

HyWays for Denmark

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Danish Context for Hyways

- Danish Strategic Energy Action plan to be presented by the Ministry of Energy and Transport in May/June 2005
- RD&D strategy for hydrogen and fuel cell to be presented by the Danish Energy Agency in June 2005
 - 1 year process with key stakeholders from energy, industry and science
 - Whole hydrogen value chain, but FC a key technology
 - More weight on demonstrations
 - Socio-economic and systems and infrastructure analysis
 - Multiple funding sources (EFP, PSO, VTU, etc.)
 - Regional innovation clusters
- Innovation platform under establishment
 - focus on sustainable energy systems
 - following an EoI on hydrogen and fuel cells headed by Risø
- Danish Hydrogen Association established November 2004

Danish knowledge in FC - patents

UK (139 patents)	France (110 patents)	Denmark (28 patents)
Johnson Matthey	Commissariat à L'Energie Atomique	Haldor Topsoe A/S
British Nuclear Fuels Ltd.	Renault	Risø National Laboratory
Victrex	Sorapec	Niels Bjerrum, DTU
Morgan Crucible	Alcatel	Danacell Aps.
Regenesys	L'Air Liquide	Danfoss A/S
Rolls Royce	Centre National de la Recherche Scientifique (CNRS)	Danish Power System Aps.
ICI / Ineos Chlor	Institut Français du Pétrole (IFP)	Danish Technological Institute
BG Technology /British Gas	Peugeot Citroën	IRD Fuel Cells A/S
Qinetiq	Valeo Thermique Moteur	Jens Nørskov, DTU
BP	Compagnie Générale des Matières Nucleaires	Oticon A/S
Ceres Power Ltd.	Snecma Moteurs	Vaillant A/S
Intelligent Energy Ltd.		

Table 1. Fuel cell patents, 1991–2003.

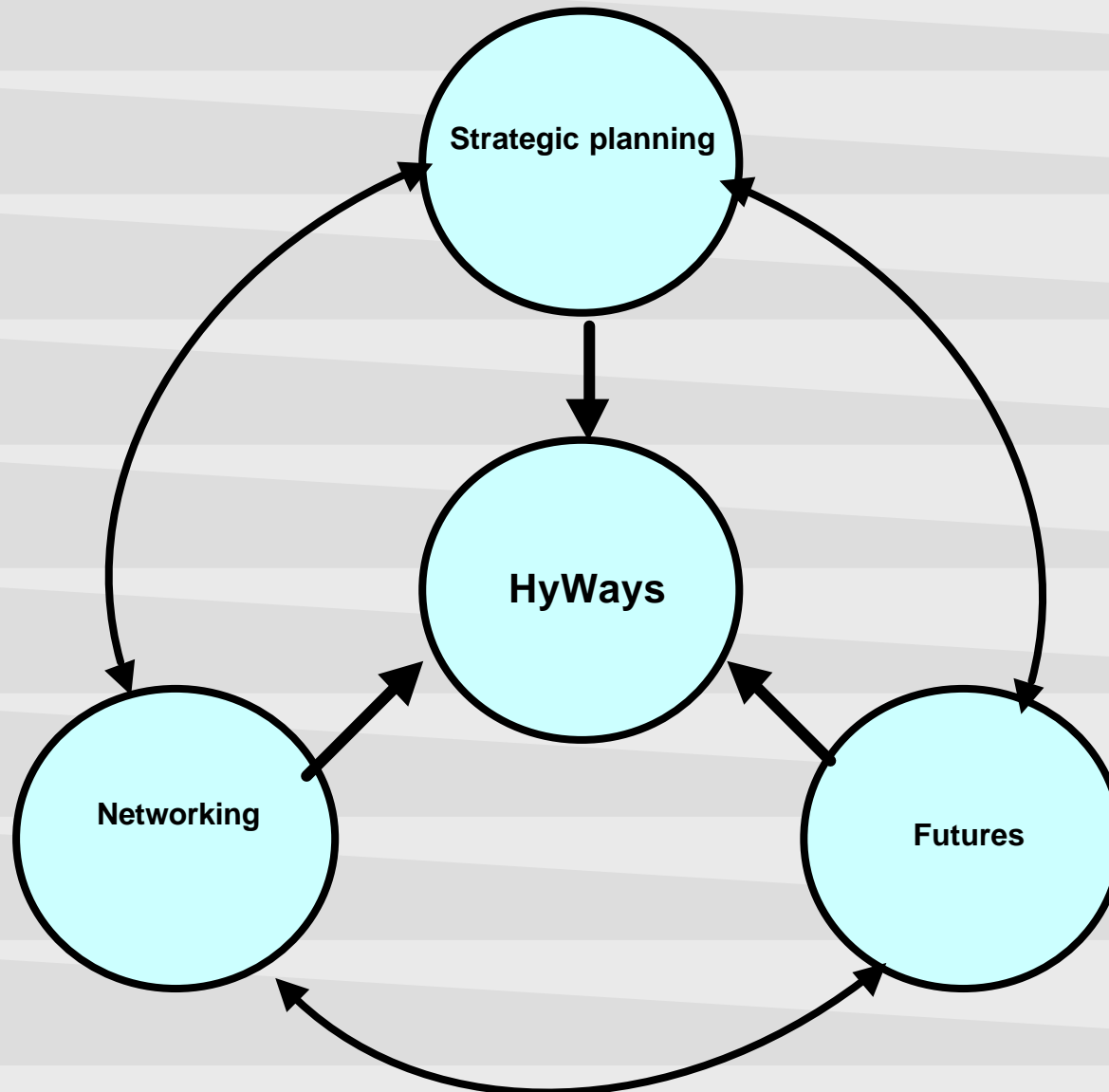
Source for French and UK patents: fuelcelltoday.com

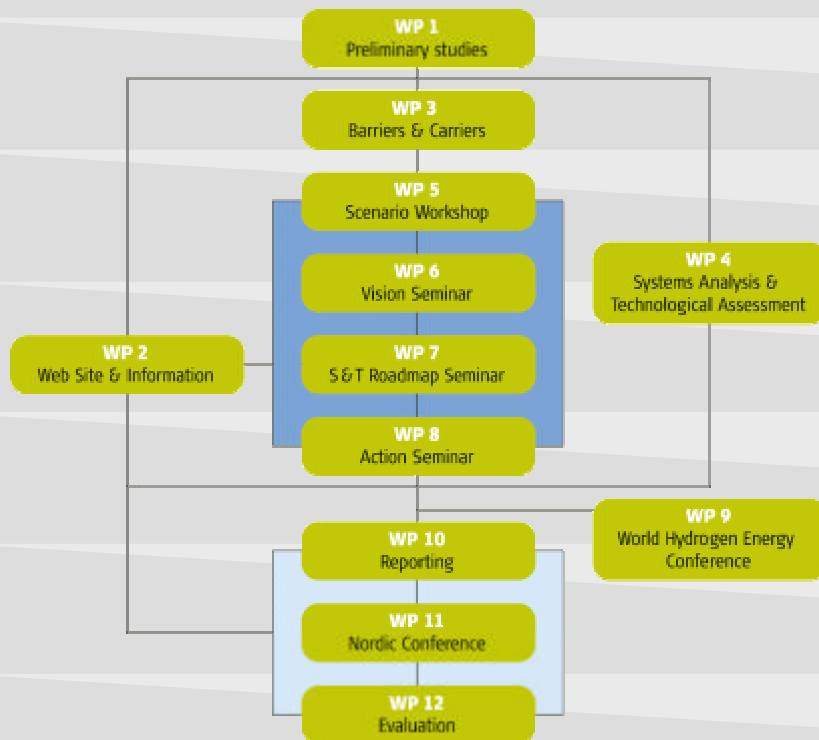
Danish knowledge in FC – citations and papers

Rank	Country	Total citations	Total papers	Average citations per paper
1	USA	4420	713	6.2
2	Japan	1816	434	4.2
3	Germany	1420	258	5.5
4	England	1133	192	5.9
5	Canada	879	146	6.0
6	Italy	571	119	4.8
7	Denmark	393	45	8.7
8	Switzerland	362	44	8.2
9	South Korea	314	126	2.5
10	Sweden	299	76	3.9

Table 1. Scientific papers and citations relating to fuel cell R&D, 1993–2003. Source: www.esi-topics.com/fuelcells/index.html

Making Sense of HyWays





- Mapping of competences
- Description of systems
- The interaction between expert judgements and figures
- Actions at Nordic level
 - Info
 - R&D priorities
 - Demonstrations
 - International standards
- www.h2foresight.info

Thank you for your attention
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