In association with

NATIONALE PLATTFORM ELEKTROMOBILITÄT

Forum 1
Future Security: Energy & Environment

"Electric Mobility going global" - International Conference hosted by the German Federal Government
May 28, 2013

Dr. Friedrich Seitz, President
Process Research & Chemical Engineering, BASF

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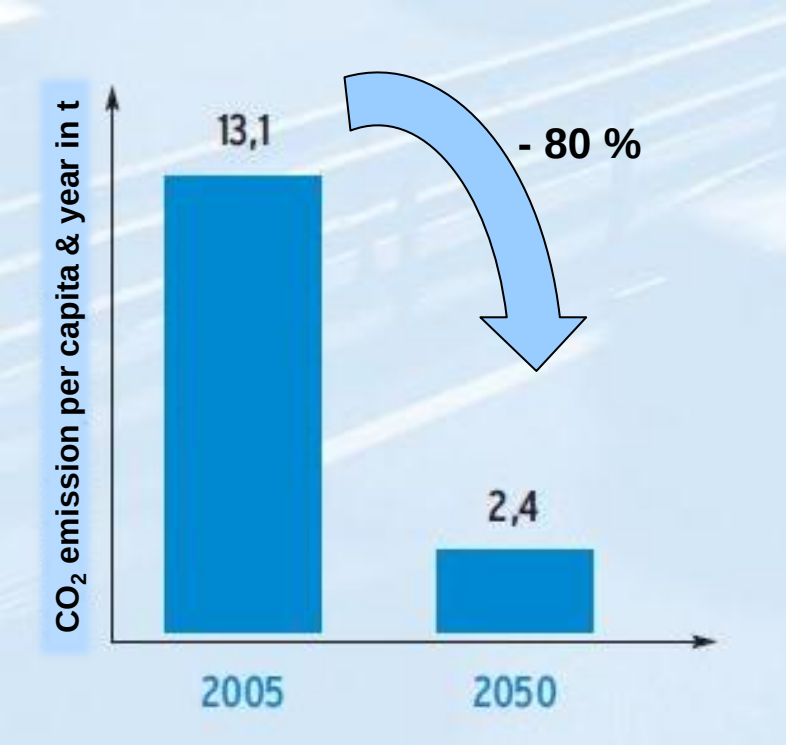
Global climate protection and “Energiewende”



Source: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

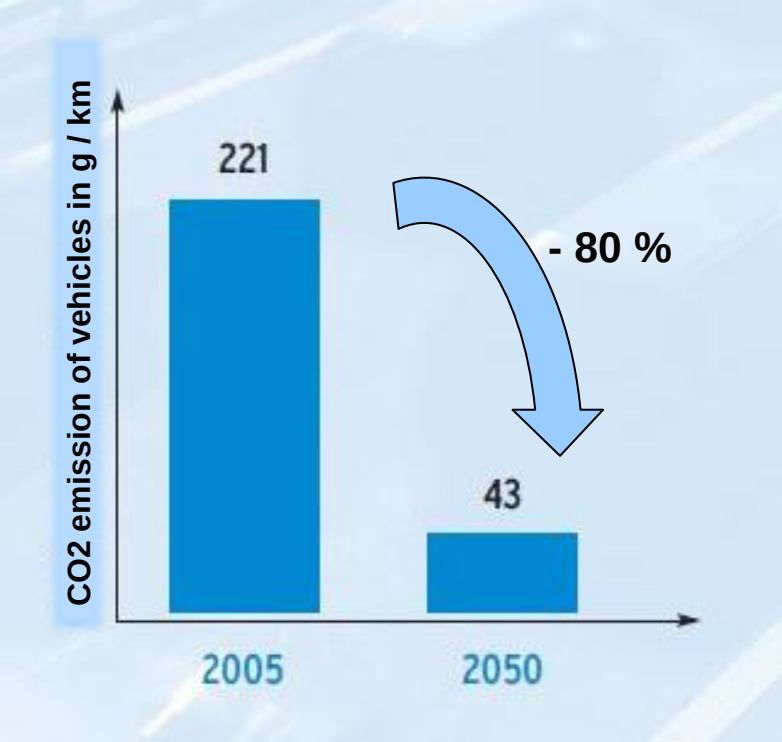
The calculations are based on models that incorporate different factors like population growth or changes in the number of vehicles

- To avoid serious consequences of the climate change, global warming has to be limited to 2 °C compared to the pre-industrial level.
- In industrial countries like Germany, this requires a reduction of CO_2 by at least 80 % by 2050.

➢ **“Energiewende“ in Germany**

Germany’s energy supply is to be guaranteed predominantly by renewable energies by 2050.

Targets necessary for the traffic sector



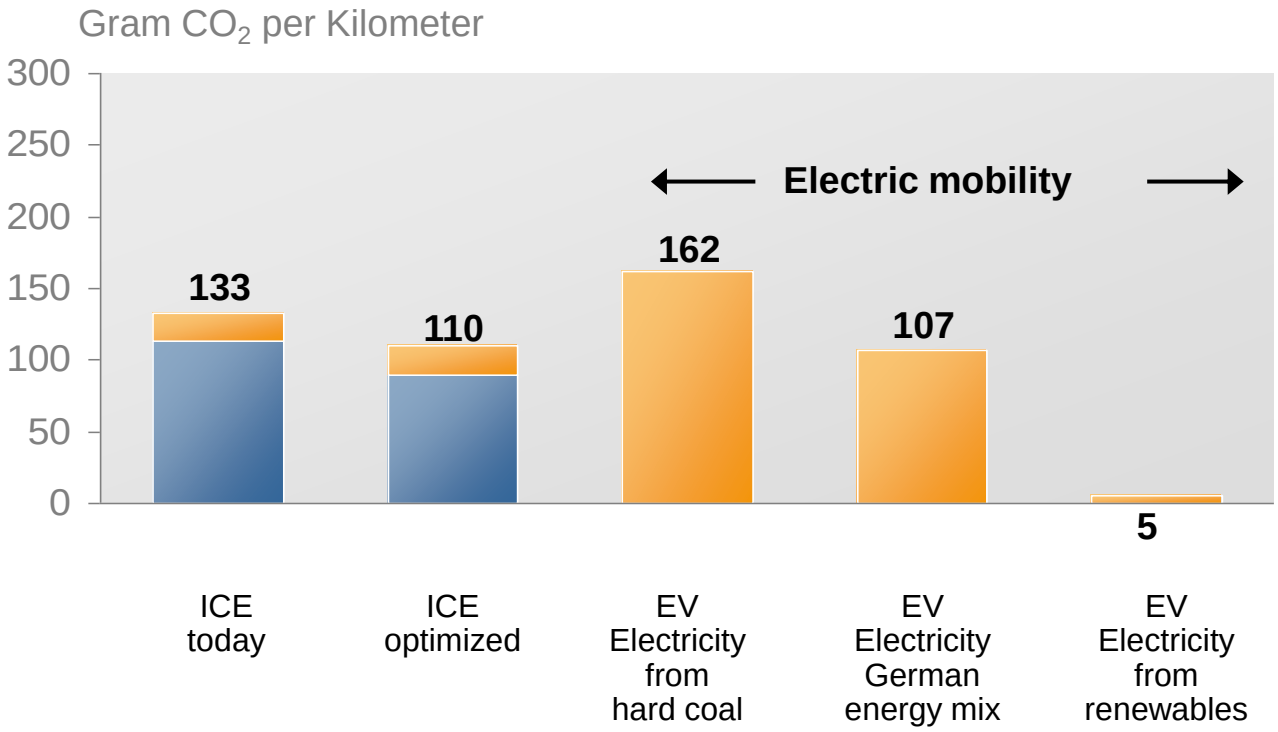
Source: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety

The calculations are based on models that incorporate different factors like population growth or changes in the number of vehicles

- To reach the 80 % goal, all sectors have to contribute.
- With regard to the traffic sector, this means a reduction of the average CO_2 emissions to 43 gram per kilometer driven by 2050.
- This requires that 2/3 of the kilometers driven have to be free of emissions until 2050, i.e. generated by pure electric or plug-in hybrid vehicles.

Is electric mobility sustainable?

CO_2 emission by propulsion concept



Operation:

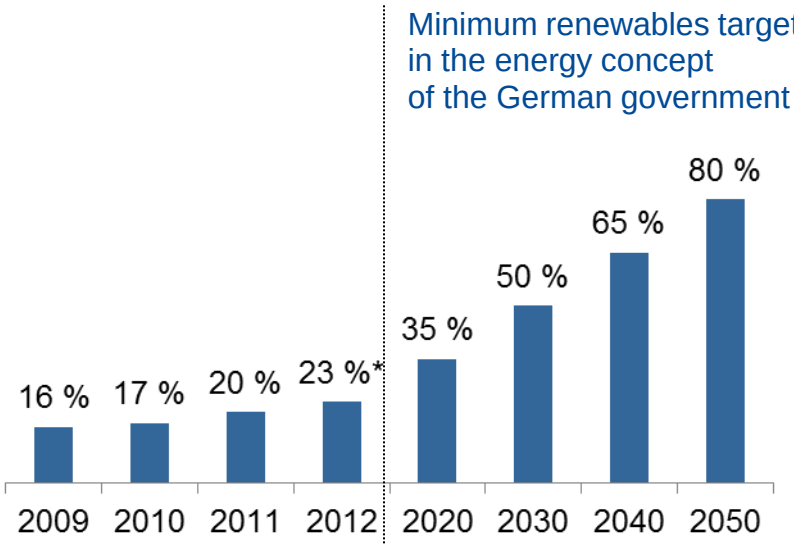
- Direct emission of the car

Production:

- Emission caused by production and transport

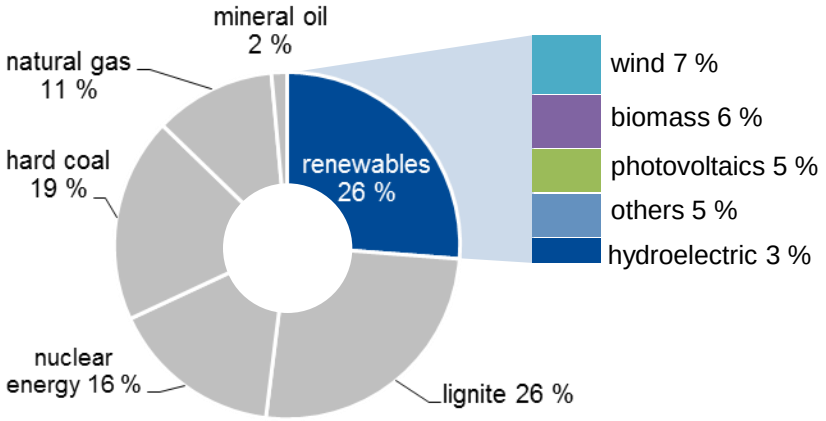
Targets of German energy turnaround

- Reshaping of the energy landscape in Germany
- Exit from nuclear power generation until 2022
- Increase of percentage share of power generation from renewables:

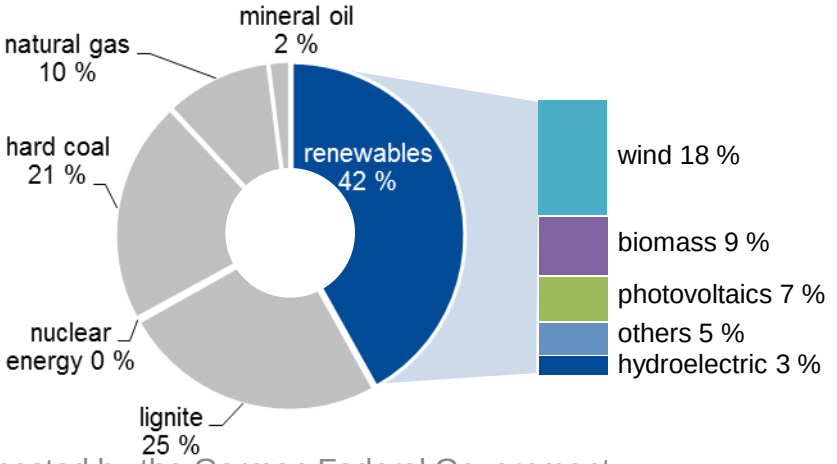


* preliminary data

Electricity production 2012

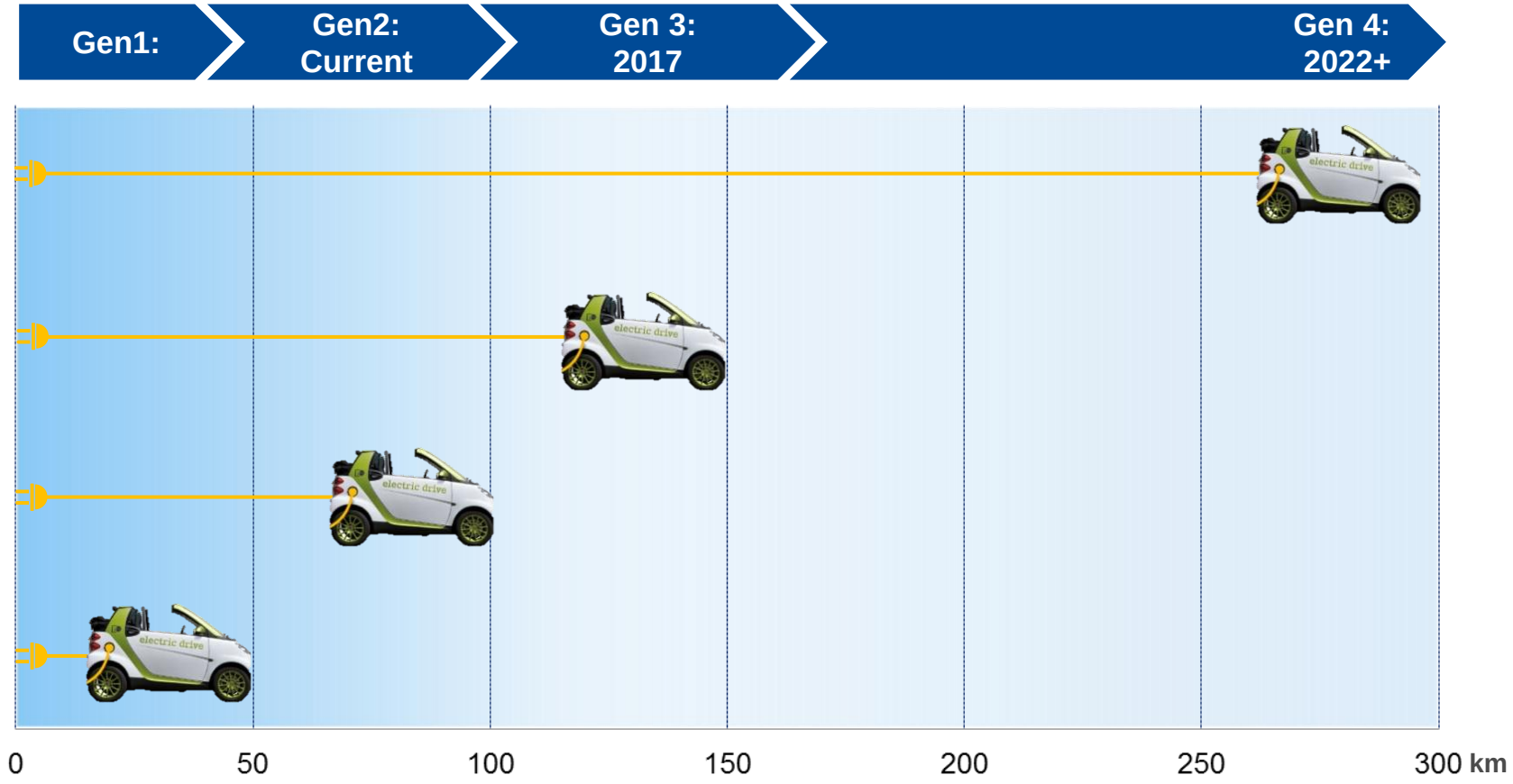


Electricity production 2023



Key requirement: Innovative battery materials

Driving range
(in km)



Smart Forvision in cooperation with BASF

Technologies for the car of tomorrow

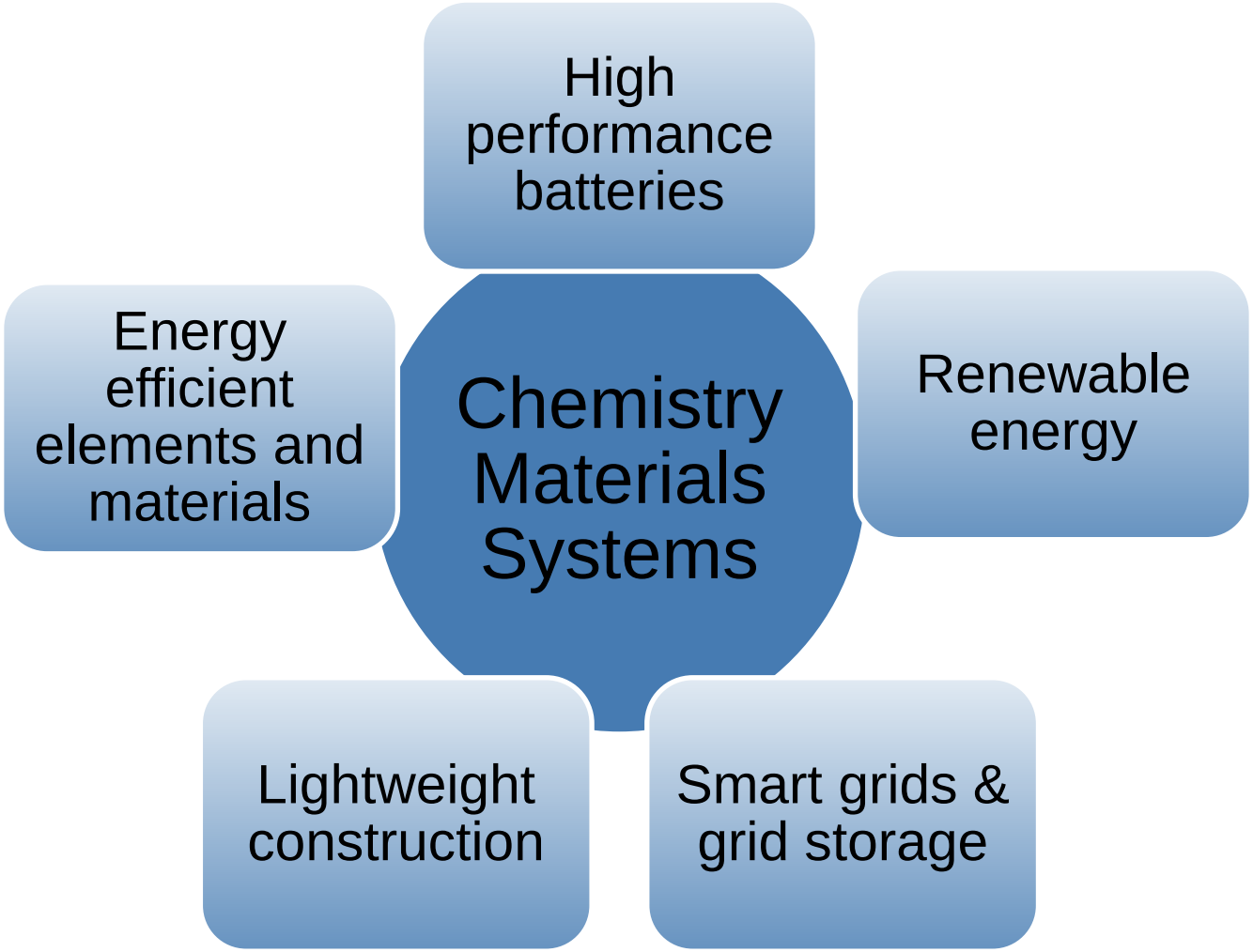
1. **Electrical energy efficiency**
   - Solar roof with transparent organic solar cells
   - Transparent organic OLEDs
2. **Holistic temperature management**
   - IR-reflecting films/pigments
   - High performance foams for insulation
3. **Multifunctional lightweight construction**
   - Lightweight ergonomically designed seats
   - Thermoplastic polyamide wheel

Go online at www.smartforvision.basf.com

Goals: maximum energy efficiency, longer driving range and more comfort

The way to electric mobility

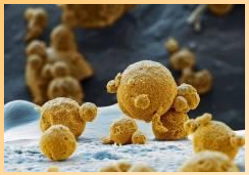
Measures



Improved battery technology

Battery as key components in electric vehicles

Materials → Components → Cells → Batteries → **Electric Car**





The battery determines characteristics of an electric vehicle

Range, costs, safety, …

The battery allows for differentiation and value creation

Challenging technology and chance for chemistry, material science and engineering

Materials are the heart of the battery cell

Chemistry plays a central role as material and component supplier

The Chemical Company