Ensuring a safe, user-friendly experience for the consumer: a B2B2C point of view

May 26th 2011

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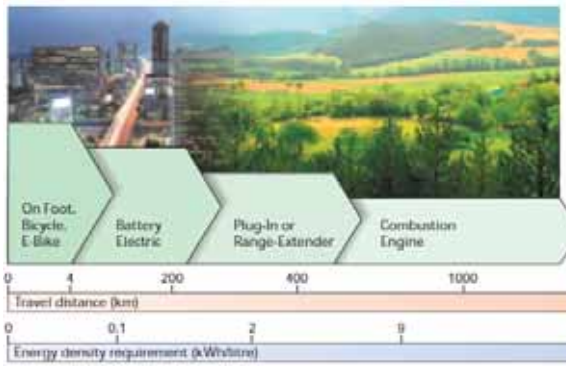
valeo added

Decarbonization and Reliability

- Increase the energy efficiency
- Use renewables in the energy pool
- Improve reliability of transport schedules
- Preserve and improve urban accessibility

Diversity of Mobility Needs



Diversity of Mobility Solutions

How could driving look and feel tomorrow?

Drive eco-friendly

- Neutral CO2 emission balance
- Lighter materials
- Hybrid / pure EV concepts
- Internal engine measures
- Car sharing and car on demand

Drive safe and smart

- Dialogue with other vehicles/ traffic infrastructure
- Intelligent traffic mgmt
- Automatic warning on tail-end traffic jams

Just good enough and cheap

- Downsized engine technology for low cost market
- Use of older product generation for emerging market
- Interior reduction to basic and simple functionalities

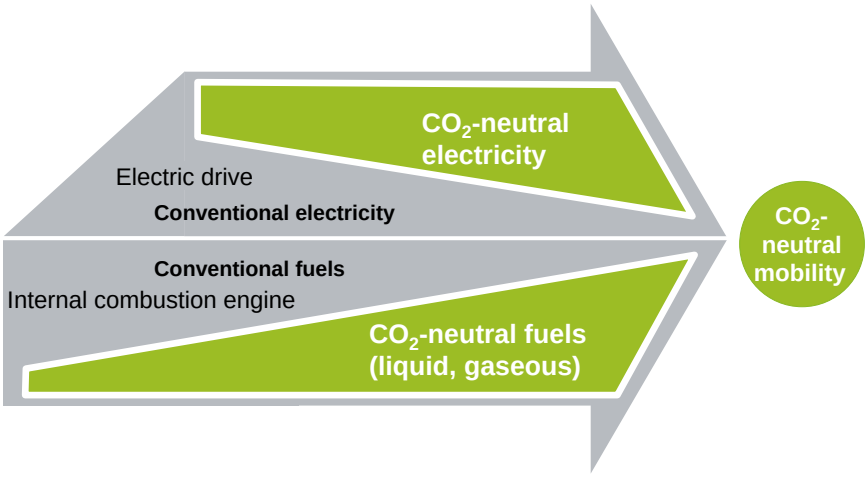
Easy comfort

- Situational automation of driving systems
- Integration of mobile devices and onboard electr.
- Flexible exterior/ interior configurations
- Modification car window transparency

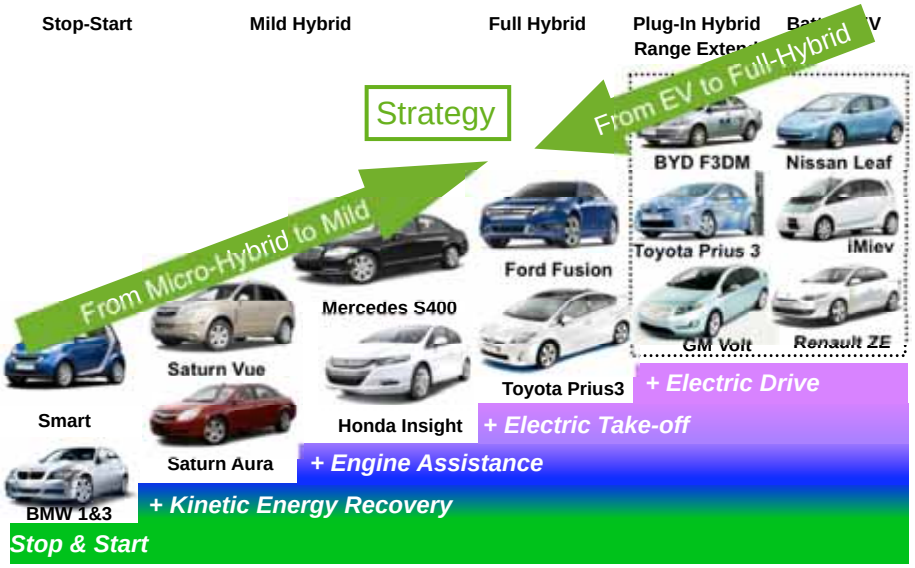
Modularity

- Variable power engines, i.e. power to be chosen/paid via mobile devices
- Flexible set-up changes of basic features
- Integration/use of external intelligence

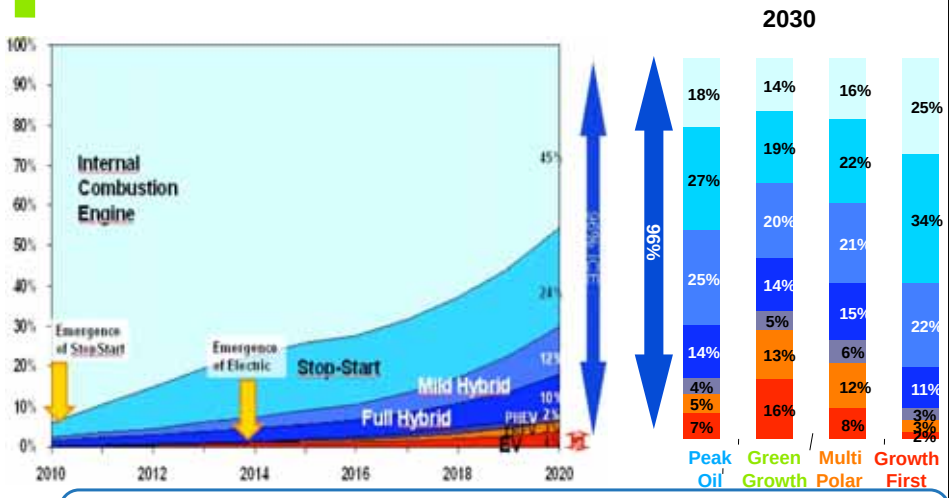
Decarbonization
Coexistence of powertrain Technologies and Energies



Hybrid / Electrical Vehicles on the market

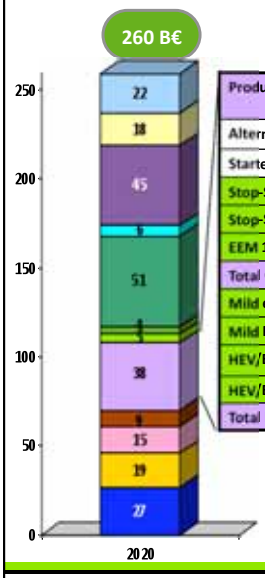


What kind of powertrain market will we have in 2030?



Peak Oil ➔ High Hybrid fitment rates because fuel economy is key
Green Growth ➔ Regulation & infrastructure pushing EVs & Hybrids
Multi Polar World ➔ Mixed of 2 different markets becoming a reasonable forecast
Growth First ➔ Low EV fitment rates, only rationales push other Hybrids

World Electrical Systems market towards 2020
The industry is investing.



ELECTRICAL SYSTEMS

Products	Market Size 2010 (M€)	Market Size 2015(M€)	Market Size 2020 (M€)	CAGR 10-20
Alternator	2 964	3 402	2 554	-1%
Starter	1 803	1 763	1 240	-4%
Stop-Start (ReStart)	101	525	684	21%
Stop-Start (iStARS)	49	243	454	25%
EEM 12 V S/S	61	261	310	18%
Total Conventional	4 977	6 194	5 242	0,5%
Mild e-Motor	115	620	1 840	32%
Mild Power Elect	239	1 160	3 815	32%
HEV/EV e-Motor	809	2 900	8 031	26%
HEV/EV Power Elect	1 361	5 274	15 457	28%
Total Hybrid	2 524	9 954	29 143	28%

2010-20 Growth

Conventional + Stop-Start = FLAT MARKET

e-Motor + 8,9 B€ x 10,7

Power Electronic +17,7 B€ X 12

7,5 B€ | 16,1 B€ | 34,4 B€

16% CAGR

Source: PTS Databook & MTP Release October 2010

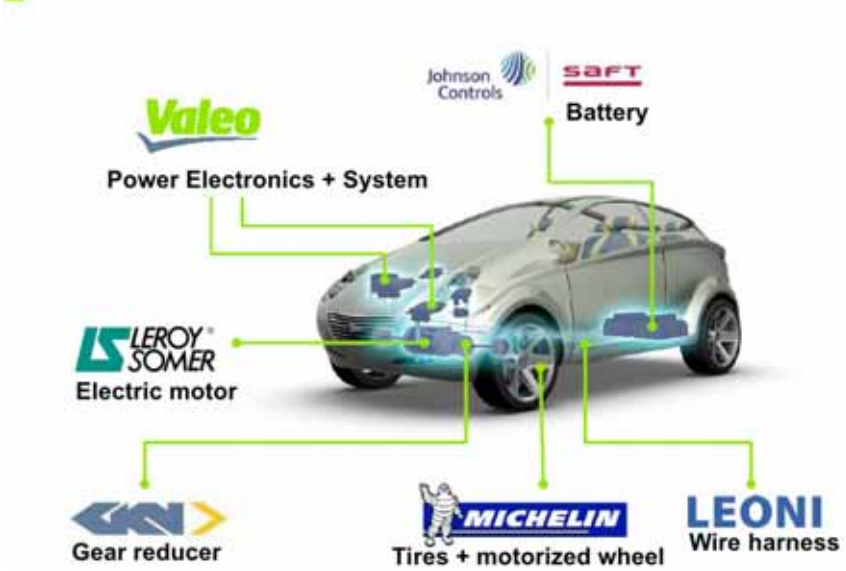
Hybrid and EV suppliers strategy: B2B…2C
Go fast in all markets with high diversity of solutions

- **Fast: Political + societal demands, therefore industrial quick answers**
  - ➔Must have solutions right away
  - ➔Create EV consortium to continue to be able to offer complete system offer for next Gen2
- **In all markets:**
  - ➔Europe, China, U.S. and Japan
  - ➔Partner with local engineering/industrial companies

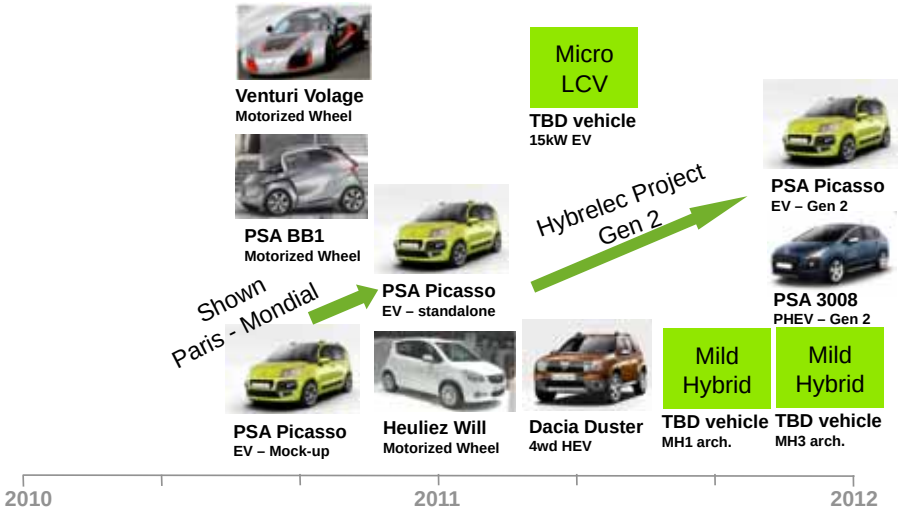
➔…2C: Manage diversity of solutions:

➔ Partners have been selected depending on architecture.

The Consortium
(Berlin Bibendum Challenge 18-22/05/11, Brussels European Parliament 31/05/11)



Consortium demonstration vehicles



Consortium vehicles covering spectrum of solutions

Customer advantages of Gen2 Inverter/charger design

- **Higher efficiency (90% vs 87%)**
  - Lower current management (Voltage Step-Up to 840V)
  - H-Bridge topology
- **Combines charger function in the inverter design**
  - Re-use of power electronics + motor inductance
  - Ability to perform “fast charge” up to the electric motor power
  - Cost savings: less (-30%) silicon , less (-30%) copper and fewer parts
- **Dependability**
  - Ability to run the motor on two phases in the case of a breakdown of one phase (not possible with conventional designs
- **Compatible in charge mode with worldwide power networks**
- **Scaleable**
  - From 15kW to 100kW using the same power module

Solution is covered by 18 patents today

Total Vehicle System

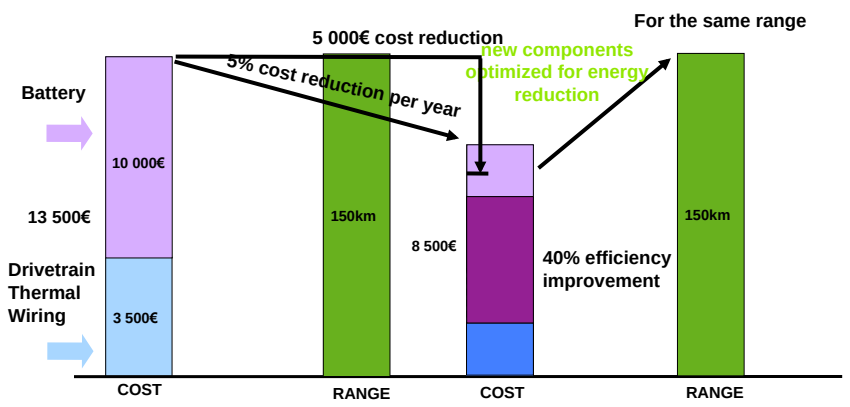
A vehicle system approach to reduce electric energy consumption

Powertrain Systems	Gen2 electric drivetrain Regenerative braking	-20%
Thermal Systems	Heat pump system Heat accumulation Heat regeneration	-15%
Comfort and Driving Assistance Systems	Smart car key and pre-conditioning	-3%
Visibility Systems	LED lighting	-2%

Total Savings 40%

Valeo technologies focused on energy efficiency

Electric Vehicle: cost evolution



Cost reduction vs range increase ➔ an OEM tradeoff

Transversal added solutions for Evs: the requirements of being permanently cost-efficient

Better solutions (greener+cheaper) : the lessons from a systems supplier

Valeo thermal solutions for EVs

Design for Electrical Vehicle

Electrical Driven Compressor

- Compactness & efficiency

Cabin Heating Solutions

- Heat pump systems: energy efficiency break through

Battery Thermal Management

- Full set of solutions for battery reliability and power availability

Thermo Accumulator

- Range extension

Optimized thermal management for increased range

Valeo Visibility

Design for Electrical Vehicle

Low Energy LED Lights for increased range

Valeo Comfort and Detection

Design for Electrical Vehicle

- Smart Key/car link

Special EV Functions:

Check Battery Status & Autonomy

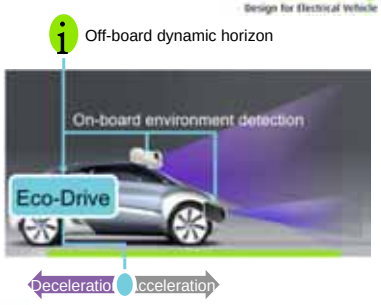
Start Preconditioning in charge mode

Smart Car Key + pre-conditioning for increased range

Valeo Comfort and Detection

Design for Electrical Vehicle

- **Urban Automatic Cruise (Eco-Drive)**
  - Smart management of electrical acceleration and deceleration based on environmental sensors ➔ 5-10% Range improvement
  - Either optimized control laws only or with full automation (similar to ACC)



- **Pedestrian Alert & Protection at Low Speed (Noise Compensation)**
  - Forward driving pedestrian detection
  - Backwards driving pedestrian detection (up to 10 meters)
    - Fusion of rear camera and rear ultrasonic sensors
  - Emergency braking based on ultrasonic sensors
    - This will help for Danner test and low speed crash

Valeo Comfort and Detection

Intersection Support & Protection

- ➔ Intersections are a major source of accidents
  - – Investigation to be started with “urbanely-tuned” sensors: 130° field of view mid range front radar & traffic light recognition with front camera

Automatic Vehicle Docking (Dock4U)

- ➔ For battery replacement or plug-in station
  - – On-going Amare-ModuloWatt public project with Valeo sensors

Image: Modulowatt Association

There is room for other approaches and solutions…

- ➢ This calls for market cautiousness
- ➢ The auto industry needs to interface/liaise with energy/ grids/ mobility management/ social acceptance.

Multi-stakeholder and system approach :

- ➢ ERTRAC - European Road Transport Research Advisory Council

  Gather stakeholders of the transport research community.
- ➢ European Green Cars Initiative - Public-Private Partnership

  PPP with European Commission and EU Member States

To be developed and reinforced in the future...

ERTRAC multi-stakeholders approach

The involvement of all stakeholders is necessary

- Public Private Partnership of industry and authorities
- Collaboration of all actors in the Supply Chain

Role of an ETP - European Technology Platform

All major stakeholders and public bodies are represented in ERTRAC

PPP European Green Cars Initiative

- Go beyond sector policies

Collaboration between industrial sectors to set joint priorities

- **Automotive**
- **Electricity**
- **ITS**

➢ **European roadmap on Electrification of Road Transport by the ETP's ERTRAC, EPoSS and SmartGrids**

Thank you for your attention !