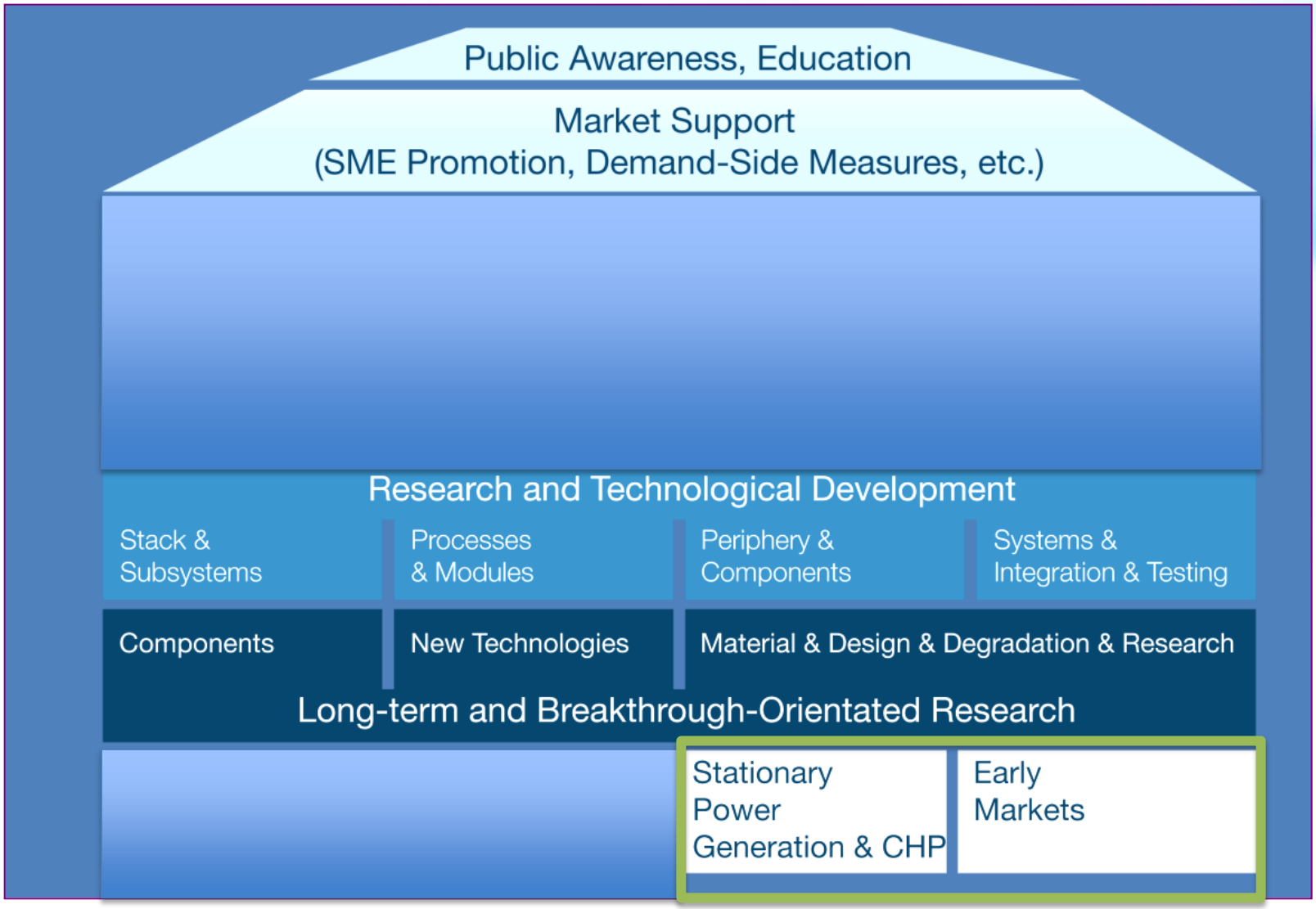
Introduction to portfolio of Energy-RTD Programme Review Days 2015

Dionisis Tsimis - Energy

Wednesday 18 November

08:00 – 08:30	**Registration**	
	PARALLEL SESSIONS ON SYSTEMS, COMPONENTS AND MATERIALS DEVELOPMENT PROJECTS	
8:30 – 8:45	Introduction to Transport portfolio: Lionel Boillot (Lord Jenkins Room, ground floor)	**Introduction to Energy portfolio: Dionisis Tsimis (Alcide de Gasperi Room, 2nd floor)**
8:45 – 8:50	Q&A	Q&A
	Panel 2 - Transport RTD: MEAs, bipolar plates, stacks and subsystems, hydrogen refuelling stations	**Panel 4 - Energy RTD**: Materials, components, performance phenomena, subsystem design and production
	Moderators: Lionel Boillot and Daria Vladikova	**Moderators: Dionisis Tsimis and Laurent Antoni**
	Panel - MEAs	**Panel - Materials and subsystems design and production**
8:50 – 9:05	CATAPULT	T-CELL
9:05 – 9:20	IMPACT	SECOND-ACT
9:20 – 9:35	CATHCAT	EURECA
9:35 – 9:50	NANO-CAT	ONSITE
9:50 – 10:00	Q&A	Q&A
10:00 – 10:30	**Coffee Break and Networking**	
	Panel - Bipolar plates, stacks and subsystems, HRS	**Panel - Performance phenomena**
10:30 – 10:45	STAMPEM	PROSOFC
10:45 – 11:00	COPERNIC	DEMSTACK
11:00 – 11:15	PHAEDRUS	CISTEM
11:15 – 11:25	Q&A	Q&A
11:25 – 12:10	**Poster Session - Panels 2 and 4 Manned (2nd floo)**	
12:10 – 12:55	**Lunch and Networking**	

Structure under FP7



Fuel Cell and Hydrogen 2 Joint Undertaking

Continuation of the FCH JU under Horizon 2020 (2014-2020)

HORIZON 2020

Transport

- Road vehicles
- Non-road vehicles and machinery
- Refuelling infrastructure
- Maritime, rail and aviation applications

Energy

- Hydrogen production and distribution
- Hydrogen storage for renewable energy integration
- Fuel cells for power and combined heat & power generation

Cross-cutting issues

(e.g. standards, consumer awareness, manufacturing methods, …)

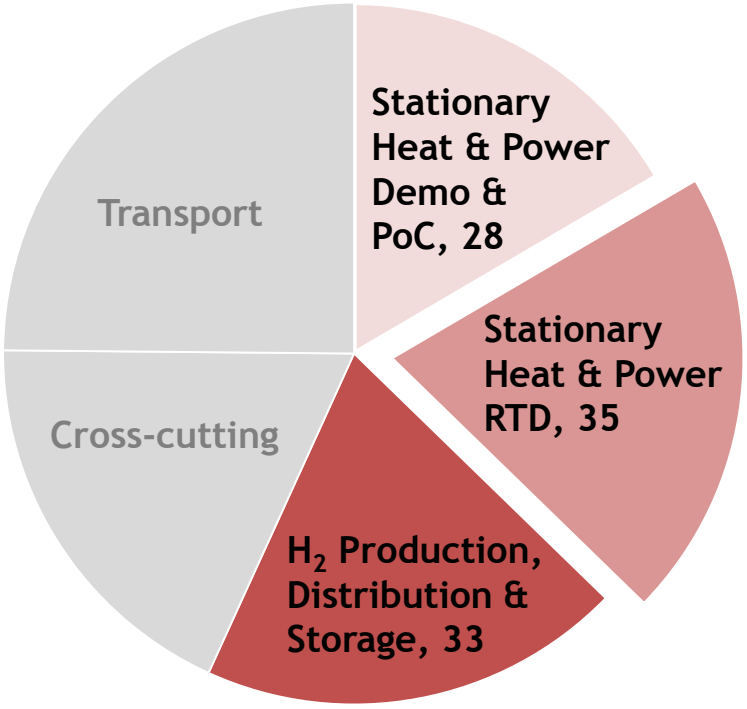
"To accelerate market entry of Fuel Cells and Hydrogen technologies, the Fuel Cells and Hydrogen 2 Joint Undertaking (FCH 2 JU) goes ahead with 1,33 B€."

Brussels, 06/05/14

ENERGY - RTD - Fuel cells for power and CHP

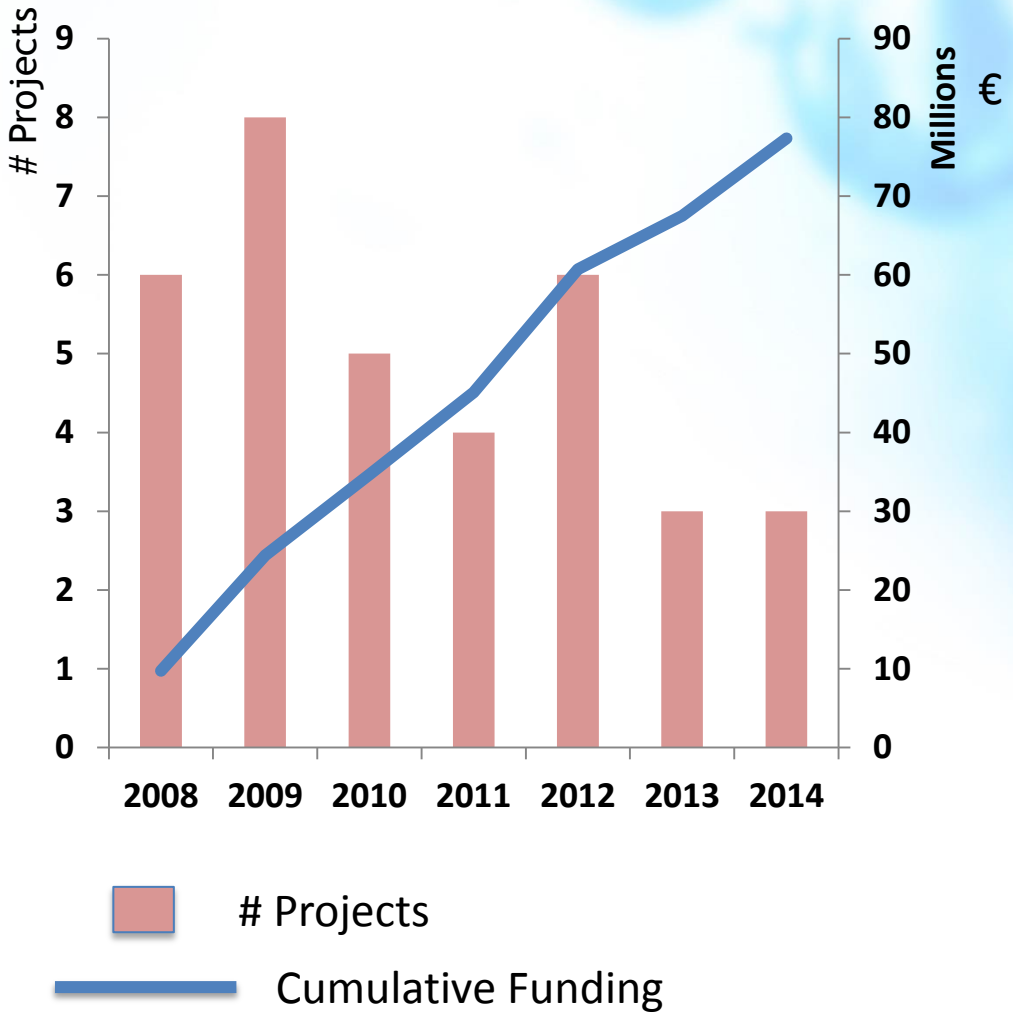
Number of projects

169 (of which FP7: 155)



19 – Finished Projects

16 – Ongoing Projects



What are the objectives of our R&D efforts?

FCH JU - MAIP

2008-2013

Research to focus on:

- Degradation
- Materials
- Control & Diagnostic tools
- Novel designs for cell and stack
- Components and Integration

FCH JU reference documents (incl. MAIP/AIPs)
http://www.fch.europa.eu/content/previous-calls

FCH2 JU - MAWP

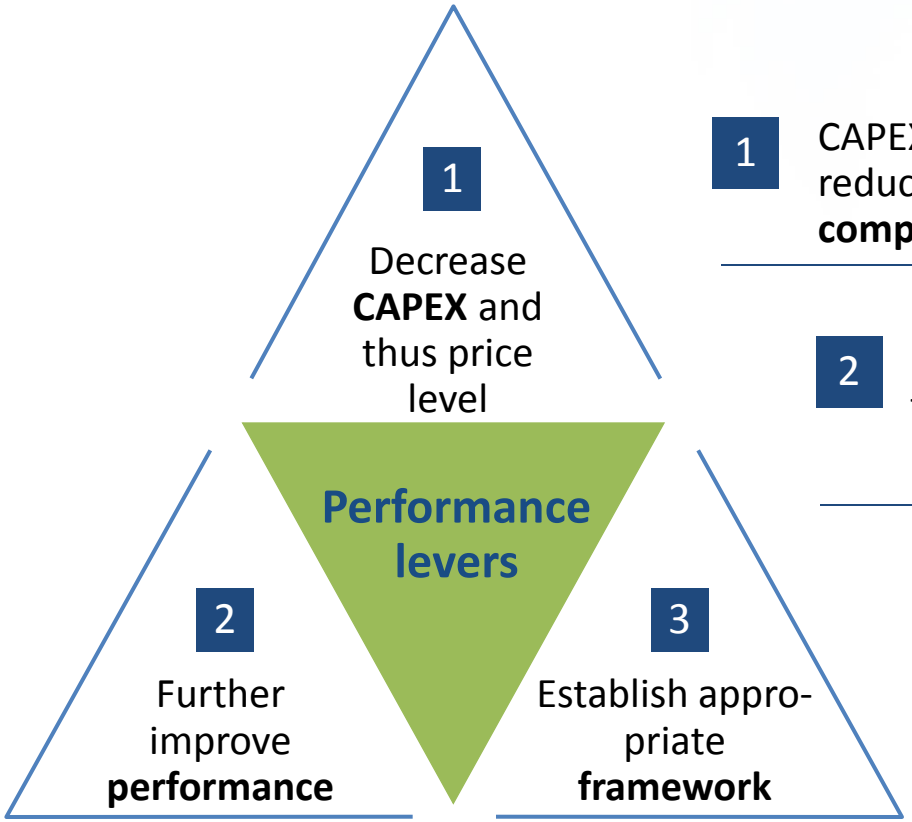
2014-2020

- Improved efficiency
- Reduced degradation
- Reduction of total cost of ownership (TCO in €/kWh)
- Reduction of harmful emissions (CO2, SOx, NOx, Particulate Matter,) noise, vibrations, etc
- Improved power supply security.

http://www.fch.europa.eu/page/multi-annual-work-plan

Three key barriers for FC commercialisation

Three levers to unlock the benefits of stationary fuel cells[1)]



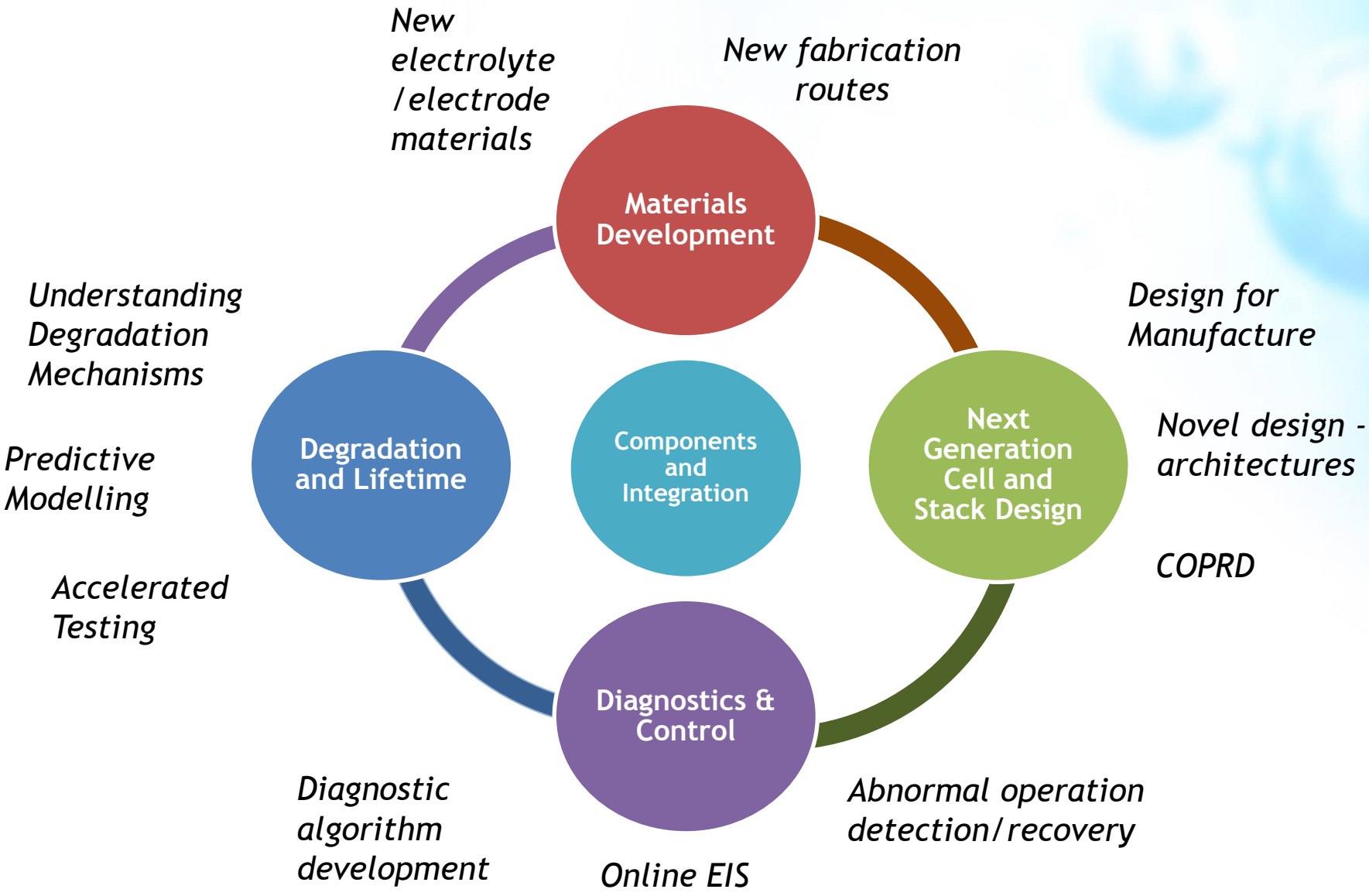
1 CAPEX and thus price level must be reduced to **enable FC competitiveness**

2 **Performance must be improved** further to prolong lifetime and increase efficiency

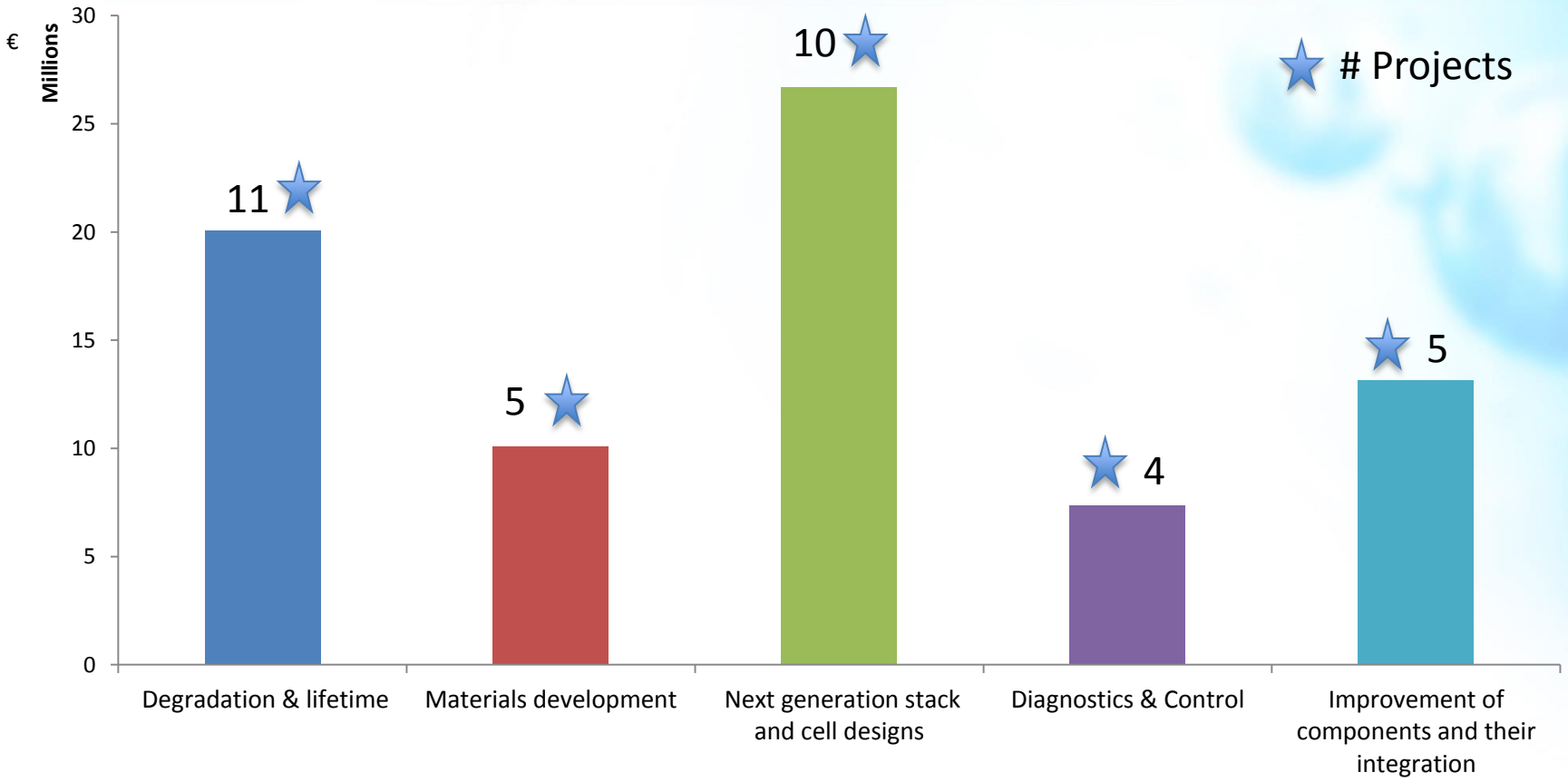
3 **Policy framework must allow to explore FC benefits** (e.g. funding to support initial commercialisation)

Source: FCH JU Coalition, Roland Berger

Research Focus Areas

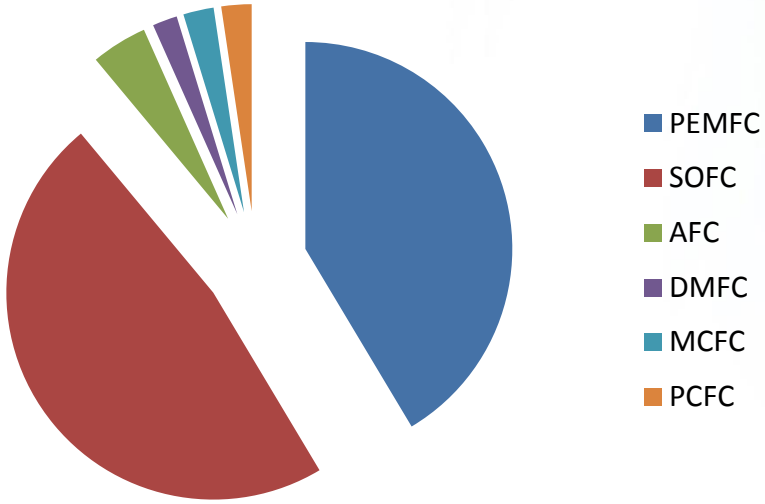


Funding - Focus Areas

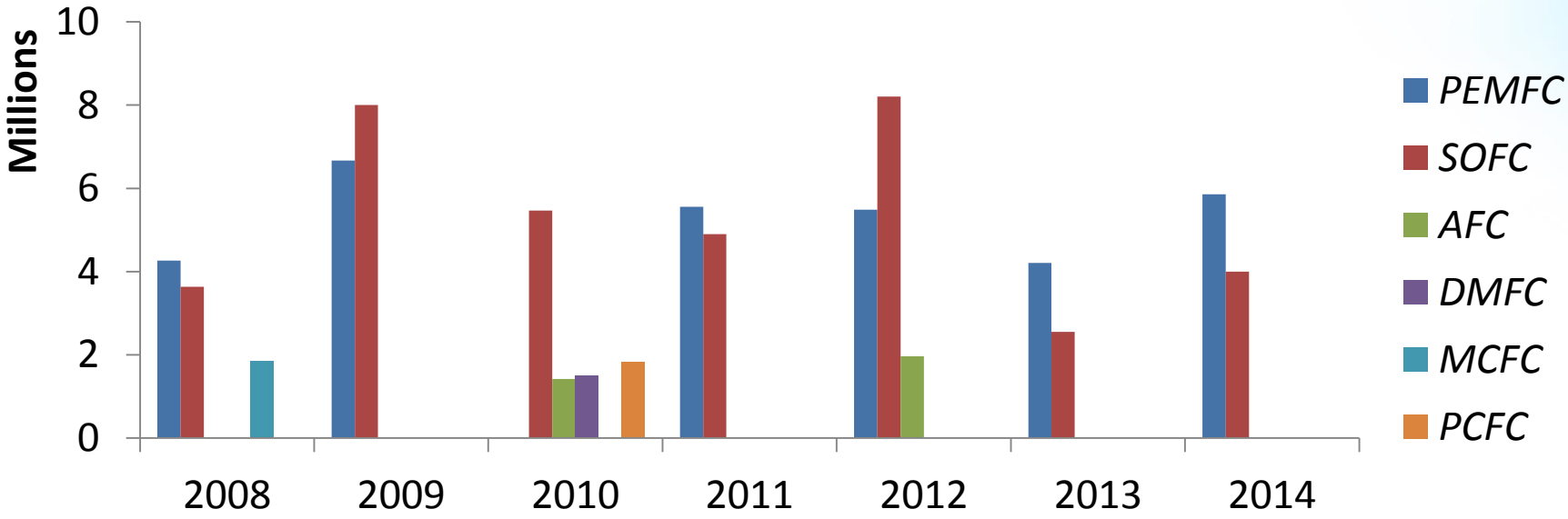


- *Next generation stack and cell design and Degradation and lifetime are the two areas receiving the biggest interest*
- *Controls and Diagnostics interest only from PEMFC and SOFC*
- *Efforts on Materials development are more SOFC oriented.*

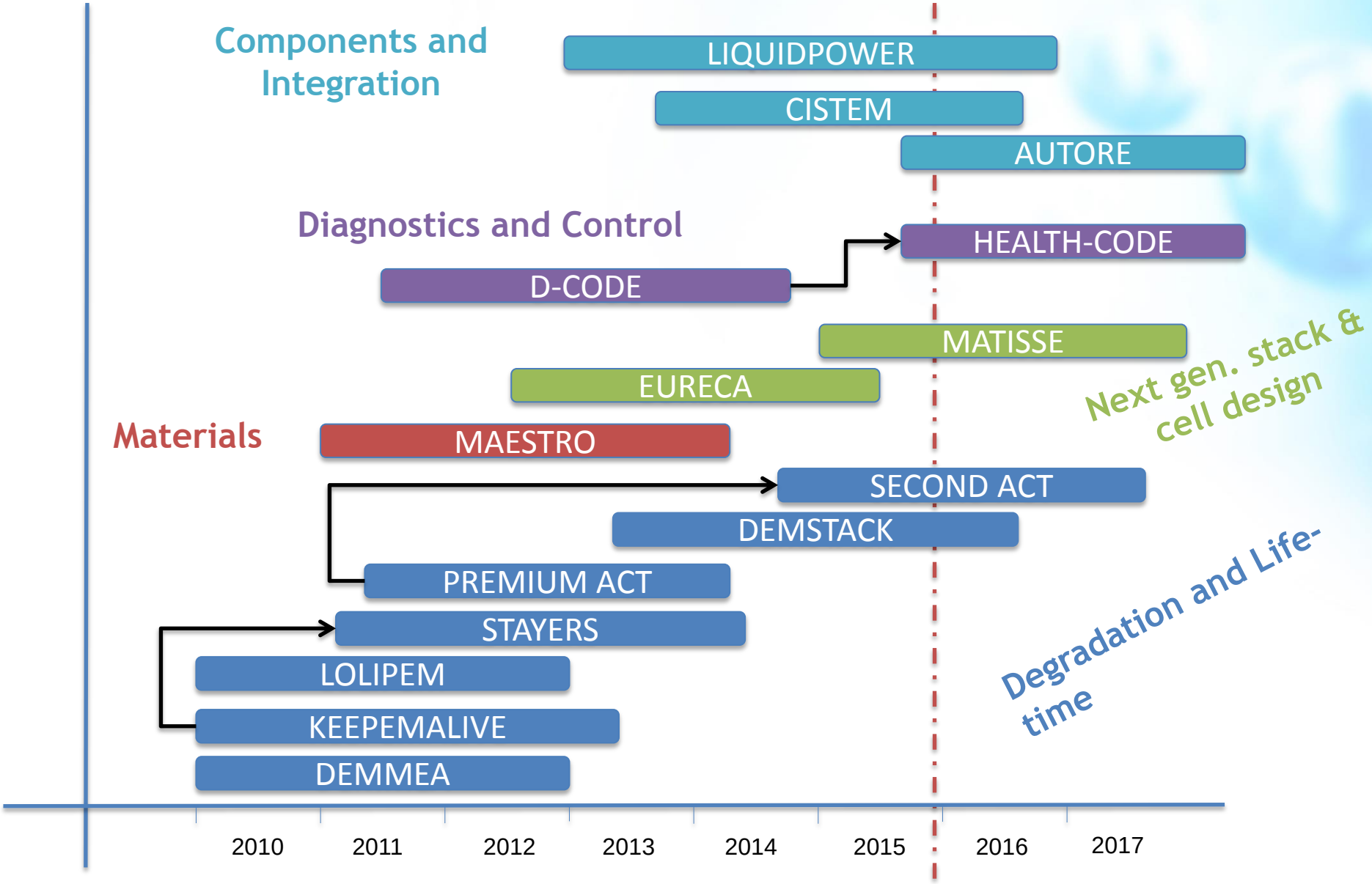
Technology Coverage



- *Research activities cover a great variety of technologies*
- *Strongest interest is shown for PEMFC and SOFC*
- *From 2012 only interest for PEMFC and SOFC*



PEMFC – Focus Areas



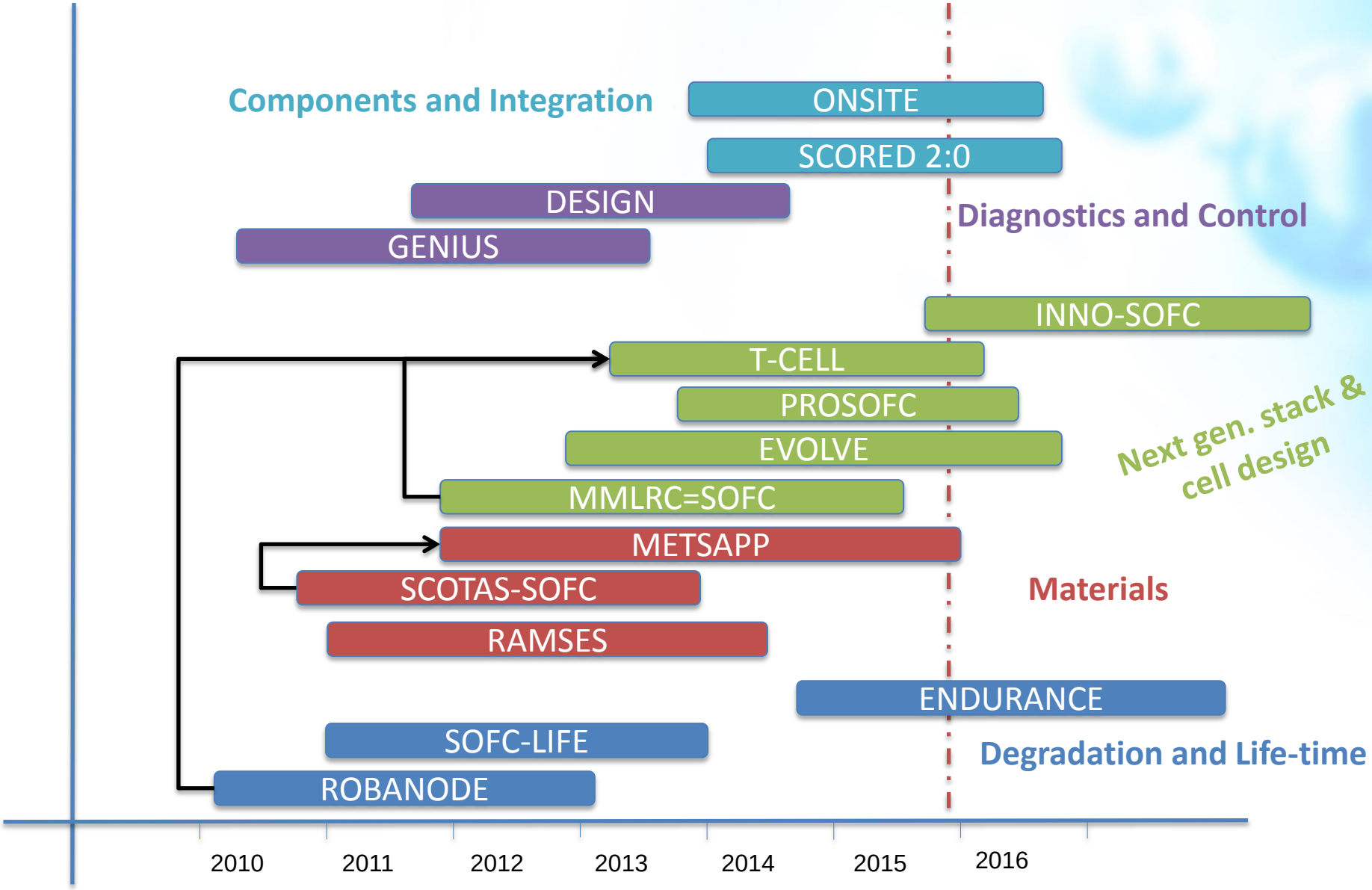
MAIP coverage - PEMFC

MAIP R&D areas	KEEPEMALIVE	DEMMEA	LOLIPEM	MAESTRO	STAYERS	PREMIUM ACT	EURECA	DEMSTACK	MATISSE	SECOND ACT	D-CODE	CISTEM	LIQUIDPOWER	AUTORE	HEALTH-CODE
Degradation & Lifetime	X	X	X		X	X		X	X	X		X			
Materials				X			X								
Cell and Stack Design							X		X	X					
Diagnostics & Control										X	X				X
Components & Integration							X		X			X	X	X	

X Primary Objective

X Secondary Objective

SOFC - Focus areas



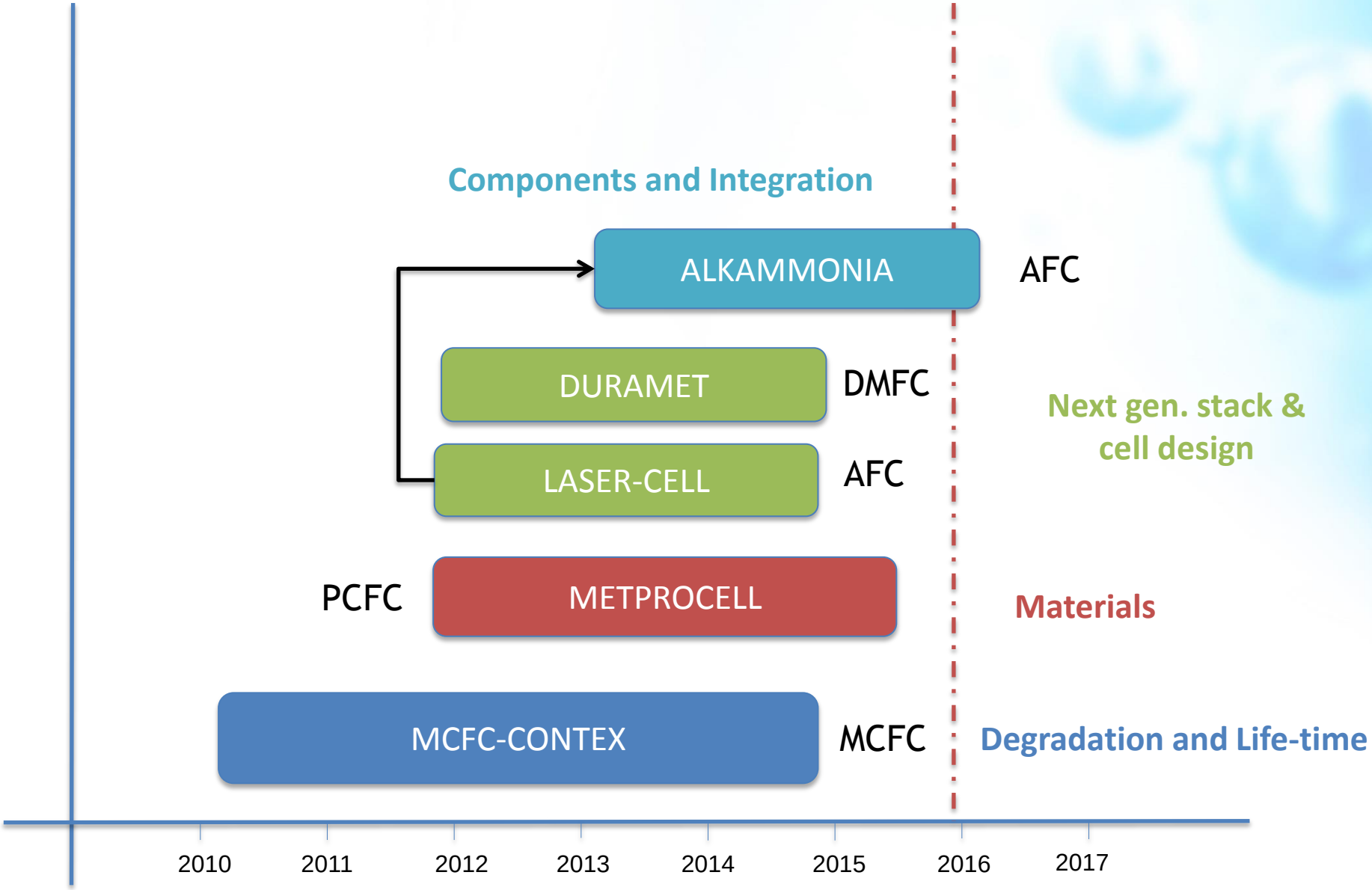
MAIP coverage - SOFC

MAIP R&D areas	ROBANODE	SOFC-LIFE	RAMSES	SCOTAS-SOFC	METSAPP	MMLRC=SOFC	EVOLVE	PROSOFC	ENDURANCE	GENIUS	DESIGN	SCORED:0	T-CELL	ONSITE	INNO-SOFC
Degradation & Lifetime	X	X							X						
Materials	X		X	X	X	X			X				X		
Cell and Stack Design			X		X	X	X	X	X				X		X
Diagnostics & Control										X	X				
Components & Integration												X	X	X	X

X Primary Objective

X Secondary Objective

Other FC technologies - Focus Areas

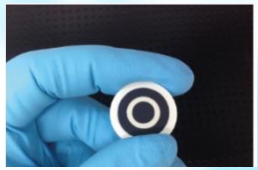


Projects' progress - Results

CISTEM – For HTPEMFC 2000h long-term test with a BoA at 0.3A/cm2 showing less than 4μV/h degradation rate

CISTEM
Construction of Improved HT-PEM MEAs and Stacks for Long Term Stable Modular CHP Units

T-CELL – Triode operation results in 40-50% lower carbon deposition in commercial anodes



SCORED 2:0 - New types of surface treatment (instead of coating layers) are being evaluated, which might constitute a new approach at corrosion protection

METPROCELL - Showing some promising results for the PCFC technology, displaying high power densities from 513-762mW/cm-2

METPROCELL

Laser-cell

- Electrode substrate cost decrease by 70% and stack production by 31%
- Modelled cost is expected to be 1255Euros/kW

ALKAMMONIA

Prototype for a novel ammonia fueled alkaline fuel cell system has been developed.

AFC

Horizontal Aspects - Energy RTD

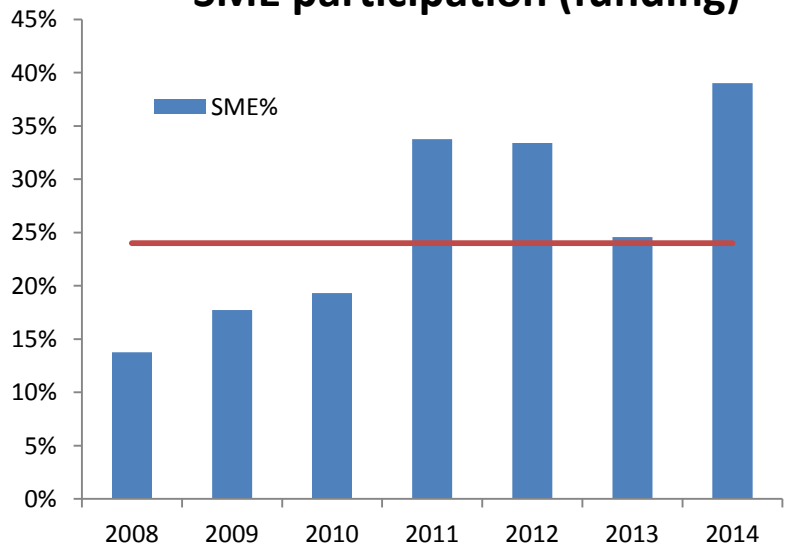
Dissemination and exploitation

- ✓ 100+ conference presentations
- ✓ 110+ Publications
- ✓ 6 patents submitted
- ✓ Project websites
- ✓ Workshops

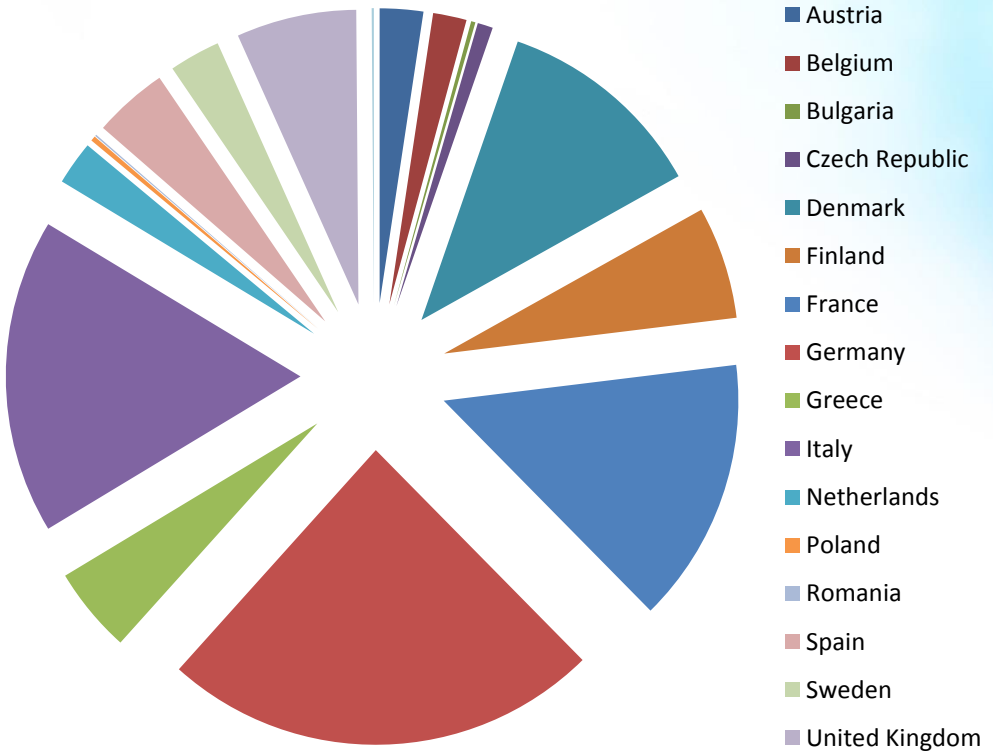
Training and Education

- ✓ 16+ PhD and 16+ Post-Doc trained/recruited

SME participation (funding)



Distribution of funding among Member States



Conclusions

- ✓ Comprehensive coverage of MAIP/MAWP objectives
- ✓ FCH JU supports a broad range of technologies
- ✓ PEMFC more focused on degradation topics
- ✓ SOFC more focused on Materials Development
- ✓ Except PEMFC and SOFC no other technology is yet showing an interest in Diagnostics and Control.