SUSTAINABILITY ACROSS THE ENTIRE VALUE CHAIN.

PREMIUM MEETS RESPONSIBILITY.

MONIKA DERNAI, CORPORATE STRATEGY SUSTAINABILITY AND MOBILITY.
THE BMW GROUP IS CONSIDERING ALL DIMENSIONS OF SUSTAINABILITY IN A HOLISTIC VIEW.
THE BMW GROUP IS COMMITTED TO ACHIEVING THE 1.5°C TARGET.

Since TODAY the BMW Group is the first German carmaker to join the “Business Ambition for 1.5°C”.

This includes our commitment to achieving climate-neutrality along the value chain by 2050.

It also automatically makes us a member of the UN's Race to Zero programme.
-50 % CO₂ FROM PRODUCT UTILISATION BY 2030 –
-40 % CO₂ ACROSS THE VEHICLE LIFECYCLE.

BEV ramp-up affects the carbon footprint of product utilisation.
By 2030, we will cut CO₂ emissions from product utilisation by at least 50%.
Use Phase is the biggest contributor to the BMW Group's global CO₂ footprint, accounting for more than 70%.
So, CO₂ emissions per car across the lifecycle will fall by at least 40% by 2030.
Energy Flexibility is Key for Enabling E-Mobility & Green Charging. Example: Germany.

The required amount of energy for e-mobility could be covered by renewable sources.

Charging electric vehicles will result in peak loads. Intelligent charging systems are essential.

Premises: Annual mileage: 15,000 km; E-drive share PHEV: max. 50%; BEV share in inventory: 50%; Consumption: 25kWh/100km; Charging capacity: 3.7kW
VEHICLE TO GRID: EV CHARGING CAN BE A PART OF THE SOLUTION TO STABILIZE THE ENERGY GRID AND INTEGRATE MORE RENEWABLE ENERGY.

Grid Power [MW]

STEP 1: LOAD SHIFTING
- Avoid charging EVs in the morning and the evening.
- Encourage charging during mid-day (from storage or through “Time of Use Tariffs”).
- Shift charging events of plugged-in vehicles.

STEP 2: VEHICLE TO GRID
- Enable both charging and discharging of EVs → use EV fleet as temporary energy storage.
DIGITAL SOLUTION FOR INTELLIGENT CHARGING: “CHARGE FORWARD”. 2021-2022: ROLL-OUT IN PARTNERSHIPS WITH UTILITIES ACROSS THE USA.

PROJECT WITH PARTNER PG&E

- 2017-2020 Pilot: ~400 BEV+PHEV customers

32% CO2 reduction potential in the use phase.

HOW IT WORKS

- Customer allows BMW to remotely manage vehicle charging.
- Charging event is moved to a time window when solar energy is available.
- This reduces CO2 footprint and cost.
AS OF APRIL 30, 2021 WE HAVE LAUNCHED CHARGEFORWARD 3.0 AND DEMONSTRATED A LEADING POSITION ON SMART CHARGING INNOVATION.

- Smart charging has been shown to reduce GHG emissions of BMW EVs by an additional 32% on average

- Customers can earn valuable incentives for participating (up to $400 per year) and enjoy off-peak electricity rates

- ChargeForward demonstrates leading position of BMW on digital innovation
HOW DOES IT WORK? CUSTOMER JOURNEY EXAMPLE.

Customer receives targeted email → Submits application on enrollment website → Downloads app and sets charge preferences (+$150 incentive) → Charging schedule optimized with option for customer override → Customer receives gift card incentives up to $250 per year

BMW Group Sustainability and Responsibility.
CURRENT BUSINESS MODEL RELIES HEAVILY ON WILLINGNESS OF THE UTILITIES. THIS WILL PLAY A LARGE ROLE IN GROWTH TRAJECTORY.

**Utilities**
- Fund programs
- Decide customer offers
- Dictate program schedule
- Provide data
- Pay BMW a fixed fee

**Incentive Payments**

**Customers**
- Opt-in to program and participation in smart charging
- Receive incentives from utilities

**Data & Fixed Fee**

**BMW**
- Market program to EV owners
- Sends charging control signals to vehicle
- Maintains IT infrastructure (front-end + backend)

BMW Group Sustainability and Responsibility.
## Long-term Options for Electric Vehicle Grid Integration

**Targets:** Make grid ready for large-scale adoption of electric vehicles, reduce customer use phase CO2 footprint

### Scale without utilities / network operators
- Each OEM offers intelligent charging to customers
- Reimbursement of customers via OEM
- Grid information from 3rd part
- OEM steers charging

- Quick to implement
- Quick to scale
- Not optimal for the grid
- Impact on customers can be managed

### Scale with utilities / network operators
- Each OEM joins with specific utilities
- Utilities pay incentives to customer
- Utilities provide grid information
- OEM steers charging

- Slow to implement
- Slow to scale
- Not optimal for the grid
- Impact on customers can be managed

### Scale with grid integration platform
- Platform integrates OEM data.
- Reimbursement of customers via platform.
- Platform steers charging event to optimize grid performance / renewable share

- Slow to implement
- Quick to scale
- Optimal for the grid
- Might impact customers negatively