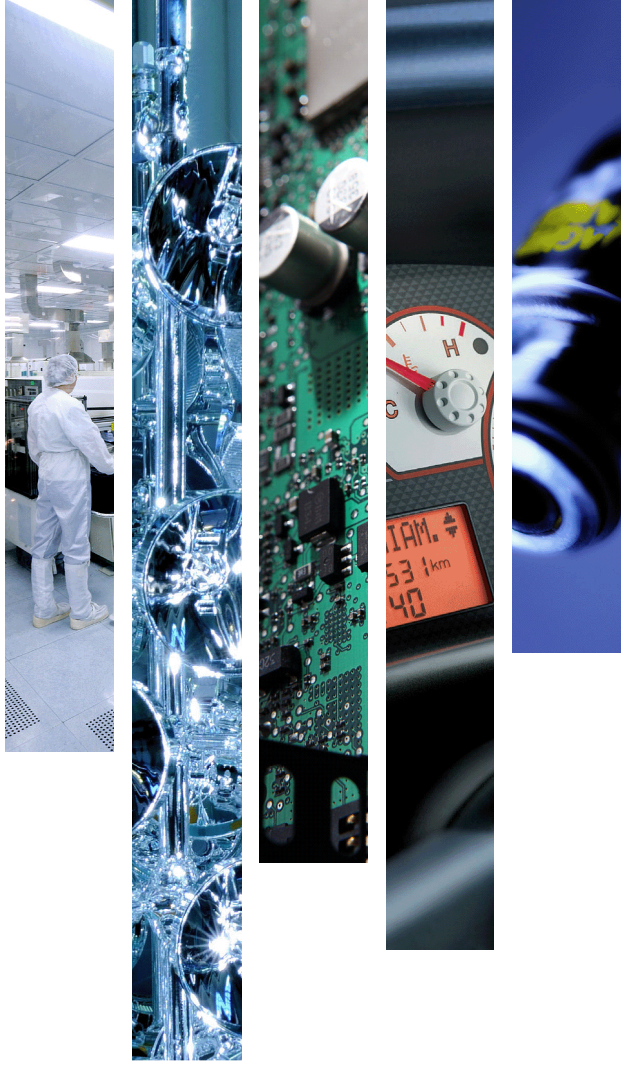

A wide range of technologies to face the mobility challenge

Magneti Marelli SpA

Luigi Piero Ippolito
Product Strategic Scenario & Innovation

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- Magneti Marelli Company Overview
- The Mobility Challenge
- Scenario Perspectives
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Magneti Marelli Company Overview

Magneti Marelli is an international company committed to the design and production of hi-tech systems and components for the automotive sector.

AUTOMOTIVE LIGHTING

POWERTRAIN

ELECTRONIC SYSTEMS
(Instrument clusters, Infotainment & Telematics, Lighting & Body Electronics)

SUSPENSION SYSTEMS
(Suspension Systems, Shock Absorbers, Dynamic Systems)

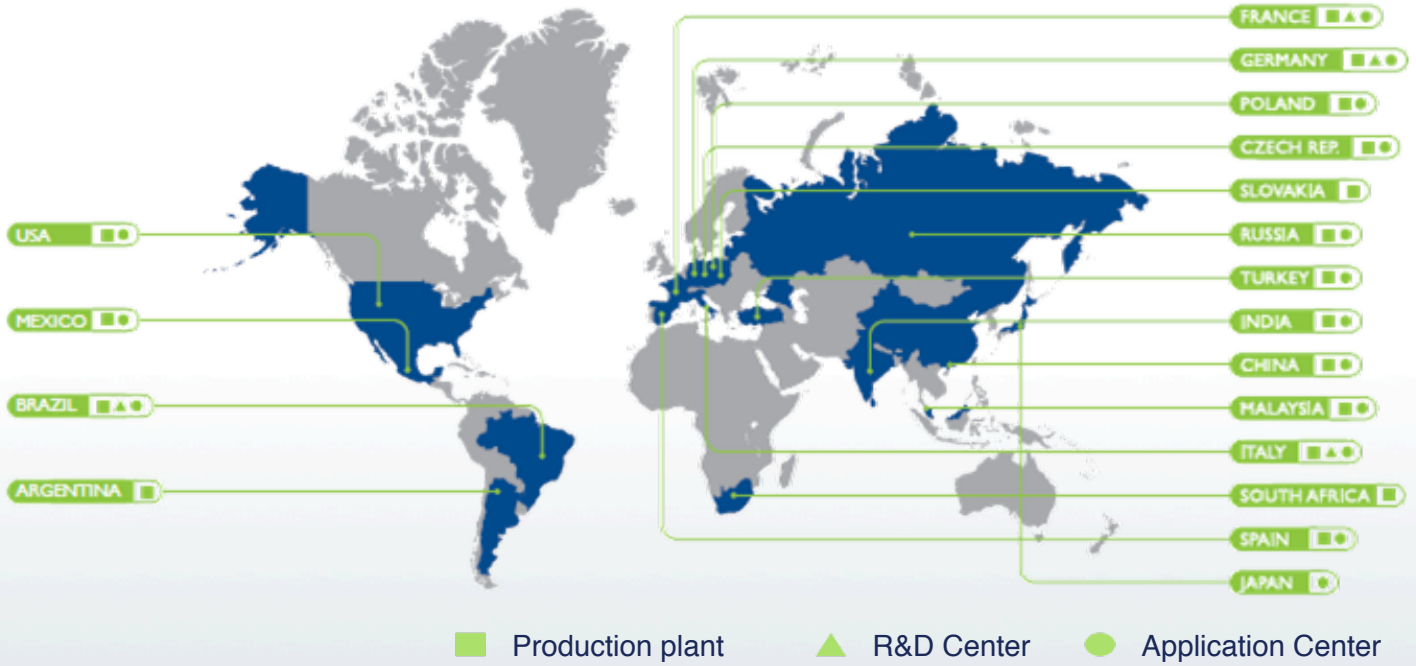
EXHAUST SYSTEMS

PLASTIC COMPONENTS AND MODULES

AFTERMARKET PARTS & SERVICES

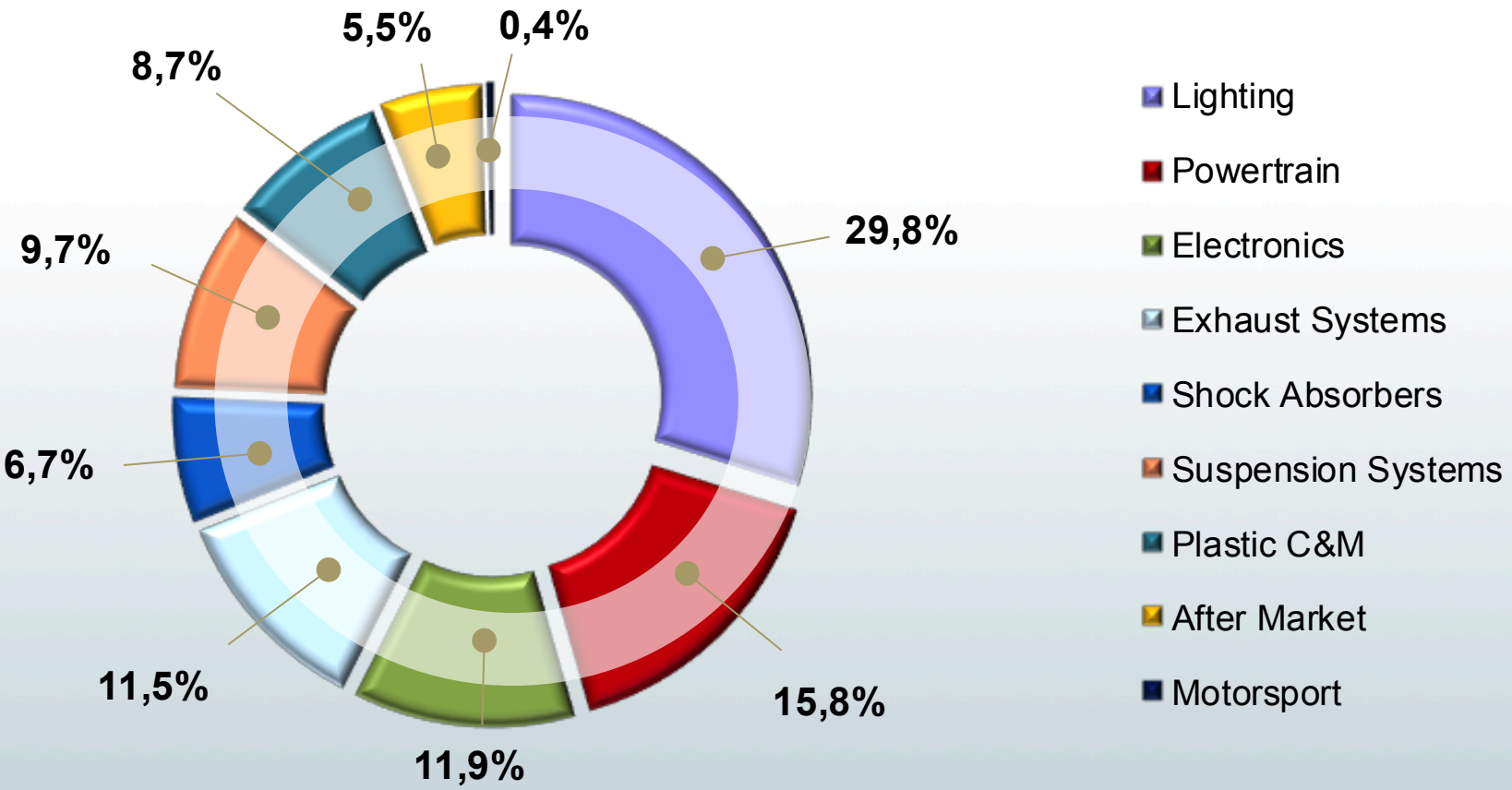
MOTORSPORT

Magneti Marelli Worldwide Presence

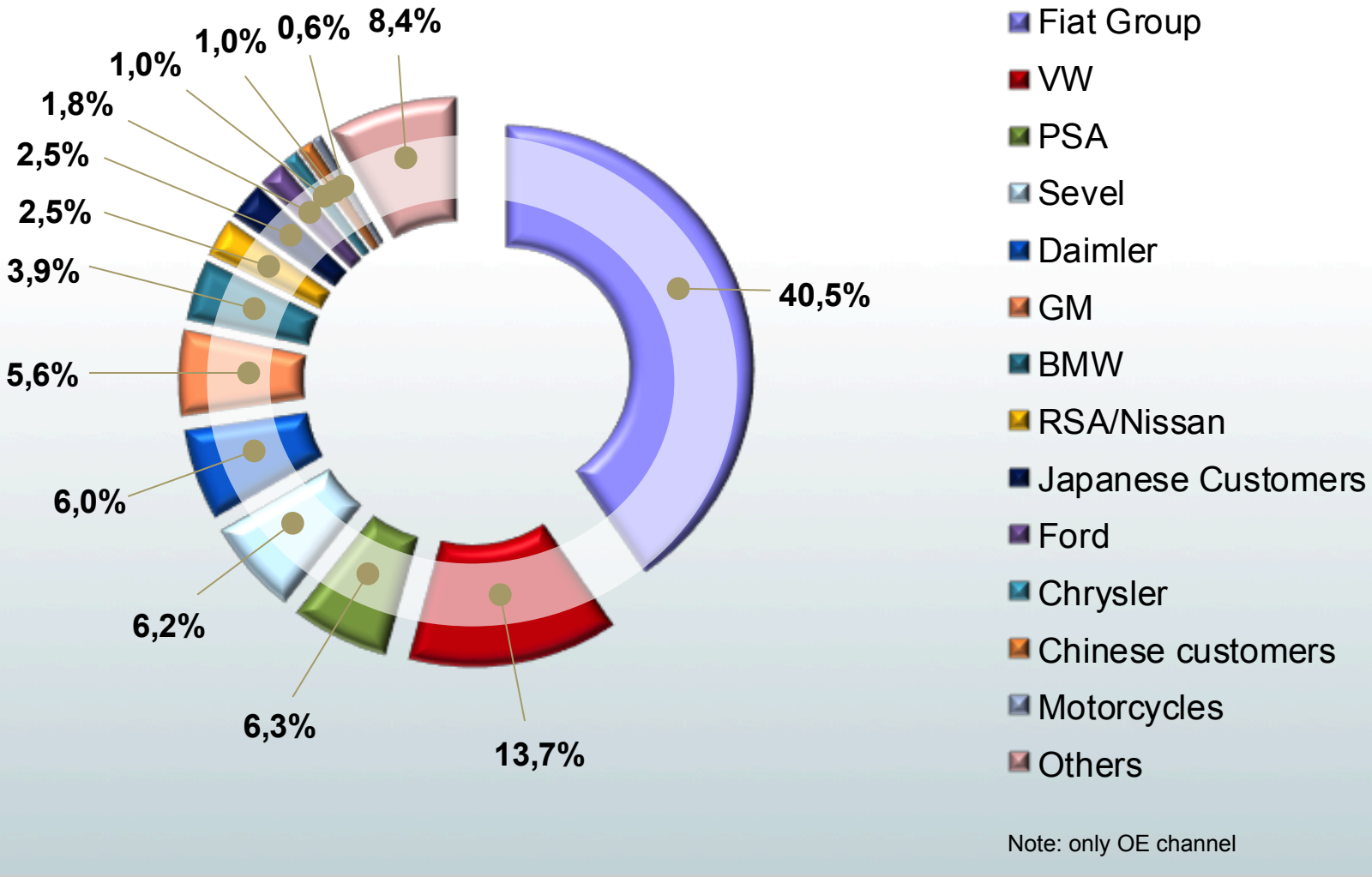


Sales 2011	**5.9 billion €**	Production units	**83**
R&D Centers	**12**	Application Centers	**26**
R&D (of sales)	**5.3%**	Investments (of sales)	**5.4%**
Employees worldwide			**~ 34,800**

Magneti Marelli 2011 Sales by Business Line



Magneti Marelli 2011 Sales by Customer



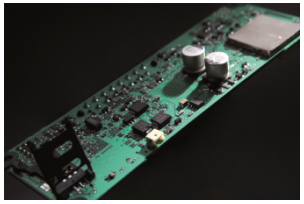
Note: only OE channel

Our Excellence

MERCEDES CLS
Full-LED HEADLAMP

AUDI R8 Full-LED HEADLAMP /
LED REARLAMP

MERCEDES S-CLASS
IR for NIGHT VISION



PSA GROUP
TELEMATIC BOX

FGA GROUP
BLUE&ME

SCENIC TFT
INSTRUMENT CLUSTER

AUDI A4
INSTRUMENT CLUSTER

FERRARI
INSTR. CLUSTER

SAIC
RADIONAVIGATION

PSA
INFOTAINMENT SYST.

KENWORTH
SMARTNAV

FERRARI 599
GTB AMT

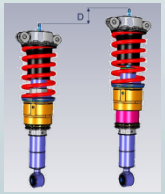
VW GDI INJECTORS

TETRAFUEL

START&STOP

ABARTH EXHAUST SYSTEMS

ALFA ROMEO SYNAPTIC
DAMPING CONTROL



FERRARI LIFTING
SYSTEM

SUSPENSIONS

RACING COMPONENTS

Every Day Most of us Experience “The Mobility Challenge” and Ask for Support from Friendly and Enhanced Technology

An alternative route

Why not an autopilot to gain time for each own interests?

Smart and Powerfull headlamps

Friendly and precise information to have a rest

Intelligent Systems to reduce the fuel consumption

Safety Systems to increase the possibility of a better destiny

Megatrends that Describe the Mobility Background

Urbanization may be a need for the knowledge society, but requires to pay attention to the mobility structure, looking for a balance between public and private transportation services.

The **"de-motorization"** of urban people is commonly accepted by Automotive Players[1], so underlying the trend to the reduction of car ownership

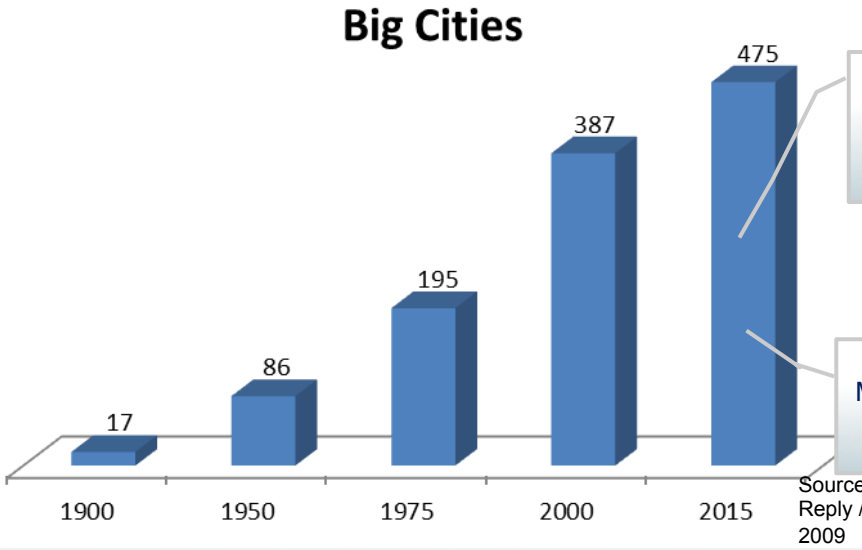
«The ownership is a burden»

«Rent anything»

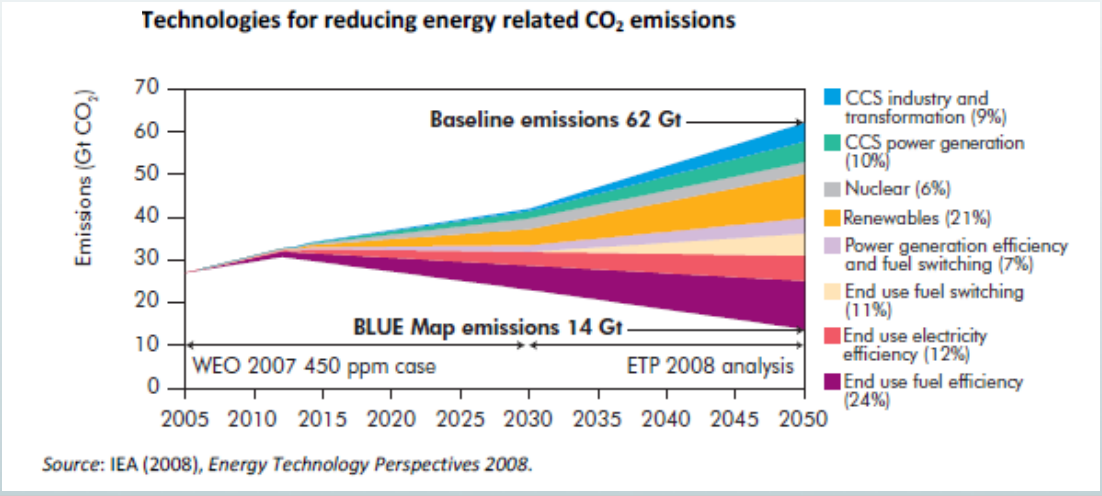
The **growth of Earth temperature** must be limited to 2°C introducing a virtuous circle based on efficiency, renewable sources, GHG[2] strong limitation.

Transports use 32% of final EU energy and **are responsible for 21% of EU GHG** (80% on roads).[1]

1) CARS21 – Interim report 2011
2) GHG: Green House Gas



Source: data from Reply / Khronopolis 2009



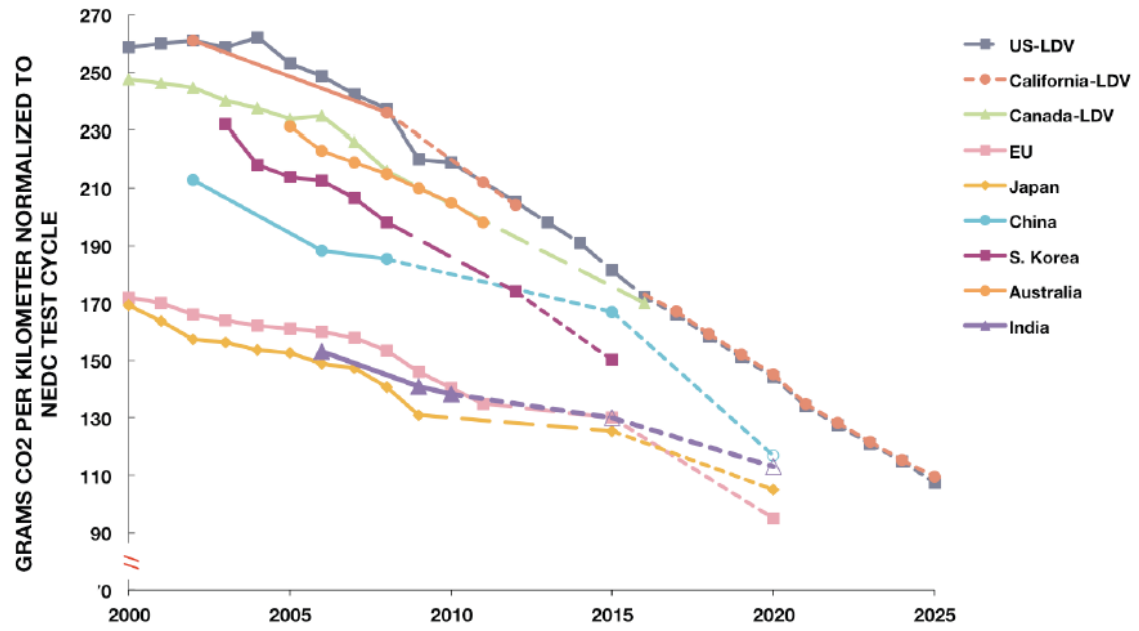
Source: IEA (2008), Energy Technology Perspectives 2008.

Pillars for Innovation: CO_2 Regulations

The **CO_2** issue is the focus of current legislation in the world. EU has tough targets to 2020 (95gr/km), that will require the access to a new generation of technologies, so increasing both complexity and cost of vehicles.

In EU, **a new «driving test-cycle»** is expected, aiming to a better matching with «real-world» driving. Furthermore the merits of fuels and powertrains should be evaluated on a «well-to-wheel» and LCA base (*CARS21 – interim report 2011)*

A few technologies, named **«ECO-Innovations»**, (e.g.:LED lamps), mainly effective out of «driving test-cycle», may generate CO_2 credits to car manufacturers (up to 7 gr/km).



Source: ICCT worshop 27th April 2012

- Legislation, market peculiarities of each Country and Government Policy will indicate the preferred technologies to CO_2 reduction.
- "Well-to-Wheel" and "Life Cycle Assessment" approach are expected.
- BEV and PHEV vehicles within 2020 will start measurable market penetration: ~ 6% share (source: IHS Global Insight 08/2011).
- Up to 2020, the big amount of improvement for CO_2 will come from conventional (ICE) powertrain.

Pillars for Innovation: CO_2 Technology Choice

Assuming average values to be valid both for diesel and gasoline engines on NEDC cycle, **the relevant vehicle levers** have the following relative weights **to 1% CO_2 reduction**:

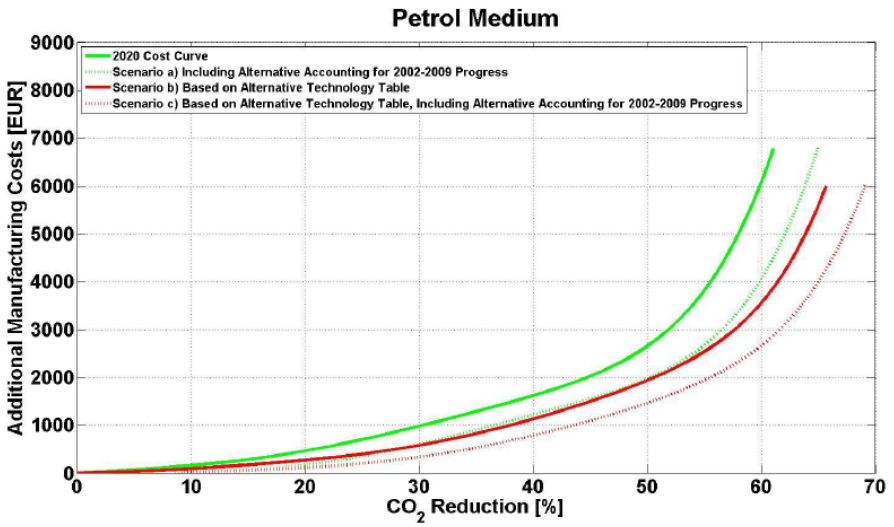
Weight →~ 25 kg
RR →~ 0,6 kg/ton
C_d*A →~ 4%

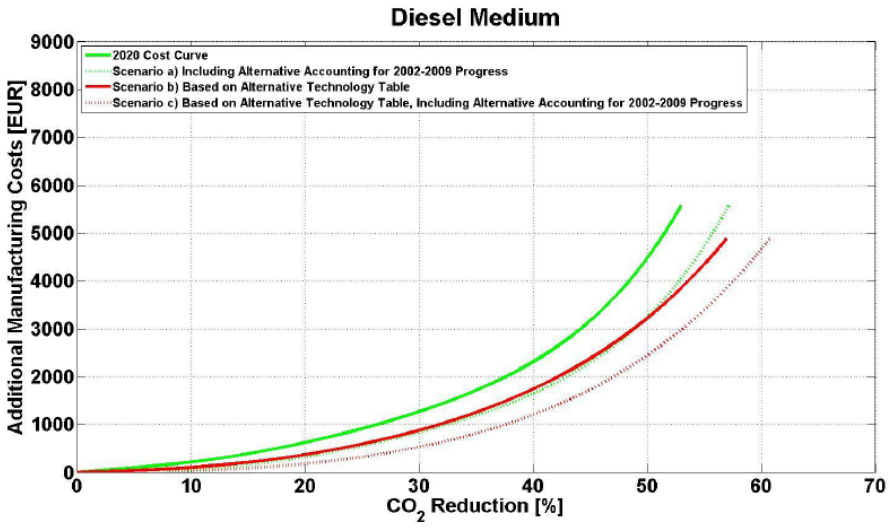
Possible Vehicle Targets according to EU regulation: from 2015 (120 gr/km) to 2020 (95 gr/km):

Weight → -100kg → -4% CO_2 → - 4,8 gr/km
Ultra Low RR → -2 kg/ton → - 4,0 gr/km
C_d*A → - 20% → - 6,0 gr/km

vehicle contribution:
~ - 14,8 gr/km → ~ 60%
powertrain contribution:
~ - 10,2 gr/km → ~ 40%

«Different solutions are eligible, balancing both vehicle domain and powertrain domain»





Source: TNO report – November 2011

Pillars for Innovation: Safety

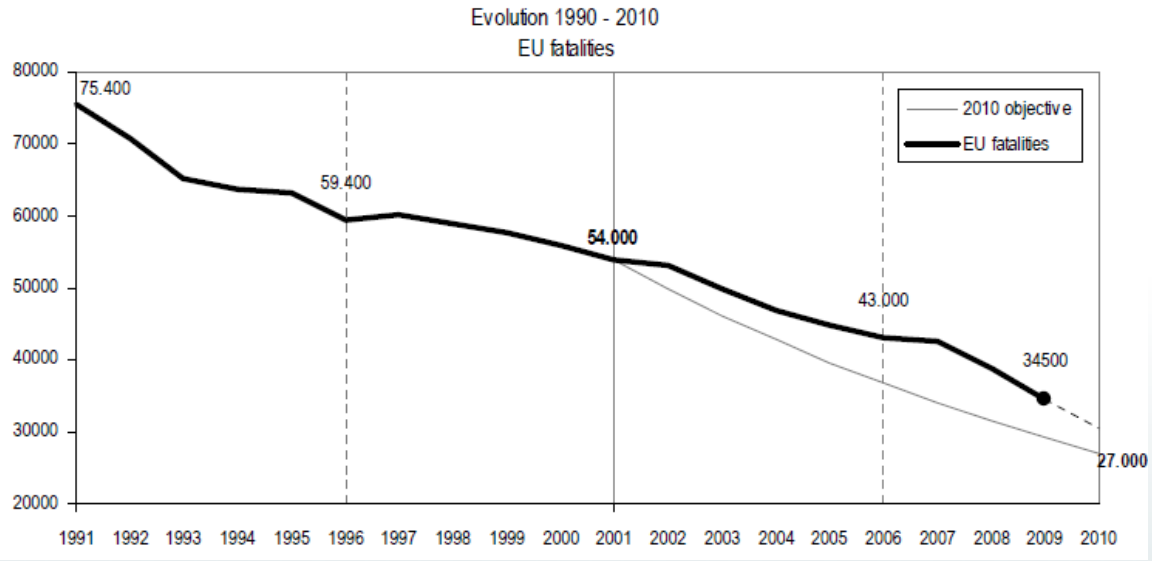
The vehicle Safety cannot be negotiated.

The 5 priorities of ACEA-CLEPA white paper for Safety:

- **Integrated Safety** (focusing to pre-crash Safety)
- **New Vehicle Concept** (alternatively powered)
- **V2X technologies** (the vehicle network supported by ICT)
- **Driver Behavior** (HMI and ADAS)
- **Standards** to better evaluate the Safety margins of new systems

open the door to a paradigm shift:

«From Autonomous to Cooperative vehicle»



Source: EU Commission – 07/2010

2001 -:- 2010
Fatalities Reduction
EU27 -50%

Pillars for Innovation: The Cooperative Vehicle

The vehicle becomes a **running "sensor" for the integrated System**:

- Floating car data
- Road status and environment detection.

The vehicle communicates the detected data to Service Providers and receives real time data to solve mobility problems.

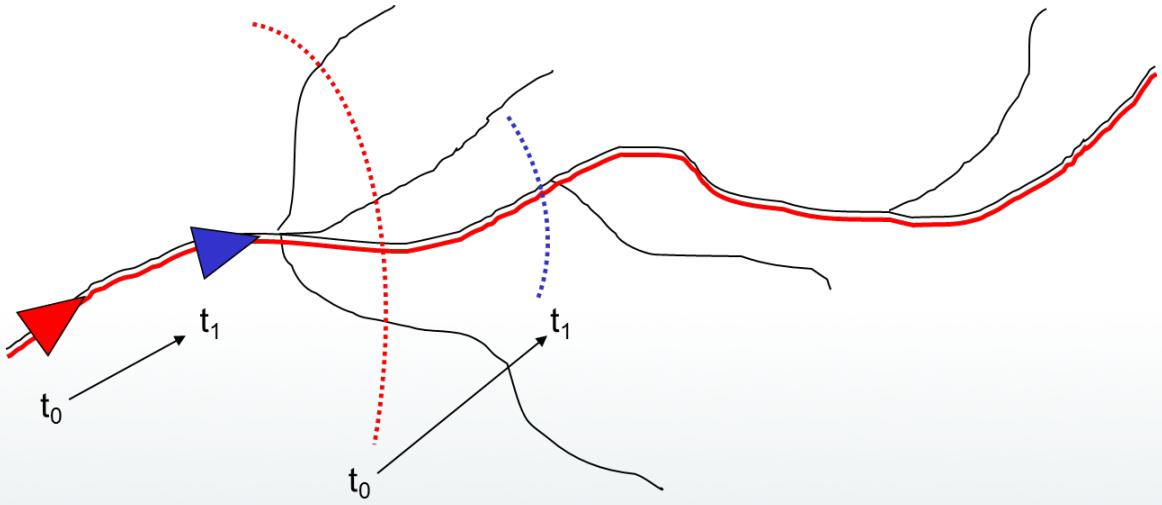
The vehicle widens the human drivers perception limits by mean:

- ADAS map supported Electronic Horizon
- Surrounding Vision
- Data Fusion
- V2V communication

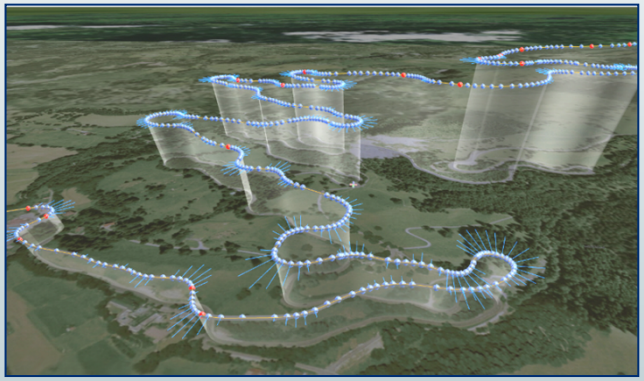
The vehicle supports and even substitutes the driver when complex control tasks are required:

«High Authority Systems and Automatic Driving»

Dynamic Electronic Horizon – Path Preview



Road slope and curvature



Traffic Signs and cross intersections

Pillars for Innovation: The Automatic Driving

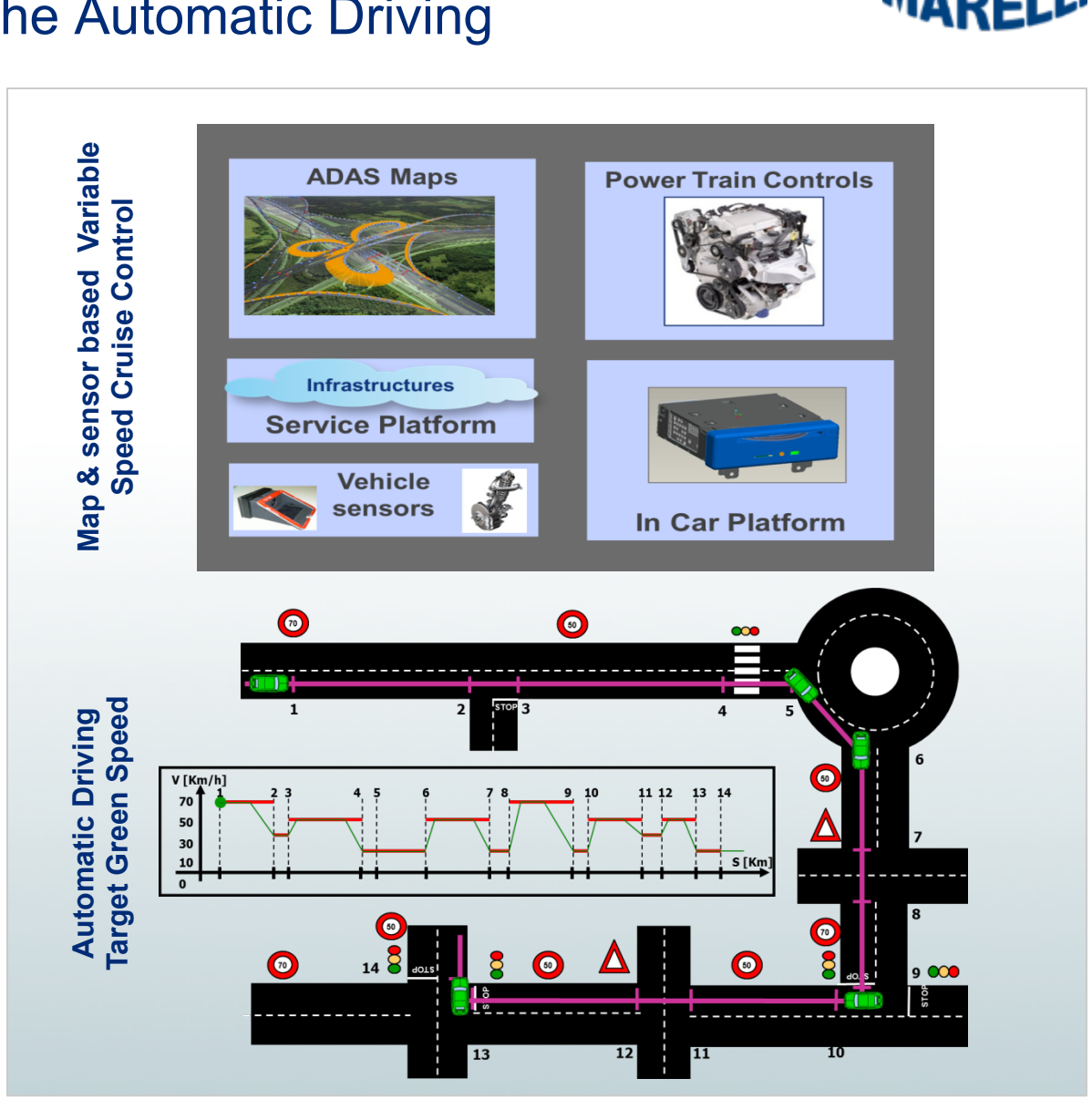
The next frontier for vehicle technologies will be the **«Automatic Driving»** supported by sensors, maps and V2X data.

The automatic driving **will support both** Fuel Economy and Safety increase.

Will be also allowed different authority levels of automatic driving according to the environment.

The advantages for the users must be clearly highlighted in order to obtain **the driver's partnership.**

Taking into account the strongly reduced crash probability a **virtuous circle** could start, allowing for weight, energy and cost reduction.



To Face the «Mobility Challenge» a Wide Technology Offer is Required: the CO_2 Case

MM's Product Lines \ Technologies	Weight Reduction	Road Loads	Efficiency	Exhaust Energy Recovery	Kinetic Energy Recovery	Eco-Driving / Eco-Navigation / Automatic Driving	GDI / Multi Air / SCR	Multifuel	HEV / BEV	Function Integration	LCA (Life Cycle Assessment)
Powertrain	X	X	X	X	X	X	X	X	X		X
Lighting	X		X							X	X
Suspension	X										X
Damper	X	X			X					X	X
Exhaust	X			X			X				X
Infot.&Telem.						X					
Motorsport				X	X						
Plastic	X									X	X

CFRP / GFRP
HSS
ADI Cast Iron
Mu-cell
Nano-structures

TPMS on tire
Lifting System

LED
Drivetrain

Electric Turbo Compound
Thermo-electric generator
Fast Warm-up Exhaust

KERS
Regenerative Shocks

Dynamic Electronic Horizon
Enhanced Active Green Driving

GDI pump
GDI INJS

Electric Motors
Power Inverter
AC/DC converters
Battery Management System

Powershock
Nanocontacts
Low Voltage Xenon

Conclusions

- The **anthropic equilibrium** of the Earth is close to a critical point.
- A “paradigm shift” towards “**cooperative vehicle**” is expected inside automotive arena.
- The **mobility challenge** would require a **wide range of technologies** according to the different promotable solutions.
- The **information based pacing technologies** may contribute to mobility solutions supporting different objectives.
- **Human behaviors** will be part of the solution.
- The vehicle technology will be dominated by the research of the **maximum efficiency and flexibility** in terms of fuels and energy vectors. The hybrid plug in and electric mobility could have a chance, but the problem of higher cost will be clearly managed by all the stakeholders.

Thank you for Your attention