



Parallel Session on Early Markets and Cross Cutting Activities

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IDA4: Definition of EM and Objectives

- Early Markets: markets which look to offer commercially successful applications at or very near today's technical achievements and/or cost
- Objective: develop/deploy a range of fuel cell-based products that can enter the market in the near term
 - 2010: 10,000 units in the market, thereof 6,000 new sales
 - 2015: 50,000 new units in the market

IDA4: Alignment with JTI high level objectives

- JTI Vision / Objectives
 - **Sustainability**
 - Security of Energy Supply
 - Global Environmental
 - **-20% CO2**
 - **+20% Renewables**
 - **+20% Energy Savings**
 - Quality of Life
 - **Local Emission Minimisation (Zero Emission)**
 - » **Including Production/Accidental Release**
 - **Noise reduction**
 - Life Cycle Impact
 - **Critical Resource Use including Manufacturing Energy**
 - **Recycling**
 - **EU Competitiveness (Lisbon Agenda)**
 - Knowledge Driven Economy
 - Rapid Growth
 - SME/Start-up Growth
 - Jobs for Europe

IDA4: Alignment with JTI – Sustainability

- Security of Energy Supply
 - Direct impact dependent on source of fuel used
 - High flexibility may be a benefit – Quantitative Assessment difficult due to fragmentation of fuels in IDA 4
 - Chemical Hydrides, CGH₂, MeOH plus a large number of „exotic / boutique“ proposals
- Energy Savings / CO₂ Reduction
 - Early Markets are significantly underestimated
 - Industrial Vehicles => 850 GWh p.a.
 - Small Stationary Units for Backup Power => 11.4 TWh p.a.
 - Industrial Tools and Outdoor Equipment => 714 GWh p.a.
- QoL (Pollution, Noise)
 - Benefits accrue if compared to current ICE applications
 - Indirect benefits for reduced power requirements through central electrical production
- Life Cycle Impact
 - Critical Materials are used (mainly Pt vs. Pb, Ni or Li in Batteries)
 - Heavy metal alloy elements (Hg, Cd etc. are reduced / eliminated)
 - Recycling Systems needed. May be more complex than for batteries, due to the additional recycling of fuel containers

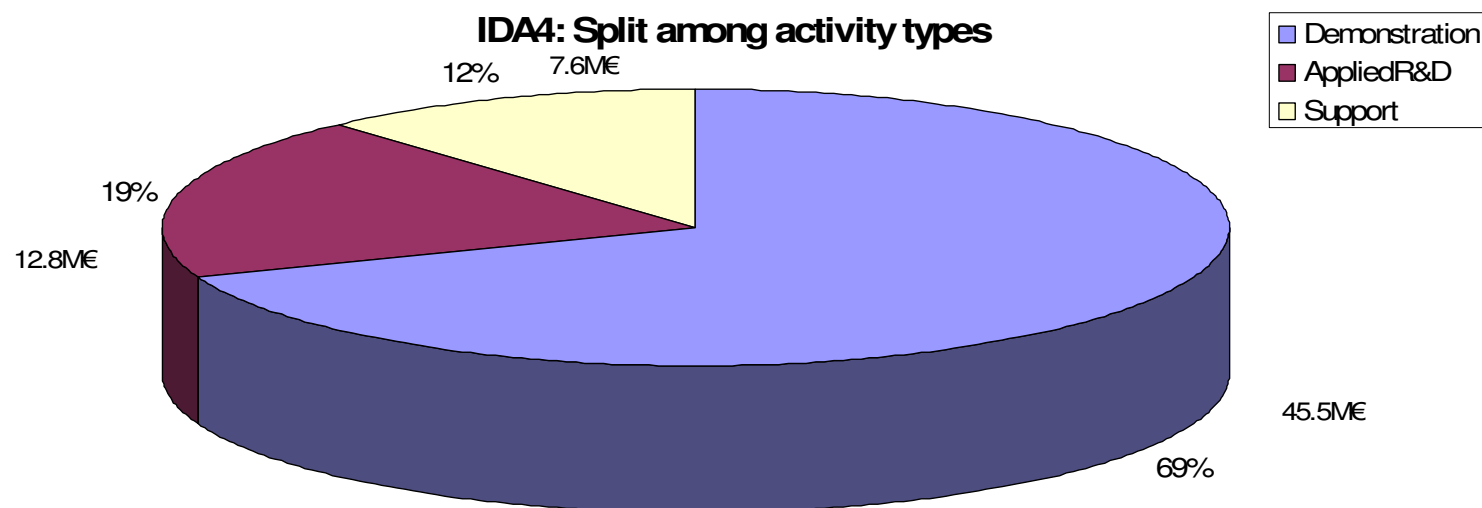
IDA4: Alignment with JTI – EU competitiveness

- Relative Niche Characteristic of Markets
 - Enables EU SMEs to be System Integrators not just Component Supplier, thus achieving higher margins
 - Industrial Electric Vehicles (Fleet 5 Mio WW vs. 500 Mio Automotive)
 - Small individual mobility (Yearly sales 3.5 Mio Vehicles)
 - UPS/Back up Power (EU Market 1 Mio Units)
 - Portable/Micro Market
 - Could be a critical technology to continue to differentiate European industrial tool market (Bosch, Hilti, Fein, etc.)
 - Dual Use Developments could be applied

IDA4: Setup of activities

- Focus on Demonstration and Deployment. Applications:
 - Stationary, particularly Back-up Power/ UPS
 - Off highway & industrial vehicles, e.g. forklifts
 - Portable (recreational, educational, medical emergency equipment, industrial power tools, military,...)
- Applied R&D where needed:
 - Stationary and transport use synergies/developments from IDA3 and IDA1, respectively
 - MicroFCs require specific activities on:
 - Fuel supply
 - Overall improvement: system architecture differs from larger FC technology
 - BoP components

IDA4: Organisation of activities



- Receive 69.0% of IDA4 JTI funding
- Demonstration heavily favoured due to closeness to commercialisation
- Some demonstration activities include applied R&D component

IDA4: Technical Targets for Stationary activities

- Backup Power / UPS targets

Characteristics	2009-2010	2011-2013
Fuel cell lifetime	2000 h	2500 h
System cost	7000 €/kW	5000 €/kW
Reliability	1 failure/year during normal conditions	No failures allowed during normal conditions
System startup time	<1 sec	<10millisec

IDA4: Technical Targets for Transport activities

- Materials Handling Vehicles

Characteristics	Targets - year		
	2008 - 2009	2010 - 2011	2012- 2013
Fuel Cell System			
System cost, €/kW (end-user price)	<7.000	<3.500	<2.500
System lifetime, hours (with service/stack refurbishment)	>5.000	>10.000	>15.000
System efficiency, % (tank → wheel)	>40	>45	>50
Hydrogen supply			
Refuelling time, minutes	5	3	2
kW usage per Nm3 supplied (on-site infrastructure → tank)	7	6,5	6
Hydrogen price at pump, €/Nm3 (end-user price)	1,2	0,8	0,6

IDA4: Demonstration activities from MAIP

No.	Activity	Rationale
E01	Deployment of electric forklifts and non-high-way vehicles including infrastructure	Demonstration of industrial application readiness of other non-highway vehicles using the same platform to achieve awareness and demonstrate relevance for these industries.
E02	Demonstration of off-highway vehicles including infrastructure	Demonstration of industrial application readiness of fuel cell systems for off-highway vehicles, including RCS for the hydrogen infrastructure to address critical application requirements with regard to sustainability, efficiency and logistic effort, thereby creating market pull for other non-highway vehicle applications.
E03	Demonstration of portable generators, back-up and UPS power systems	Demonstration of application readiness with regard to cost competitiveness, run times, logistics and sustainability of portable generators, back-up and UPS-systems in real use in order to achieve market break through.
E06	Demonstration of portable and micro FCs for various applications	Demonstration of application readiness of portable and micro fuel cells for various use in education, industrial tools, sub-micro CHP etc. in order to provide awareness and attract additional niche applications.
E07	Demonstration of portable and micro FCs for recreational & military application	Demonstration of application readiness of portable generators for providing benefits with regard to noise, emissions, temperature, power density and run time for recreational and military use under severe conditions.

IDA4: Applied R&D activities

- Stationary: transferred to IDA3. Overlap of scope with a similar activity identified
- Transport: assumed to come primarily from IDA1.
- MicroFCs
 - Fuel supply
 - Improvement of fuel cells
 - BoP components (excluding fuel supply)

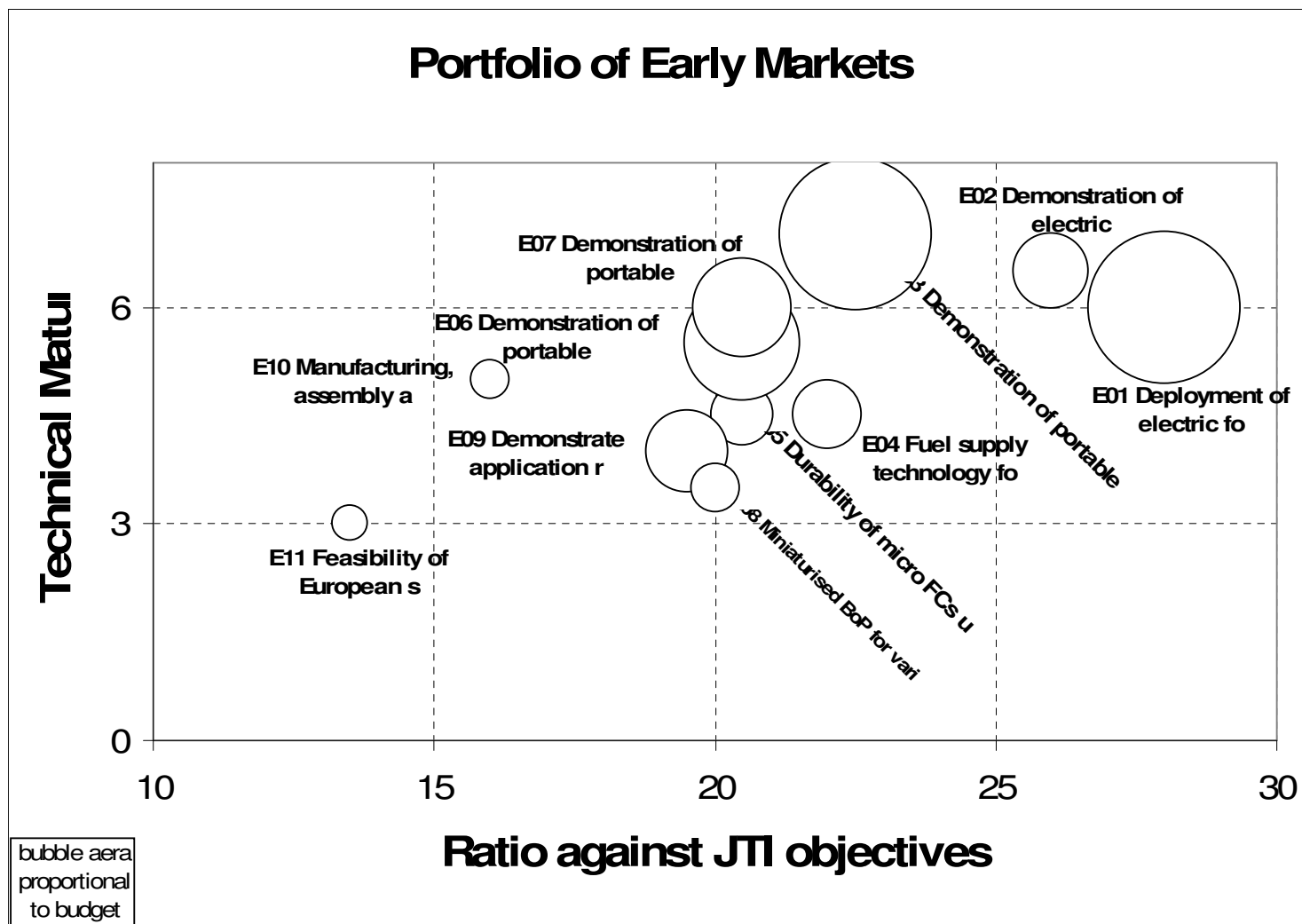
IDA4: Applied R&D activities

No.	Activity	Rationale
E04	Fuel supply concepts for portable and micro FCs	Applied research to identify lead applications, assess fuelling needs and options for fuel supply of portable and micro fuel cells, hydrogen and non hydrogen; develop a strategic approach including the associated logistical and distribution requirements as well as RCS for the requested fuel storage solutions.
E05	Durability of micro FCs under typical operating conditions	Applied research to achieve application readiness of micro fuel cells for portable applications matching extended run times, power density requirements and sustainability criteria.
E08	Miniaturised BoP for special devices	Applied research on miniaturized balance of plant for analytical or medical devices in order to achieve the required power density, fuel variability and target cost.
E09	Demonstrate application readiness of stationary-type FCs	Applied research to provide and demonstrate application readiness of stationary-type fuel cells with regard to life time, efficiency and robustness
E10	Manufacturing, assembly and testing for micro FCs	Applied research on high quality production methods and processes for micro fuel cells in order to ensure safe and reliable quality standards
E11	Feasibility of a small power system platform	Study to assess the feasibility of a small power technology platform based on identified lead applications in order to reduce fragmentation of research activities, accelerate development by combining forces and reduce relative investment barriers for small and micro enterprises.

IDA4: Support activities

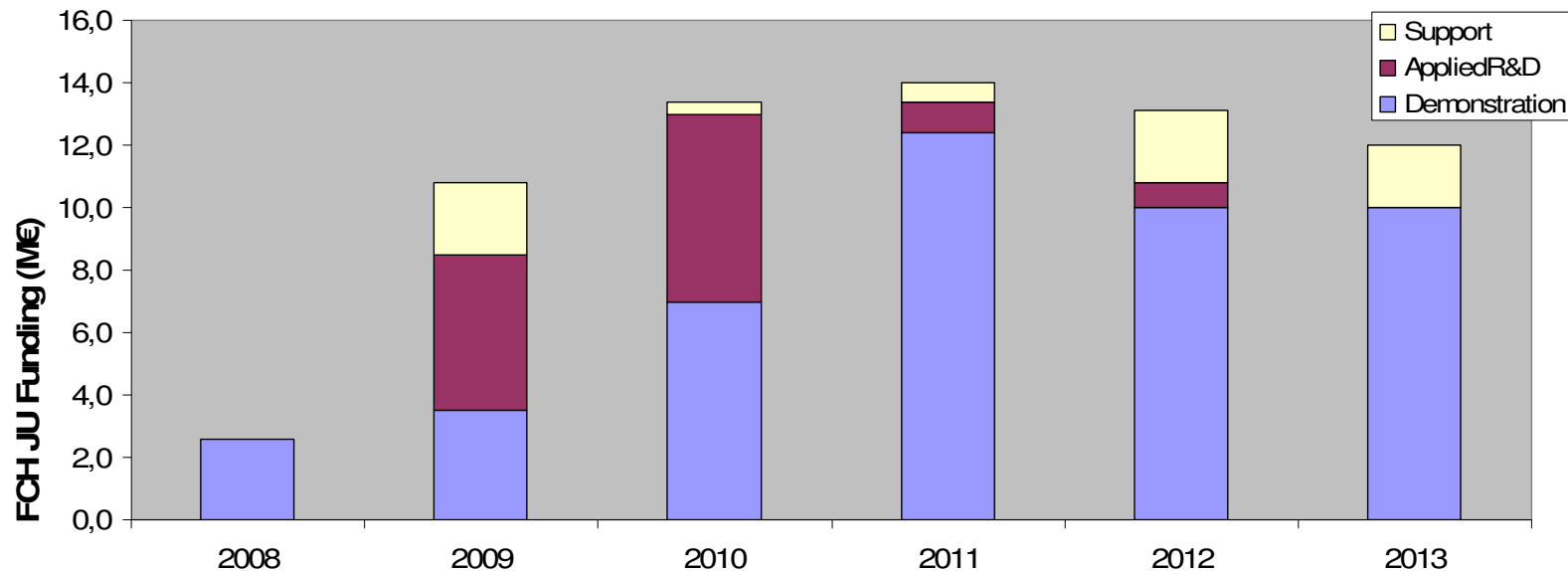
- RCS (4 total):
 - Pre-normative research
 - Safe indoor use of FCs
 - H2 cartridges
 - Dispensing machines
- SME-specific measures (4 total):
 - Financing
 - Stimulation of procurements, esp. with public agencies

IDA4: Prioritisation of activities



IDA4: Indicative Budget

IDA4 Indicative Annual Budgets



- Overall budget is 65.9 M€ (incl support), representing 13% of overall
- Activities' budgets are split throughout several calls

Cross Cutting activities

- IDA-specific RCS activities are built in to each IDA's work program
- CCI constitutes separate block of parallel activities to IDAs
- Total budget for Cross Cutting Activities is 28.3M€ (public funding) or 6% of overall budget

Cross Cutting activities: Types

- Program level activities:
 - Socio-Economic Modelling and Planning (2)
 - Technology Monitoring and Assessment (3)
 - Lifecycle Analysis (LCA) (2)
 - Regulations, Codes & Standards (RCS) (2)
 - Joint Public Awareness Activities (e.g. Hydrogen Week) (1)
 - Educational Projects: e.g. training and educational information (2)
- Technical activities, such as pre-normative research (PNR) on topics which transcend the boundaries of the various applications, e.g. design and test criteria for composite hydrogen storage containers or fuel quality. (2)
- SME-specific measures (1)

*Numbers in parentheses indicate number of supported activities



THANK YOU

IDA4 Committee

Chairman: Herbert Wancura

Seconded Expert: Carlos Navas