

International Partnerships: A Secret for Fuel Cell Success?

Counter-intuitive cross cultural partnerships can be not only advantageous for commercial fuel cell product development, but required in many cases.

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James Horwitz

Fuel Cell Intelligence

+1 617 527 7944

Jim@fuelcellintel.com

Agenda

The Global Fuel Cell Challenge

Multinational Partnerships Create Compelling Products

Marketing a Disruptive Technology

Conclusion

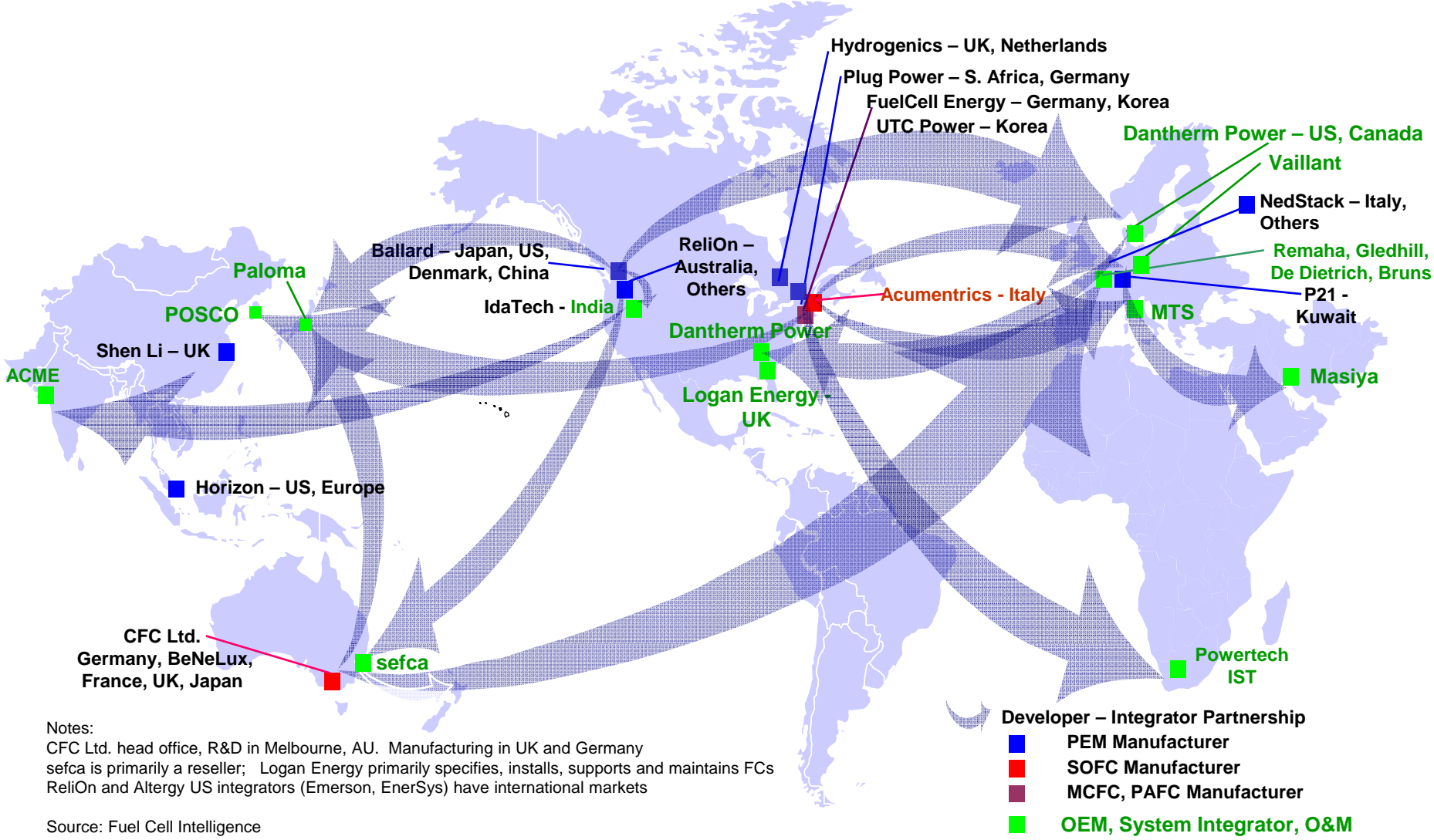
The Global Fuel Cell Challenge

Developers and International Partners

North American Developers	Location	International Integrators, Market Segment
Acumentrics	Westwood, MA, US	MTS (Merloni), Italy – mCHP
Altery Systems	Fremont, CA, US	EnerSys, Global – Critical backup
		Eaton Electric, Global – Critical backup
Ballard Power Systems	Vancouver, BC, Can	Dantherm Power, Denmark – Critical backup
		ACME via IdaTech, India – Telco, utility backup
		BAXI Innotech, Germany – mCHP
Hydrogenics Corp.	Mississauga, ON, Can	Linde, Germany – Tow tractors
		Heliocentris, Germany – Mini Bus
		CommScope, Global – Telco backup
Intelligent Energy	CA	Suzuki, Japan – Small motive
		Boeing, US, Spain – Flight Power
Nuvera Fuel Cells	Billerica, MA, US	Sacré-Davie, Canada – Generation
		Fiat, Italy – Motive
Plug Power Inc.	Latham, NY, US	Vaillant, Germany – mCHP
ReliOn, Inc.	Spokane, WA, US	Emerson, Global – Telco backup
UTC Power	Hartford, CT, US	Samsung, Korea – CHP
		Van Hool, Belgium – Bus power
FuelCell Energy	Danbury, CT, US	POSCO, Korea – CHP
		CFC Solutions, Germany – CHP

The Global Fuel Cell Challenge

Developers and Partners



Notes:
 CFC Ltd. head office, R&D in Melbourne, AU. Manufacturing in UK and Germany
 sefca is primarily a reseller; Logan Energy primarily specifies, installs, supports and maintains FCs
 ReliOn and Alteryg US integrators (Emerson, EnerSys) have international markets

Source: Fuel Cell Intelligence

The Global Fuel Cell Challenge

Fuel Cell Markets and Market Segments

Application	Segment	FC Capacity	Commercial Production	Many International Partnerships
Stationary				
Critical Backup	Telecom Towers	1-5 kW	2008	Domestic FC makers partner with global integrators, Ballard - Dantherm
	Data Center	5 – 300 kW	2009	
CHP	Mid-size Commercial	50 kW – 4 MW	2009	Acumentrics – Merloni Plug Power – Vaillant ClearEdge – BASF CFCL – Gledhill, Remaha, EWE, Bruns, Thermique. Gaz de France Trenergi – Global Sup., Global Market
	Residential Cogen	1-4 kW	2010	
	Small Commercial	5 kW- 49 kW	2012	
Dedicated Generation	Waste Hydrogen	1 – 10 MW	2010	Nuvera in Italy, Linde in California
	Large Generation	1 MW – 100 MW	2013	
Mobile				
Vehicle Power	Forklifts (MHV)	4 – 20 kW	2008	Forklifts – Very domestic
	2/3 Wheeled	1 – 20 kW	2010	
	Barge	20 – 120 kW	2012	Japan domestic, US market. Nuvera locomotive in Japan, Ballard in US. Suzuki is using GM automotive fuel cell, Quantum tank
	Locomotive (Train)	120 kW – 1 MW	2015	
	Automobile	60 – 100 kW	2015	
Auxiliary Power Units	Luxury Sailing Yacht	1 kW	2009	Many partnerships, Stack, engineering, truck makers. Topsoe-Wärtsilä Ice Breakers
	Long-haul Truck	2 - 5 kW	2010	
	Mid-Large Marine	20 kW – 1 MW	2012	
	Commercial Aircraft	250 kW – 1 MW	2015	
Portable	Mobile Generators	2 kW – 60 kW	2010	.Toshiba and Medis have targeted US, Smart to US, military
	Soldier Power	100W – 500W	2009	
	Electronics	10W – 400W	2009	

Source: Fuel Cell Intelligence

Red: Commercial (+ value prop)

Green: Near-Commercial

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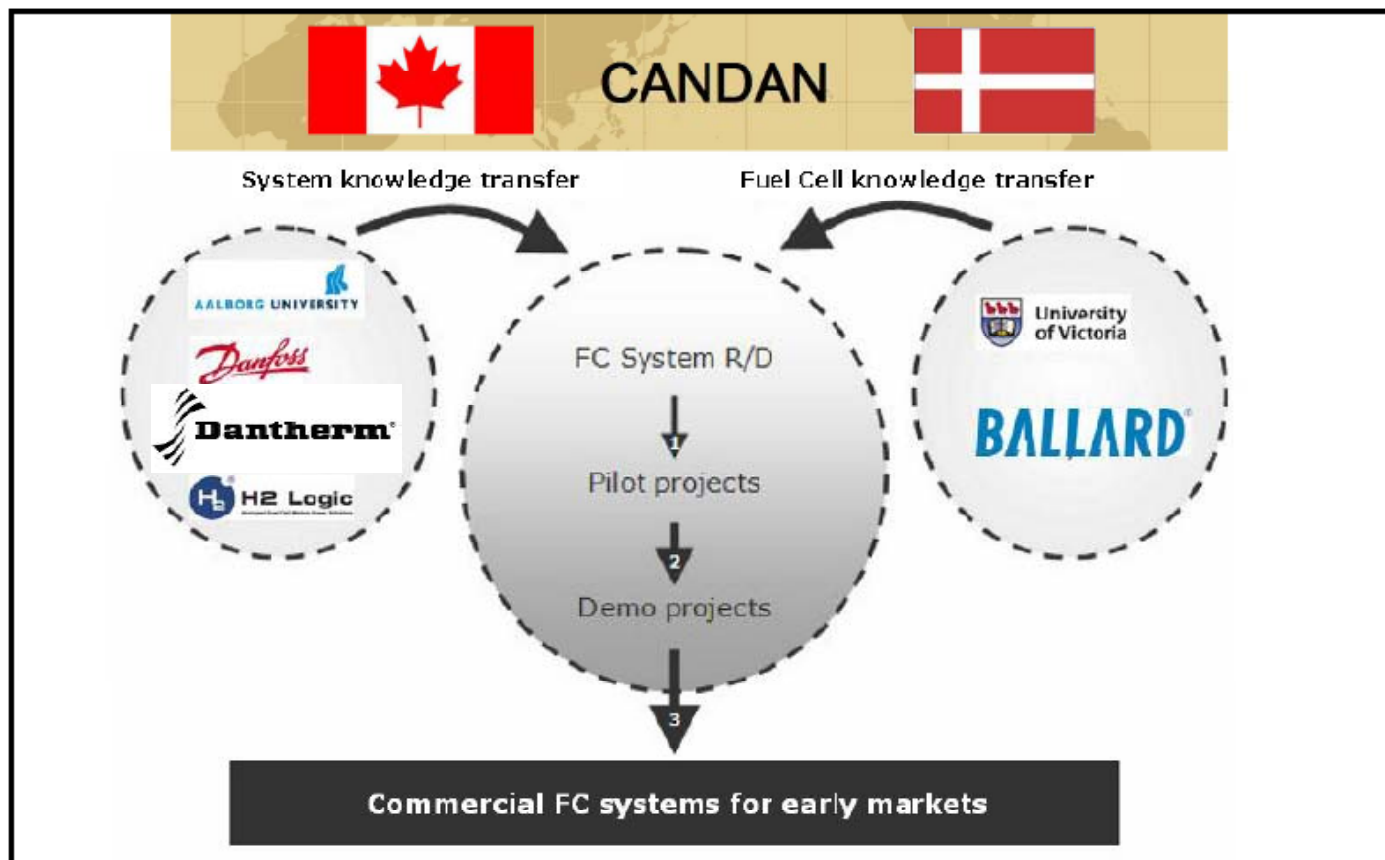
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Multi-National Partnerships

The CanDan Partnership



From Dantherm Power Fuel Cell Seminar presentation by Paw Mortensen, permission granted



Multi-National Partnerships

Danish aren't afraid of a pretty face

Dantherm Power
Paw V. Mortensen
 Manager, Business Development
 Direct: +45 9614 3752
 Mobile: +45 1138 4068
 Fax: +45 9614 3820
 E-mail: pvm@dantherm.com
 Dantherm Power A/S
 Marienlystvej 65 - DK-7800 Skive - Denmark
 Phone: +45 9614 3700
 www.dantherm-power.com

Danfoss
Per Balslev
 M.Sc., Ph.D.
 Director, Fuel Cell Business
 Direct tel: +45 7488 6740
 Mobile tel: +45 4013 1898
 E-mail: balslev@danfoss.com
 Danfoss A/S
 Danfoss Ventures
 Nordborgvej 81
 E14-N17
 DK-6430 Nordborg
 Denmark
 Tel: +45 7488 2222
 Fax: +45 7488 6999
 www.danfoss.com

Dantherm Power
Rasmus H. Refshauge
 R&D Manager PEMFC
 Direct: +45 9614 4775
 Mobile: +45 2891 1293
 Fax: +45 9614 3820
 E-mail: rth@dantherm.com
 Dantherm Power A/S
 Marienlystvej 65 - DK-7800 Skive - Denmark
 Phone: +45 9614 3700
 www.dantherm-power.com

Dantherm Air Handling
Also 0207
Jesper Thomsen
 Manager R&D and Business Development
 Direct: +45 9614 3722
 Mobile: +45 2944 7810
 Fax: +45 9614 3820
 E-mail: jtd@dantherm.com
 Dantherm Air Handling A/S
 Marienlystvej 65 - DK-7800 Skive
 Phone: +45 9614 3700
 www.dantherm-air-handling.com

Dantherm Air Handling
Project - Boiler/HVAC Good Conv.
Morten L. Karlsen
 Project Manager Research & Development
 Direct: +45 9614 3849
 Mobile: +45 2891 1359
 Fax: +45 9614 3820
 E-mail: mlk@dantherm.com
 Dantherm Air Handling A/S
 Marienlystvej 65 - DK-7800 Skive
 Phone: +45 9614 3700
 www.dantherm-air-handling.com

Danfoss
Also
Chas Munkholm
 Manager Sales & Development
 Dantherm Power Skive
 Direct: +45 9614 3727
 Mobile: +45 9614 3820
 E-mail: cm@dantherm.com
 Dantherm Air Handling A/S
 Marienlystvej 65 - DK-7800 Skive
 Phone: +45 9614 3700
 www.dantherm-air-handling.com

Dantherm Power
Tom A. Ollila
 Business Development and Market Manager
 System Sales Office
 Mobile: 731 789 6160
 E-mail: tao@dantherm.com
 Dantherm Power Inc.
 4260 Orchard Park Blvd.
 Spartanburg, SC 29303
 Phone: +1 864 595 9800
 Fax: +1 864 595 9810
 www.dantherm-power.com

GRUNDFOS Management A/S
Anco Sangers
 Project Manager Fuel Cells Business Unit Dosing
 Telephone: +45 87 50 14 00
 Direct: +45 87 50 47 37
 Fax: +45 87 50 14 71
 Mobile: +45 20 28 36 70
 E-mail: asangers@grundfos.com
 Grundfos Management A/S
 Poul Due Jensens Vej 7
 DK-8850 Bjerringbro
 Denmark
 www.grundfos.com

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Multi-National Partnerships Create Compelling Products

New Ballard FCgen-1300 developed in part for the Indian backup market

Ballard FCgen-1300



Source: Ballard Power Systems

Multinational Partnerships Create Compelling Products **Developed vs. Developing Markets**

ACME Telecom order for 10,000 1300's gives
IdaTech/Ballard in a future in India.

Proves over-optimistic, but contract is rewritten this week to allow
fluid sales targets.

Indians, Americans, Canadians are all happy.



Multinational Partnerships Create Compelling Products

Domestic Clusters vs. International Partnerships

- **Domestic**

- Ease of communication
- Target market is de facto local
- Market conceptual errors go undiagnosed

- **International**

- Complimentary attributes
- More direct communication (less innuendo)
- Market is intrinsically global
- Wider experience

Multinational Partnerships Create Compelling Products

The Integrator Viewpoint

Domestic Supply Side Partners

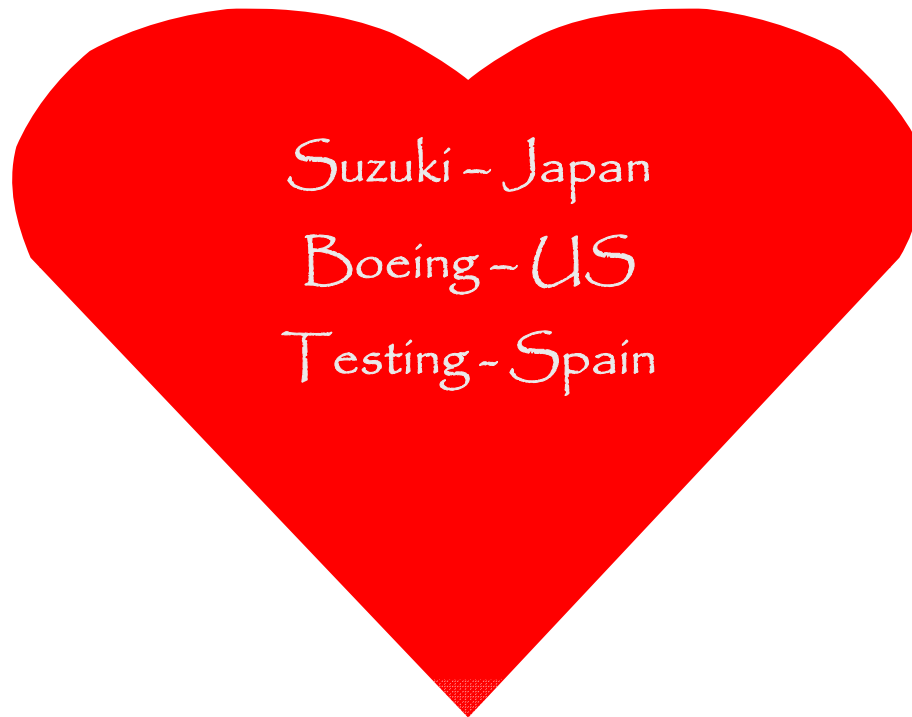
- **Rapid nuanced communication**
- **Quick delivery**
- **Avoids the English-metric communication gap**

International Integrators

- **Orthogonal concepts**
- **Complementary Cultures**
- **Enlightening technologies**
- **Discrete communication**
- **Limited number of commercial manufacturers globally**

Multinational Partnerships Create Compelling Products

UK Intelligent Energy Partners



UK-based fuel cell stack developer Intelligent Energy has partnered with Japanese Suzuki for the past five years to bring the ENV fuel cell motorcycle to market. IE has also powered a Boeing-built UAV.

Multinational Partnerships Create Compelling Products

European High Temp Membranes Invade the US

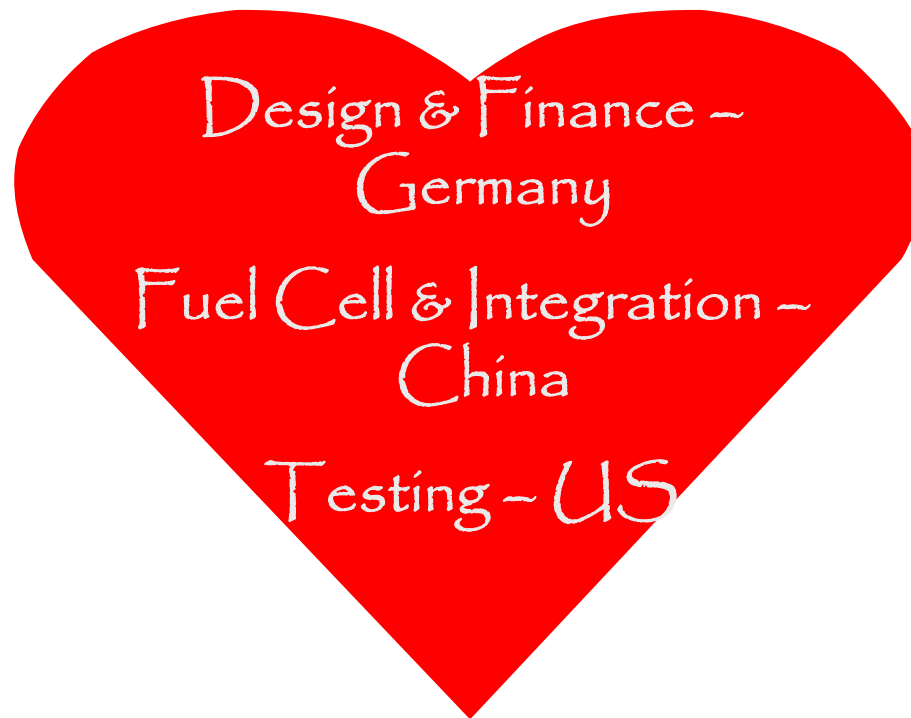
**BASF closes German plant -
Consolidates in US**

**Plug Power through Vaillant
and BASF hits mCHP**

**ClearEdge uses BASF to hit
CA mCHP**

140° - 200° PEM Membranes from German BASF and upstart Greek Advent Technologies could give some US developers help.

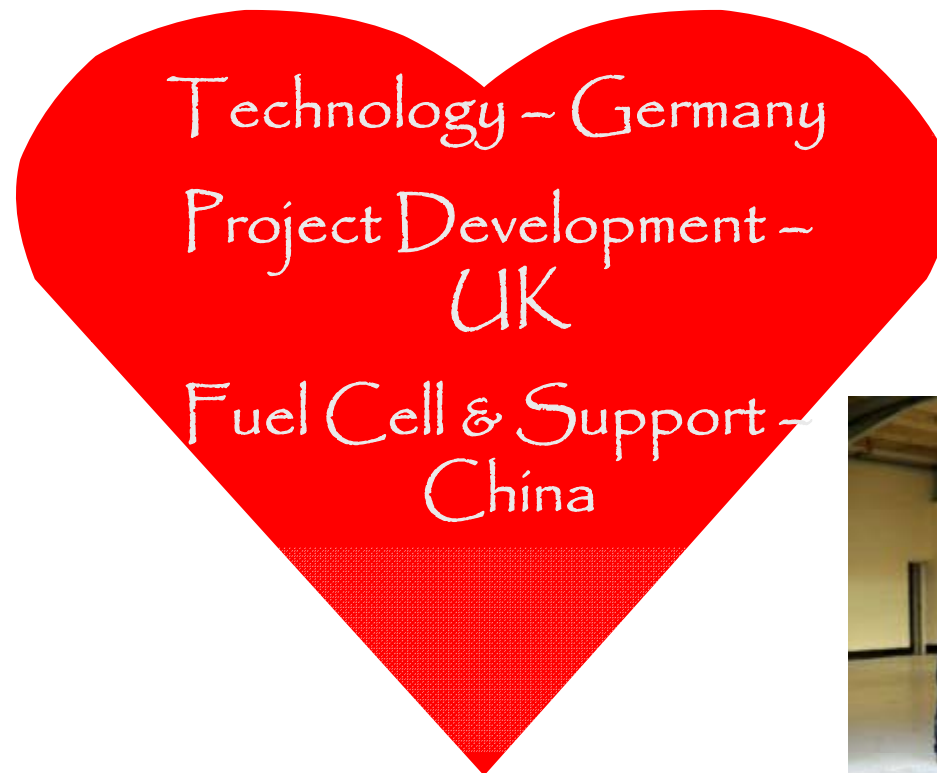
Multinational Partnerships Create Compelling Products **Volkswagen Passat Lingyu FCV**



Volkswagen has partnered with SIAC – Shanghai International Automotive, and the 55 kW fuel cell stack developed by the staff at Tonji University in China in conjunction with VW Shanghai – Introduced in California

Multinational Partnerships Create Compelling Products

Sunderland Tribrid



A Shanghai-based Shen Li High Technology fuel cell and its support crew has helped the UK U. of Sunderland retrofit a a bus into a Fuel Cell Tri-brid which also relies on a US-made Maxwell Ultracap

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Marketing a Disruptive Technology

Today's Talking Points

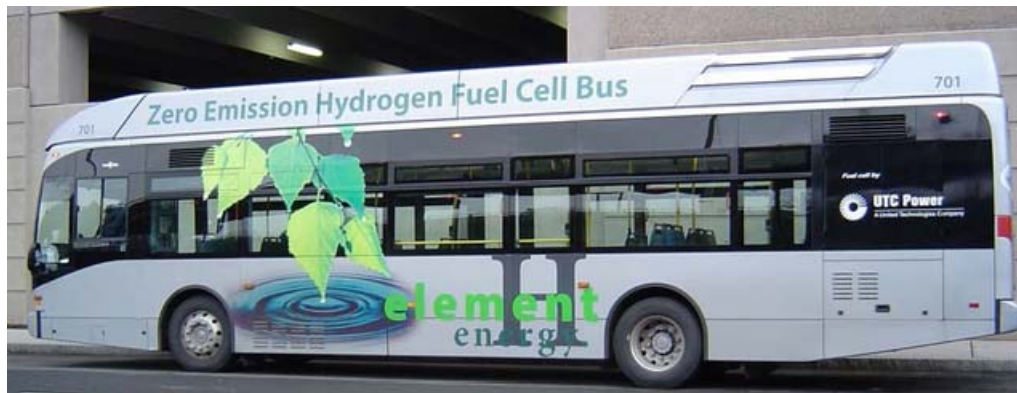
- Government Support
 - Disincentive to international partnerships
 - International partnerships may obviate need
- Popular Acceptance
 - Denmark likes the environment
 - US like to innovate
 - Japan likes the mass market
 - Germany likes to engineer
 - No one culture has all the answers
- Codes and Standards
 - Local integrator knowledge therefore...
 - International partners expand markets

Marketing a Disruptive Technology

Success Stories

- **One small ocean between Connecticut and Belgium**

UTC Fuel Cell + Van Hool Bus



Source: UTC Power

- **April 2009: US Bus, Canadian Hydrogenics fuel cells**

Proterra Fuel Cell Plug-In Hybrid



Source: Fuel Cell Intelligence

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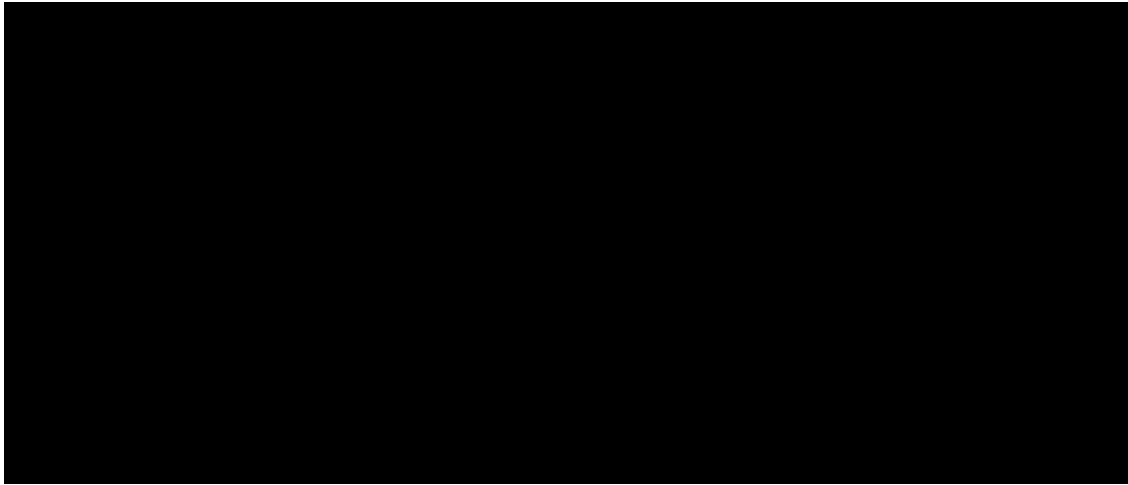
Conclusion **Fuel Cells are not Sexy...**



Source: American Honda Motor Company

The Clarity & Jamie Lee Curtis notwithstanding

Conclusion ... and Fuel Cells are not Violent.



Source: B. Broccoli & 007

“Quantum of Solace” notwithstanding

Conclusion

The World is Your Playground – Use It

The Commercialization of Fuel Cells needs to take every advantage the world markets, developers, and integrators can provide.

- “The middle east is a huge market – I’m going there.”

Mickey Orros, Altergy

- “Europe is ten years ahead of the US in environmental issues!”

Sam Logan, LOGANenergy

**“The Fuel Cell Future is Global”
“Thinking Globally Will Breed Success”**

Jim Horwitz, Sidelines Observer & Gadfly

Thank you for your attention – Questions?

Fuel Cell Intelligence

Questions regarding fuel cell commercialization can be answered.

For more information on our services: market studies and analysis based on a comprehensive data base and statistical modeling, please contact Jim Horwitz at Jim@FuelCellIntel.com or contact our offices:

Newton/Cambridge MA USA

James Horwitz
Fuel Cell Intelligence
38 Adella Ave.
W. Newton, MA 0465 USA
Phone: **+1 617 527 7944**

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