Powertrain Systems: a strong global player

- Electric machines

#1 Worldwide
Powertrain Systems: a strong global player

- Electric machines
- Transmissions

#2 Worldwide
Powertrain Systems: a strong global player

- Electric machines
- Transmissions
- Air loop & engine management

Electric Supercharger

1st to Market
Powertrain Systems: a strong global player

- Electric machines
- Transmissions
- Air loop & engine management
- Power electronics

Power electronics needed for all applications
Powertrain Systems: a strong global player

- Electric machines
- Transmissions
- Air loop & engine management
- Power electronics

Powertrain well positioned to catch all market opportunities
Powertrain Systems: 2014 key figures

Total sales: 3.3 Bn €
- Growth: +5% compared to 2013*

EBITDA: 12.3% of sales
- +1.8pt compared to 2013

- 18,400 Employees
- 18 Countries
- 37 Production sites
- 21 Research & Development centers

* OEM sales growth on a like-for-like basis
Powertrain Systems: Worldwide Presence (incl. JVs)

North America
- 11% Turnover
- 12% Headcount

Europe
- 47% Turnover
- 48% Headcount

China
- 11% Turnover
- 13% Headcount

South America
- 3% Turnover
- 4% Headcount

Asia excl. China
- 28% Turnover
- 23% Headcount
Powertrain Systems: In Asia

- **Today**
  - 16 Production sites
  - 7 R&D centers
THE CO$_2$ EMISSIONS CHALLENGE

Michel FORISSIER
Powertrain Systems R&D and Product Marketing Director
What drives Powertrain market?

CO₂ regulations

Pollutants regulations

Regulatory boards are paving the next 20 years
What drives Powertrain market?

End users value Fuel efficiency #1...

Question:
To what degree are you interested in innovations for the following areas when buying your next new car?
Very interested and would pay a premium + very interested

Source: Signal Group 2014

Note: Flag badges for illustrative purposes only.
What drives Powertrain market?

…but they want fun to drive!

2016 Audi RS5 TDi - 386 HP

2015 Ford F150 - 411 HP

2015 Dodge SRT - 707 HP

2014 Mercedes PU106A Hybrid - 740 HP
What has then Powertrain to achieve

- More Power
- No pollutants
- More Fuel Efficiency
To achieve this goal: 3 main levers

Super Efficient Engines
Super Efficient Transmissions
Hybrid / Electric Systems

Courtesy Mazda, VW-Audi, Honda
Super Efficient Engines

- Downsizing with turbochargers
- Direct injection
- Variable valve timing
- Thermal management
- New combustion techniques
- Torque assist via electric motors

Engine: More Power, less Fuel
Super Efficient Engines

- Downsizing with turbochargers
- Direct injection
- Variable valve timing
- Thermal management
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- Torque assist via electric motors

Market CAGR 14-24

<table>
<thead>
<tr>
<th>Component</th>
<th>Growth Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbos</td>
<td>6%</td>
</tr>
<tr>
<td>Supercharger</td>
<td>+++</td>
</tr>
<tr>
<td>Direct injection</td>
<td>9%</td>
</tr>
<tr>
<td>Variable valve timing</td>
<td>8%</td>
</tr>
<tr>
<td>Thermal management</td>
<td>27%</td>
</tr>
<tr>
<td>New combustion techniques</td>
<td>21%</td>
</tr>
<tr>
<td>Torque assist via electric motors</td>
<td>30%</td>
</tr>
</tbody>
</table>

Engine: More Power, less Fuel
Super Efficient Transmissions

- More speeds: 6, 7, 8, 9, 10!
- Automatic Manual Transmissions
- Electric clutch
- Dual Clutch Transmissions
- Continuous Variable Transmissions
- Integration of electric motors

Transmissions: More automatic
### Super Efficient Transmissions

<table>
<thead>
<tr>
<th>Feature</th>
<th>Market CAGR 14-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>More speeds: 6, 7, 8, 9, 10!</td>
<td>13%</td>
</tr>
<tr>
<td>Automatic Manual Transmissions</td>
<td>8%</td>
</tr>
<tr>
<td>Electric clutch</td>
<td>8 - 12%</td>
</tr>
<tr>
<td>Dual Clutch Transmissions</td>
<td>12%</td>
</tr>
<tr>
<td>Continuous Variable Transmissions</td>
<td>4%</td>
</tr>
<tr>
<td>Integration of electric motors</td>
<td>17%</td>
</tr>
</tbody>
</table>

Overall market CAGR 14-24: 4%

Transmissions: More automatic
Hybrid / Electric Systems

Significant growth potential on top of current powertrain technologies

Hybrid systems: The new additional growth area
# Hybrid / Electric Systems

<table>
<thead>
<tr>
<th>System Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop &amp; Start</td>
</tr>
<tr>
<td>Mild Hybrid</td>
</tr>
<tr>
<td>Full Hybrid</td>
</tr>
<tr>
<td>Plug-In Hybrid</td>
</tr>
<tr>
<td>Electric Vehicle</td>
</tr>
<tr>
<td>Electric Vehicle with range extender</td>
</tr>
</tbody>
</table>

**Hybrid systems: Multiple solutions**
### Hybrid / Electric Systems

<table>
<thead>
<tr>
<th>System</th>
<th>Market CAGR 14-24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop &amp; Start</td>
<td>11%</td>
</tr>
<tr>
<td>Mild Hybrid</td>
<td>36%</td>
</tr>
<tr>
<td>Full Hybrid</td>
<td>17%</td>
</tr>
<tr>
<td>Plug-In Hybrid</td>
<td>33%</td>
</tr>
<tr>
<td>Electric Vehicle</td>
<td>18%</td>
</tr>
<tr>
<td>Electric Vehicle with range extender</td>
<td>15%</td>
</tr>
</tbody>
</table>

Overall market CAGR 14-24: 4%

**Hybrid systems: Multiple solutions**
Every year, new technologies emerge and take significant penetration rates:

- Valeo is addressing all of those new technologies

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**Engines and transmissions: still more value ahead**

- **Launch of Valeo double dry clutch** in 2015
- **Launch of Valeo pendulum technology** in 2016
- **Launch of Valeo double wet clutch for several OE** in 2017
- **Launch of Valeo electric supercharger** in 2018
- **Mass production of electric supercharger** in 2020
- **Launch of Valeo double wet clutch for several OE** in 2021
- **Mass production of electric supercharger** in 2022
- **Launch of Valeo double dry clutch** in 2023
- **Launch of Valeo pendulum technology** in 2024

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- **Dampers**
- **Dual clutch**
- **Electric Supercharger**
Every year, new technologies emerge and take significant penetration rates:

- Valeo is addressing all of those new technologies

A permanent flow of opportunities ahead

- Mass production of 48V systems in EU, US & China
- Electric Vehicles > 1 M/year with battery costdown
- Fuel Cell emergence

Launch of Valeo 12V StARS microhybrid

12+12V massive application at Premium OEMs

Plug-In Hybrids incentives in EU, China & US

Stop & Start

12+12V

48V

PHEV

Battery EVs

FCEV
Our answer: Electric Supercharger Platform
Electric Supercharger:
A breakthrough in engine dynamics and efficiency

- Instantaneous response
- Better fuel economy
- Improved performance
Our answer: All Dual clutch systems

Dry technology for fuel economy
In production in China and Korea since 2014

Wet technology for high torque / high demand
In production in Europe 2016

We master both technologies
CAGR 14-24
12%
18%
M/S in 2024
Our answer: Machine platform approach

- Same DNA
- Same structure
- Same assembly
- Same Capex

- 25 million machines produced in 2014

- CAGR 14-24
  - +++
- Mild-Hybrid iBSG

- Micro-Hybrid iStARS
- High efficiency generator

- 12V
- 48V

- CAGR 14-24
  - 11%
- 30% M/S in 2024
Valeo 48 V Hybrid Vehicle

- Regenerative braking
- Torque assistance and boost
Powertrain Systems: Financial perspectives 2020

Sales 2014
3.3 Bn €

EBITDA 2014
12.3 % of sales

+~11% CAGR 2020
~13.5pt
Powertrain growth 11% CAGR* 

Powertrain market growth 7% CAGR

Growth above market, thanks to powertrain innovations

Innovation drives growth
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