



Dr. Thomas Becker, Vice President Governmental Affairs BMW Group,
August 30th, 2011.

VEHICLE ELECTRIFICATION'S ROLE.

THE NEXT STEP OF EVOLUTION IN AUTOMOBILITY.

**BMW
GROUP**



Rolls-Royce
Motor Cars Limited

BMW GROUP'S EFFICIENT DYNAMICS STRATEGY.



TODAY

- Optimisation of fuel consumption and emissions.
- Lightweight construction.



TODAY

- Full and mild hybrid vehicles.
- Initial step towards electrification of the drivetrain.
- Plug-in Hybrid drive-trains.



NEAR FUTURE

- First limited electric vehicle production in 2008.
- MINI E on the road since 2009.
- BMW ActiveE in 2011.
- Introduction BMW i3 in 2013.



FUTURE

- Commitment to and validation of technology.
- Optimisation of BMW H2 ICE.
- Improvement of hydrogen storage and efficiency.

BMW Group's drive strategy provides **a broad technology spectrum for today and the future.**

Combustion engine

Hybrid technology

E-vehicle

Hydrogen

THE FUTURE OF MOBILITY.



Environment

Climate change and the subsequent effects



Urbanisation

By 2030, over 60 % of world population will live in cities



Politics and Regulations

CO2 - and fleet regulations,
Restrictions on imports

CONTRIBUTING FACTORS

Economics

Shortage of resources, increase in the price of fossil fuels



Culture

Sustainable mobility as part of a modern urban lifestyle;



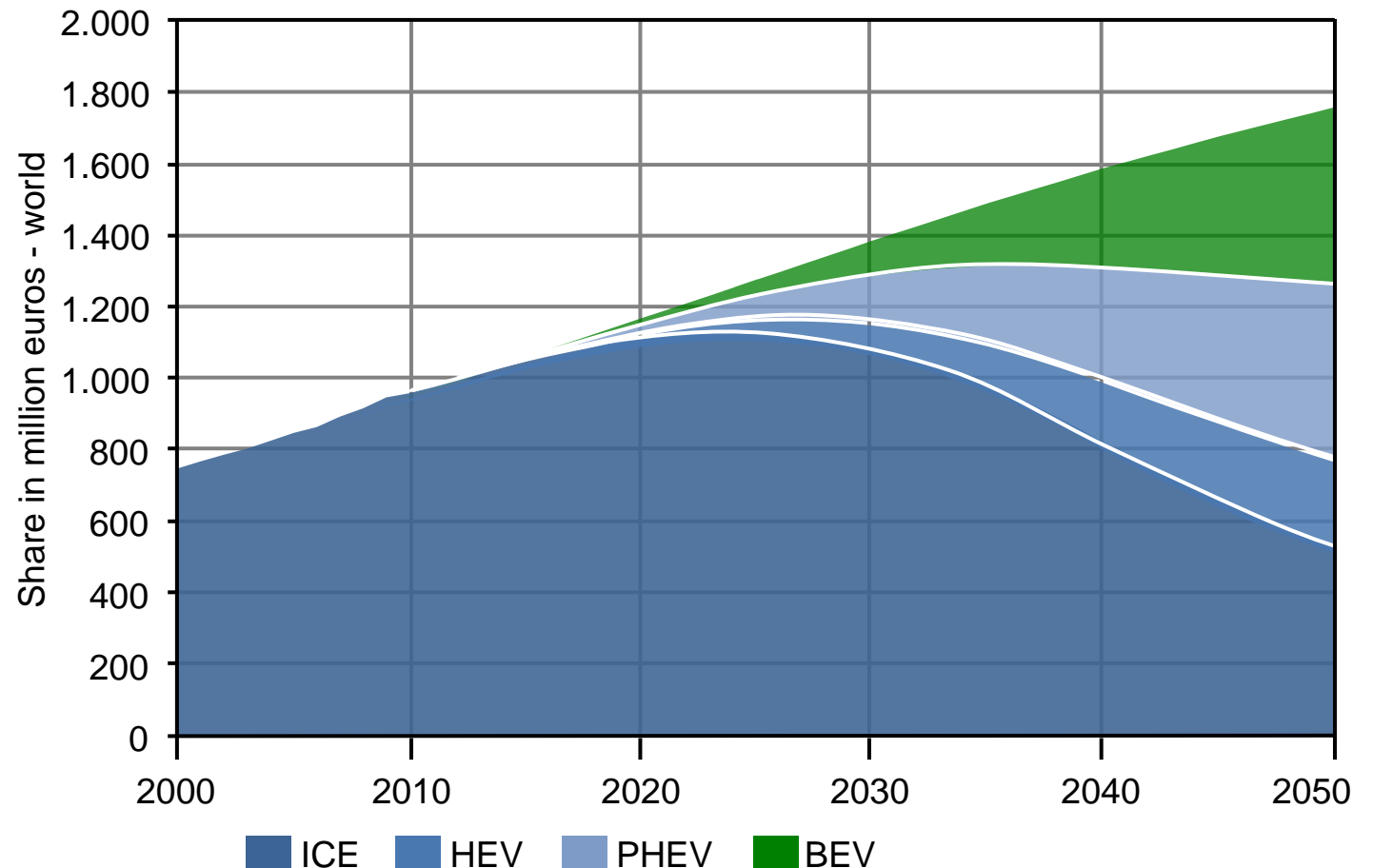
Customer Expectations

Changing values

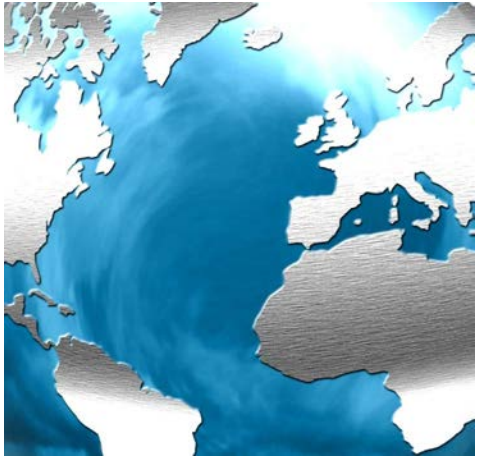


FORECAST FOR VEHICLE POPULATION. ELECTRIFIED VEHICLES WILL ACHIEVE RELEVANT MARKET SHARES.

- Internal combustion engines will continue growth until 2020-30.
- The percentage of electrification will steadily increase.
- In 2020, the proportion of new registrations for electrified vehicles is estimated at 5 – 15%.



CUSTOMER EXPECTATIONS – CUSTOMERS PREFERENCES ARE CHANGING.

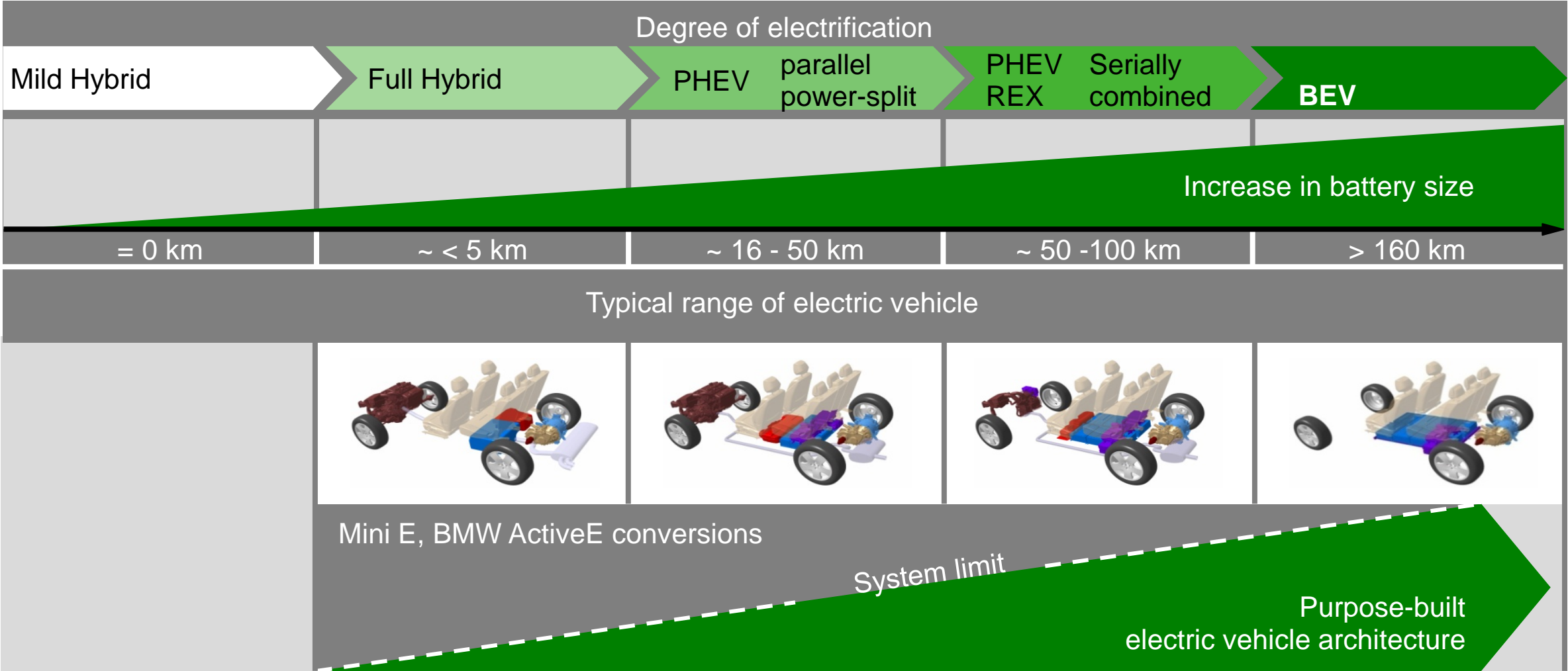


Significant increase in **customers awareness** as a result of:

- the climate change debate.
- significant volatility in fuel prices during recent years.
- but also: debate about and success of alternative drive trains.

Sustainability is increasingly becoming the focus of attention. But: **differing levels of awareness** with respect to preferences,
motives for action and embedding sustainability is a priority with customers

AN ELECTRIC VEHICLE REQUIRES A NEW, PURPOSE-BUILT VEHICLE ARCHITECTURE.



CFRP – A STAND-OUT MATERIAL FOR USE IN CAR BODIES.



- CFRP is a composite material out of carbon fibres and a synthetic matrix.
- Extremely durable and extremely light.
- At least 30 % lighter than aluminium and 50 % lighter than steel for identical component use.
- Outstanding suspension and high level of energy absorption in a crash.
- Resistant against corrosion, acids and solvents.
- Shows no fatigue over a long service life.
- Allows customisation of component properties thanks to the material's unique anisotropy.

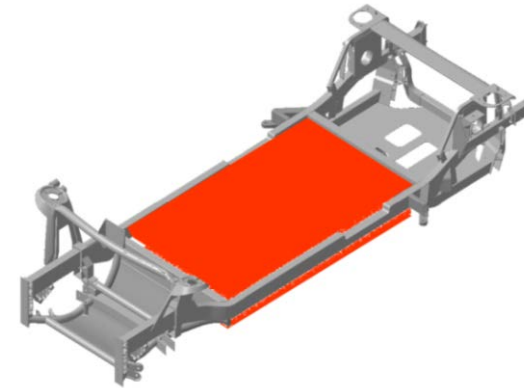
THE INTEGRATION OF THE ELECTRIC DRIVETRAIN.

Implementation of complete vehicle architecture with LifeDrive

- Easy development of derivatives
- Weight reduction through light-weight materials.
- Specific structure to accommodate for batteries.



Drive: Aluminium spaceframe incl. Batteries



Batteries in underbody

- Low point of gravity.
- Area for crash protection.
- Level ground of vehicle interior.

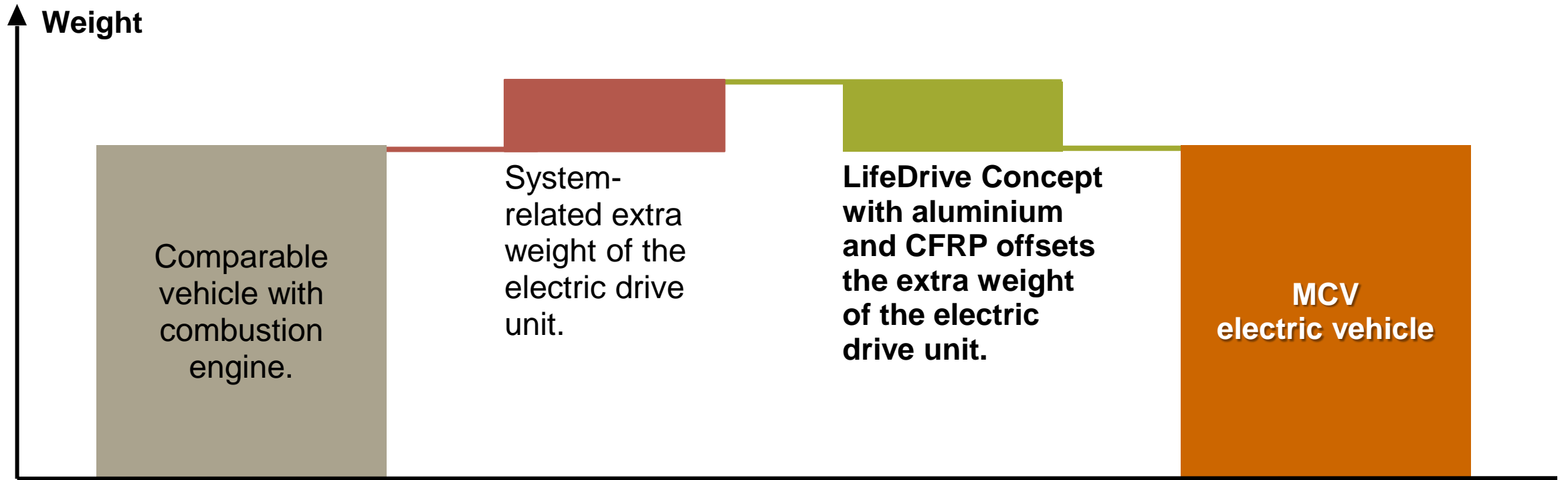


Life: Carbon fiber structure with Exterior Shell



LIGHT WEIGHT DESIGN AND THE LIFEDRIVE CONCEPT.

The LifeDrive concept with **aluminium chassis** and **CFRP passenger cell** breaks the weight spiral for electric vehicles.



MINI E AND BMW ACTIVE E SERVE AS KEY LEARNING PROJECTS FOR THE BMW i3.



102EX – THE PHANTOM EXPERIMENTAL ELECTRIC.



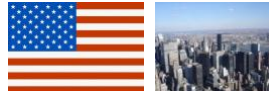



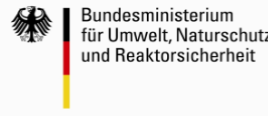


















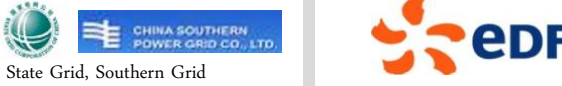



- A one-off, experimental electric test car from Rolls-Royce;
- The first application of the technology in the super luxury segment and the largest battery pack ever fitted to a passenger car;
- An opportunity to showcase experimental technologies and processes such as ‘wireless’ induction charging, Atlantic Chrome finish and vegetable-tanned leather interior;
- Launched at Geneva, followed by media drives in March, then customer test programme, commencing April;
- A market research tool that will tour extensively throughout 2011.

BMW i8 AND BMW i3.



OVERVIEW OF SCIENTIFIC PROJECTS WITH LEADING PARTNERS WORLDWIDE.

						
1.)						
Government						
Scientific monitoring						
Field trial	50 Units, 40 Private / 10 Fleet 	40 Units, 20 Private / 20 Fleet 	450 Units, 246 Private / 204 Fleet 	50 Units since 03/2011. 	50 Units, 25 Private / 25 Fleet 	20 Units since 03/2011 
Infrastructure and energy		Diverse regionale Energiepartner 				

1.) Not included the MINI E field trial with Siemens and the SWM in Munich 09/2010.

RESULTS OF THE FIELD TRIALS.



Today the range achieved is already sufficient for the majority of user needs. In Germany the average distance driven per day is 40 kilometres.

The ranges of electric powered vehicles for example the MINI E are therefore sufficient.

80 % of the distance driven per year is within a close urban proximity. 20% of annual distances driven are for recreational purposes.



Through series production of automotive batteries, economies of scale and competition among providers will bring down costs significantly in the medium and long term.

E-Drives:

- open up a new, high-quality drivetrain experience.
- offer a strong competitive advantage.
- are very dynamic and agile.
- are highly efficient and boast zero local emissions.

ECOLOGICAL RELEVANCE.



Germany:

96 % of private users regard renewable energy for charging electric vehicles as important.

72 % of users agree that EVs should be charged exclusively with renewables.

10 % of users agree that since EVs are “environmental friendly” it is not necessary to charge an EV with renewable energy.



Great Britain:

89 % of private users regard renewable energy for charging electric vehicles as important.

22 % of users agree that EVs should be charged exclusively with renewables.

17 % of users agree that since EVs are “environmental friendly” it is not necessary to charge an EV with renewable energy.



USA:

96 % of private users regard renewable energy for charging electric vehicles as important.

20 % of users agree that EVs should be charged exclusively with renewables.

75 % of users agree that since EVs are “environmental friendly” it is not necessary to charge an EV with renewable energy.



Source: User Survey Berlin, UK and USA.

THE CHALLENGE OF DEFINING RESPONSIBILITY ALONG THE VALUE CHAIN.

The Challenge ahead for industry and government: Shares of the overall impact on the environment between	
Well-To-Tank (WTT) and Tank-to-Wheel (TTW) differ massively.	
<ul style="list-style-type: none">- Car manufacturers thereby loose control of the impact on the environment.- Customers want assurance that driving electrically is a sustainable choice.	
Gasoline	<div><div>Well-To-Tank (oil industry, power generation)</div><div>Tank-To-Wheel (automobile industry)</div></div>
EVs	<div><div></div><div>0 g/mi</div></div>
	<div><div>Need to address politically</div><div>Already addressed by GhG standards → EV: 0 g/mi</div></div>
Definition	<ul style="list-style-type: none">- Governments need to ensure the “net benefit” of the overall chain.- Additional demand for EVs need to be generated without fossil fuels.

ENABLING SUSTAINABLE MOBILITY.



The REC Solution.

All grid-tied renewable-based electricity generators produce two distinct products, physical electricity (kWh) and Renewable Energy Certificates (RECs). A renewable energy certificate represents the property rights to the environmental, social, and other non-power qualities of renewable electricity generation.

A REC, and its associated attributes and benefits, can be sold separately from the underlying physical electricity associated with a renewable-based generation source.

RECs provide buyers flexibility:

- In procuring green power across a diverse geographical area.
- In applying the renewable attributes to the electricity use at a facility of choice (this could be a vehicle).

THANK YOU FOR YOUR ATTENTION.



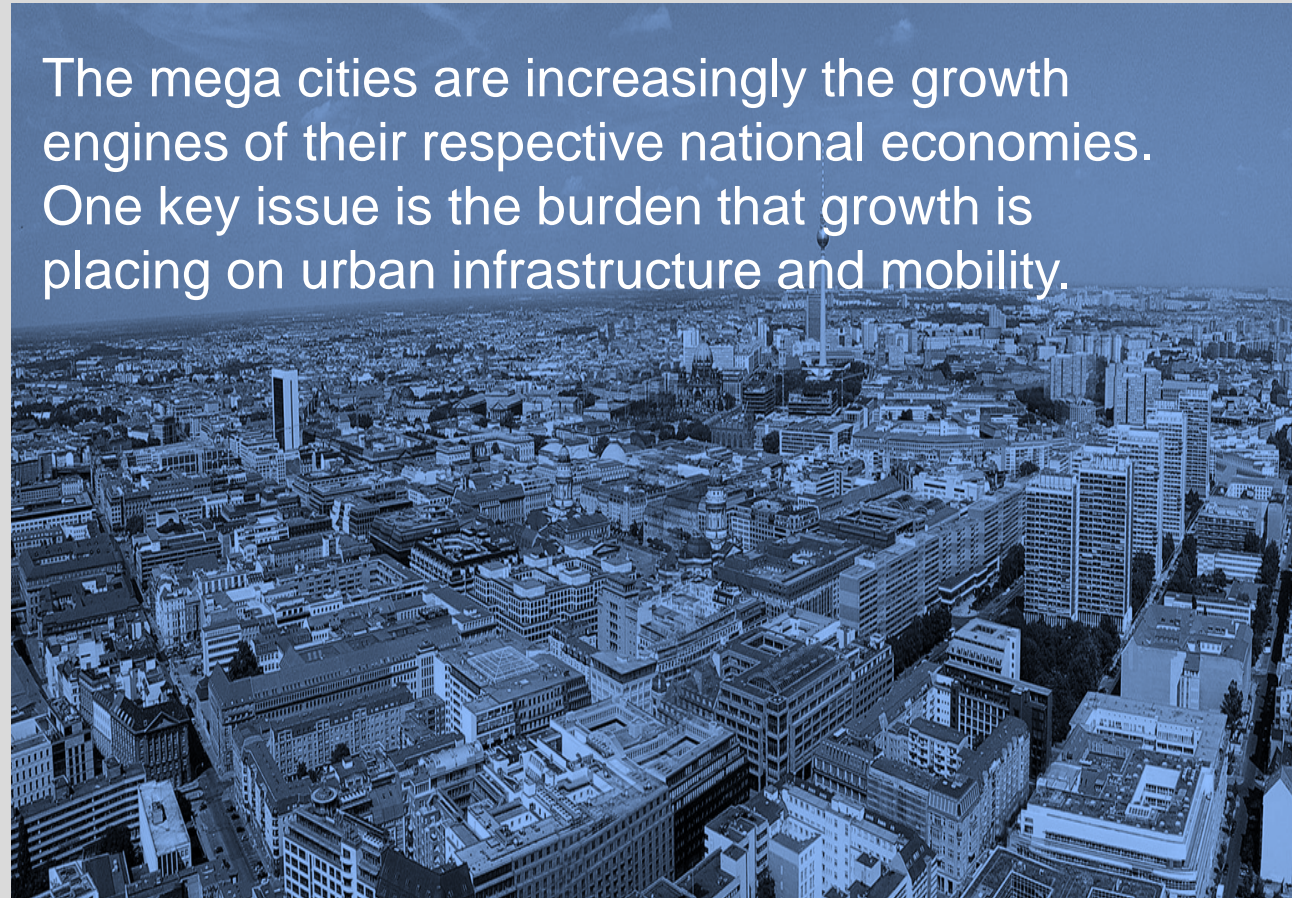
URBANISATION.

Development of urban population. Mega cities as a worldwide trend.

In **2007** humanity reached a significant demographic milestone:
For the first time in history more people lived in cities than in the countryside.

By 2030, over 60 % of the population will live in cities. The growth rate is particularly rapid in the so-called mega cities, with more than 10 million inhabitants. The mega cities listed by the UN already have a total population of around 280 million inhabitants.

The mega cities are increasingly the growth engines of their respective national economies. One key issue is the burden that growth is placing on urban infrastructure and mobility.

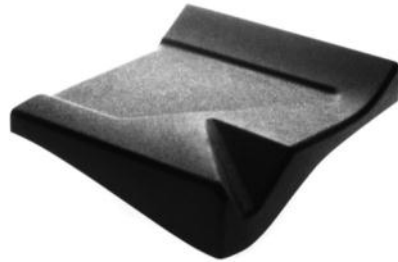


BMW i – BORN ELECTRIC. SUSTAINABILITY DEFINES THE PRODUCT LIFE CYCLE.

New vehicle
concepts



New materials
and recycling



Production concept
of the future



New electric
drivetrain



Integrated approach of BMW i



New
processes



Employees

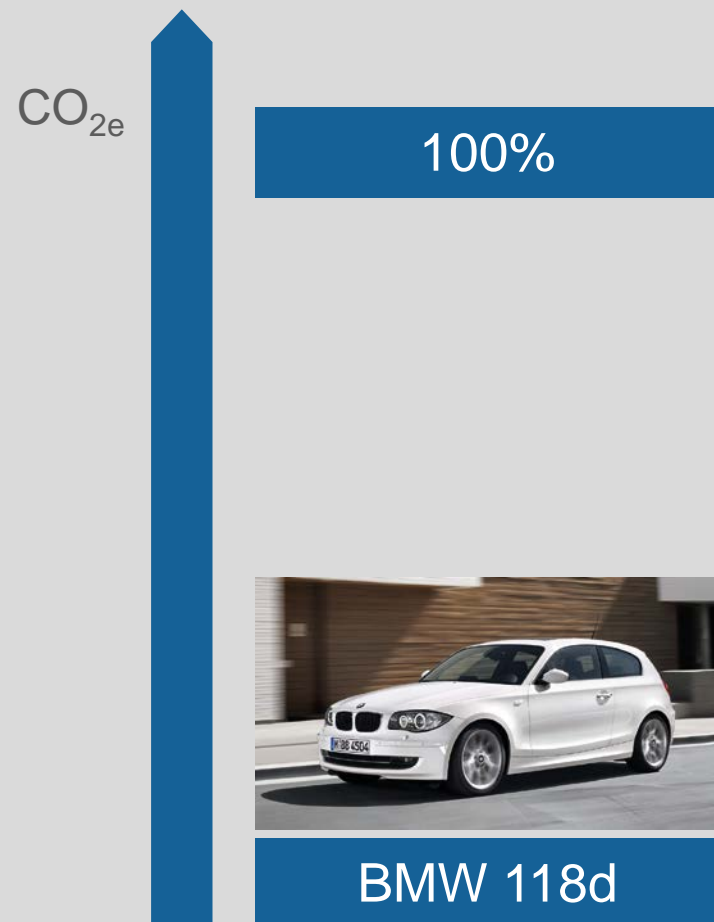


Pioneering design



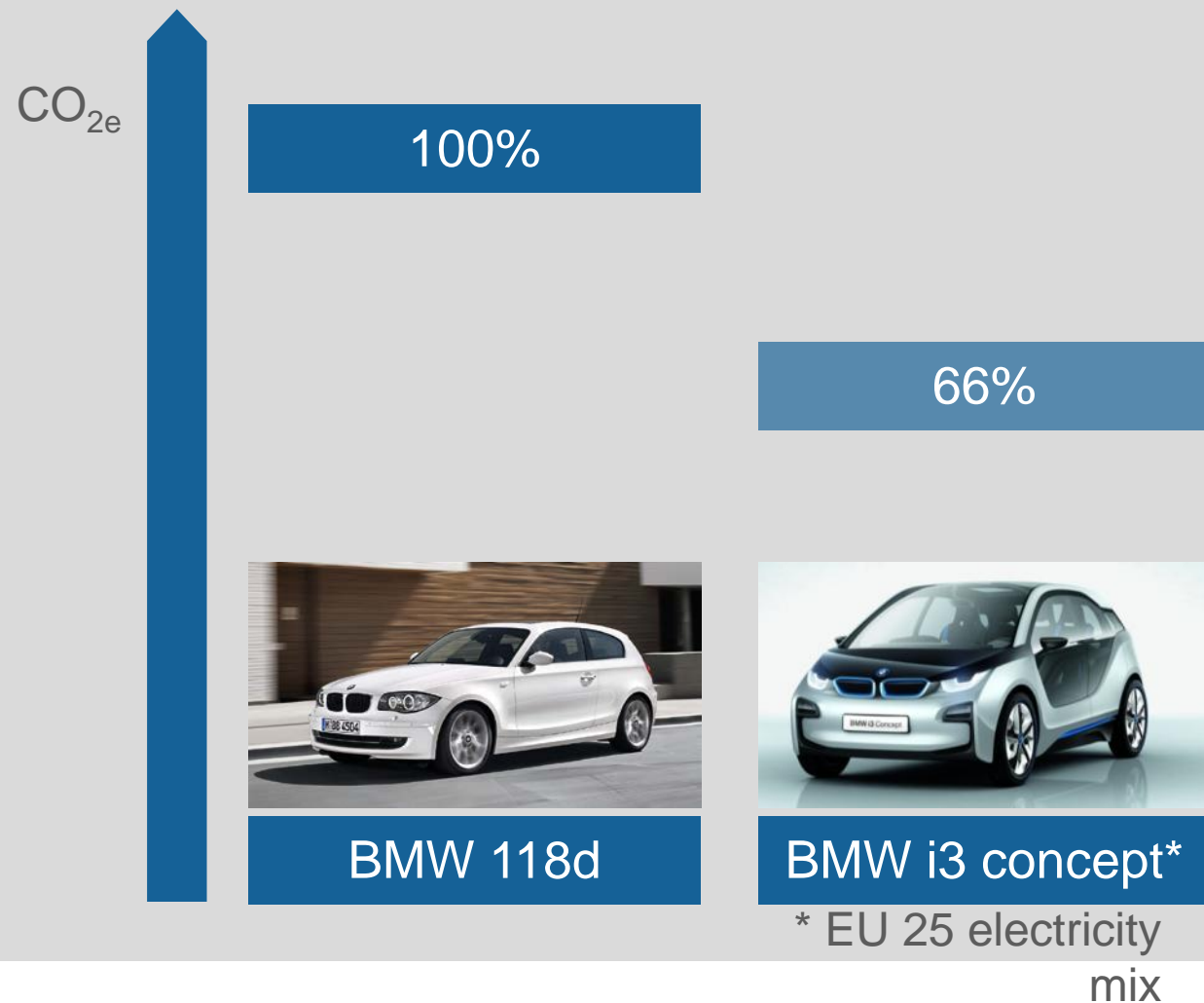
New customers

BMW i – BORN ELECTRIC. GLOBAL WARMING POTENTIAL IN THE PRODUCT LIFE CYCLE SIGNIFICANTLY LOWER.

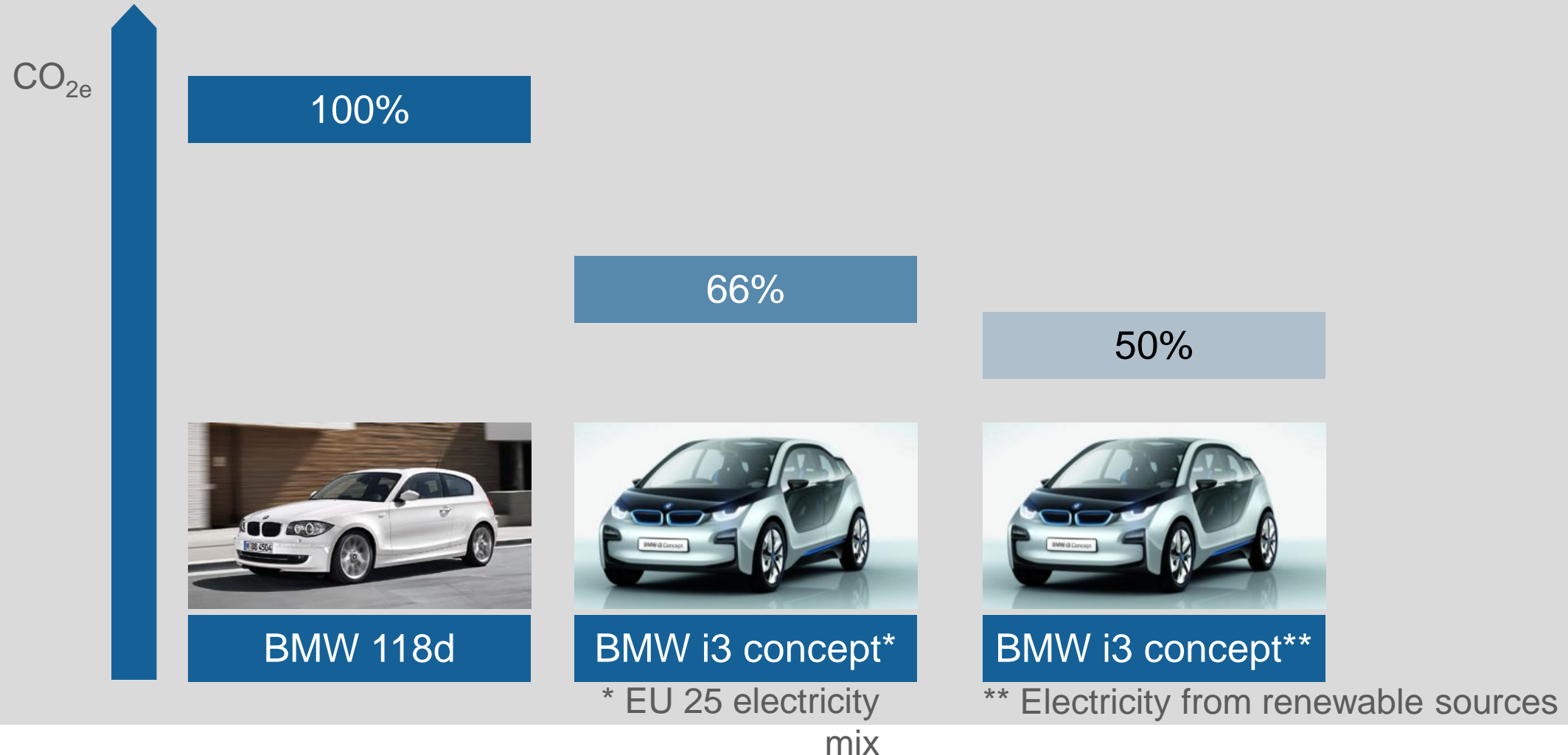


CO_{2e} = carbon dioxide equivalent

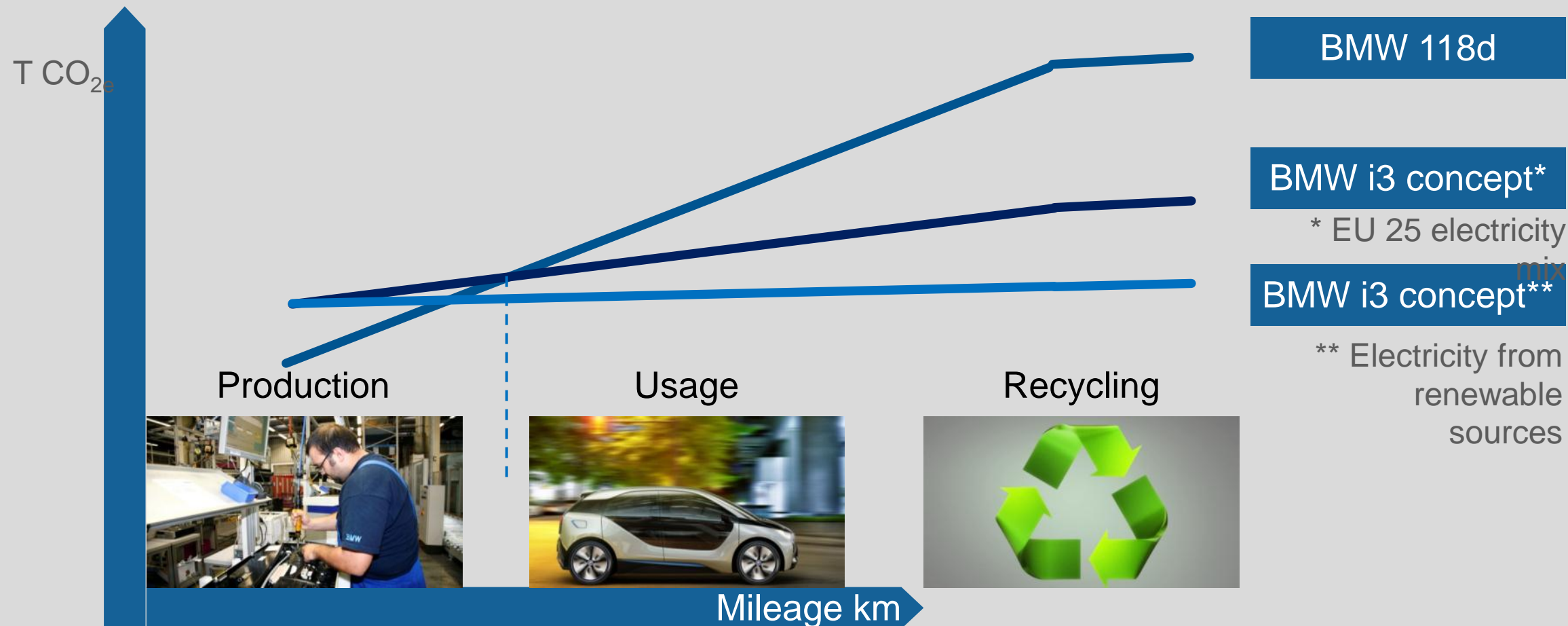
BMW i – BORN ELECTRIC. GLOBAL WARMING POTENTIAL IN THE PRODUCT LIFE CYCLE SIGNIFICANTLY LOWER.



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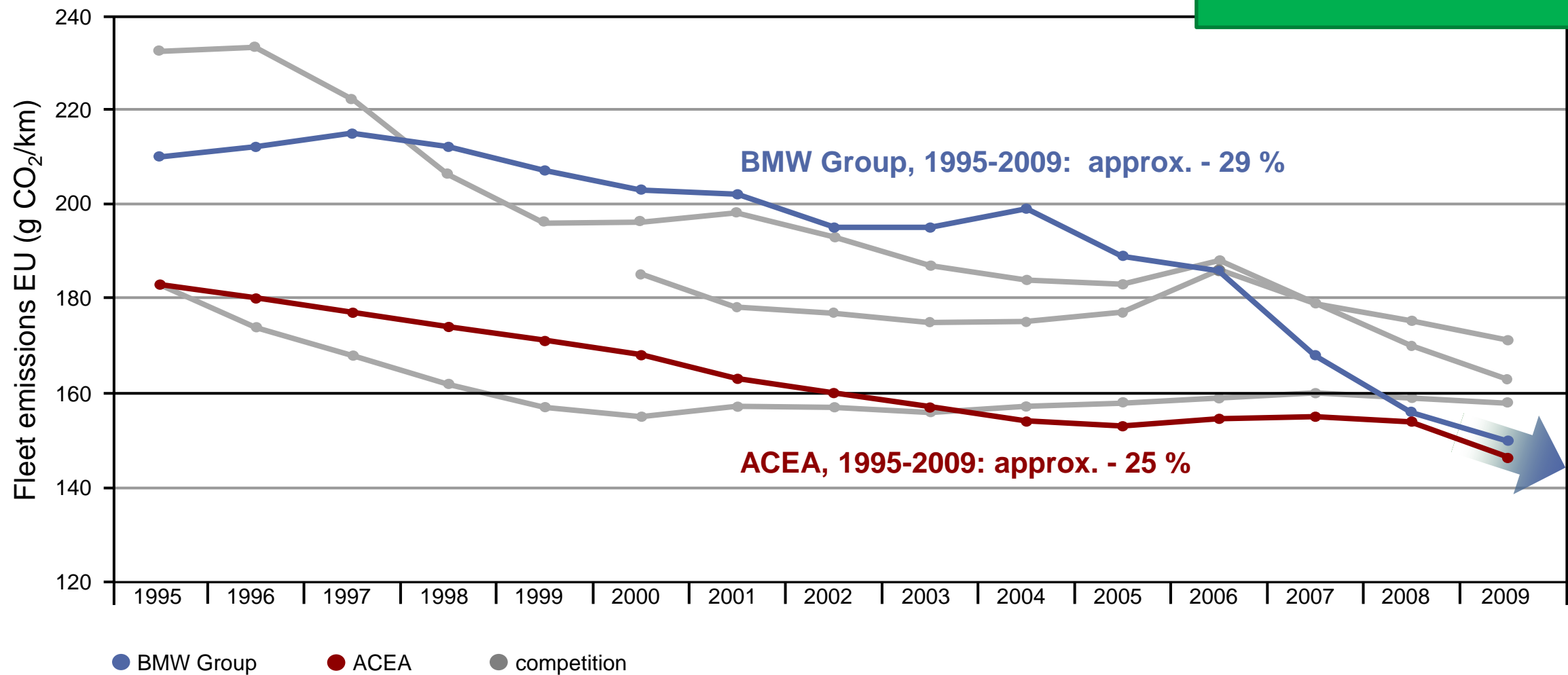
BMW i – BORN ELECTRIC. BREAK-EVEN IN PRODUCT LIFE CYCLE ASSESSMENT AT LESS THAN 50,000 KM.



COMPARISON OF CO2 FLEET REDUCTIONS IN EUROPE.

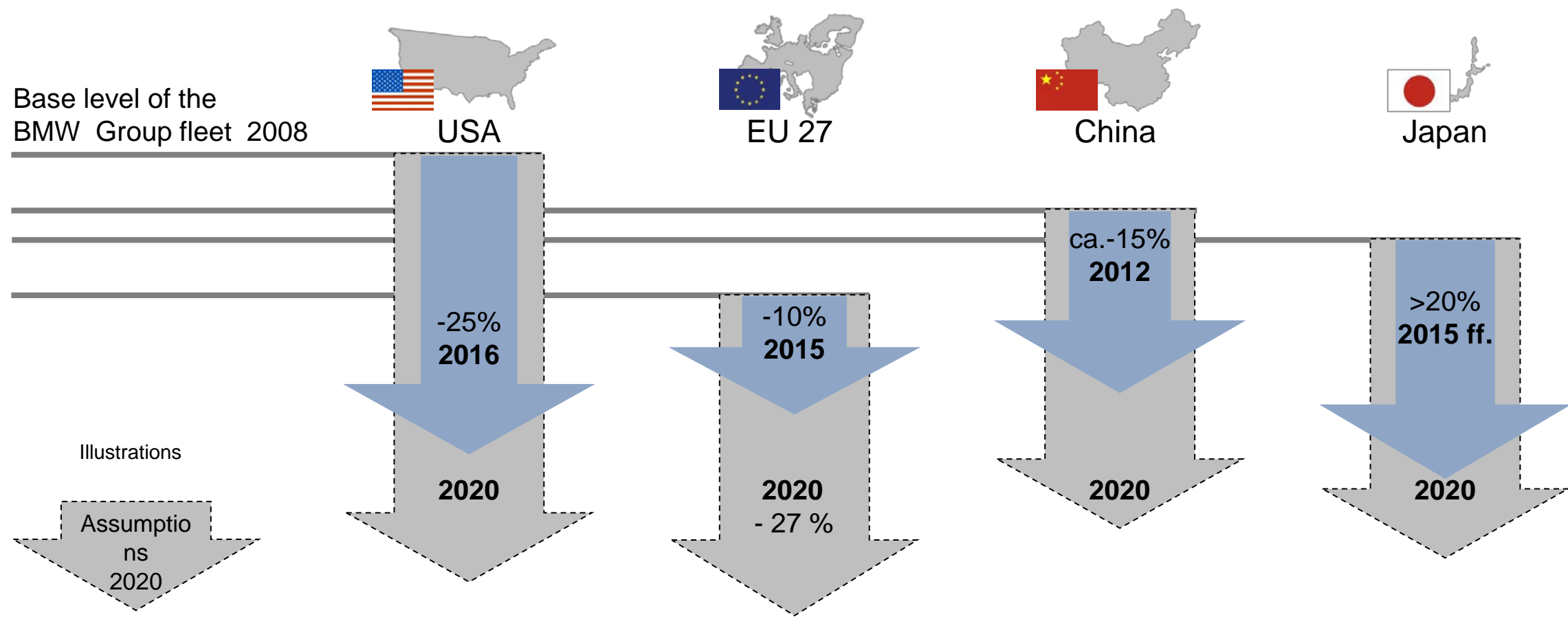
BMW HAS ALREADY ACHIEVED A GREAT DEAL – ALSO MEET FUTURE TARGETS.

Ggf. nur Folie internationale challenges in the future



POLITICS AND REGULATIONS.

Fleet objectives require a global reduction in CO₂ emissions. The BMW Group will reduce the CO₂ emissions of their new fleet of cars worldwide more than 25 % between 2008 to 2020.



CONNECTED DRIVE AND MOBILITY SERVICES. DRIVER ASSISTANCE SYSTEMS.



Increasing demands on
drivers in all spheres of life




Growing complexity
of urban mobility

Rising social pressure
due to environmental
concerns and safety

BMW i driver assistance systems for enhanced comfort and safety

BMW GROUP SUPPORTS FUEL ECONOMY OR CO₂-BASED TAXATION SYSTEMS.

European states take various measures of taxation:

-  – Registration tax upon purchase and registration
 -  – Annual road tax
 -  – Registration and annual road tax
- 16 of EU 27 member states have implemented a CO₂- based taxation scheme. However, no scheme is similar to another.
 - Putting a transparent price tag on the CO₂ emissions or fuel economy encourages the demand on fuel efficient cars in every car segment.
 - CO₂- taxes have a built-in positive effect on EVs economically and in terms of perception.

