ID. INSIGHTS
SUSTAINABLE E-MOBILITY

Keynotes:
Christian Senger
Ralf Pfitzner
Dr. Michael Liebert
Climate protection and decarbonisation

Ralf Pfitzner
Head of Sustainability of the Volkswagen Group
The automotive industry is part of the problem: The transport sector accounts for 1/7 of global greenhouse gas emissions.

Source: IPCC 2014, EEA 2018
Volkswagen is determined to be part of the solution, focusing on climate change mitigation and decarbonisation.

**Focus Area: Climate Change Mitigation and Decarbonization**

**Why it matters to Volkswagen:**

- Because of our significant influence and thus our responsibility
- Because of rising stakeholder expectations
- Because decarbonisation delivers direct business value
CO\textsubscript{2} matters over the entire life cycle

Our Decarbonization Index (DKI) allows to track improvements in CO\textsubscript{2}-performance

Paris commitment needs 30% reduction goal per car by 2025

*2015 DKI t CO\textsubscript{2}/vehicle: Average Volkswagen Group vehicle across all brands
Volkswagen addresses an entire ecosystem, goes beyond the vehicle itself

Energy transition
- Wolfsburg power plant conversion saves 1.5 mn tons of CO₂/year by 2022 – corresponding to emissions of 870,000 cars per year

Low-emission product
- Further reductions
- Alternative fuels
- E-offensive

Mobility services
- MOIA electric shuttles in first cities
- All-electric car-sharing Volkswagen We Share Q2/2019 in Berlin

Charging infrastructure
- Elli to offer green energy, wallboxes and holistic charging solutions
- Volkswagen is part of IONITY rapid charging network

e-Golf - Electrical consumption in kWh/100 km: combined 12.7, CO₂ emissions combined in g/km: 0, efficiency class: A+
BEV today first choice in CO₂ over lifetime
Current Golf vs. e-Golf

Source: Volkswagen K-GEGU

<table>
<thead>
<tr>
<th>Fuel Type</th>
<th>Production (cradle2gate)</th>
<th>Fuel Supply (well2tank)</th>
<th>Use (tank2wheel)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol</td>
<td>26</td>
<td>27</td>
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<tr>
<td>Diesel</td>
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<td>CNG</td>
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<tr>
<td>PHEV*</td>
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<tr>
<td>BEV**</td>
<td>57</td>
<td>62</td>
<td>120</td>
</tr>
</tbody>
</table>

* EU 28 Mix, Petrol
** EU 28 Mix
Summary: Ralf Pfitzner on climate protection and decarbonisation

- Decarbonisation and climate change are focus topics
- We track CO₂ over the entire life cycle
- Volkswagen addresses an entire ecosystem
- BEV and PHEV leading in overall energy efficiency
Sustainable e-mobility for all

Christian Senger
Head of Volkswagen Product Line e-Mobility
Volkswagen is committed to the climate goals of the Paris Agreement

Paradigm shift already underway

“Well below 2°C goal” is guideline and benchmark

Vision of CO₂-neutral mobility is firmly anchored

Transformation is underway at all brands

Realignment of governance

Redistribution of resources
We are acting early to lay the groundwork for meeting the climate goals.

**CO₂ emissions**
- New vehicle fleet
- Existing fleet

**Fleet renewal**
- CO₂-neutral new vehicle fleet
- CO₂-neutral existing fleet

Today → 2050
There will be massive changes in our drivetrain portfolio by 2040.

- Battery electric (BEV): ~60%
- Fuel cell (FCEV): 10-25%
- Plug-in hybrid (PHEV): 10-20%
- Combustor (ICE): >85%

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**Legend:**
- Battery electric (BEV)
- Fuel cell (FCEV)
- Plug-in hybrid (PHEV)
- Combustor (ICE)
Volkswagen has launched the most extensive e-offensive in the global automotive sector

Goal: Electrification of the entire model portfolio

- 25% of new Group vehicles will be powered solely by electricity
- 50 BEVs + 30 PHEVs.

2025

2030

- At least one electric version of each of the Group’s > 300 models.
Volkswagen is driving forward e-mobility like no other volume manufacturer

> 50 New fully electric vehicles by 2025

~ 30 Billion € invest by 2023

~ 15 Million MEB vehicles in the first wave
Volkswagen will achieve major economies of scale by producing MEB vehicles worldwide.

Eight e-sites to be set up worldwide by 2022:

- Chattanooga, USA
- Emden, Germany
- Hanover, Germany
- Zwickau, Germany
- Dresden, Germany
- Mladá Boleslav, Czech Republic
- Anting, China
- Foshan, China
The Volkswagen brand’s e-offensive is based on three strategic pillars

**Low Costs**
Consistently generating economies of scale by Group-wide use of MEB electric platform.

**Strong Benefits**
Exploiting the full potential of e-mobility by developing a completely new product family.

**Modern Lifestyle**
Networking hardware, software and services for contemporary and modern mobility solutions.
The MEB electric platform is the technological and economic backbone of the e-offensive

By 2022, we will be offering pure electric models in all relevant vehicle segments.
Electric for all: The launch of the Volkswagen ID. at the end of 2019 marks the start of a new era
The ID. is trimmed to reduce CO₂ along the entire value chain – and achieve a climate-neutral balance.
Consistent reductions in CO₂ emissions in production and supply chain

1) CO₂ effect

1) Measures implemented

1) Measures in implementation/planning

First half 2020

1) Through certified projects – e.g. VCS (Verified Carbon Standard) or REDD+ (reducing emissions from deforestation and forest degradation)

Concept Car
Offerings for CO₂-neutral use throughout the entire life cycle

Charging with green power...

...makes the ID. CO₂-neutral throughout the entire life cycle
From today’s perspective, electric vehicles are the best way to achieve effective climate protection.

<table>
<thead>
<tr>
<th>Eco-balance over life cycle 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petrol</td>
</tr>
<tr>
<td>Diesel</td>
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<tr>
<td>EV after optimization</td>
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- **Limited potential**
  for further CO₂ improvements by 2050

- **High potential**
  for further CO₂ improvements by 2050
In a nutshell: Volkswagen is making the car climate-neutral

“Well below 2°C” is the yardstick for our actions

Biggest e-offensive worldwide launched

Attractive and affordable electric cars for all

MEB is strong basis for major economies of scale

The ID. marks the start of a new era in 2019

First car in the world with a CO₂-neutral balance
How to make the ID. carbon neutral

Dr. Michael Liebert
Head of Sustainability VW Passenger Cars
For Volkswagen, sustainability covers a multitude of measures

- Resource protection
- Health
- Human rights
- Mobility
- Profitability & growth
- Customer & employee related topics

Sustainability considers and harmonizes business, environmental and social aspects.
Sustainable CO₂ optimization addresses the entire life cycle of a vehicle.

CO₂ optimization measures throughout the entire life cycle:
- **Production:** Supply chain, Production
- **Use phase:** Fuel/energy supply, Fuel consumption
- **End-of-life:** Recycling

Key priority: Avoidance & reduction (Focus on core business)

Complementary: Compensation (Non-avoidable emissions only)
Battery production and charging are key levers for the CO$_2$-neutrality of the ID.
(tCO$_2$/vehicle before optimization)
Our vision is 100% CO₂-neutral E-mobility
Decarbonisation concept

Volkswagen’s delivery promise

- CO₂-neutral production incl. supply chain
- Zero-emission vehicle
- Green energy contracts for charging
- Green energy charging infrastructure

Customer offerings for the use phase

- CO₂ neutral customer handover from dealer
- Offerings for CO₂-free usage period
The ID. made in Zwickau will be CO₂-neutral at handover to our customers

CO₂ supply chain & production

- Energy-efficiency Zwickau
- Green energy Zwickau
- Green energy further suppliers
- Green energy cell production HV battery

Market launch

First half 2020

Avoidance & reduction

Compensation of non-avoidable emissions

Concept Car
We focus on climate projects with the highest quality standards

Focus

Additional, measurable and certified climate effects
Social and ecological impacts
Geographical proximity to global Volkswagen locations

Project types

- Reforestation in tropical climate zones
- Protection of tropical forests
- Household-related CO₂ avoidance through social projects
- Renewable energy projects
Use phase optimization requires joint efforts
Key stakeholders by life cycle phase

- **Production**
  - Supply chain
  - Production

- **Use phase & end-of-life**
  - Energy supply
  - Recycling

**Suppliers**
- Volkswagen
- <1 year

**Customers**
- >10 years

**Politics**
- Handover to customers

*Concept Car*
National energy mix optimization is a crucial political factor
Life cycle emissions based on average national energy mix
(tCO₂/vehicle before optimization)
Volkswagen focuses on green energy across all charging scenarios

Carbon neutrality requires green energy

- HOME | 50%
- WORK | 20%
- HIGHWAY | 5%
- PUBLIC | 25%
Significant steps taken on the path towards a CO$_2$-neutral ID.

$tCO_2$/vehicle

ID. CO$_2$ emission over life cycle (before optimization)

Supply Chain
Avoidance & reduction

Zwickau
Avoidance & reduction

Supply Chain & Production
Compensation

Use Phase

Our vision

100%
Summary: Michael Liebert on how to make the ID. CO₂-neutral

- Decarbonisation is our sustainability priority for climate protection
- Our vision: 100% CO₂-neutral e-mobility
- We ensure a CO₂-neutral handover of the ID. to the customer
- We focus on CO₂ avoidance and reduction in the core business – compensation as an additional measure
- We recommend and actively support green energy in all charging scenarios
- More than 50% of life cycle emissions have been already addressed – many long-term measures will be tackled
Climate protection

a MARATHON not a sprint.