



Fuel Cell Europe

***Enabling initiatives to accelerate early
fuel cell market adoption:
Case studies***

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Scottish Hydrogen Conference, 15-16 September 2009



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Agenda

Part 1: FuelCellEurope: background

Membership

What we do

Part 2: Fuel Cell deployment in Europe:

Applications

Commercial developments: where do we stand?

Part 3: Enabling initiatives:

Case studies

Conclusion:

Re-inforcing our collective impact in Europe



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Part 1: Fuel Cell Europe

What we do





What we do:

1. **Engaging with policy makers** to position fuel cells as a lasting technology option to address energy, climate change and urban mobility issues;
2. **Ensuring adequate and lasting government support** across Europe to enhance the development and deployment of fuel cell technologies and applications;
3. **Working towards the removal of regulatory barriers** that hinder the development of fuel cell technologies across Europe.
4. **Raising awareness** about the availability of fuel cell applications and educating decision makers:
5. **Supporting SMEs** in their efforts to get easier access to European and national government funds; and subsidies.
6. **Fostering industrial cooperation** at European and international level to accelerate the commercial deployment of fuel cells;
7. **Fostering early market opportunities** working in cooperation with corporate user groups.
8. **Enabling collaboration** with European, National and Regional initiatives;
9. **Developing synergies and reinforcing international cooperation** with key sectoral industry groups to address joint energy, climate change and urban mobility issues.
10. Enhancing dialog with the **finance community**.



Enabling fuel cell deployment in Europe



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Part 2: Fuel Cell deployment in Europe





Fuel Cells Applications

1. Stationary applications:

On site power generation

(Micro)-cogeneration

Backup power (telecom, data centers, critical applications)

Landfills / Wastewater Treatment Plants

2. Transport applications:

Special purpose vehicles / scooters

Inner-city buses

Vehicle fleets

Passenger cars

3. Special applications:

Handling materials / forklifts

Auxiliary Power Units

Marine

Defence

4. Portable and micro power

Electric tools

Laptops

Battery chargers



Stationary Applications



Sources: 1, 2, 3: MTU Onsite Power; 4: Ballard; 5, 6, 7: UTC Power



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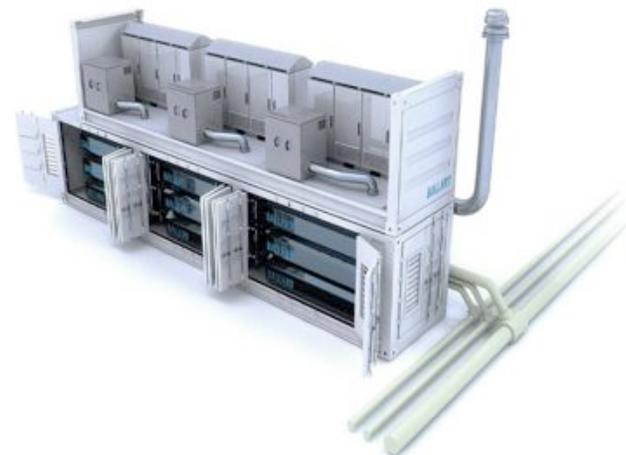
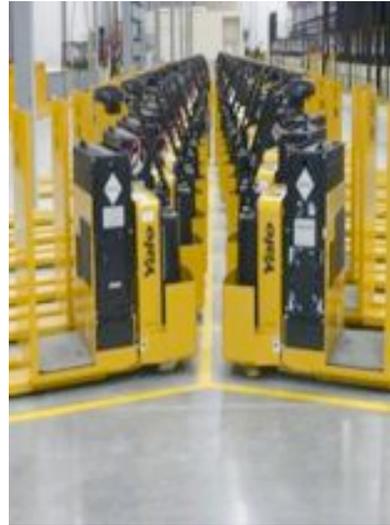
Transport Applications





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Special applications





Portable and Micro power





Commercial deployment: where do we stand?

Market trends:

Electricity production from by-product of chemical process (chlorine, sodium chlorate, ethylene, styrene,) is commercially viable and attractive with appropriate feed-in tariffs

Material handling solutions offering attractive economic value proposition

On-site power and cogeneration gaining market traction

Backup power solutions gaining market traction, especially in developing countries / remote areas where power quality is important

Micro-power / portable power early stage champions emerging

Raising interest from municipalities for **hydrogen fuel cell bus platforms**

Passenger cars starting small commercial fleets through leasing in specific urban hubs (Daimler / Honda)



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Part 3: Enabling initiatives Case studies





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Enabling initiatives in Europe

- ✓ Fuel Cell and Hydrogen Joint Technology Initiative
- ✓ HyRamp: the European Fuel Cell and Hydrogen Regions and Municipalities Partnership
- ✓ The Global Hydrogen Bus Alliance
- ✓ The German Callux Program
- ✓ Marine Hydrogen and Fuel Cell Association
- ✓ Fuel Cell Europe Customer Application Groups:
 - ✓ Postal services
 - ✓ Public transport
 - ✓ Material handling



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Case 1: Fuel Cell and Hydrogen Joint Technology Initiative

- ✓ Large scale European public private partnership
- ✓ Aimed to steer and optimise the usage of R&D and demonstration projects in Europe
- ✓ Budget of 470M government funding for 7 years
- + Allows industry and the research community to be actively involved in the steering and the management process
- + Ensures mid term shared ownership and political momentum
- + Generates further critical mass in Europe
- Curving red tape is not an easy task
- Many diverging agendas difficult to reconcile to define priorities
- Further work required to increase government's financial contribution in the JTI to ensure most applications fields are properly covered and projects have enough critical mass



Case 2: HyRamp

- ✓ European fuel cell and hydrogen regions and municipalities partnership
- + Very relevant bottom-up initiative to complement the JTI top down approach
- + An excellent vehicle to bundle initiatives and share best practices among active regions in Europe
- Tangibles outcomes and financial commitments unsure
- No formal weight against the EC, EP and Member States to influence policy decisions
- Relatively limited resources



Case 3: German « CALLUX » Program

- ✓ Program aiming to facilitate the deployment of **household micro-cogeneration systems**
- ✓ Part of the **German National Innovation Program**
- ✓ Aims to install by 2012 **several hundred systems** operating during the next 8 years to prove technico-economic feasibility
- ✓ **Budget of 84M incl. 40M financed by German Ministry of Transport and Buildings through NIP**
- ✓ **All major stakeholders of the sector are involved:**
 - ✓ Heating system manufacturers and fuel cell system integrators: *Vaillant, Viessmann, Baxi Innotech, Hexis*
 - ✓ Electricity utilities: *EnBW, E.ON, EWE, MVV, VNG*
 - ✓ The Scientific community: *Center for Solar Energy and Hydrogen Research Institute of Stuttgart*
- ✓ **Nearly 50% of the initial CAPEX investment should be covered**



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Case 4: Fuel Cell Europe Customer Application Groups

Example: Customer Application Group Postal services

- ✓ Focused activity led by FuelCellEurope and targeting postal service organisations
- ✓ The objective is to intensify discussions and information exchange with postal service businesses to facilitate the emergence of sizeable projects
- ✓ Builds on Royal Mail's hydrogen initiative
- ✓ Fuel Cell Europe acts as a « broker » to facilitate well targeted contacts to build mutual understanding between the supply side (fuel cell and hydrogen companies, integrators and OEMs) and the demand side (postal operators)
- ✓ Agreement signed between Royal Mail, FuelCellEurope, PostEurop and CENEX to work jointly on the development of a common platform for a hydrogen fuel cell small delivery van
- ✓ Undergoing definition of project concept with PostEurop and a number of European Postal Operators for funding by Intelligent Energy Europe



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Part 3. Conclusion:

Re-inforcing our collective impact in Europe





Conclusion

1. At this stage of development of the fuel cell industry, **strong industrial cooperation constitutes the main route to market in Europe**
2. Past experiences in the fuel cell industry have shown that **short term strategies do not pay off**
3. Government and decision makers aim for **CO2 lean hydrogen production in short term**
4. More work is required to **generate economically functional synergies between hydrogen and RES**. RE companies need to play an active role.
5. Collectively **certain sectors can constitute direct routes to market:**
 1. The postal services business (e.g. delivery vehicles)
 2. Logistic companies (e.g. material handling)
 3. Chemical plants (e.g. valuing hydrogen as a by-product)
 4. Administrations (e.g. early purchasing power)
 5. Telcos (e.g. power backup)
6. As the energy security, climate change and oil depletion issues become more and more prominent, fuel cell and hydrogen companies will need to invest a substantial amounts of their resources to engage with policy makers as the nuclear, wind, solar, biomass sectors have been doing.



Conclusions: where should fuel cell companies put their eggs?

Energy = Thermodynamics + Economics + Politics

In the past 15 years:

70-80% Thermodynamics:

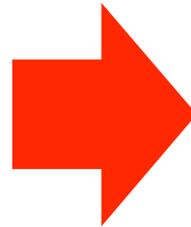
- R&D
- Technology development
- Overall design
- IPR

15-20% Economics:

- Market understanding & preparation
- Educating supply chain partners
- Pilot projects
- Heavily subsidized projects

0-5% Politics:

- Generate the necessary government subsidies to co-finance the R&D effort



In the next 5 years:

20-30% Thermodynamics:

- Design optimisation
- Performance optimisation

40-50% Economics:

- Cost reduction and industrialisation
- Market deployment
- Supply chain agreements
- Go to market strategies

20-40% Politics:

- Influence overall energy and environment debate
- Generate government purchase
- Adapt market access conditions
- Adapt feed-in tariffs
- Regulatory frameworks
- etc



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Thank you for your attention!

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