



March 20, 2013

R&D: FUTURE-PROOFING THE BMW GROUP.

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BMW
GROUP



Rolls-Royce
Motor Cars Limited

OVERVIEW.



1

**Challenges in the
automotive industry**

2

Our solutions

Evolution and revolution

**Managing growth & profitability:
Process chains, architecture,
modular systems**

3

Summary

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GLOBAL TRENDS IMPACT ON PERSONAL MOBILITY. R&D MUST DELIVER NEW SOLUTIONS.



Environment

Climate change and its knock-on effects



Urbanisation

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



Customer Expectations

Changing values



DRIVING FACTORS

Economics

Dwindling resources,
rising fossil fuel prices



Culture

Sustainable mobility as part of a modern urban lifestyle;
taking social responsibility



Politics and Regulations

CO₂ and fleet regulations,
import restrictions

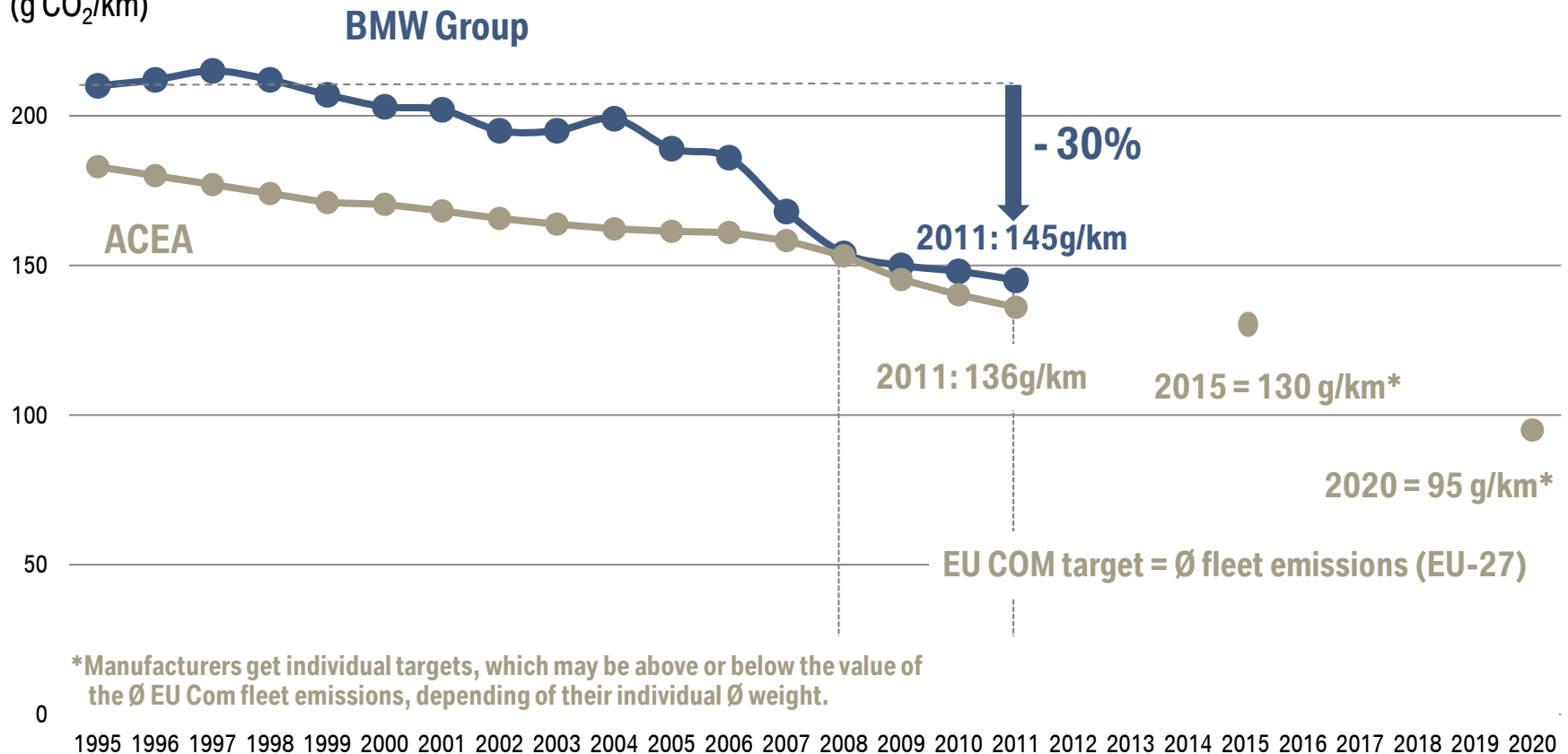


COMPARISON OF CO₂ FLEET REDUCTIONS IN EUROPE. BMW GROUP HAS ALREADY ACHIEVED A GREAT DEAL. TOUGH TARGETS TO COME.

BMW Group has more than fulfilled its contribution to the **ACEA commitment** to reduce fuel consumption by 25 % from 1995 to 2008.

EU fleet emissions

(g CO₂/km)



*Manufacturers get individual targets, which may be above or below the value of the Ø EU Com fleet emissions, depending of their individual Ø weight.

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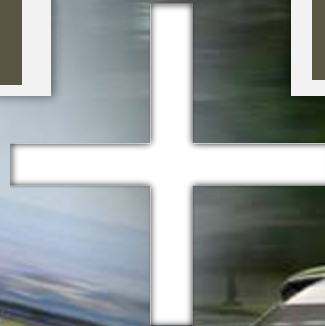
OUR DUAL-TRACK APPROACH SETS A CLEAR DIRECTION FOR R&D.

Evolution

Efficient combustion engines
–EFFICIENT DYNAMICS/MINIMALISM–
Innovative technologies

Revolution

Alternative drivetrains
Mobility services
Innovative materials and processes



PURPOSE-BUILT DESIGN – THE BMW i LIFEDRIVE CONCEPT.

BMW dynamic
driving performance



Vision:
Clean production



Optimized integration
of electric drive system



Visionary design language



Innovative key technologies:
CFRP & electric motor



BMW i

Free forms in interior
and exterior design



Easy to update with
changing technologies



Social
sustainability



Customer-friendly
e-mobility concepts



Integrated high-voltage
component safety concept







BMW i8 Concept

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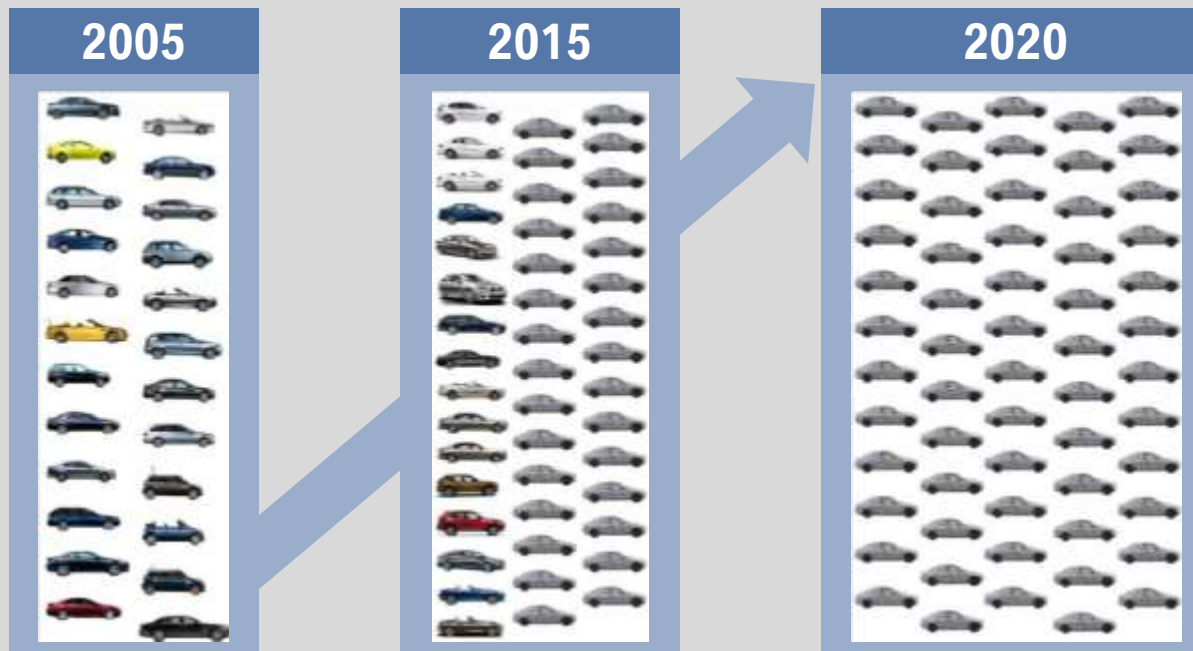
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OUR GOAL: TO MANAGE A THREE-TIMES LARGER PORTFOLIO WITH RESOURCES THAT HAVE NOT INCREASED PROPORTIONATELY.



Without a Modular Strategy, a three-fold increase in model numbers would send costs and resources spiralling along the process chain. The Modular Strategy enables shorter development cycles and enhanced flexibility in our plants.







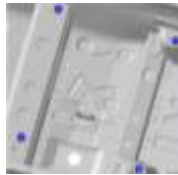
THE MODULAR STRATEGY IS THE ENABLER FOR THE EXPANSION OF THE BMW GROUP MODEL RANGE.

Architectures

Underbody

e.g.:

- Front seat attachments



Modular product

Modular front seat

Common elements

e.g.:

- Structure
- Head restraint



Modular system

Front seat attachment

e.g.:

- Standardised seat installation process

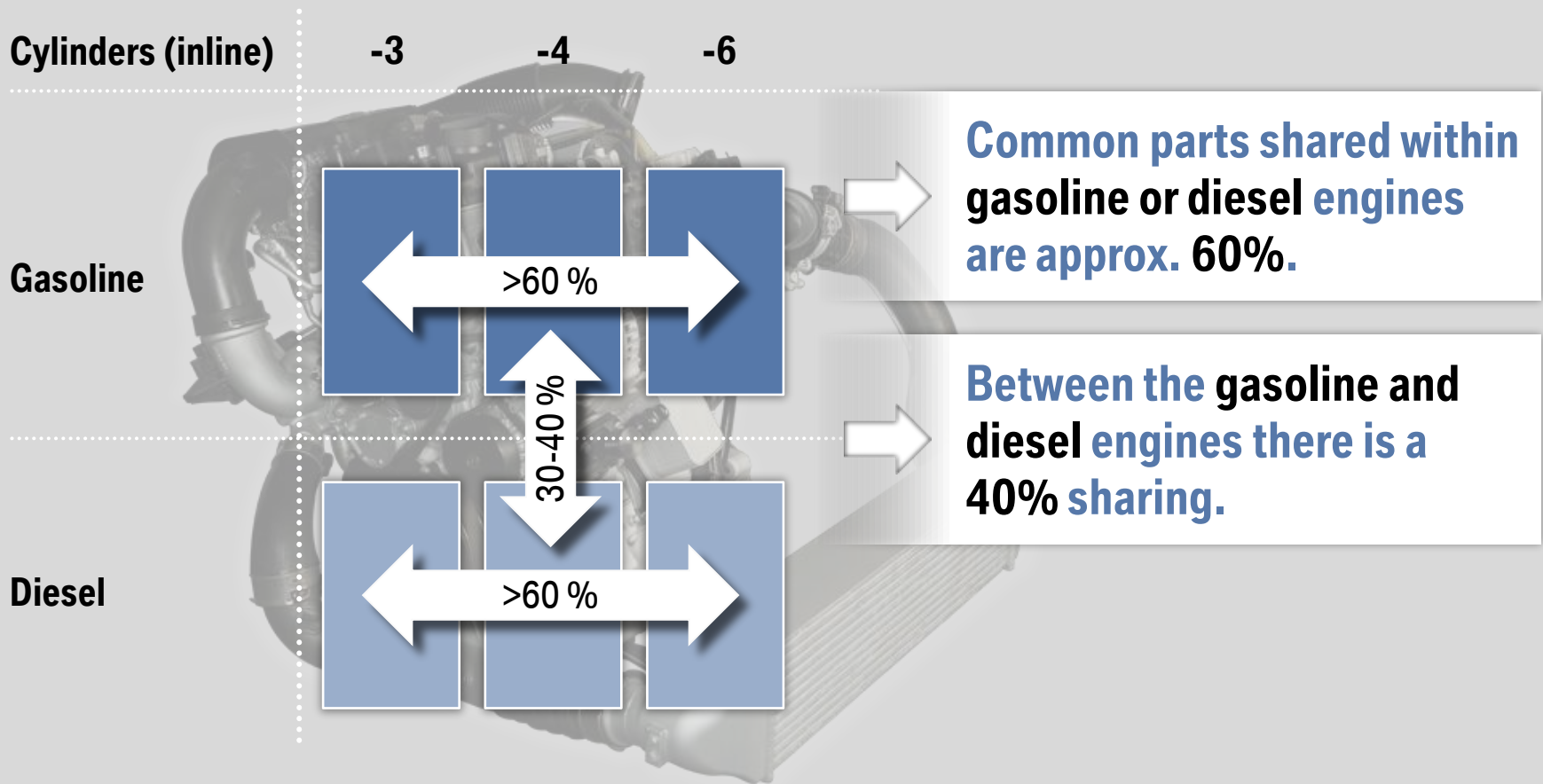


Shorter development time
Shorter time to market

Lower investment costs
Lower manufacturing costs

Lower development costs
Lower fixed costs

THE NEW BMW EFFICIENTDYNAMICS ENGINE FAMILY – HIGH LEVELS OF COMMONALITY BETWEEN AND WITHIN DIESEL AND GASOLINE ENGINES.



COMMON ARCHITECTURE, NOT PLATFORMS. IN PREMIUM VEHICLES DIFFERENTIATION IS KEY.

BMW Group architecture = 3 core areas.



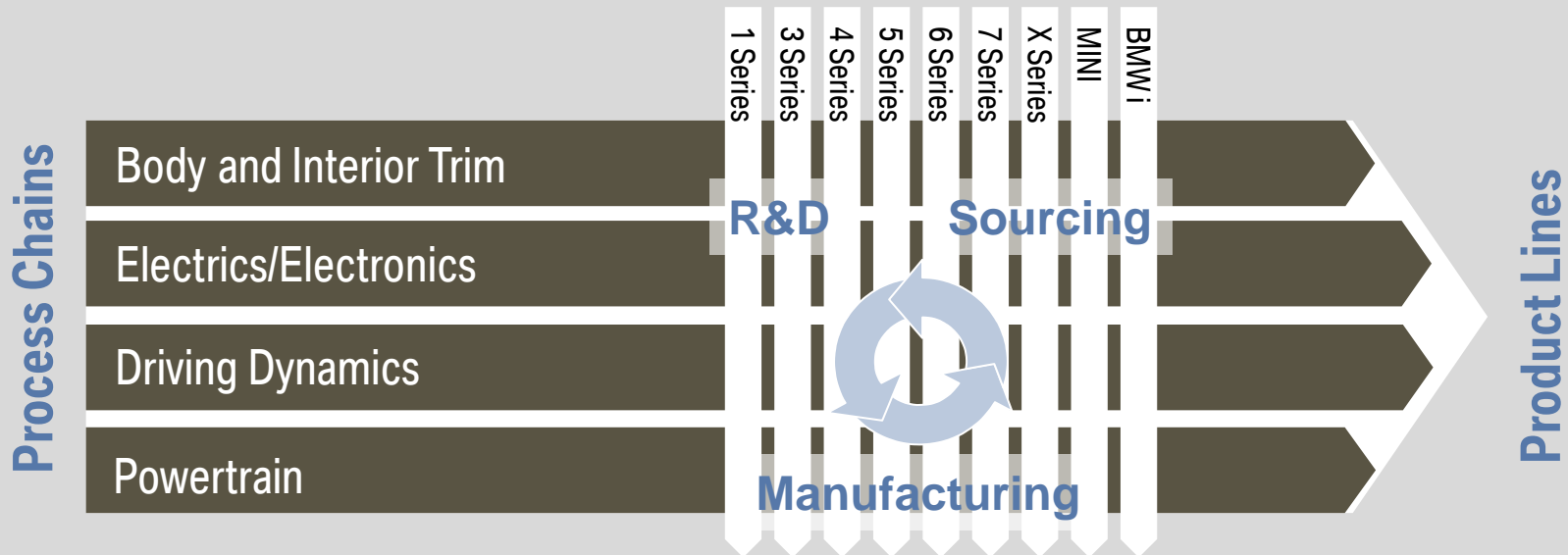
Engine compartment

Drivetrain

Rear

BMW Group architectures allow maximum differentiation between models in terms of design and dimensions and account for about 70% of all production cost.

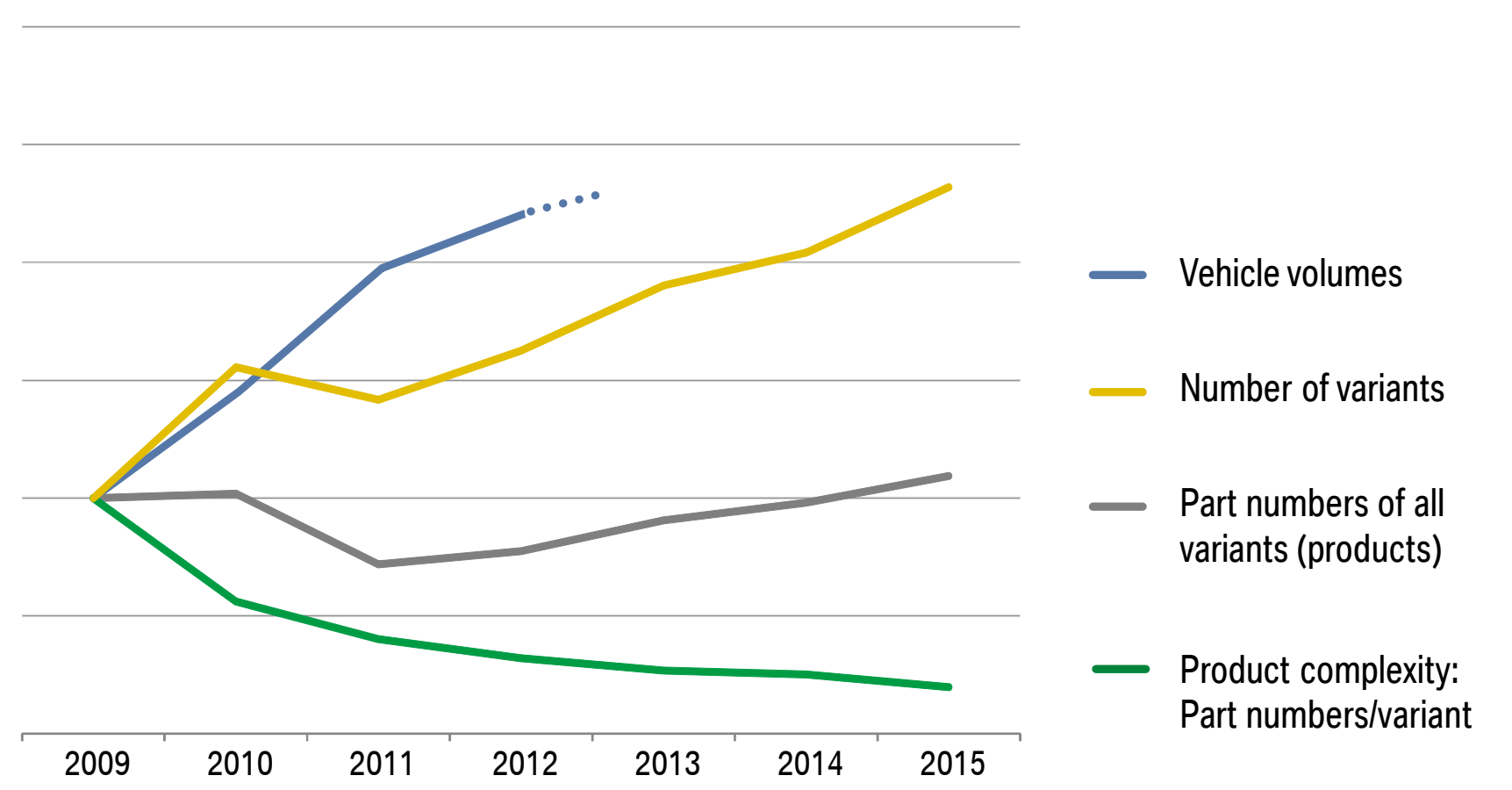
PROCESS CHAINS PROVIDE EFFICIENT PRODUCT DEVELOPMENT PROJECTS.



Process chains bundle development-, purchasing- and manufacturing-skills and deliver faster and better solutions for product variety

- Modules & standards for all products
- Best practice solutions for all products
- Acceleration of decision-making and processes

ECONOMIES OF SCALE ACHIEVED THROUGH MODULAR SYSTEMS AND COMPLEXITY MANAGEMENT ALMOST ON PAR WITH VOLUME MANUFACTURERS.



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CHALLENGES



Manage growth and complexity




Achieve CO₂ and emissions targets



Manage variety of new technologies

APPROACHES




Optimization of process chain management

Architectures

Product and process modules

Electro mobility

OBJECTIVES



Efficiency in R&D, purchasing and production

Profitable growth

Further technological leadership