



Programme Review Days 2016

Panel 1: Technology validation in transport applications

Moderator: Enrique Girón, FCH JU Project Officer
Co-moderator: Deborah JONES, Uni. Montpellier

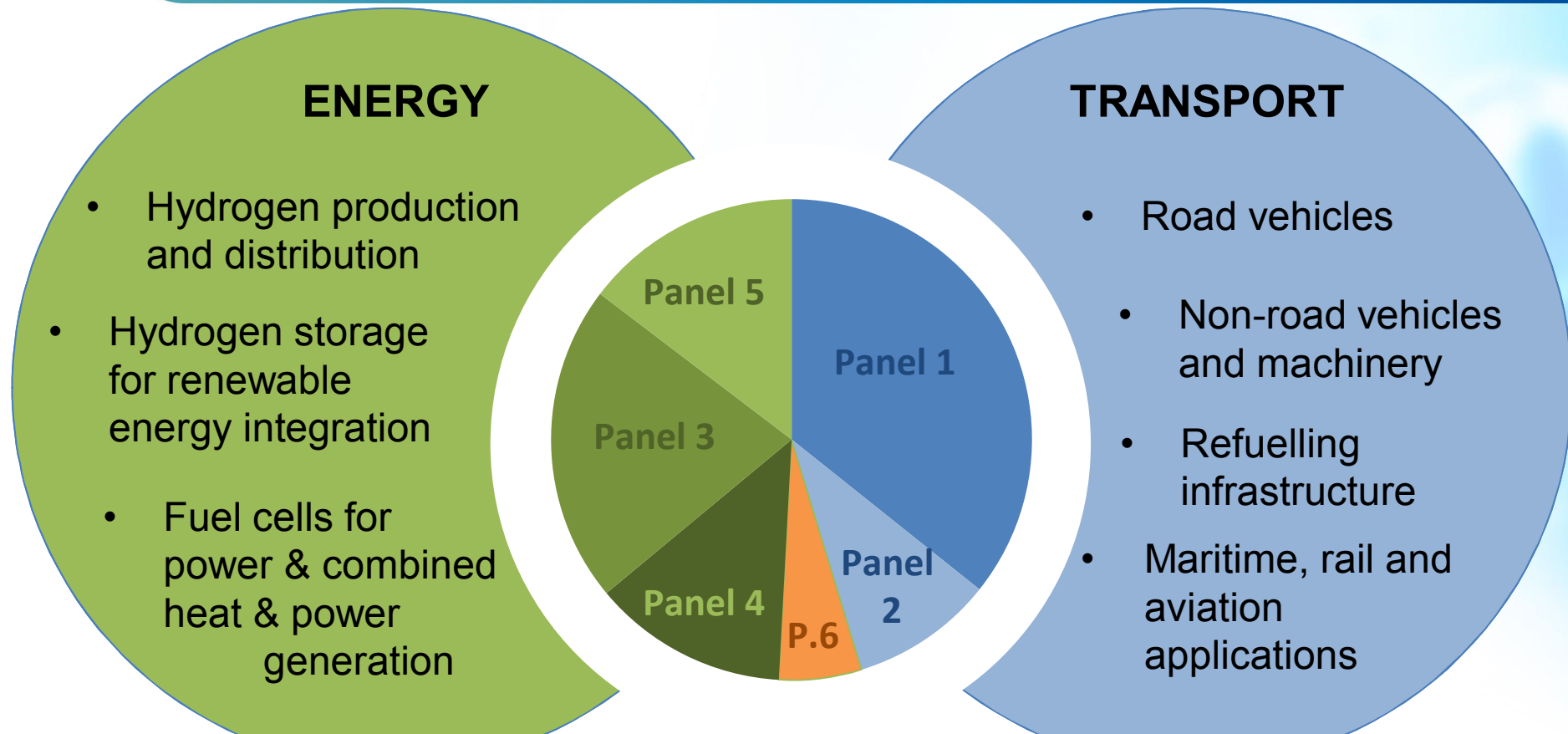


<http://www.fch.europa.eu/>

In the agenda

13:05	15:00	TECHNOLOGY VALIDATION IN TRANSPORT APPLICATIONS: vehicles, infrastructures, APU, fuel cells (Panel 1) – Moderated by Enrique GIRON and Deborah JONES
13:05	13:15	Portfolio presentation
13:15	13:35	Car projects: SWARM, HyFive and H2ME
13:35	13:50	HYCARUS
13:50	14:00	Q&A
14:00	14:20	Bus projects: HIGH V.LO-CITY, HYTRANSIT, CHIC, 3EMOTION
14:20	14:35	NEWBUSFUEL
14:35	14:50	PURE
14:50	15:00	Q&A

FCH JU portfolio 2008-2015: 185 projects, 638 M€



Cross-cutting

(e.g. standards, safety, education, consumer awareness, ...)



**Panel 1 –
Transport
validation**

**Panel 2 –
Transport
research**

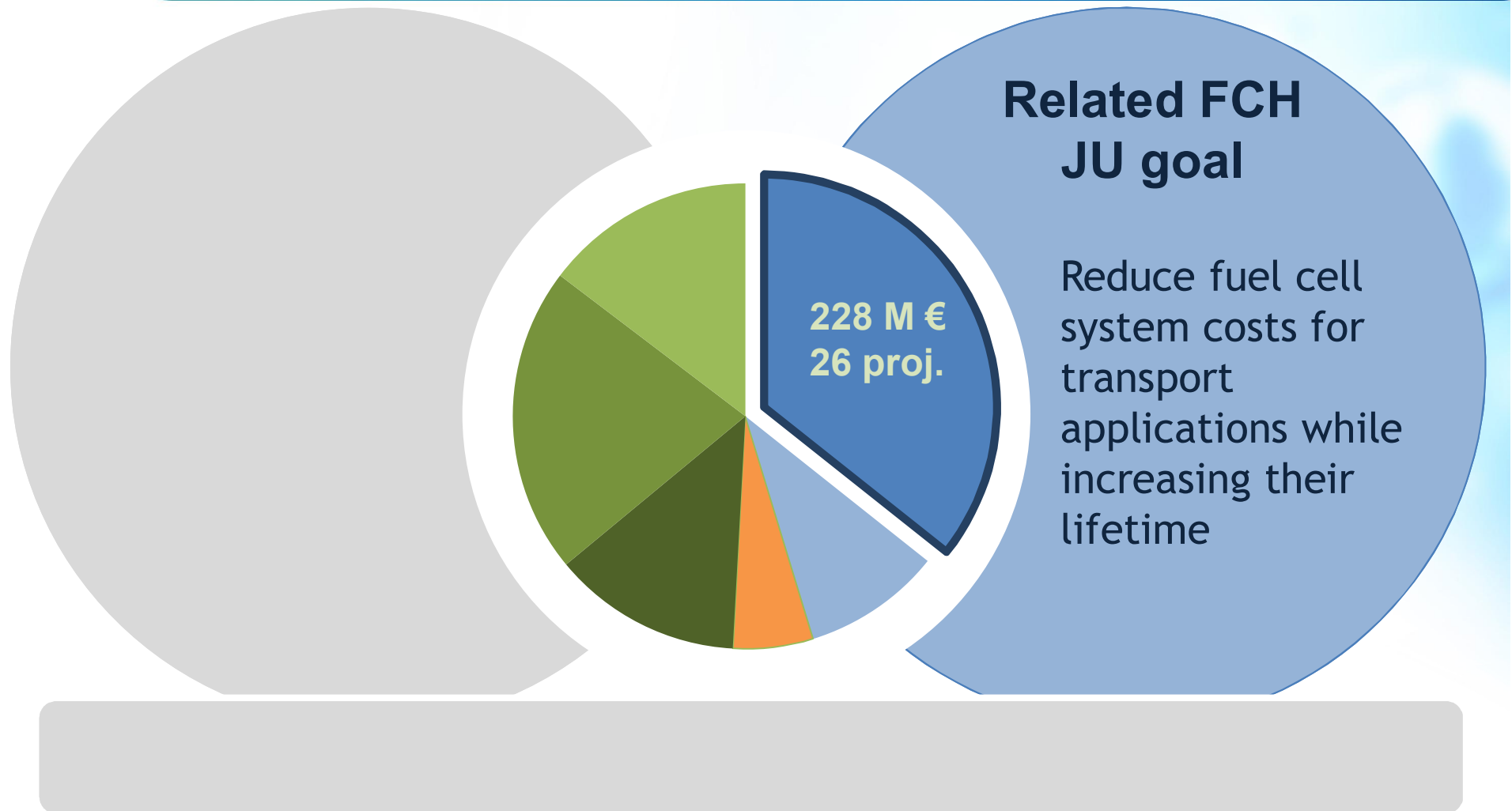
**Panel 3 –
Stationary
validation**

**Panel 4 –
Stationary
research**

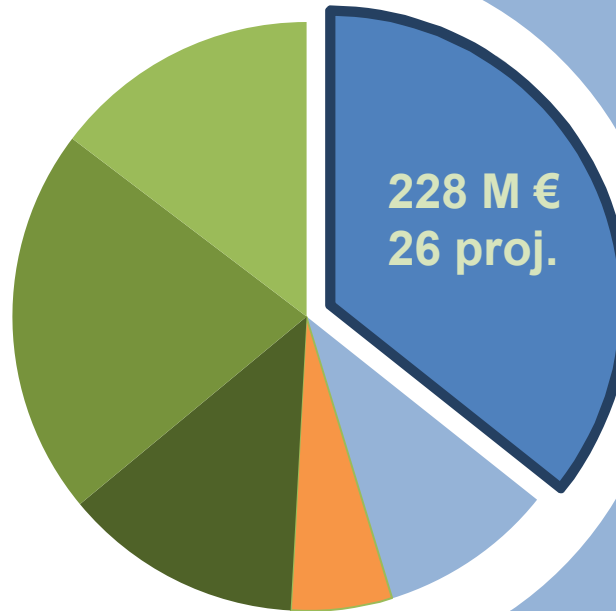
**Panel 5 – H2
prod, distrib.,
storage**

**Panel 6 –
Cross-
cutting**

Panel 1: Technology validation in transport applications



Panel 1: Technology validation in transport applications

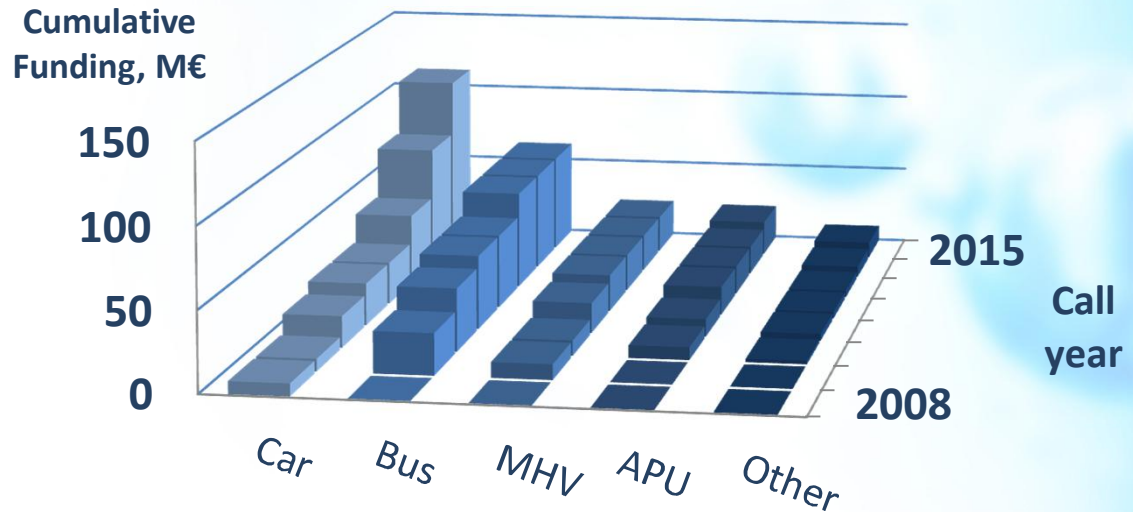
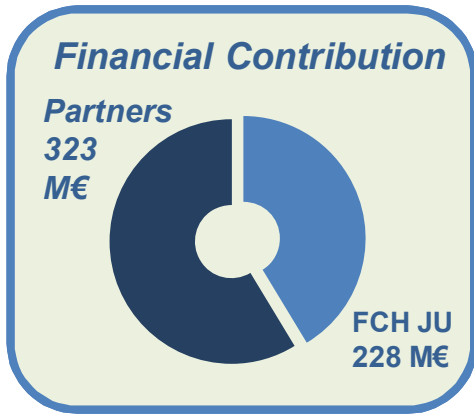


Related FCH JU goal

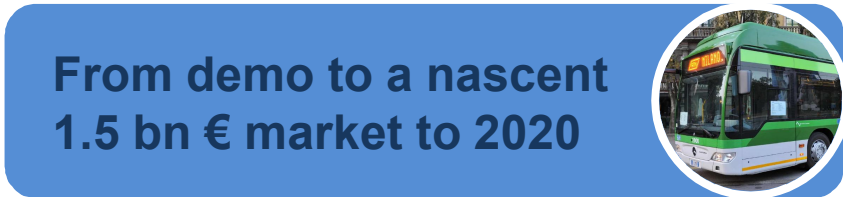
Reduce fuel cell system costs for transport applications while increasing their lifetime

On the road to deployment

26 projects
228 M€

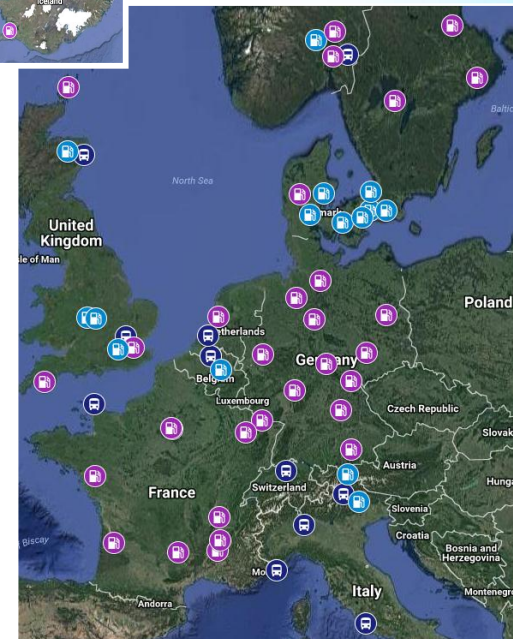


From national plans to a EU strategy



From demo to a nascent 1.5 bn € market to 2020

- ✓ >45 HRS
- ✓ >1,500 cars
- ✓ 67 buses in 12 cities

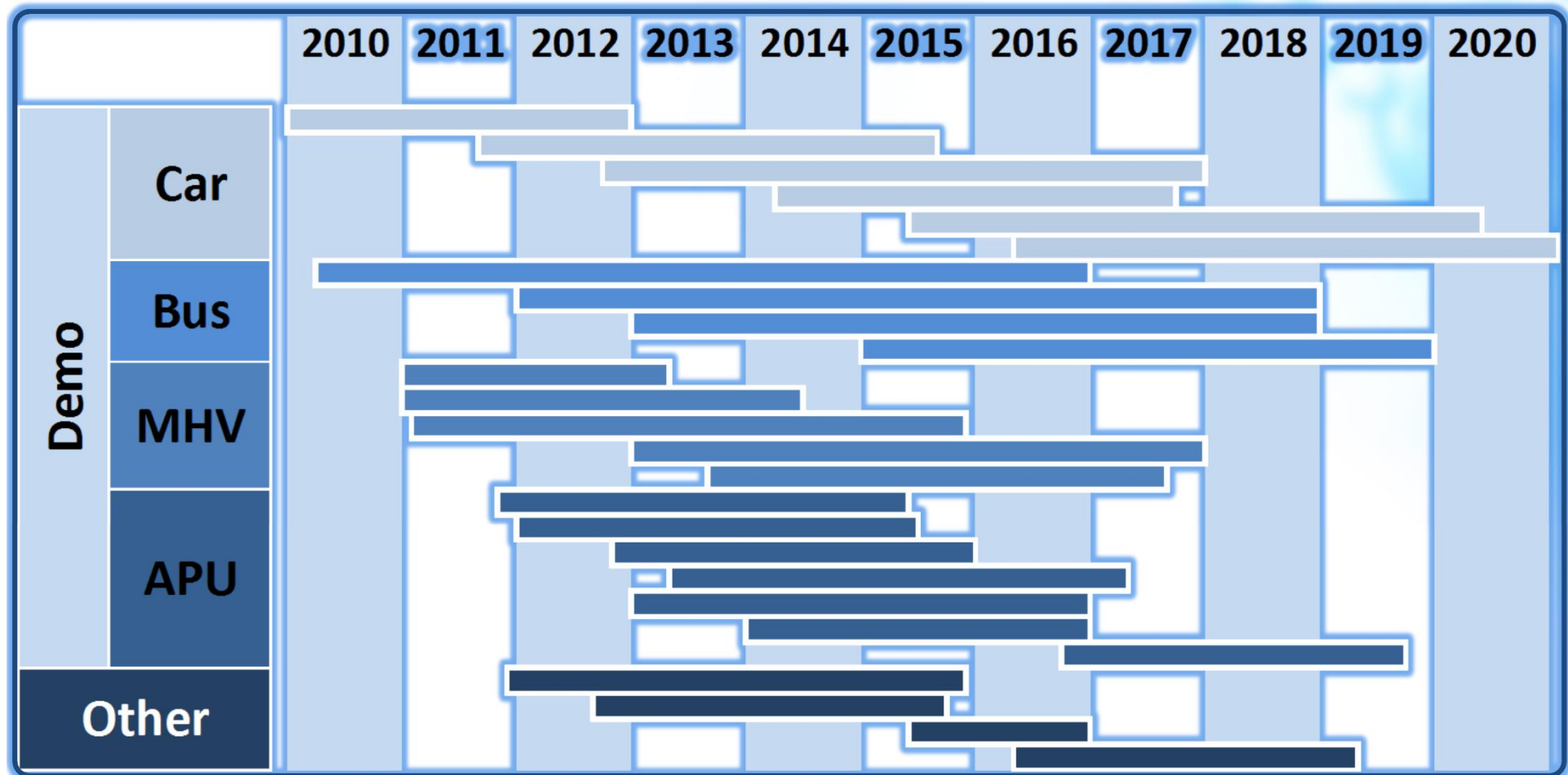


First steps to EU business case

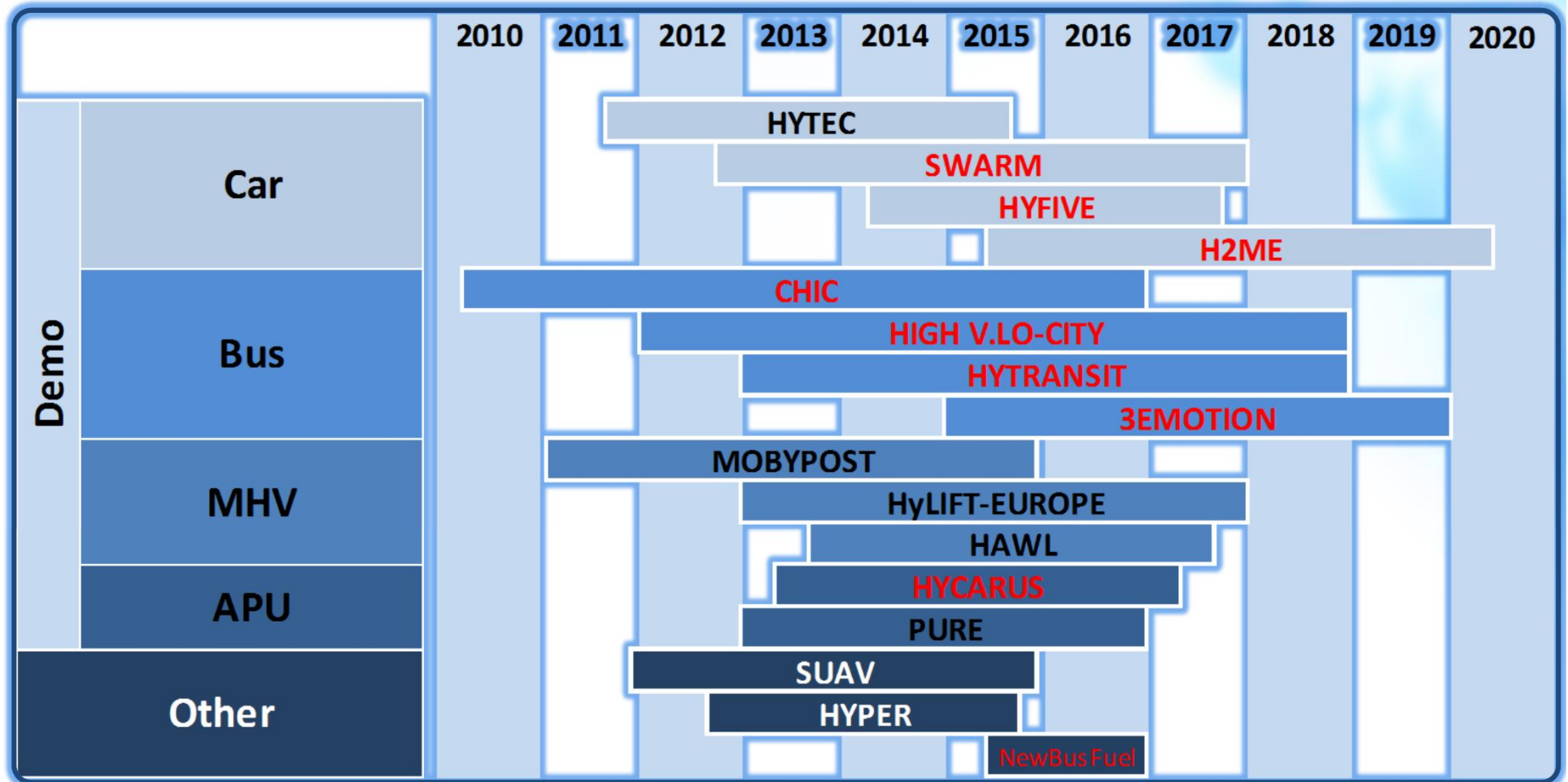
- ✓ >250 MHV
- ✓ 10 sites

From demonstration to the market

26 projects
228 M€








16 projects/162 MEUR in the 2016 programme review









Cars: Meeting our technical objectives

CARS	FCH JU project results 2015		MAWP target 2017
Specific FC system cost, €/kW		<	150
FC vehicle cost, k€ (C-segment)		<	70
Tank-to-wheel efficiency, %		>	42
Availability, %		>	98
FC system lifetime, h		>	5,000

- ✓ > 1,000,000 km driven since projects started
- ✓ > 4,400 refuelling operations within 2015 only
- ✓ > 13,300 kg of H₂ consumed since projects started
- ✓ 1.3 kg(H₂)/100km as average consumption
- ✓ 99.2% average availability
- ✓ Up to 594 km of driving range








Buses: An “almost” commercial product

BUSES	FCH JU project results 2015		MAWP 2017 Objectives
FC bus system lifetime , h		>	15,000 2x8,000
FC bus cost, k€		<	700
Fuel consumption, kg/100km		<	8.51
Availability, %		>	90

- ✓ > 446,000 km driven since projects started
- ✓ > 2,500 refuelling operations within 2015
- ✓ > 42,900 kg of H₂ consumed since projects started
- ✓ 9.8 kg(H₂)/100km as average consumption
- ✓ Up to 86% of availability



MHV: Building the European business case

MATERIAL HANDLING VEHICLES	FCH JU project results 2015	MAWP 2017 Objectives	
Specific FC system cost, €/kW @10 kW		<	1,500
H ₂ storage system cost, €/kg H ₂		<	1,000
Lifetime, h		<	10,000
Efficiency, %		>	50
Availability, %		>	95

- ✓ > 11,300 refuellings
- ✓ > 4,000 kg of H₂ consumed
- ✓ ~ 45.000 h of operation
- ✓ 3 OEM and 6 models
- ✓ 48 units deployed



HRS: Setting up networks across Europe

REFUELLING STATIONS	FCH JU project results 2015	MAWP 2017 Objectives	Non-European SoA
Cost of H ₂ at pump, €/kg	✓	5 ¹ -11 ²	7 ¹ -16 ²
CAPEX (M€) ³	✓	1-2.5	1.3-3

¹Hydrogen produced from hydrocarbons

²Hydrogen produced from renewables

³700 bar HRS, 200-1000 kg/day capacity including on-site storage

- ✓ 8 countries
- ✓ 130,000 kg H₂ refuelled within 2015 only
- ✓ 17,500 refuelling operations within 2015 only
- ✓ 96% average availability in 2015

Summary



Cars: Meeting our technical objectives



Buses: An “almost” commercial product



MHV: Building the European business case



HRS: Setting up networks across Europe



APU: Exploring applications



Thank you for your attention

Enrique Girón

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Further info :

- FCH JU : <http://www.fch.europa.eu/>
- HYDROGEN EUROPE : <http://hydrogeneurope.eu/>
- N.ERGHY : <http://www.nerghy.eu>

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