



Il mercato dei veicoli a basso impatto ambientale

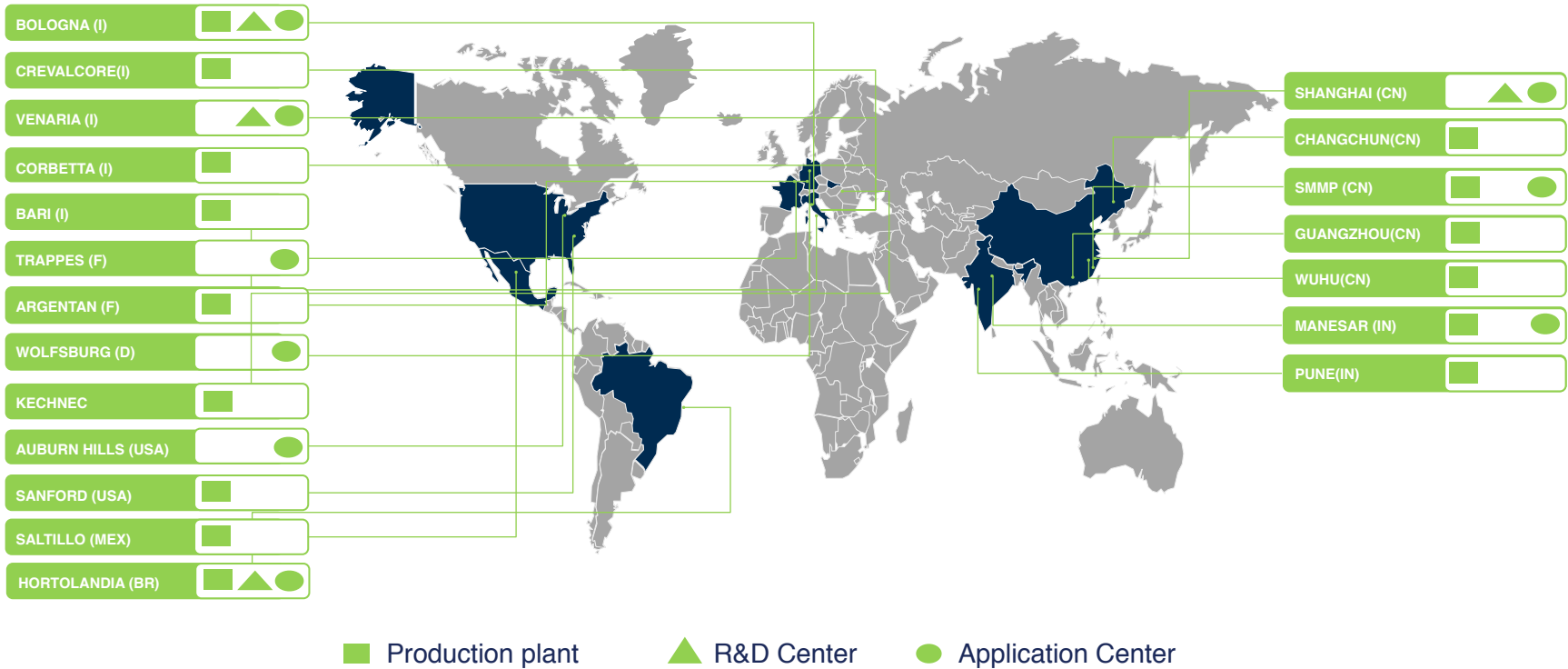
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Responsabile Strategic Marketing Magneti Marelli Powertrain

Bologna, Italy

March, 30th 2016

Magneti Marelli Powertrain Worldwide Presence



Sales 2015	919 mio €	Production units	15
R&D Centers	4	Application Centers	9
R&D*	5.7%	Investments*	13.7%
Employees worldwide	5.293		

* % of "make" sales

GASOLINE ENGINE CONTROL

- Multifuel systems
- ECUs
- Injectors GDI & PFI
- GDI pumps
- Throttle bodies
- Intake manifolds
- Fuel rails



DIESEL ENGINE CONTROL

- ECUs
- Mechatronic throttle bodies
- Intake manifolds with variable swirl control
- Selective catalytic reduction



HEV / BEV

- VMU
- Inverter
- Electric Motor



TRANSMISSIONS

free choice
The pleasure of change

- Freechoice AMT
- Hydraulic power units
- DCT
- TCU



HY-KERS • ADVANCED HYBRID SYSTEM LaFerrari

From F1 KERS technology Magneti Marelli Powertrain has developed with Ferrari an hybrid system for the limited edition passenger car LaFerrari: the HY-KERS system. This technology guarantees high performances with maximum efficiency.



HYBRID VEHICLE WITH AUXILIARY MOTOR (BSG) AND DCT WITH INTEGRATED TRACTION MOTOR

LaFerrari



HY-KERS fitted on the LaFerrari generates total power of 863 HP. It consists of a Ferrari V12 6.3-l aspirated combustion engine with 800 HP running on gasoline, and of an electric motor consisting of two electric engines with a total power of 120 kW. The HY-KERS system is able to operate simultaneously to

The HY-KERS fitted on the LaFerrari consists of a Ferrari V12 6.3-l aspirated combustion engine running on gasoline, and of an electric motor consisting of two electric engines with a total power of 120 kW (about 163 HP).

The HY-KERS system is able to operate simultaneously to reduce emissions

High lights
 ICE V12 800 hp
 E-motor 163 hp
 E-motor2 25 hp
 CO₂ - 48%

MAGNETI MARELLI COMPONENTS: TRACTION & AUXILIARY MOTORS, DUAL POWER INVERTER WITH LOW & HIGH VOLTAGE DC/DC



Electric Generator 30.0 krpm
500 V - 40kW - 30 Nm



Electric Motor Generator 18.5 krpm
500 V - 140 kW - 270 Nm



Power Inverter 500 V

Electric Generator 30.0 krpm
500 V - 40kW - 30 Nm

Electric Motor Generator 18.5 krpm
500 V - 140 kW - 270 Nm

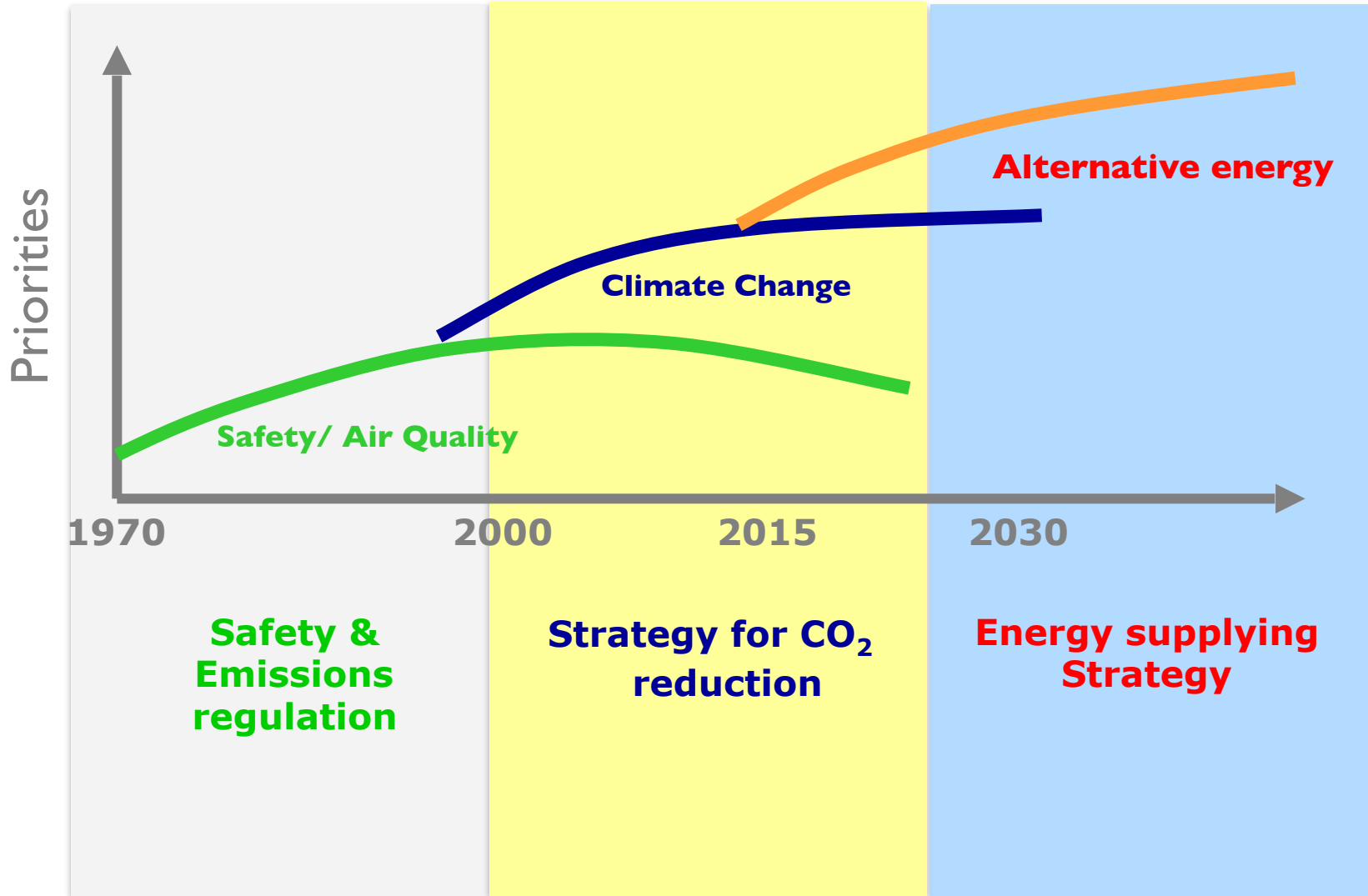
Power Inverter 500 V

HY-KERS Highlights:

- HY-KERS to power ratio >1
- No impact on vehicle dimensions
- -35 mm reduction in centre of gravity
- 100% improvement in response time
- + 20% longitudinal acceleration
- > 50% reduction in CO₂ emissions

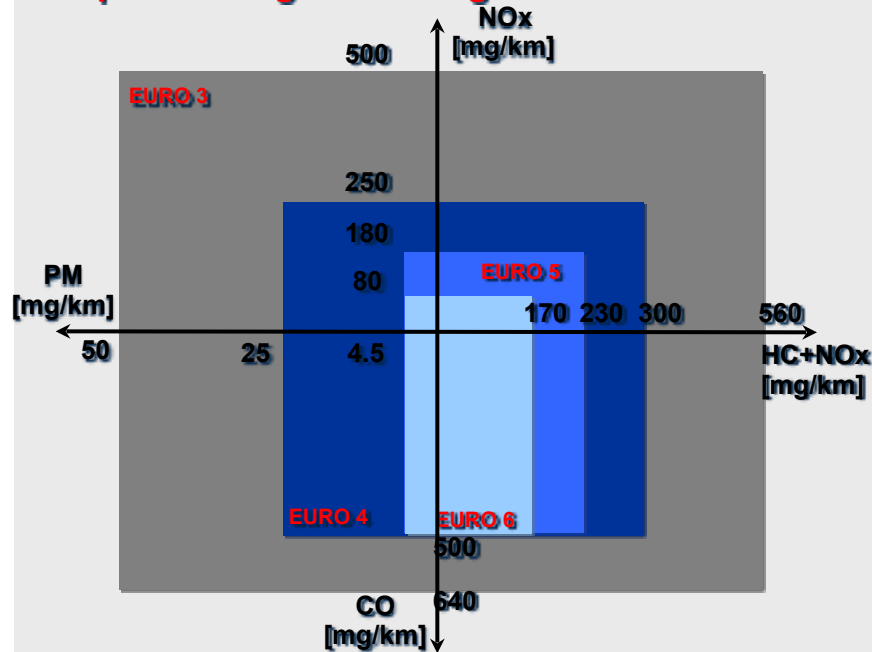
Hev/Bev type : Hybrid vehicle with auxiliary motor (BSG) and DCT with integrated traction motor
 MM components : Traction & Auxiliary motors, dual power inverter with low & high voltage DC/DC

Vehicle view point



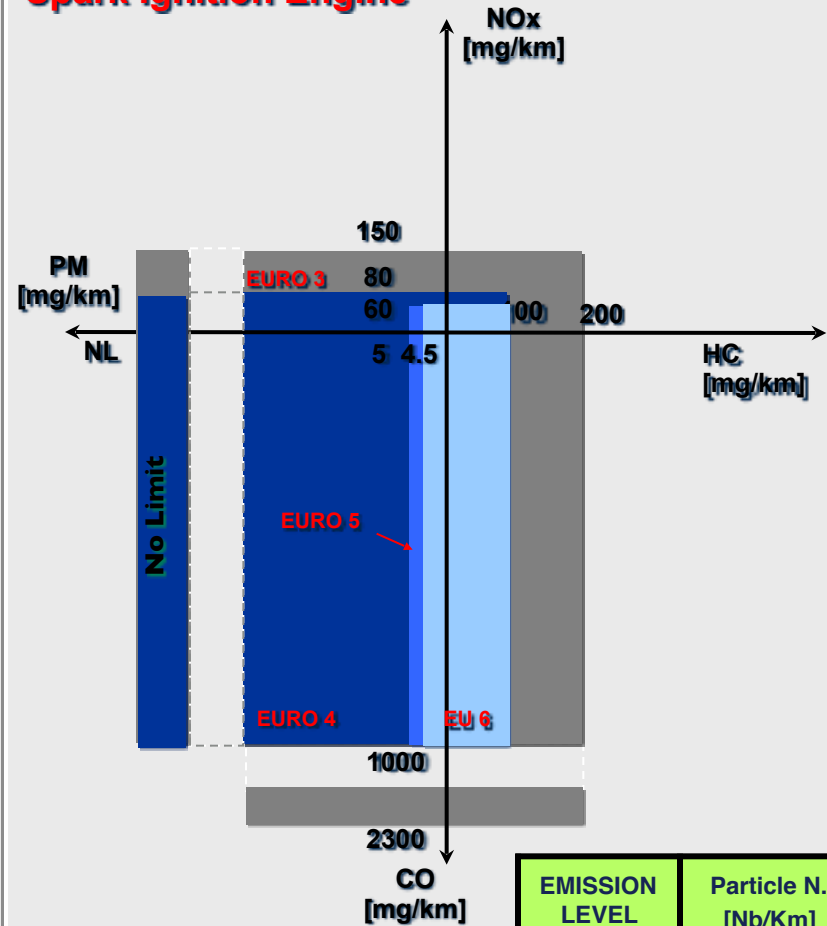
Evolution Driver: EU Emission Trend for LD Vehicles Test

Compression Ignition Engine



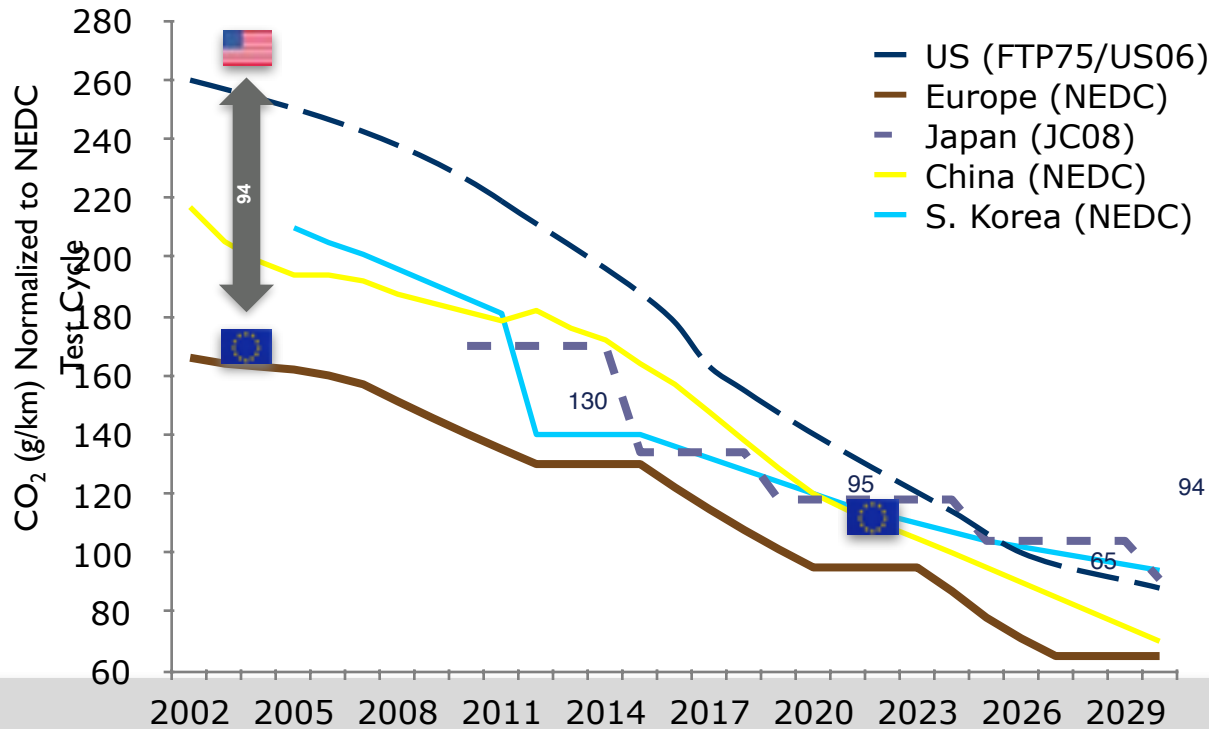
EMISSION LEVEL	Particle N. [Nb/Km]
Euro 5	$6 \cdot 10^{11}$
Euro 6	$6 \cdot 10^{11}$

Spark Ignition Engine



EMISSION LEVEL	Particle N. [Nb/Km]
Euro 6	$6 \cdot 10^{12}$
Euro 6.2	$6 \cdot 10^{11}$

CO₂ and EMISSION World Wide Legislations



Source of data: IHS GlobalInsight

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
US	T II B8	Tier II Bin 5						Tier II Bin 4			
Europe	Euro 4					Euro 5				Euro 6	
Japan	Japan '05				Japan '09						
S. Korea	Euro 3	Euro 4				Euro 5				Euro 6	
China (Beijing)	Euro 3			Euro 4				Euro 5			



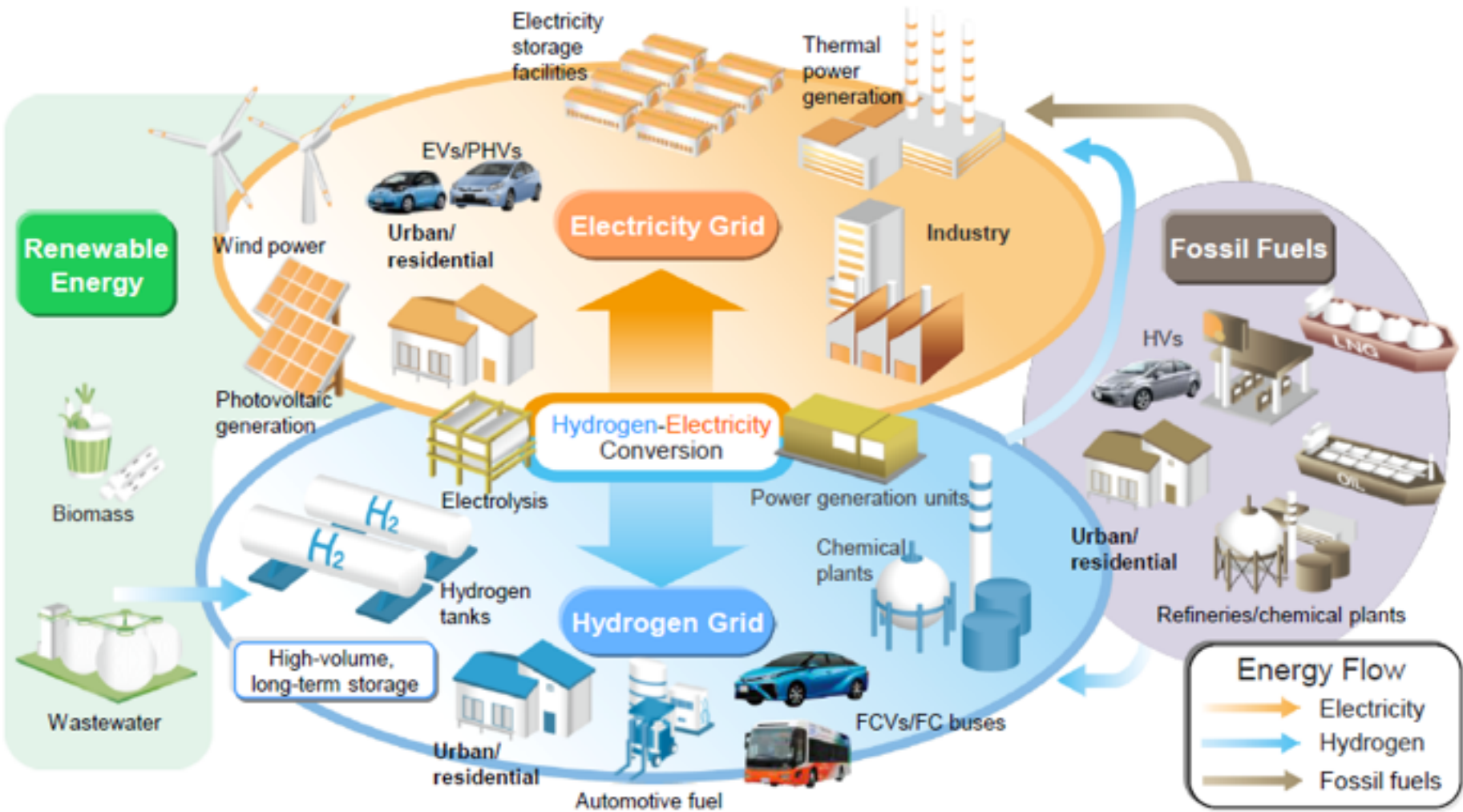
Cannondale F-1000 (1995) 10,669 kg

-11%



Cannondale FS-I Carbon 2 (2015) 9,455 kg

A Sustainable Society (Toyota Vision)



A society which uses diverse energy sources, with electricity and hydrogen infrastructures

Fuel Diversity and Use - A possible Scenario

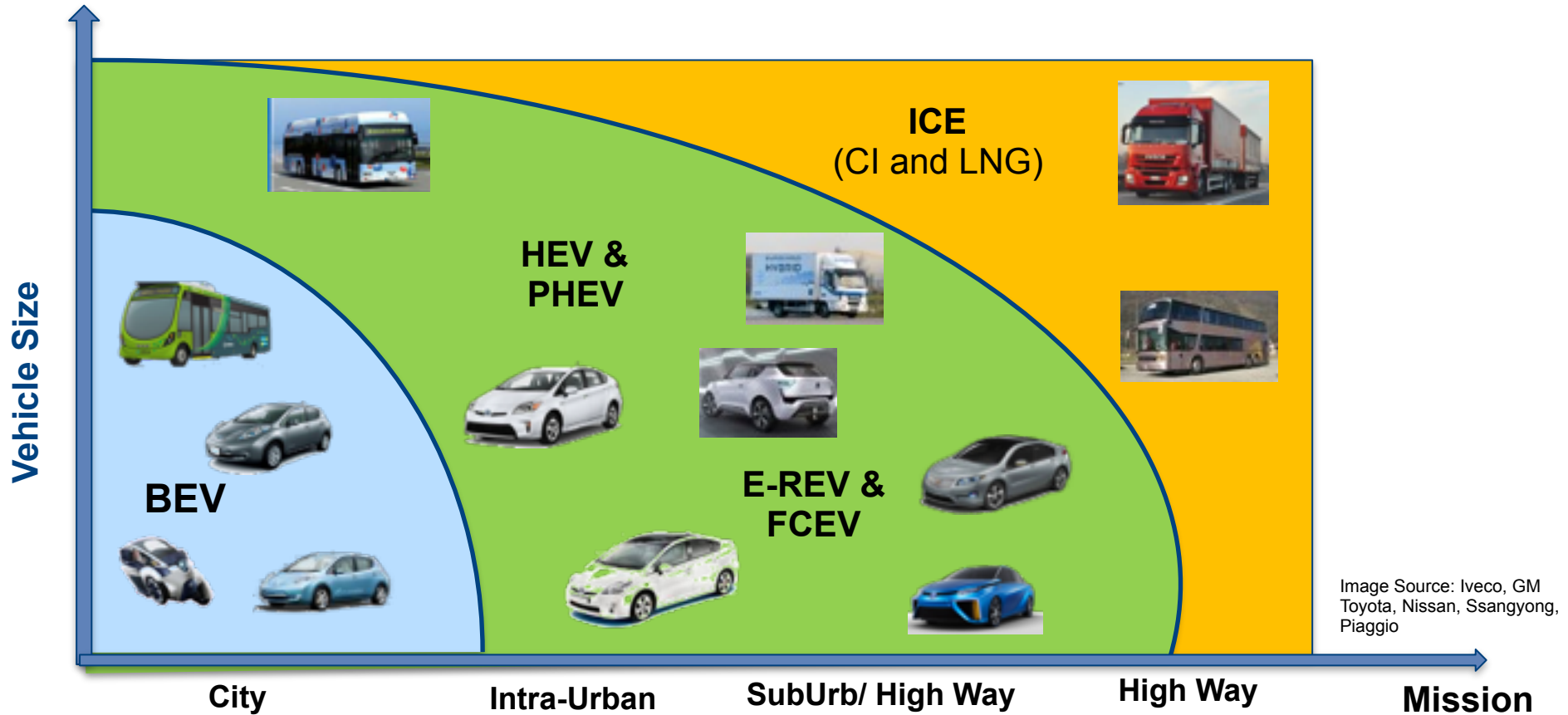
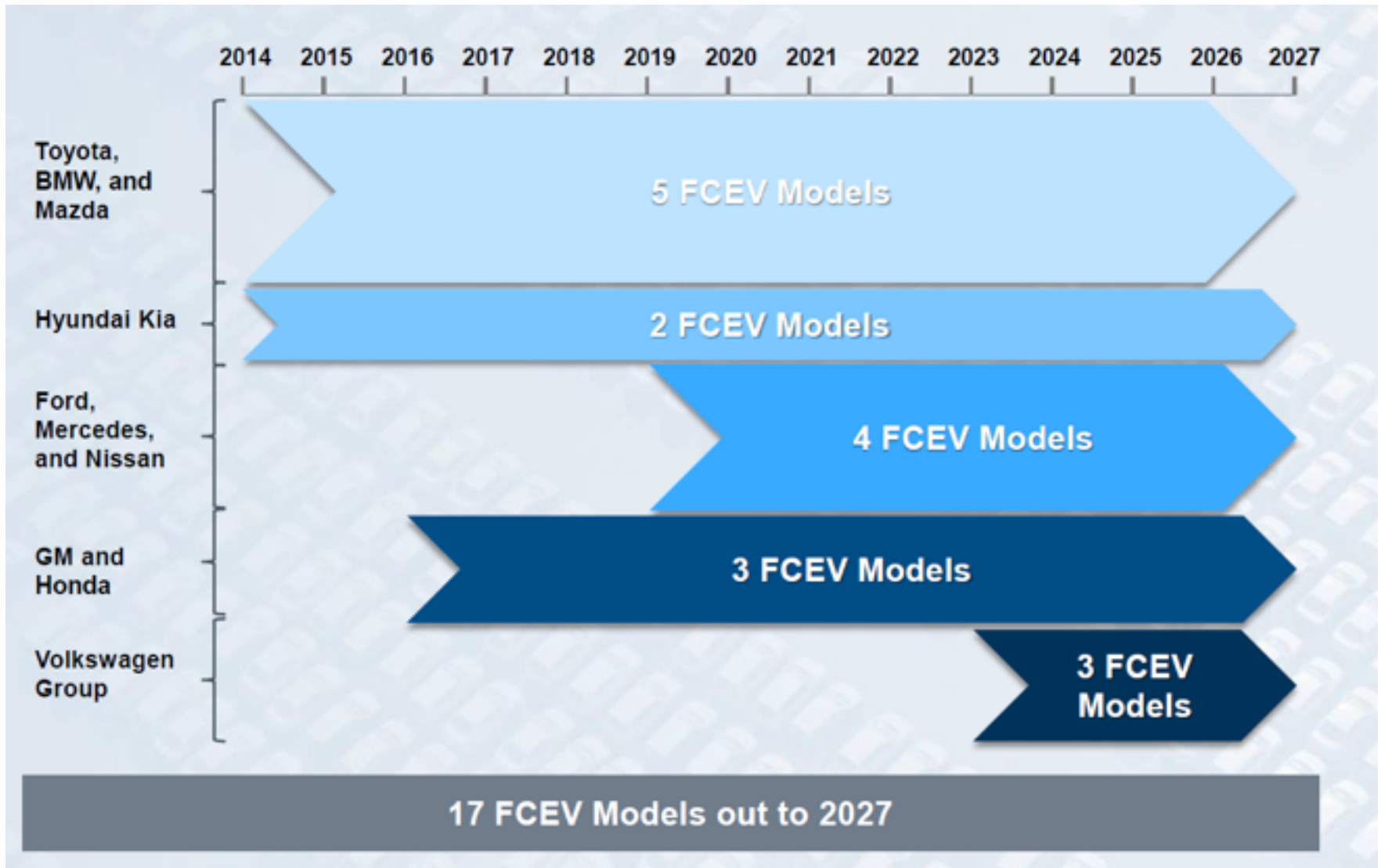


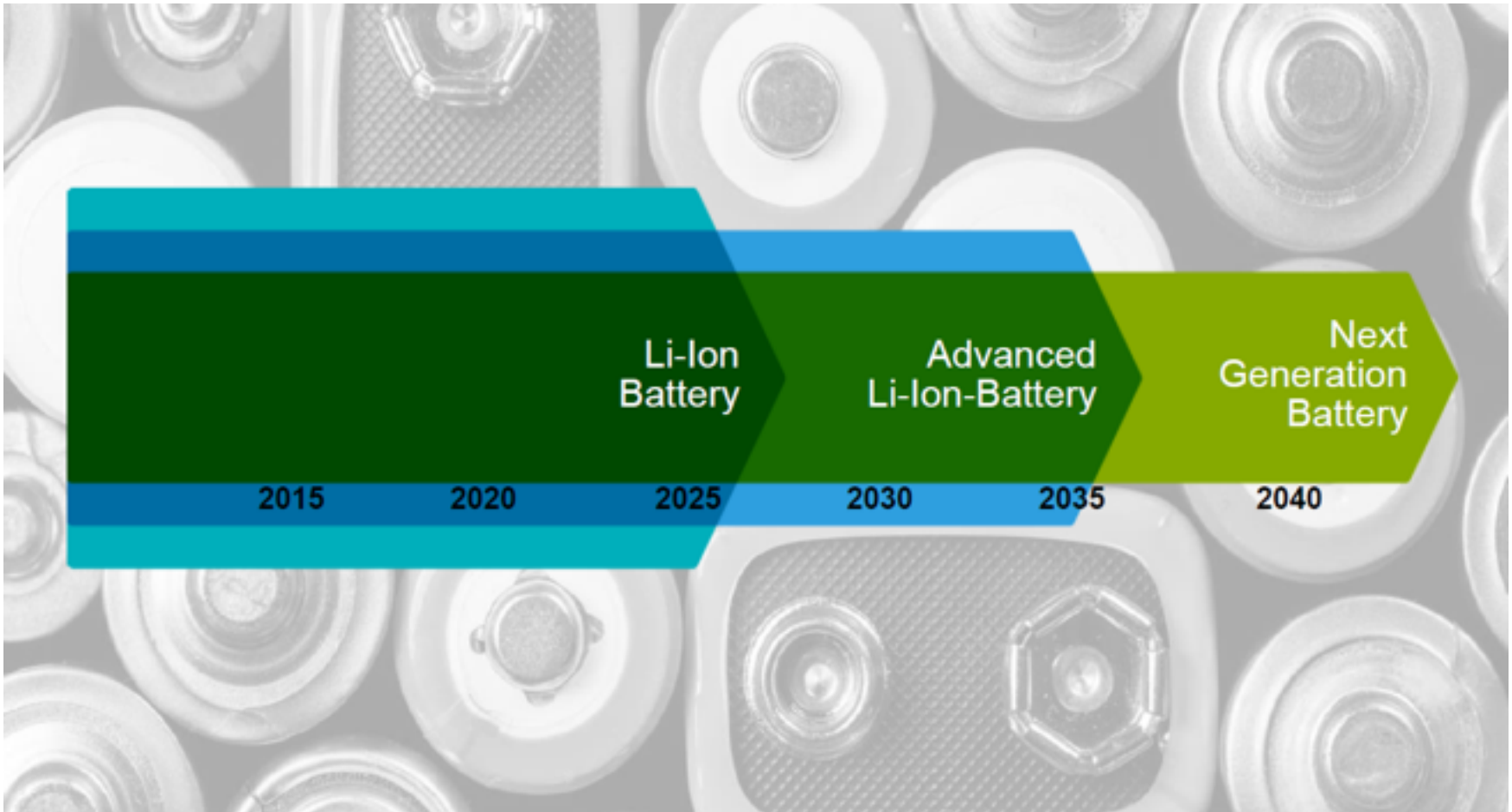
Image Source: Iveco, GM
Toyota, Nissan, Ssangyong,
Piaggio

Powertrain	Fuel	Use	Mission Profile
BEV	Electricity	short distance	
HEV & PHEV	Electricity + CNG or Synt Fuels or Carbon Fuels	wide use	
E-REV & FCEV	CNG or Synthetic Fuel or Carbon / Hydrogen	medium to long distance	
ICE	LNG, Synthetic Fuels, Carbon Fuels	long distance	

FCEV model by OEM



Hydrogen window of opportunity



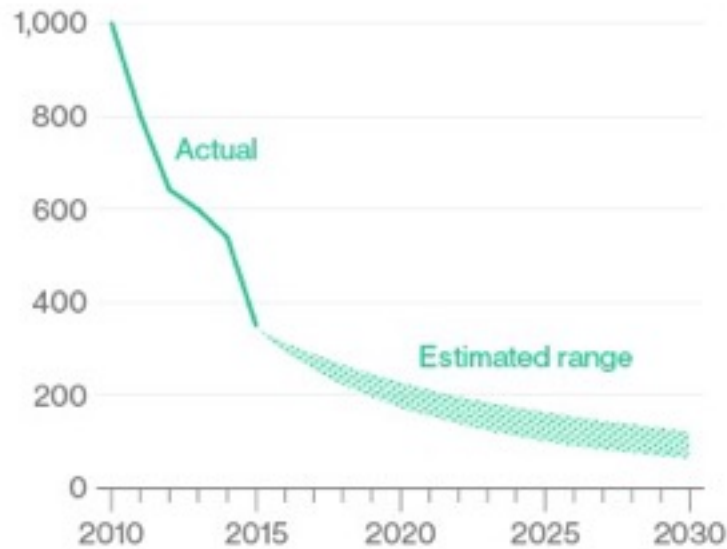
Battery cost evolution

It's All About the Batteries

Batteries make up a third of the cost of an electric vehicle. As battery costs continue to fall, demand for EVs will rise.

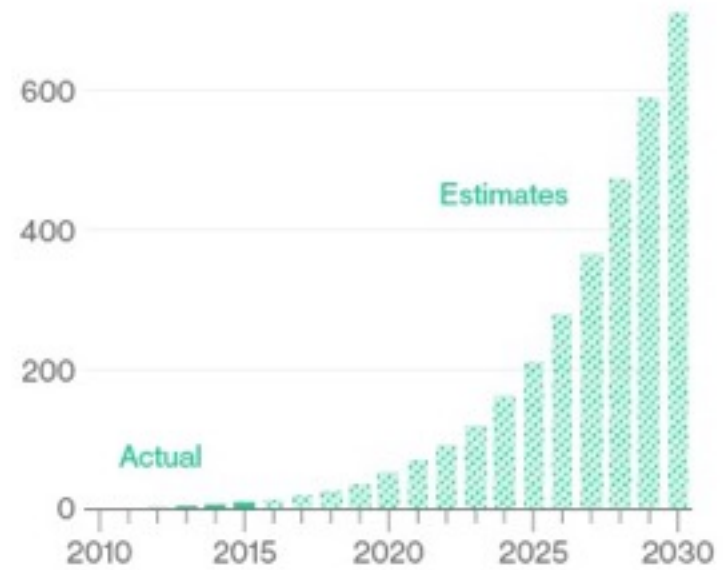
Cost for lithium-ion battery packs

\$1,200 per kilowatt hour



Yearly demand for EV battery power

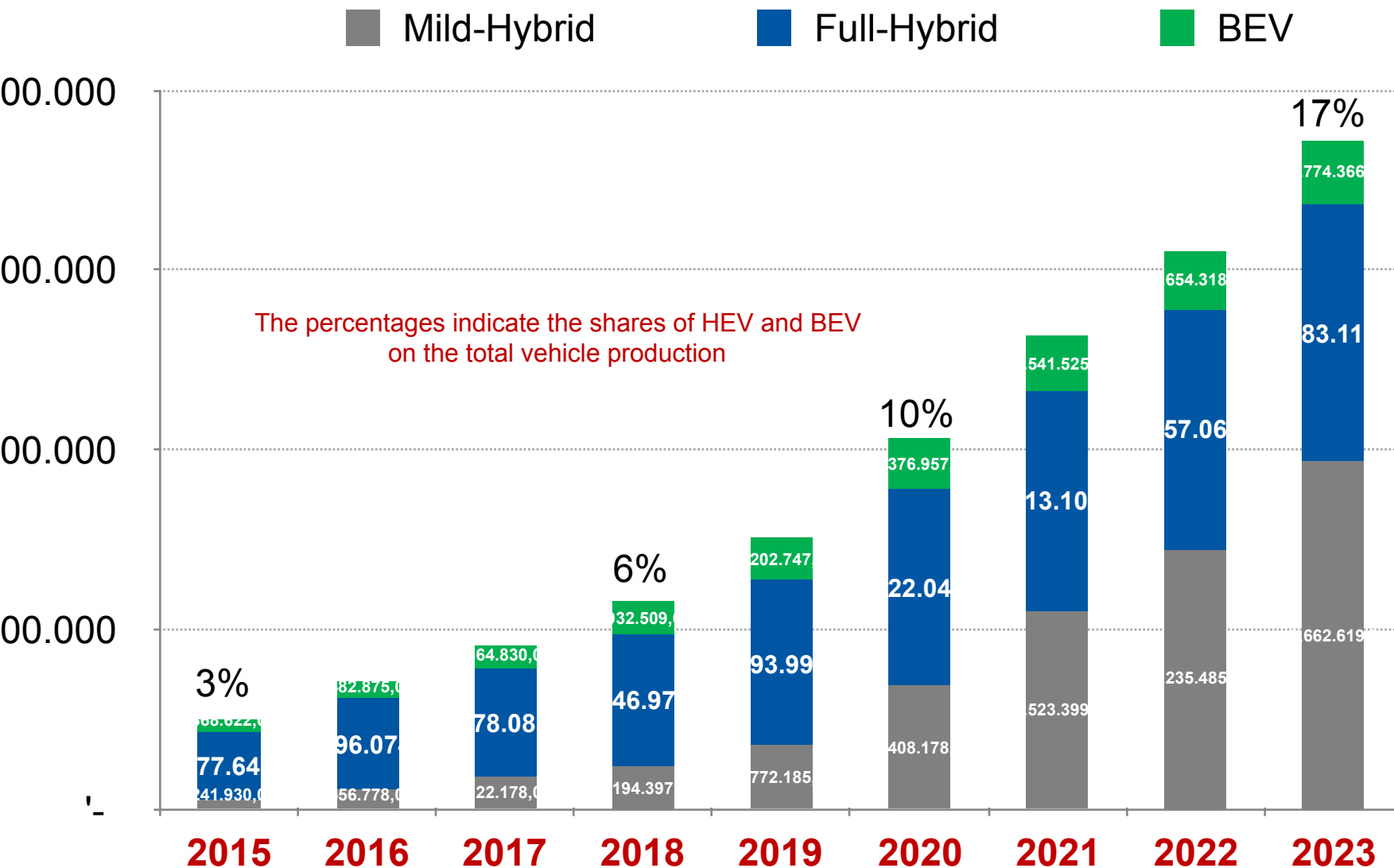
800 gigawatt hours



Source: Data compiled by Bloomberg New Energy Finance



Global vehicle production – Hybrid and Battery Electric Vehicles

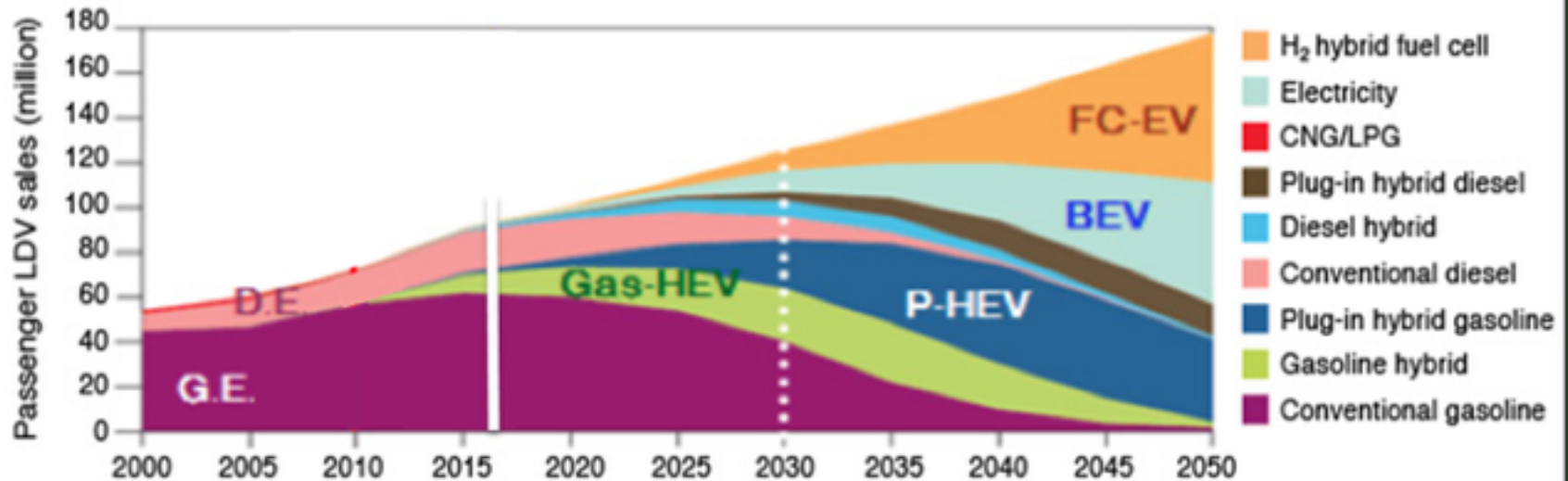


Perimeter considered: PCs and LCVs up to 6.0 tons.

Source: IHS data base

A breakdown of next-generation of car

- ▶ ~ 2016 : Conventional ICEV and Gas-HEV, PHEV occupy the mainstream.
- ▶ 2030 ~ : Electric propelled cars occupy the mainstream



Source: International Energy Agency



Savannah, first steamship to cross the Ocean (1819)

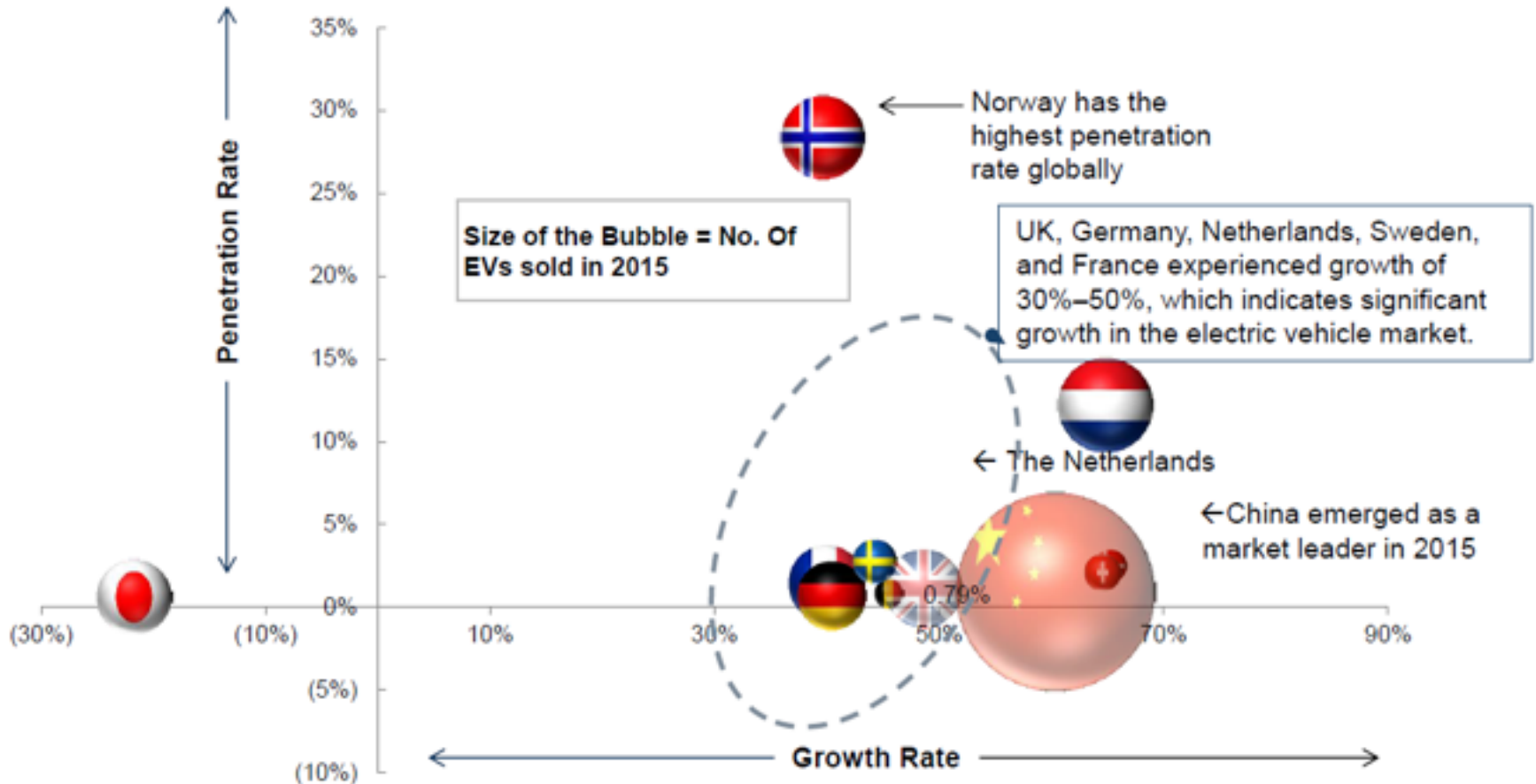
90 years



W.T. Lawson, last commercial sailboat to cross the Ocean (1907)

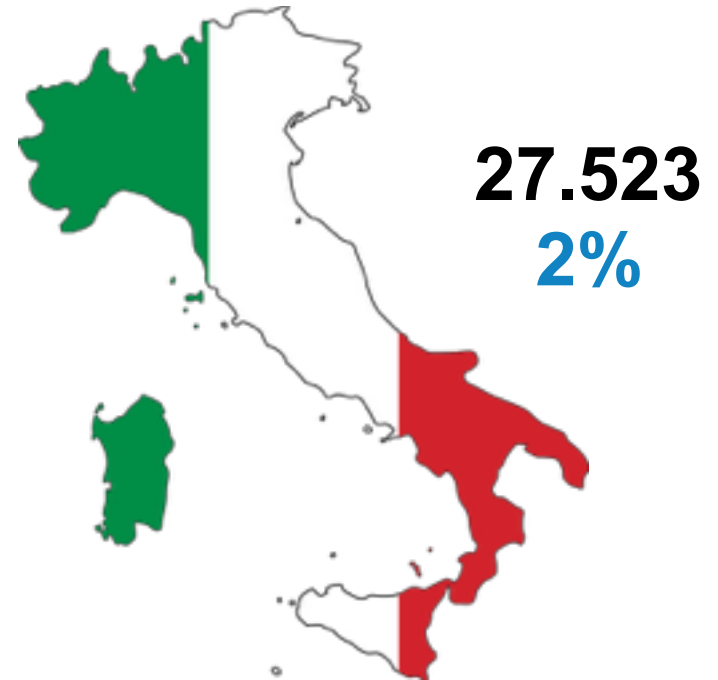
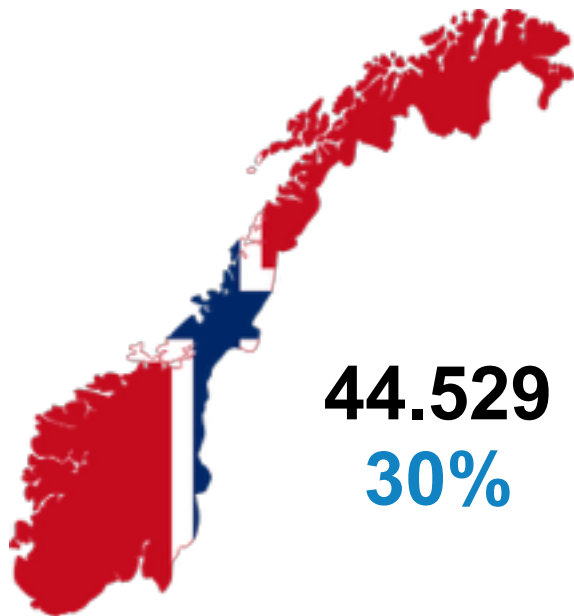
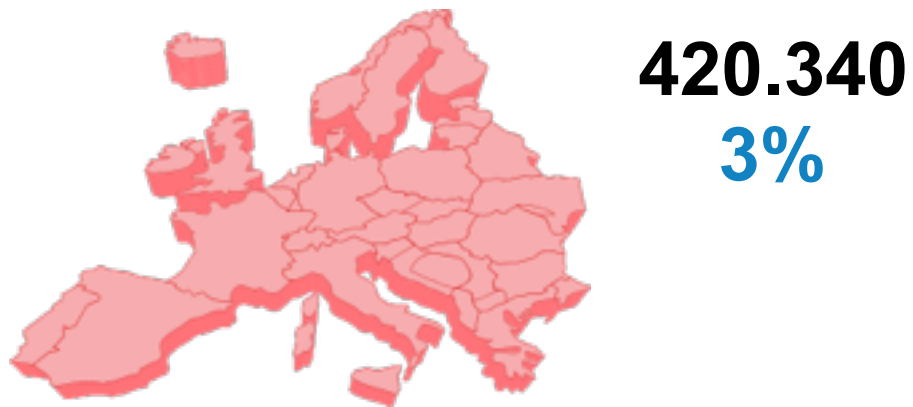
EV growth and penetration widely differs between countries

Total EV Market: Growth Analysis for Top Countries, Global, 2015



Source: Frost & Sullivan

2015 Hybrid and electric vehicles registrations



EV Market: AC Charging Points in Major Countries, Europe, 2015

Country	Normal 3–7 kW	Accelerated 8–22 kW	Rapid >23 kW
Belgium	400	126	34
Denmark	31	232	103
France	9,271*	522	211
Germany	1,478	1,488	215
Italy	406	212	17
The Netherlands	2,415	2,871	189
Norway	1,354	43	219
Spain	430	40	120
Switzerland	892	336	93
UK	1,300	195	501

Note: The charging stations mentioned are public charging stations.
 *Includes 6,000 charging stations from electric car sharing



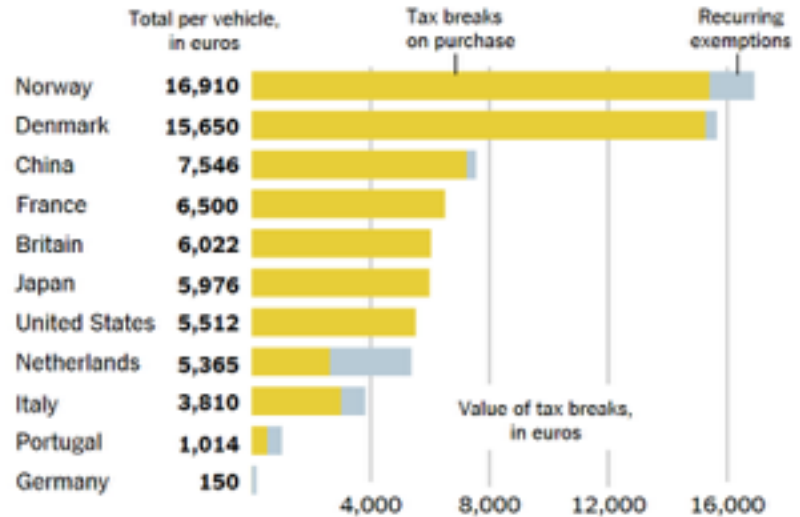
Source: Chargemap; Frost & Sullivan

Electric charge station network



Taxation

Tax breaks on purchase and use of electric cars
Jan. 2014 data, selected markets



VW e-Golf (250.000 kroner)
26.000 €



VW Golf diesel (330.000 kroner)
35.000 €