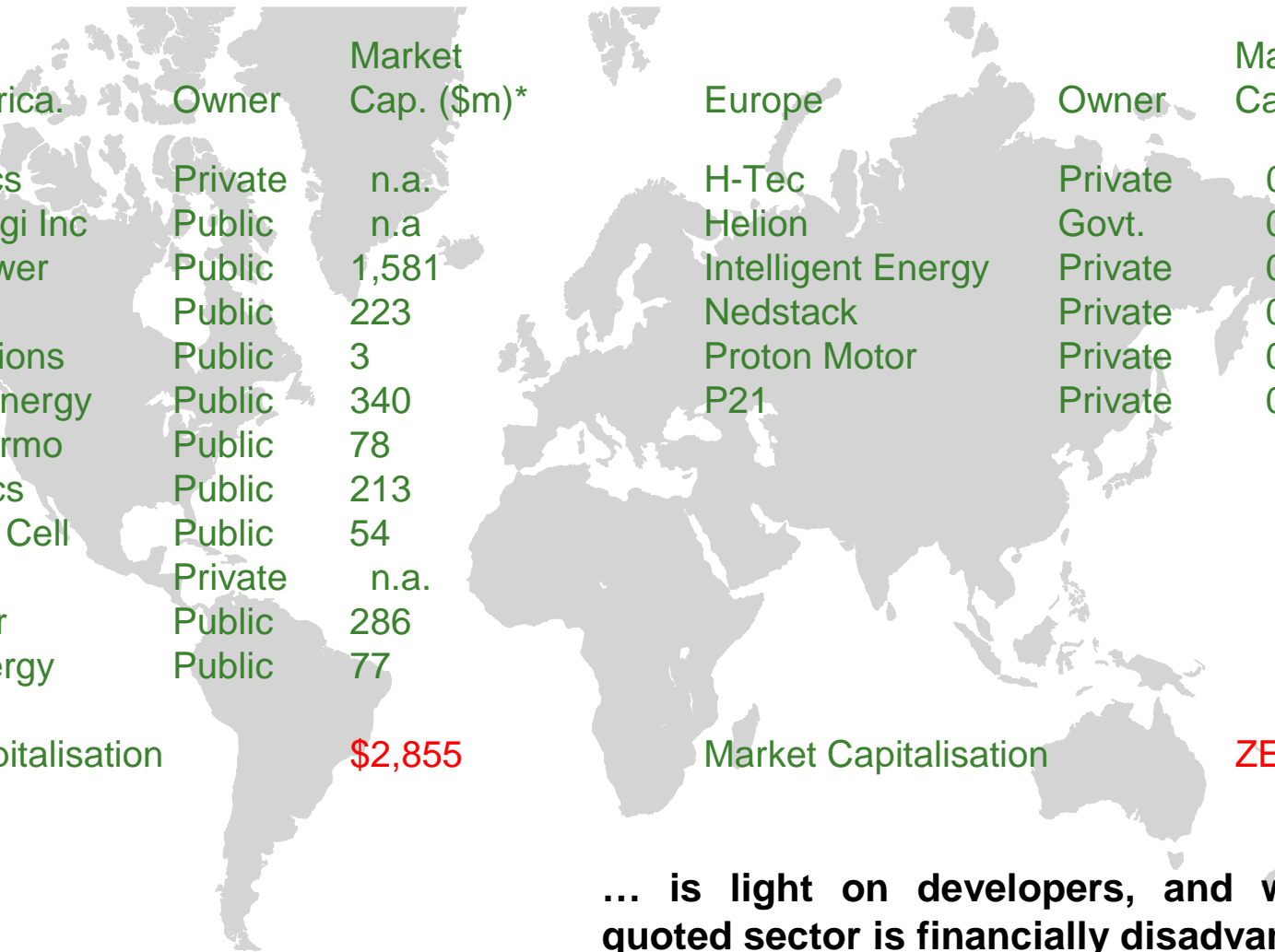
Then systems developers
write the text



Major Fuel Cell Components Suppliers



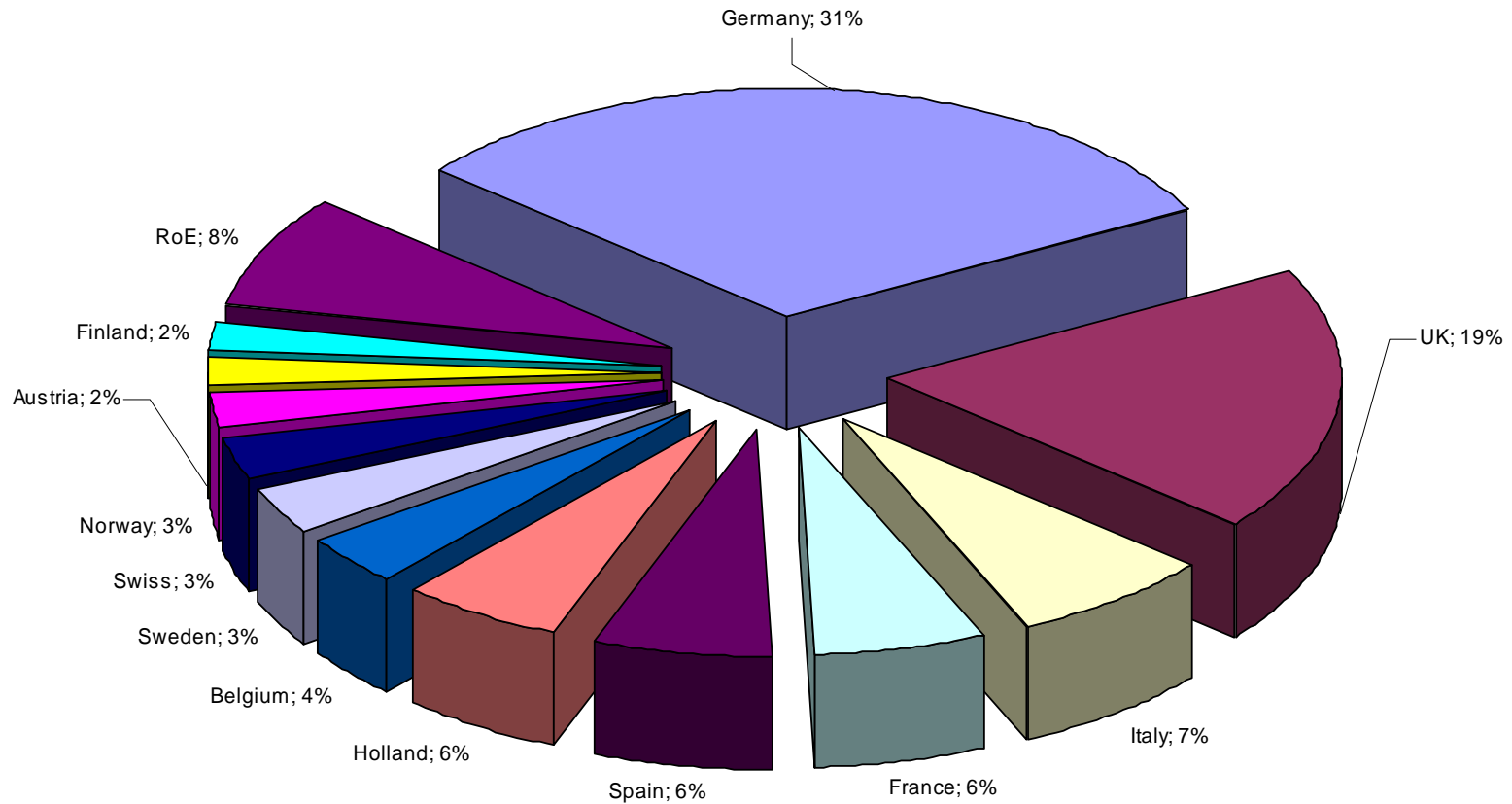
Independent Fuel Cell Systems Developers



North America	Owner	Market Cap. (\$m)*	Europe	Owner	Market Cap.
Acumentrics	Private	n.a.	H-Tec	Private	0
Astris Energi Inc	Public	n.a.	Helion	Govt.	0
Ballard Power	Public	1,581	Intelligent Energy	Private	0
ECD	Public	223	Nedstack	Private	0
Energy Visions	Public	3	Proton Motor	Private	0
Fuel Cell Energy	Public	340	P21	Private	0
Global Thermo	Public	78			
Hydrogenics	Public	213			
Millennium Cell	Public	54			
Nuvera	Private	n.a.			
Plug Power	Public	286			
Proton Energy	Public	77			
Market Capitalisation		\$2,855	Market Capitalisation		ZERO

... is light on developers, and with no quoted sector is financially disadvantaged

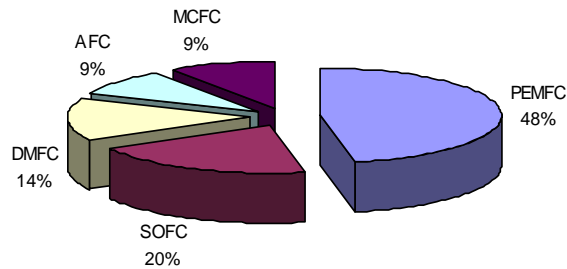
Distribution of the European Fuel Cell Industry: Sample data



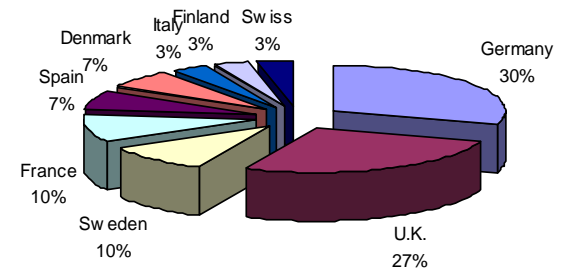
*Source: Core Technology Ventures LLP. Data, a subset of our database, refer to number of European entities developing fuel cell related hardware but excludes well-capitalised & quoted companies

European Systems and Components: sample data

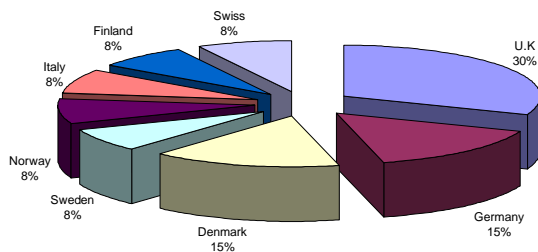
Systems Developers



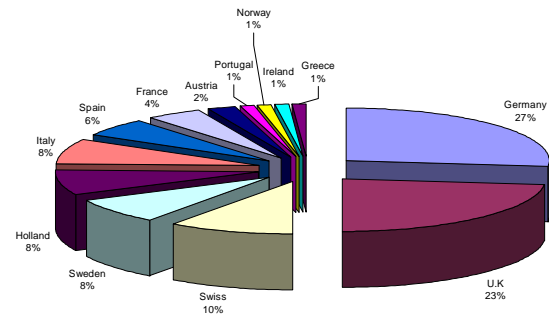
PEMFC Systems Developers



SOFC Systems Developers

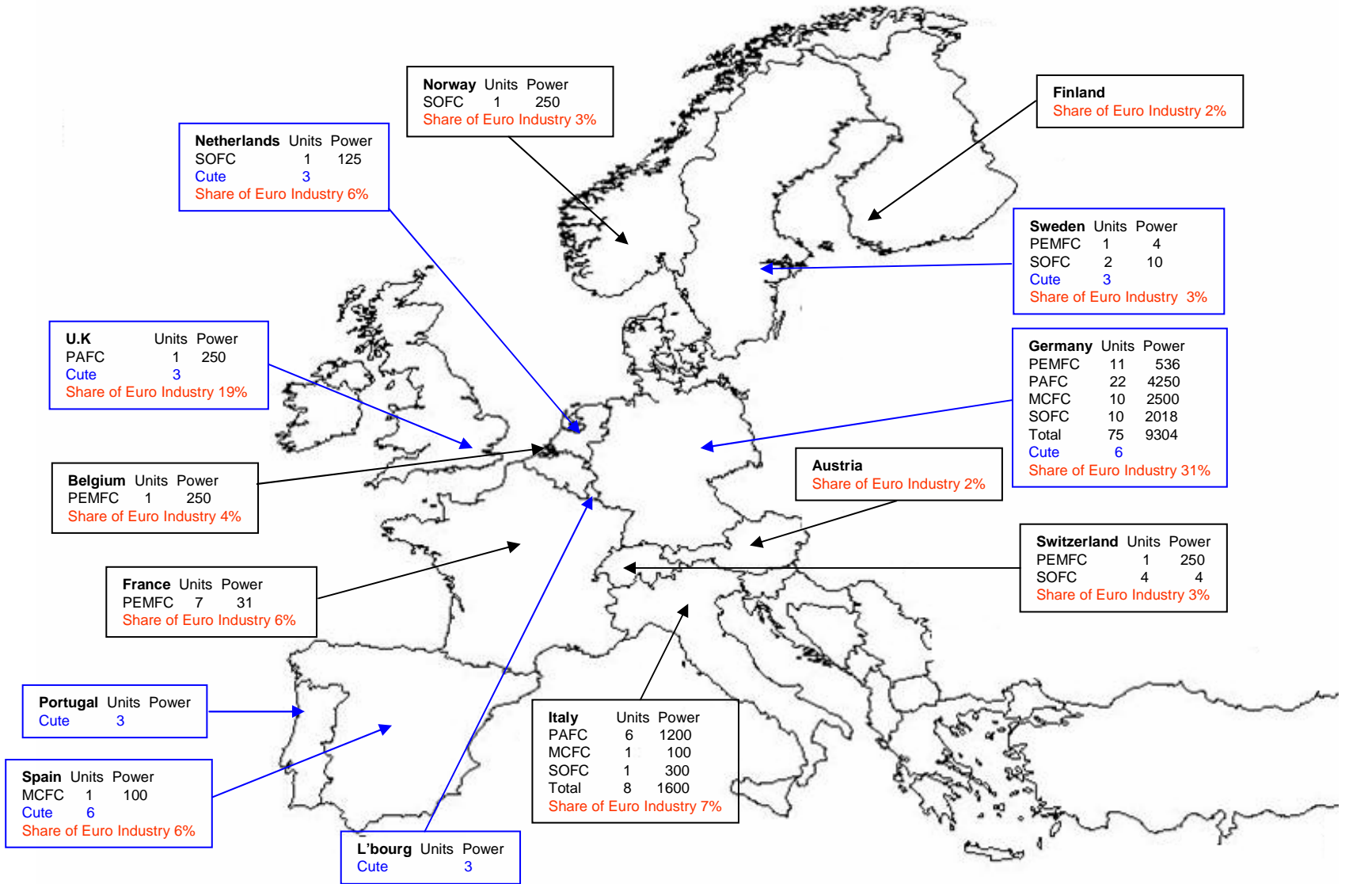


Components



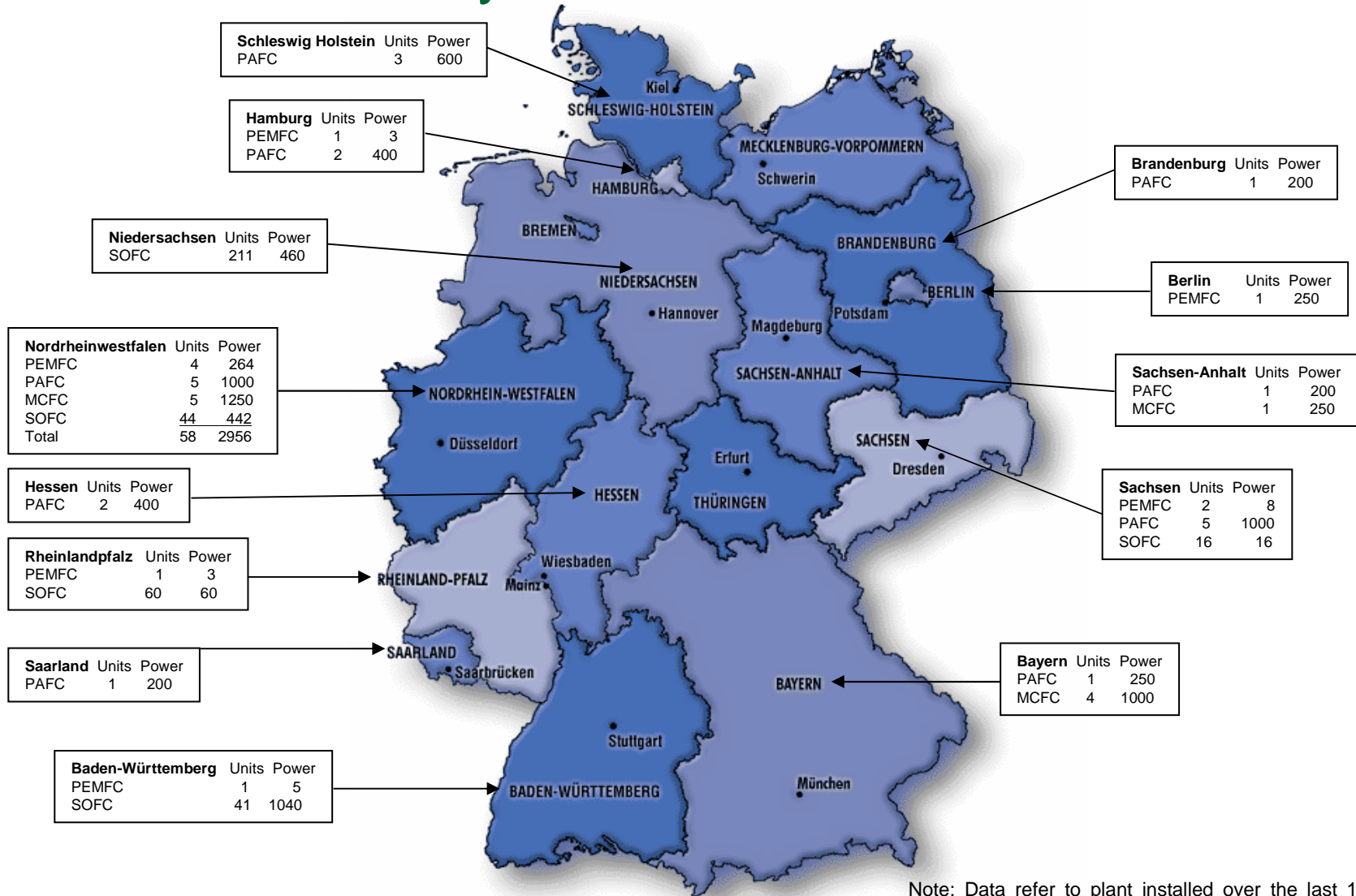
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European Map: 12MW Stationary, 27 Buses



Note: Stationary data refer to plant installed over the last 10 years and planned over the next 18 months

German Stationary Fuel Cell Demonstrations:

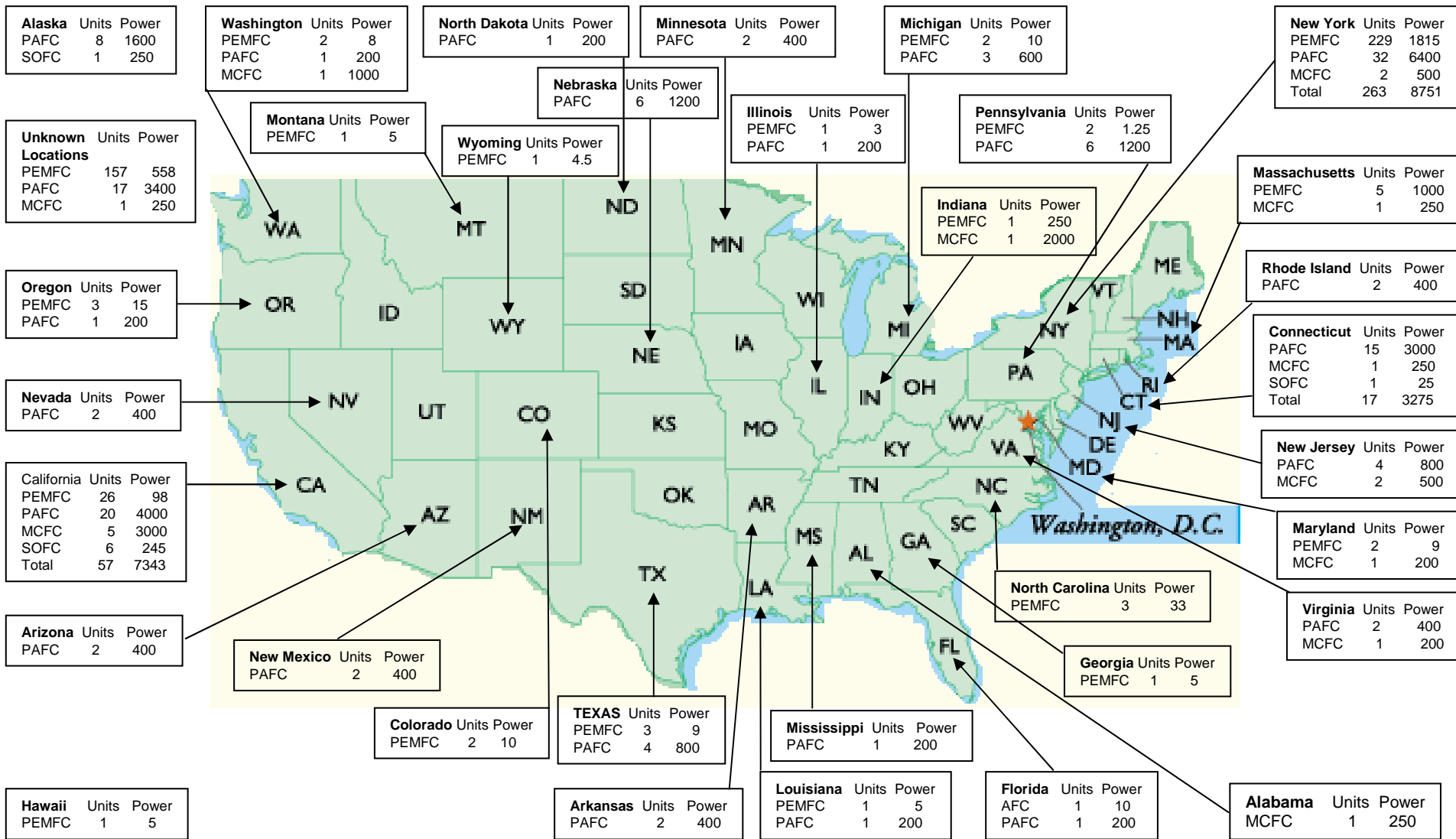


Note: Data refer to plant installed over the last 10 years and planned over the next 18 months

German Total 9.3MW

NRW Total: 3MW

US Fuel Cell Demonstrations: 40MW Stationary



Financial & Regulatory Support: US versus Europe

	North America	Europe
Venture Capital Initiative	Yes	No
Private Financing (V.C.s)	Yes	Minimal
Public Finance (e.g. NASDAQ)	Yes	No
State Financing	\$210m	€ 120m
Per Capita State Financing	\$0.81c	€0.38c
Public Procurement Policies	Yes	No
Fuel Cell Military Contracts	Yes	??
Specific Regulations (e.g. ZEV)	Yes	No

Europe's FC industry is struggling for cash and financial expertise
 Europe's investment community is missing regulatory support:

*The US 'Venture Capital Initiative' is a \$25m fund set up by the Dept of Defence to invest in portable power

Policy versus Regulation: A source of risk!

- ❖ Governments provide
 - The Policy Framework and
 - The Legal & Regulatory Framework, which may hinder an emerging technology. The UK New Trading Arrangements are a case in point.
 - Financial markets take account of the legal & regulatory framework within which policy is executed, NOT the policy in isolation

- ❖ The authorities may not always realise the importance of policy credibility, a necessary condition to attract the indispensable private financing

- ❖ On the basis of current regulatory, financial & fiscal support for fuel cells
 - The US and Japanese appear to be streets ahead of the Europeans.
 - On present trends the danger is the US will build on its fiscal, regulatory and financial market advantage and suck ever greater quantities of capital out of Europe. Manufacturing capacity and human capital (jobs) will follow financial capital.
 - As far as the High-Level Group for Hydrogen and Fuel Cells, we reserve judgement

- ❖ But Europe and the EU could build on its renewables strategy
 - by extending this vision to fuel cells and ensuring entrenched industries do not abuse the regulatory process

- ❖ We believe that it is a matter of time before the link between renewable sources and fuel cells is made, and if it is the policy drivers multiply

European Policy Drivers: Resolving paradoxes

“The overall objective of the EU energy policy is to help ensure security of energy supplies for European citizens and businesses at competitive prices and in an environmentally compatible way”.

Source: European Union Energy Outlook to 2020, p9, DGTREN, Nov 1999.

Environment Policy

- Green House Gasses
- Pollutants

Energy Policy

- Security
- Sustainability

Renewable Energy Policy: A multiplicity of drivers

“The Union has today set itself a new strategic goal for the next decade: to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion”.

Source: Presidency Conclusions, Lisbon European Council 23/24 March 2000.

Regional Policy

- Social Cohesion
- Local employment

Competition Policy

- Technology
- Employment

Conclusions

- ❖ The European fuel cell industry displays relative weakness when compared to the US namely:
 - Access to private capital and the associated financial and commercial expertise is lacking
 - State funding levels remain significantly below major competitors
 - European demonstrations need to be addressed
 - Government support varies significantly across a fragmented Union: Germany leads
- ❖ On the positive side, Europe possesses a significant number of players, particularly in materials and components which should ultimately attract private finance
- ❖ From our perspective fuel cells are a natural complement to renewable energy sources
 - European policy has created the largest wind industry in the world.
 - The next logical step would be to extend this vision to incorporate fuel cells
 - Such political commitment would in part overcome the inherent financial disadvantages facing early-stage companies
 - But ultimately the industry must deliver
- ❖ From a financial perspective the potential size of the fuel cell industry is massive
- ❖ From a political perspective this implies huge investment requirements and corresponding job opportunities
- ❖ From an industry perspective it is time to speak with a single voice, avoid internal arguments and unite under a single European Fuel Cells Association:
 - Fuel Cells Europe has begun the process