Ralf Pfitzner, Head of Sustainability Volkswagen AG
Making The Change Happen Conference, Berlin, 2\textsuperscript{nd} July 2018
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With our Together Strategy 2025 we have integrated sustainability in the core of our business strategy.

VISION
“We are a globally leading provider of sustainable mobility”

MISSION
We offer tailor-made mobility solutions to our customers.
We serve our customers’ diverse needs with a portfolio of strong brands.
We assume responsibility regarding the environment, safety and social issues.
We act with integrity and build on reliability, quality and passion as the foundation for our work.
Radical Product and Business Model Innovations lead to a Transformation of the Automotive Industry with related sustainability opportunities and challenges

Key trends in the automotive world at a glance

<table>
<thead>
<tr>
<th>Future vehicle concepts</th>
<th>Advanced mobility solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Autonomous</td>
<td>Robotaxi</td>
</tr>
<tr>
<td>Electrified</td>
<td>PRT, GRT, FRT*</td>
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<tr>
<td>Connected</td>
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<table>
<thead>
<tr>
<th>Today's vehicle concepts</th>
<th>Sharing &amp; Mobility On Demand</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUV/CUV trends</td>
<td>Shared</td>
</tr>
<tr>
<td>Budget cars</td>
<td>Conventional drive system</td>
</tr>
</tbody>
</table>

Topics

- Energy efficiency
- Decarbonization/Energy transformation
- Low emissions
- Supply chain (materials)
- Impact on workforce
- Data protection
- Inclusive mobility

*PRT = Personal Rapid Transit; GRT = Group Rapid Transit; FRT = Freight Rapid Transit
Focus on strategy: Resolutely making progress toward sustainable mobility

- Efficient combustion engines and alternative drives
- Battery technology
- Charging infrastructure
- Mobility services
- Self-driving system (SDS)

Sustainable mobility
Paving the way for sustainable mobility

Up to the end of 2022: We will be putting more than €34 bn into e-mobility, digitalization, autonomous driving and mobility services – thereof in 2018: €6.6 bn

Up to the end of 2022: Volkswagen Group and its joint-venture partners in China will be making around €15 bn available for e-mobility, autonomous driving, digitalization and new mobility services.

Also putting more than €90 bn into the conventional vehicle and drive portfolio – thereof in 2018: €19.8 bn
Sustainability@Volkswagen focuses on material topics along the triple bottom line

“For us, sustainability means simultaneously striving for economic, social and environmental goals in a way that gives them equal priority” (Volkswagen Annual Report 2017)

Sustainable Value Enhancement: Identification of value drivers, managing related risks and opportunities

Materiality Analysis is based on Global Trends, Stakeholder Surveys, Internal Guidelines, Strategy 2025, GRI Standard, CSR-RUG. Refined by expert workshops
Climate Change: our most material sustainability challenge – Volkswagen develops Decarbonization Index derived from 2° Goal
Climate Change: In terms of carbon footprint, BEV based on European Energy mix is already favorable compared to internal combustion engine

Carbon footprint of powertrain and fuels today according to our current Life Cycle Assessment studies

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>CO₂eq./km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol - conventional</td>
<td></td>
</tr>
<tr>
<td>Diesel - conventional</td>
<td></td>
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<tr>
<td>Natural gas - conventional</td>
<td></td>
</tr>
<tr>
<td>Natural gas - e-gas*</td>
<td></td>
</tr>
<tr>
<td>Plug-in hybrid - conv. electricity mix green energy*</td>
<td></td>
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<tr>
<td>Electric vehicle - conv. electricity mix green energy*</td>
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</tr>
</tbody>
</table>

Source: Life Cycle Assessment Team Volkswagen K-GERU 2018
A-class vehicle, 200,000 km running distance | WLTC | range electric vehicle: 300 km * Technical potential ** MDBevo (SOP 2018)
Climate Change: Volkswagen is realigning its energy supply for production

- **Converting** the two large power stations in Wolfsburg from coal to natural gas
- **Saving 1.5 million tons of CO₂ per year**\(^1\), equal to the annual CO₂ emissions of 870,000 vehicles
- **Investing about €400 million** in new gas and steam turbine systems

- **Globally, already 37% of global electricity consumption in production is based on renewable energies** (as of 2017)

\(^1\) when fully effective in 2022
Climate Change: Example Audi - carbon neutral factory Brussels

Audi Brussels: Home of the new e-tron Sportback

"CO₂-neutral site" certificate from Belgian testing company Vinçotte

- covers all production processes and all other emissions generated at the plant
- either by renewable energies (ca. 95 %)
- or compensated by environmental projects (ca. 5 %)

→ World's first certified CO₂-neutral high-volume production plant in the premium segment

The Brussels plant

- Foundation: 1949
- Site area: 540,000 m²
- Employees: 2,792 (as of 31 December 2017)
- Previous Models: Audi A1
- Production (2017): 95,288 vehicles
Technologies to optimize vehicle emissions: target 95g CO₂ in 2021

Conventional engines
- Diesel
- Gasoline

Improve efficiency of combustion

Electrification
- mHEV
- mHEVplus
- HEV
- PHEV
- BEV

Extended portfolio of electric and hybrid vehicles

Further vehicle optimization
- Efficient Air conditioning compressor
- Efficient electrical generator
- Ultra low rolling resistance tires
- Optimized residual braking torque
- Active aerodynamics
- Extended use of LED-Lighting

Improve battery technology
- Extended range
- Lower price

Push customer demand
# Climate Change & Environmental Protection: Reuse and Recycling of Li-Ion Batteries

**Second Life for Batteries**

Porsche has teamed up with Swedish company Box of Energy to develop a solution that involves recommissioning used batteries as energy storage systems.

The prototype stationary storage unit with 18 KWh capacity contains two used batteries from a Panamera G1 II (End of production: 2016)

**Battery Recycling**

Today, already commercially available processes exist to recover the resources Cobalt, Nickel and Copper from used Li-Ion batteries.

Volkswagen started already back in 2009 in the publicly funded „LithoRec“ project to work on recycling of Li-Ion batteries.

Based on promising results from the project, Volkswagen further develops the recycling process with the goal of an increased process efficiency.
Supplier Management: „Sustainability in Supplier Relations“ (SiSR) to mitigate potential risks and ensure resilience of the supply chain

<table>
<thead>
<tr>
<th>REQUIREMENTS</th>
<th>MONITORING</th>
<th>TRAINING AND SKILLS</th>
</tr>
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<tbody>
<tr>
<td>Contractually binding</td>
<td>Verification of compliance with requirements</td>
<td>Training and raising awareness of buyers and suppliers</td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Environmental protection</td>
<td>- Sustainability questionnaire</td>
<td>- E-learning programs for suppliers and buyers</td>
</tr>
<tr>
<td>- Employee rights</td>
<td>- App for evaluating suppliers’ sustainability</td>
<td>- Classroom training courses for suppliers and buyers</td>
</tr>
<tr>
<td>- Transparent business relationships</td>
<td>- Supplier audits</td>
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<tr>
<td>- Fair trading practices</td>
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<tr>
<td>- Duty of care to build responsible supply chains</td>
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FURTHER DEVELOPMENT

- Working and sharing information with the global procurement network
- Involvement in cross-sectoral sustainability initiatives
- Involvement in working groups on sustainability with other automotive manufacturers
Supplier Management: Value Chain for electric vehicle raw materials

Example: proportions of the cell of a NMC 6-2-2, 62 kWh-Battery

- **CATHODE**
  - Nickel: 30 kg
  - Manganese: 10 kg
  - Cobalt: 10 kg
  - Lithium: 10 kg
  - + others

- **ANODE**
  - Graphite: 75 kg
  - + others

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<table>
<thead>
<tr>
<th>Raw Material</th>
<th>Amount</th>
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<tbody>
<tr>
<td>Nickel</td>
<td>30 kg</td>
</tr>
<tr>
<td>Manganese</td>
<td>10 kg</td>
</tr>
<tr>
<td>Cobalt</td>
<td>10 kg</td>
</tr>
<tr>
<td>Lithium</td>
<td>10 kg</td>
</tr>
<tr>
<td>Graphite</td>
<td>75 kg</td>
</tr>
</tbody>
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Equally important to focus on: costs, availability AND sustainability

„NEW“ Focus of procurement

“Classic“ Procurement Focus
Supplier Management: Sustainable raw material procurement

Our process for defining measures

- Risk rating 2017/2018
- Identified TOP 16 materials for activities
- Measurement definition (3 levels)
  - Individual measures
    - Sustainability roadmap for specific suppliers
    - Work with raw material matrix for current and future activities involving high risk materials
  - DRIVE Sustainability (OEM Initiative)
    - Common measures for determined materials are defined on the basis of the Dragonfly risk study (Q1 2018)
    - Sustainability roadmap for common activities will be published in Q2 2018
  - Industry Initiatives
    - Global Battery Alliance
      - WEF Initiative
      - International Partners (OECD, UNICEF, etc.)
      - Sustainable supply chain for all battery raw materials
    - Responsible Minerals Initiative
      - Cooperation with other initiatives
      - Certification for cobalt smelters will be piloted in 2018
      - Aluminium Stewardship, EITI etc.
Increase in competitiveness and safeguarding the future are the focus points of the Volkswagen Brand Future Pact agreement

| Working Group 1 | • Increase of productivity by 25%  
|                 | • Reduction of plant costs |
| Working Group 2 | • Increase of productivity by 25%  
| Components     | • Discontinuation of unprofitable products |
| Working Group 3 | • Reduction of hardware-oriented development work  
| Technical      | • Increased efficiency in development processes |
| Development    | Working Group 4  
| Administration | • Reduction of bureaucracy |

Secure the Future

- 4 additional models: 2 conventional and 2 MEB vehicles
- Investments in:
  - Electric drive trains
  - Pilot facility battery cell
  - Battery system
- Competency/capacity increase in autonomous driving, electrification, connectivity etc.
- Creation of employment in new business segments

Reduction in workforce based on demographic curve\(^1\)

\(^1\) ~ 9,350 early retirement contracts signed in 2017.
Corporate Responsibility: more than 400 projects globally show our engagement for societies we operate in

Example: The Volkswagen Child Safety Initiative (CSI) in China

Challenge: Safety seat use rate: China: 11.5% / Europe: >90 %

Goal: Improve public understanding of the importance of child road safety

Activities:
• Child road safety education in cooperation with dealers
• Community Innovation Contest
• "Protect Childhood - Child Safety First" Forum

Evaluation system:
→ 99.32% of parents taking part pay more attention to child road safety.

Find out more:
https://csrprojects.volkswagenag.com/csr-projects.html#all
Sustainability Council as critical advisor to the Group Board of Management

Topics
- Sustainable Mobility and Climate Protection
- Social Responsibility and Integrity
- Future of Work and Digitalization

Tasks
- Strategic Counseling of the Board of Management
- Strengthening of the Sustainability Management
- Bridge to Stakeholders
- Expertise and Initiatives

Projects
- Open Source Lab for Sustainable Mobility
- Forecast-based Financing – Combat Climate Change Impacts in Asia-Pacific
Communication on Sustainability: Sustainability Report and Sustainability Magazine “Shift”

Report
Includes the combined separate nonfinancial report and fulfils the requirements of the HGB (German Commercial Code) and the German CSR Directive Implementation Act.
GRI Standards (comprehensive level)

FOCUS: ESG, facts, figures, regulation, GRI / UN SDGs

Shift Magazine
How can Volkswagen – after the Diesel Crisis - talk about sustainability again without fear of derision and ridicule?
Shift, which complements our traditional Sustainability Report, is an initial answer.

FOCUS: Conflicting goals, change /crisis, outlook
Summary and Outlook

• With our Together Strategy 2025 we have integrated sustainability in the core of our business strategy

• Sustainability@Volkswagen focuses on material topics along the triple bottom line, addressing both risks and opportunities

• Climate Change is our most material sustainability challenge – Volkswagen develops Decarbonization Index derived from 2°C goal, activities cover the entire life cycle

• Sustainability in Supplier Relations helps to mitigate potential risks and ensures resilience of the supply chain; challenges of E-mobility value chain are known and addressed

• Stakeholder engagement is important to regain trust. Among others, our Sustainability Council acts as critical advisor to the Group Board of Management

• Outlook: We will bring Sustainability closer to the core business; more to come on decarbonization and impact assessment of our activities