DAIMLER
Sustainability Management & Environment@Daimler

I. Organisation, Scope & Targets
II. Holistic approach towards Environmental Challenges
III. Production related Issues
IV. CO₂ & Electrification
V. CASE

Dr. Udo Hartmann, Head Group Environmental Protection & Energy Management
Our Sustainability Management Daimler Group

### Corporate Sustainability Board (CSB)

<table>
<thead>
<tr>
<th>Department</th>
<th>Board of Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human Resources</td>
<td>Member of the Board of Management/Co-Chair CSB reports to the General Management</td>
</tr>
<tr>
<td>Communication</td>
<td></td>
</tr>
<tr>
<td>Policy and External Relations</td>
<td></td>
</tr>
<tr>
<td>Purchasing</td>
<td></td>
</tr>
<tr>
<td>Group Research &amp; MB Cars Development</td>
<td></td>
</tr>
<tr>
<td>Integrity and Legal Affairs</td>
<td></td>
</tr>
<tr>
<td>Environmental Protection</td>
<td></td>
</tr>
</tbody>
</table>

### Daimler Group Companies

- **Mercedes-Benz Cars**
- **Daimler Trucks**
- **Mercedes-Benz Vans**
- **Daimler Buses**
- **Daimler Financial Services**
Responsibilities and interfaces of Corporate Environmental Protection

Board of Management

Determine goals and areas of activity

Politics & Society

Analyze legislation and social environmental trends

Product

Production

Push worldwide implementation of goals and ensure legal compliance

Environmental Officer

Communication & Dialogue

Stakeholder & Customer

Business Units

Daimler AG
### Climate Protection & Energy

<table>
<thead>
<tr>
<th></th>
<th>Europa</th>
<th>Weltweit</th>
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</thead>
<tbody>
<tr>
<td>Reduction CO₂ emissions passenger cars</td>
<td>-30% 2007 - 2016</td>
<td>Reduction CO₂ emissions passenger cars and Light-Duty-Trucks USA -25% 2012 - 2019</td>
</tr>
<tr>
<td>Reduced consumption CV heavy</td>
<td>-20% 2005 - 2020</td>
<td>Reduced consumption CV heavy (NAFTA) -10% 2015 - 2019</td>
</tr>
<tr>
<td>Reduced consumption of buses</td>
<td>-20% 2005 - 2020</td>
<td></td>
</tr>
</tbody>
</table>

Reduction of CO₂ and nitrogen oxide emissions over the entire life cycle for each new model generation

Achieve a leading position in premium segment of electric and hybrid vehicles

### Air Quality & Health

Market launch of ten models, which conform to the future legislation Real Driving Emissions (Step 1)

Ensure allergy sufferer friendly interiors for all new passenger car models

### Resource Conservation

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of renewable raw materials (MBC)</td>
<td>+25% 2010 - 2015</td>
<td></td>
</tr>
<tr>
<td>Use of recyclates (MBC)</td>
<td>+25% 2010 - 2015</td>
<td></td>
</tr>
<tr>
<td>Evaluate recourse efficiency of MBC</td>
<td></td>
<td>By 2020</td>
</tr>
<tr>
<td>Increased use of car2go</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Construction of a hydrogen infrastructure</td>
<td></td>
<td>400 By 2023</td>
</tr>
</tbody>
</table>

New in 2015
I. Organisation, Scope & Targets
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Elements of the environmental management system RD with focus on design for environment

Mercedes-Benz Development Process

Plan
1. Daimler Green Strategy
2. Environmental policy/program

Do
3. Design for environment as central element of the environmental management system in R&D

Check
4. Environmental audit
5. Management Review

ISO 14001 EM-system
ISO 14006 Design for Environmental aspects
ISO TR 14062 Environmental aspects

Quality
Cost
Time
Environment

Strategy phase
Technology phase
Vehicle phase
Production phase

Consumption/CO₂-Emissions
Exhaust Emissions
Green Materials
Recycling
Prohibited subs./Indoor Emissions
Acoustic/Noise

Climate protection & air quality
Resource Conservation
Health

Life Cycle Assessment

Plan → Do → Check → Act
Challenges for research & development of automobiles

Balancing of disparate requirements in a permanent task in Research & Development

Within the different environmental targets contradictory effects are possible
For our Products a look at the whole life cycle is crucial – E-Class Plug-In Hybrid E 350 e

Production

Supply chain | Daimler production | Fuel supply | Driving emissions

Utilization phase (250 tKm)

E 300 Predecessor - 2009 | E 300 New - 2016 | E 350e Hybrid - water power | E 350e Hybrid - EU-electricity

All values in tons CO₂

Production

<table>
<thead>
<tr>
<th>Supply chain</th>
<th>Daimler production</th>
<th>Fuel supply</th>
<th>Driving emissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.5</td>
<td>1.5</td>
<td>12.9</td>
<td>9.5</td>
</tr>
<tr>
<td>6.4</td>
<td></td>
<td>6.7</td>
<td></td>
</tr>
</tbody>
</table>

Utilization phase (250 tKm)

<table>
<thead>
<tr>
<th>E 300 Predecessor - 2009</th>
<th>E 300 New - 2016</th>
<th>E 350e Hybrid - water power</th>
<th>E 350e Hybrid - EU-electricity</th>
</tr>
</thead>
<tbody>
<tr>
<td>70.8 tons CO₂</td>
<td>52.7 tons CO₂</td>
<td>25.0 tons CO₂</td>
<td>36.0 tons CO₂</td>
</tr>
<tr>
<td>-25%</td>
<td>-64%</td>
<td>-5%</td>
<td>-49%</td>
</tr>
</tbody>
</table>

Sum

- All values in tons CO₂

Daimler AG
The resource input of C 250 and C 350 e
Comparison of Material Composition

+ 270 kg additional weight of C 350 e compared with C 250

Comparison of Modules [kg] (C 250 vs. C 350 e)

- Steel/Ferrous Materials
- Light Metal
- Polymer Material
- Other Metals
- Operating Liquids
- Other Materials

<table>
<thead>
<tr>
<th>Module</th>
<th>Mass [kg] C 250</th>
<th>Mass [kg] C 350 e</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exterieur</td>
<td>1,705</td>
<td>1,975</td>
</tr>
<tr>
<td>Interieur</td>
<td>1,435</td>
<td>1,645</td>
</tr>
<tr>
<td>Suspension</td>
<td>-2</td>
<td>25</td>
</tr>
<tr>
<td>Drive rod/control rod</td>
<td>-12</td>
<td>66</td>
</tr>
<tr>
<td>Electricity/Electronics</td>
<td>-17</td>
<td>80</td>
</tr>
<tr>
<td>SPARE wheel well, HV Crash package</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>17” Wheels, Breaks, Pneumatic Susp</td>
<td>12</td>
<td>5</td>
</tr>
<tr>
<td>50l Tank, Cooling Circuit, E-Engine</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>Li-Ion Battery, E/E, Cabling etc.</td>
<td>20</td>
<td>2</td>
</tr>
</tbody>
</table>
Remanufacturing / Product Recycling
New Life for Used Parts

Over 12,000 Parts in Reman Portfolio - incl. E-Drive Components...

...with significant environmental benefits

-15t CO₂
New Parts Mix
Reman
- 95%

-0.5t CO₂
Exchange Transmissions G281
Reman
- 60%
E-Mobility thought to the end
World's largest 2nd-use battery storage (13MW) in operation
I. Organisation, Scope & Targets
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Despite massive quantity increase, we reduced essential environmental impacts of **Daimler plants** in 2015.

**CO₂**

3,231,000 t  
-1%

**Waste Water**

9.2 mio. m³  
19%

**Removal**

121,000 t  
-39%

**Recovery**

343,000 t  
+13%

**Units**

292,000  
+12%

1.7 mio.  
+9%

508,000  
+2%

29,000  
-9%

---

*Produced vehicle without joint ventures/contract manufacture*
The relative environmental performance of MBC production improved significantly compared to the previous year.

- **Energy Consumption**: -5.5% per veh.
- **CO₂ Emissions**: -5.7% per veh.
- **Waste amount**: -3.9% per veh.
- **Water Consumption**: -2.2% per veh.
- **VOC Emissions**: -1.8% per veh.

**Production**

Units 2015: 292,000

Changes to 2014:
- 1.7 Mio: +12%
- 508,000: +9%
- 29,000: +2%
- *Produced vehicle without joint ventures/contract manufacture

Units 2014: 293,000

Changes to 2013:
- 1.7 Mio: -9%
- 508,000: -9%
- 29,000: -9%
Production: Technical Modules to improve environmental performance

**Powertrain**
- NanoSlide Microcoating in aluminum engines
- Laser Cleaning instead of degrease
- Energy-Manager for Machine Tools

**Body Construction**
- Energy Optimization Robots
- Analysis Product Effect for energy demand
- Laser welding (RobScan) instead of WPS

**Surface**
- Integrated Coating Process IP2 primer-less painting
- Energy Efficient Dryer
- Energy-optimized Pretreatment

**Assembly/Logistics**
- Energy Optimized Conveyor Technology
- Cycle Time Optimization
- Building Energy Management

**Process optimization in all plant to reduce resources demand, especially focusing on the energy issue**
And how do we achieve these values...

For example new Nanoslide Coating Technology

- Aluminum Engine Block
- Grey Cast Iron Cylinder Liners
- Nanoslide Coating

**Process Optimization**

**(2nd Generation*)**

**Mechanically Roughening**
instead of
**High-Pressure Water Jet**

**Electric Energy**
- ca. 700 MWh/a per module (Plan: 4 modules)
- ca. 22,500 MWh over life cycle

**Process Water**
- ca. 15,000 m³/a per module (Plan: 4 modules)
- ca. 480,000 m³ water over life cycle

**Recirculation of aluminum chips**
- Reduction of 8% primary aluminum
- Elimination of 15 t/a aluminum slurry

*FAME = Family of Modular Engines = new family of state-of-the-art
ku = kilo units
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Our road to emission-free driving
Mercedes-Benz Cars Fleet in Europe

Daimler AG
Our road to emission-free driving

High-tech combustion engines

Consequent hybridization

Electric vehicles with battery and fuel-cell
Powerful and efficient: The new 4-Cylinder Diesel OM 654 sets standards in terms of environmental compatibility

- 17% Weight Reduction
- 24% Friction Losses
- 13% CO$_2$-Reduction
- 80% NOx-Reduction
- 14% Performance Increase
- 11% Improved Acceleration

- Aluminum-Crankase
- Nanoslide Coating
- Stepped Combustion Bowls
- Engine-Related Emission Control
Introduction of 10 plug-in-hybrid vehicles by 2017

- S-Class
- GLE
- GLC
- GLC COUPE
- C-Class
- C-Class Estate
- C-Class LWB
- E-Class

Years:
- 2014
- 2015
- 2016
- 2017
Electric drive vehicles
Next generation fuel-cell system: huge technological progress

**2010: Underfloor package**
- 206 g Platinum
- 4 kW / m² active area
- Screw compressor

**2017: Compartment package**
- 20 g Platinum
- 9 kW / m² active area
- Electric turbo charger with turbine

- 30% reduction fuel cell engine size
- 90% reduction of Platinum
- 30% higher electric range in future vehicles
- 40% higher system performance
Emission regulations and battery technology development favour battery cost position

- EV >= conventional
- HV battery system costs
- Conventional powertrain costs

<table>
<thead>
<tr>
<th>Year</th>
<th>Expected Cost (€ / kWh)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>200 - 300</td>
</tr>
<tr>
<td>2020</td>
<td>150</td>
</tr>
<tr>
<td>2025</td>
<td>100</td>
</tr>
<tr>
<td>2030</td>
<td>200 - 300</td>
</tr>
</tbody>
</table>
Ambitious Re-Definition of our EV market targets

Ready for the market

EV Share
Mercedes-Benz Cars
Sales 2025

Greater China
NAFTA
WEU

Highest Potential EV Share
Mercedes-Benz Cars 2025

-illustrative-
Electric Line Up extended into the Future

- SLS AMG Coupé Electric Drive
- B 250 e
- smart fortwo electric drive
- smart electric drive - fortwo and forfour
- Mercedes-Benz GLC F-CELL

Intelligent EV-Architecture

Battery-electric vehicle with up to 500 km range
Foundation of new Mercedes-Benz electric vehicle strategy
Modular set up of next generation drive train technologies will allow a variety of derivatives.

Modular Battery Concept

Modular eDrive Concept

Front Axle  Rear Axle

Large

Medium

Small

Illustrative
Investment of 500 million euros in our second battery plant in Germany

- Production space stocked up from 20,000 to 60,000 m²
- 2nd plant start of operations: summer 2017
- Production of Li-Ion batteries for hybrid as well as electric vehicles and energy storage systems

Deutsche ACCUMOTIVE GmbH & Co. KG, Kamenz, Germany
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Today: one car for different mobility cases. Tomorrow: possibly the most suitable car „on-demand“.

We are about to re-invent personal mobility
moovel – find, book and pay

moovel

- Public transport
- Carsharing
- Railway
- Taxi
- Bikesharing
Forging ahead with increasing business in Mobility Services

<table>
<thead>
<tr>
<th></th>
<th>CAR2GO</th>
<th>MYTAXI</th>
<th>Combined change*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Members</td>
<td>2,100,000</td>
<td>3,400,000</td>
<td>+77%</td>
</tr>
<tr>
<td>Cities</td>
<td>30</td>
<td>43</td>
<td>+22%</td>
</tr>
<tr>
<td>Transactions</td>
<td>16 mill.</td>
<td>7 mill.</td>
<td>+39%</td>
</tr>
</tbody>
</table>

* car2go and mytaxi combined 09/16 (YTD) vs. 09/15 (YTD)
mytaxi and Hailo create Europe’s largest taxi e-hailing company

The two innovative leaders in the field of taxi e-hailing are joining forces.

Customers enjoy various forms of mobility with a transparent overview and easy-to-pay services.

Another strategic step in making Daimler Financial Services a leader of mobility solutions and platforms.
Leadership in Future Mobility will be determined by the combination of the four dimensions:

- E-Mobility
- Autonomous Driving
- Shared Mobility
- Digitalized Eco System

Mobility of the Future
More Information at

www.Mercedes-Benz.com
Innovation – Sustainable mobility
www.Daimler.com
Sustainability
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