

## Fuel and Lubricant Solutions



### POLYISOBUTENES

Low, Medium and High  
Molecular Weight  
Polyisobutenes (PIB)



### MINERAL OIL ADDITIVES

Fuel Additives  
Aviation Fuel Additives  
Refinery Additives



### AUTOMOTIVE FLUIDS

Engine Coolants  
Brake Fluids



### LUBRICANT ADDITIVES

Antioxidants  
Antiwear Additives  
Extreme Pressure  
Additives  
Metal Deactivators  
Corrosion Inhibitors  
Pour Point  
Depressants  
Viscosity Modifiers



### BASE STOCKS FOR LUBRICANTS & COMPONENTS FOR METALWORKING FLUIDS

Base Stocks  
Thickeners  
Emulsifiers  
Solubilizers



### COMPOUNDED LUBRICANTS

Transmission Fluids  
Axle Lubricants  
Industrial Gear Oils  
Biodegradable  
Hydraulic Fluids  
Industrial Compressor  
Lubricants  
Refrigeration  
Compressor Lubes

 **BASF**

We create chemistry

AG-Bio-Öle  
Ludwigshafen

23.11.2018



# Agenda

## **1. BASF – We create chemistry**

## 2. Fuel and Lubricant Solutions – Your Leading Solution Provider

# BASF – We create chemistry

- Our chemistry is used in almost all industries
- We combine economic success, social responsibility and environmental protection
- Sales 2017: €64,457 million
- EBIT 2017: €8,522 million
- Employees (as of December 31, 2017): 115,490
- 6 Verbund sites and 347 other production sites





# Chemicals – a growth industry

Global annual growth rate of ~3.4%\*



Agriculture



Health & nutrition



Energy & resources



Construction & housing



Consumer goods



Transportation



Electrical & electronics



## Chemistry as enabler to meet current and future needs



~10bn

... people by 2050



70%

... of the world population will live in cities by 2050



50%

... more primary energy consumption by 2050



30%

... more food needed by 2050





\* Average annual real change 2018-2020; BASF Report 2017 p.121

# Our purpose, strategic principles and values



We create chemistry for a sustainable future



-  We add value as one company
-  We innovate to make our customers more successful
-  We drive sustainable solutions
-  We form the best team



- Creative
- Open
- Responsible
- Entrepreneurial

# Organization of the BASF Group

- Combined into five **segments**, 13 **divisions** bear operational responsibility and manage our 55 global and regional **business units**
- The operating divisions develop strategies for the 86 different **strategic business units**
- The **regional divisions** contribute to the local development of BASF's business, help to exploit market potential and are responsible for optimizing the infrastructure for our business
- Eight **functional units** and seven **corporate units** support the BASF Group's business activities.



# BASF's Segments



## Chemicals

Petrochemicals  
Monomers  
Intermediates



## Performance Products

Dispersions & Pigments  
Care Chemicals  
Nutrition & Health  
Performance Chemicals



## Functional Materials & Solutions

Catalysts  
Construction Chemicals  
Coatings  
Performance Materials



## Agricultural Solutions

Crop Protection

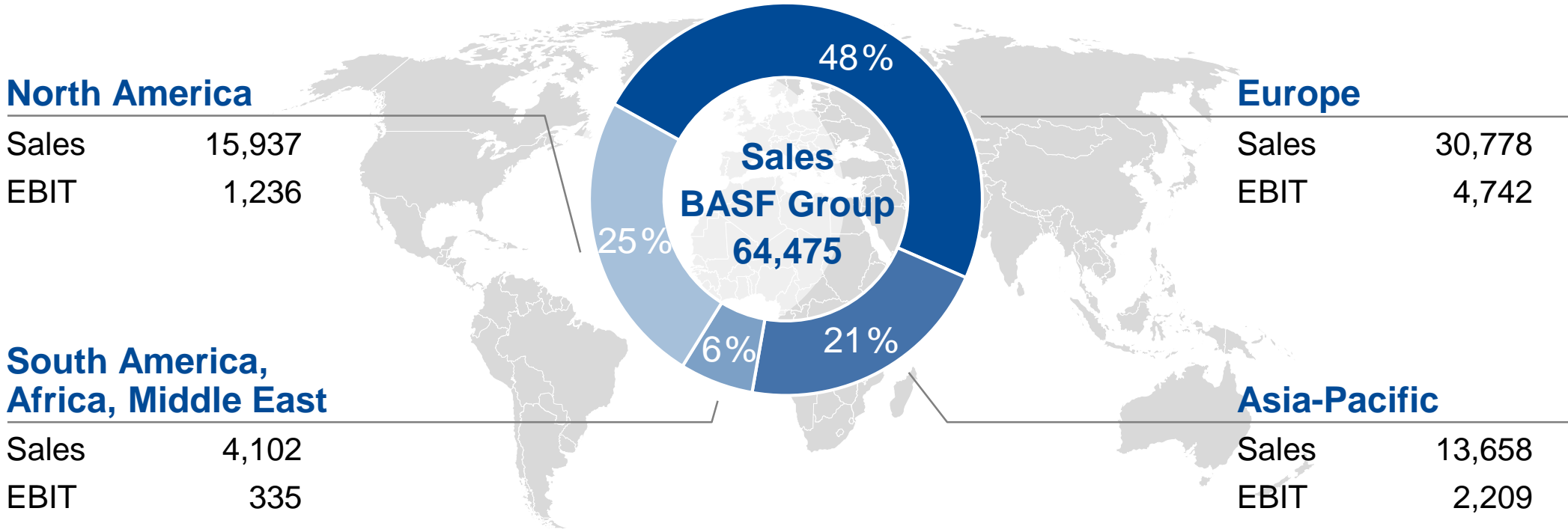


## Oil & Gas

Oil & Gas

# Sales\* and EBIT in the regions 2017

Figures in Million €



\* By location of company



# Innovation – meeting challenges, developing new business areas

**Research for the future: With our innovative products and processes, we provide sustainable solutions for global needs.**

- Expenditures for research and development €1,888 million
- Around 10,000 employees worldwide involved in research and development
- Around 3,000 research projects
- Around 800 new patents filed



# Our purpose

## We create chemistry for a sustainable future

We want to contribute to a world that provides a viable future with enhanced quality of life for everyone. We do so by creating chemistry for our customers and society and by making the best use of available resources.

We live our corporate purpose by:

- Sourcing and producing responsibly,
- Acting as a fair and reliable partner,
- Connecting creative minds to find the best solution for market needs.

For us, this is what successful business is all about.



# Our strategic principles



We add value as *one* company



We drive sustainable solutions



We innovate to make our customers more successful



We form the best team



# Sustainability along the value chain



\* Material aspects include, for example, energy and climate, water, resources and ecosystems, responsible production and employment & employability.



# Partnerships drive sustainability

## Initiative “Together for Sustainability”

- Joint initiative of leading chemical companies since 2011
- Standardized and shared supplier evaluations and audits
- Implementation of follow-up processes where needed

Enhancing sustainability along the supply chain



# We source responsibly

## Our supply chain sustainability goals and KPIs 2017

**513** sustainability assessments initiated through an external service provider

**120** raw material supplier sites audited on EHS

**Goal:**  
**70%** of relevant suppliers evaluated with regard to their sustainability performance by 2020

Clear targets for supplier evaluation defined, development of action plans



# Sustainability along the value chain



We source responsibly

We produce safely for people and the environment

We produce efficiently

We drive sustainable solutions

We respect people and treat them fairly

### Material aspects\*



\* Material aspects include, for example, energy and climate, water, resources and ecosystems, responsible production and employment & employability.

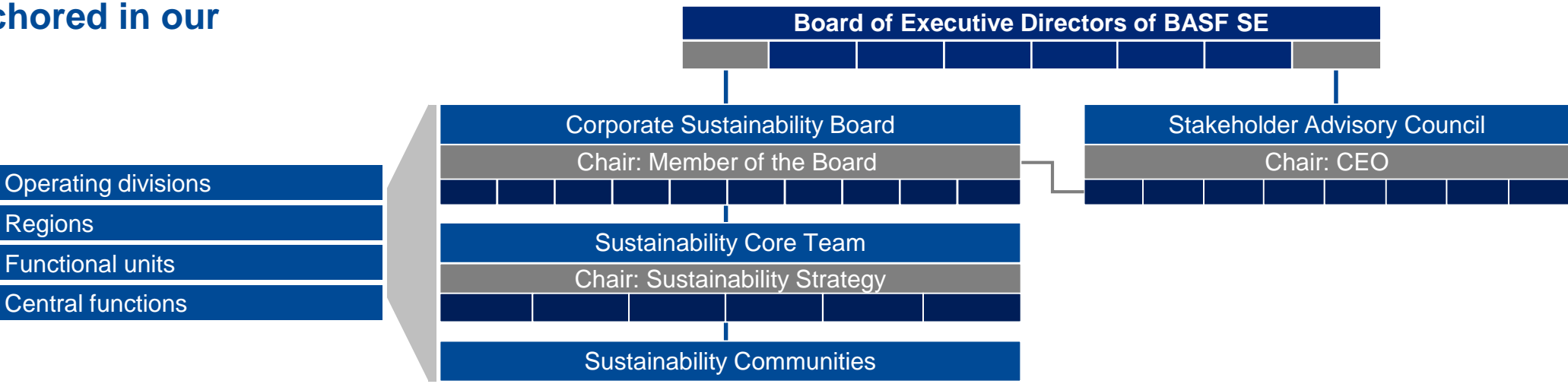
# We integrate sustainability in our management systems

Sustainability integrated in our business strategies

## Strategy Process



Sustainability anchored in our organization





# Verbund advantages reduce the environmental impact

Geismar



Antwerp



Ludwigshafen



Nanjing



Freeport



Kuantan



BASF  
"Verbund"  
avoided  
**3.9 million t**  
of CO<sub>2</sub> emissions  
in 2017

Efficiency drivers: heat integration, process control and process integration

# Energy and climate protection

## Greenhouse gas emissions

per metric ton of sales product  
by 2020 (baseline 2002)\*

**-40%**

Status  
2017:  
**-35.5%**

## Energy efficiency

Coverage of our primary energy demand  
through certified energy management  
systems (ISO 50001) at all relevant sites

**90%**

Status  
2017:  
**54.3%**



\* Excluding oil and gas production

# Occupational safety and process safety

**Lost-time injury rate**  
per one million  
working hours by 2025

**≤0.5**

Status  
2017:  
1.4



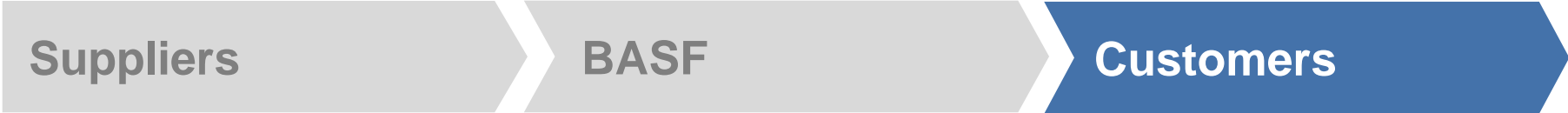
**Process safety incidents**  
per one million  
working hours by 2025

**≤0.5**

Status  
2017:  
2.0



# Sustainability along the value chain



## Material aspects\*



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We produce efficiently

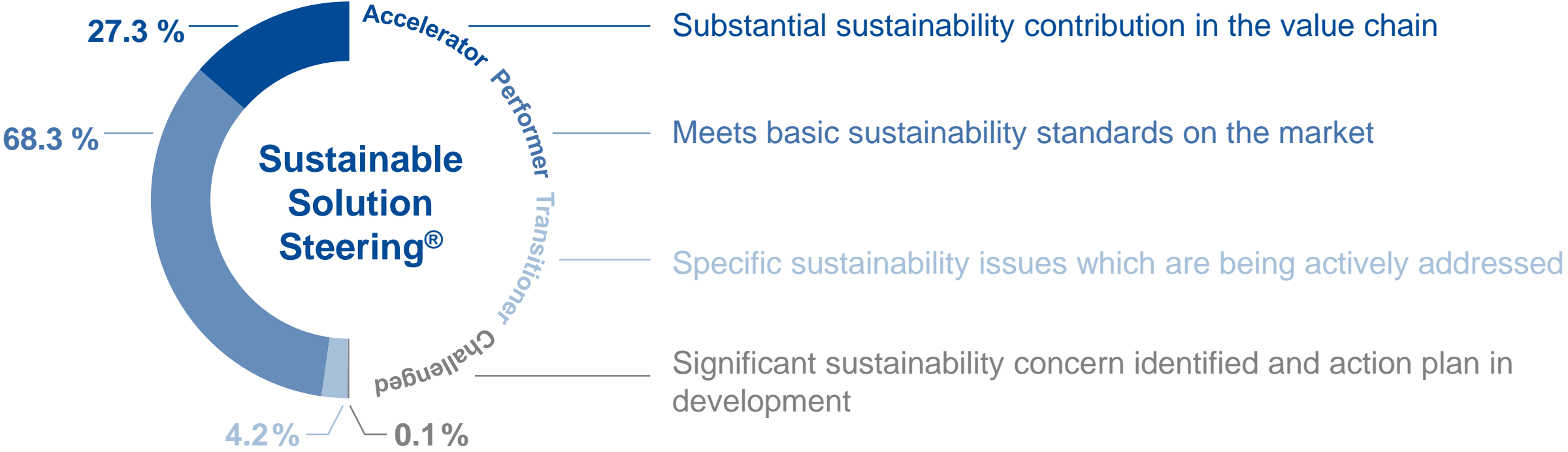
We respect people and treat them fairly

We drive sustainable solutions

\* Material aspects include, for example, energy and climate, water, resources and ecosystems, responsible production and employment & employability.



# Sustainable Solution Steering® – How our products contribute to sustainability



Goal: Increase the share of Accelerators to 28% by 2020.

# Solutions for a sustainable future

## Examples of Accelerator Solutions



**Acronal® MB**  
From biomass to dispersions



**Sokalan® RO 3500**  
Antiscalant for reverse osmosis membrane treatment for water reuse applications



**Ultramid® Flex F38**  
Partly biobased copolymer



**PrimeCube®**  
for coating truck cabins.



**Vault® HP**  
Biological seed treatment system for soybeans and other dicots



**Merivon®**  
Fungicide for advanced disease control and plant health

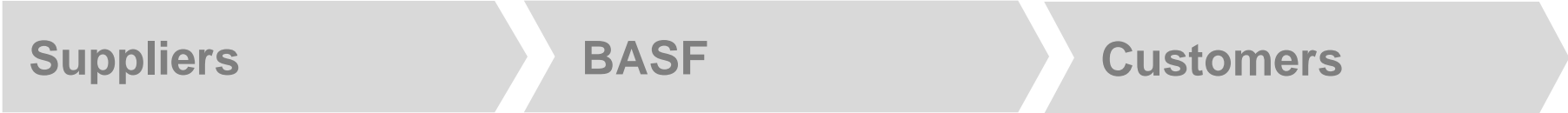


**Natuphos® E**  
Enzyme which helps pigs and poultry better utilize phosphorus



**Glasurit 923-610 HS Clear**  
Clearcoat for shorter processing times and energy savings

# Sustainability along the value chain



## Material aspects\*



We source responsibly

We produce safely for people and the environment

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We produce efficiently

We respect people and treat them fairly

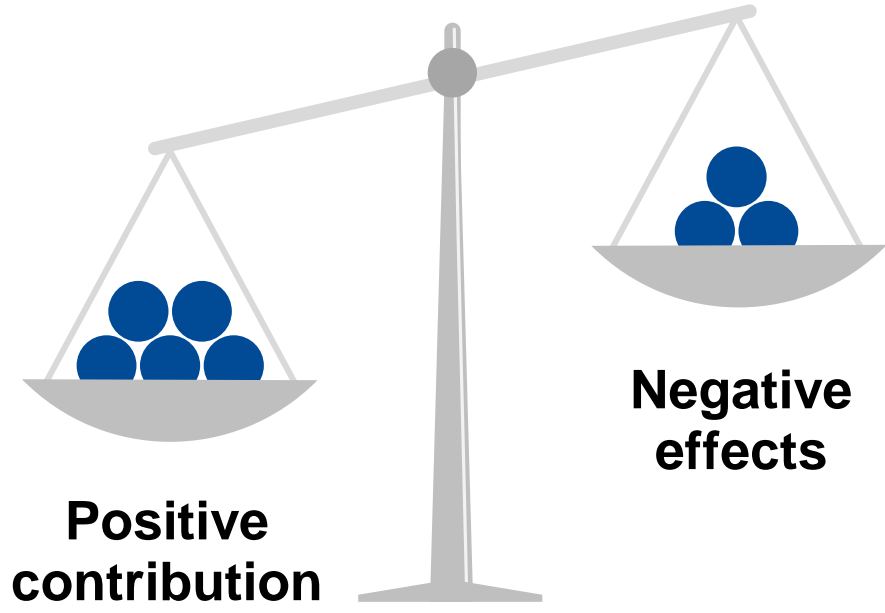
\* Material aspects include, for example, energy and climate, water, resources and ecosystems, responsible production and employment & employability.

# “Value-to-Society” approach measures our contribution to a sustainable future

## Our economic, social and environmental value contribution

- Wages
- Taxes
- ...

- Emissions
- Resources
- ...



Business activities



Impact on people and environment

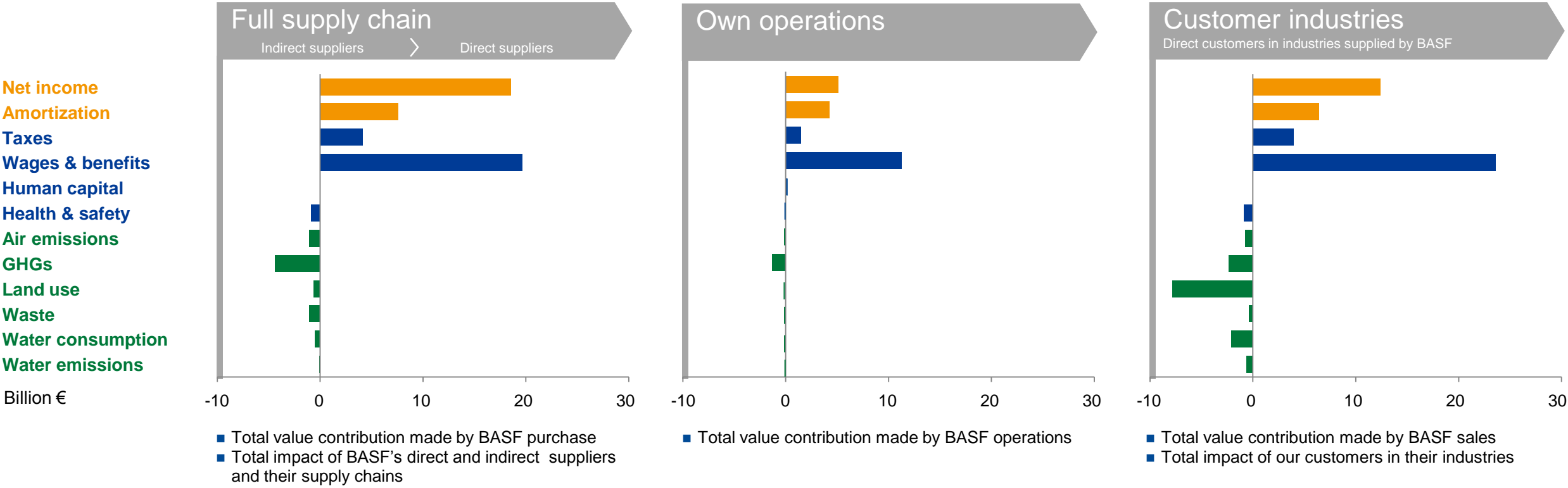


Value-to-Society in monetary terms (€)



# Value-to-Society results 2016

We deliver a significant net positive value contribution along the value chain



# Through our business we contribute to the UN SDGs



## BASF

- contributes to the UN SDGs through products and solutions along the value chain
- addresses the SDGs with its materiality topics
- uses the SDGs as orientation for BASF's own goal setting
- will continue to monitor the SDGs by using established indicator systems (e.g., GRI)
- is in continuous dialogue with external stakeholders to establish trustful partnerships on the way to reaching the SDGs

## In particular, we contribute to:



# Our social engagement

## Two approaches

### Corporate Citizenship

- Donations
- Community engagement
- Corporate volunteering
- Sponsoring

### Starting Ventures

- Business-oriented projects



## One goal

### Improve quality of life...



... for the communities around our sites and worldwide



... for low-income consumers and value chain partners

# Sustainability networks

## Sustainability requires dialogue and partnership with stakeholders

- We engage in sustainability networks
- to better understand trends in society as the drivers of our business
- to help shape measurement and performance standards
- to partner for joint contributions to Sustainable Development

## Examples



# Sustainability Ratings, Rankings and Awards

## CDP Disclosure Leadership

BASF is one of the world's leading companies in reporting on climate protection and in sustainable water. BASF has been included in the „CDP Water A“ list for the second time.



## FTSE ESG Rating & FTSE4Good Global Index

BASF received the highest score in the chemical industry in ESG rating and has been included again in the FTSE4Good Global Index.



## MSCI

In 2017, BASF achieved a AA-ESG rating the fifth time in a row and, therefore, currently belongs to the top 13% of the industry group „Diversified Chemicals“.



## Sustainalytics

BASF has scored in the overall ESG rating well, whereas the company has even finished as Leader in the Governance category.



# Agenda

1. BASF – We create chemistry
- 2. Fuel and Lubricant Solutions –  
Your Leading Solution Provider**



# Fuel and Lubricant Solutions

## Part of Performance Chemicals Division



### Plastic Additives

- Antioxidants
- Light stabilizers
- Process stabilizers
- Flame retardants



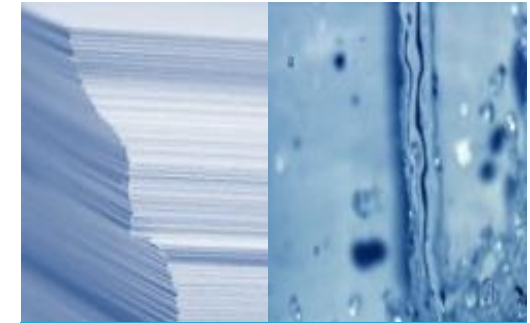
### Oilfield and Mining Solutions

- Process chemicals for extraction of oil, gas, metals and minerals
- EOR chemicals



### Fuel and Lubricant Solutions

- Automotive fluids
- Mineral oil additives
- Polyisobutenes
- Base stocks for lubricants and components for metalworking fluids
- Lubricant additives
- Compounded lubricants



### Paper and Water Chemicals

- Process chemicals and functional chemicals for paper and board manufacturing, and water treatment
- Kaolin
- Membrane technologies

# Partner for Fuel And Lubricant Solutions

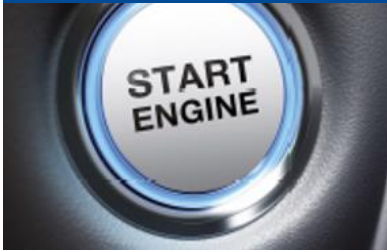
## Our Business Segments

### Polyisobutenes



- Low, Medium and High Molecular Weight Polyisobutenes (PIB)

### Mineral Oil Additives



- Fuel Additives
- Aviation Fuel Additives
- Refinery Additives

### Automotive Fluids



- Engine Coolants
- Brake Fluids

### Lubricant Additives



- Antioxidants
- Antiwear Additives
- Extreme Pressure Additives
- Metal Deactivators
- Corrosion Inhibitors
- Pour Point Depressants
- Viscosity Modifiers

### Base Stocks for Lubricants & Components for Metalworking Fluids



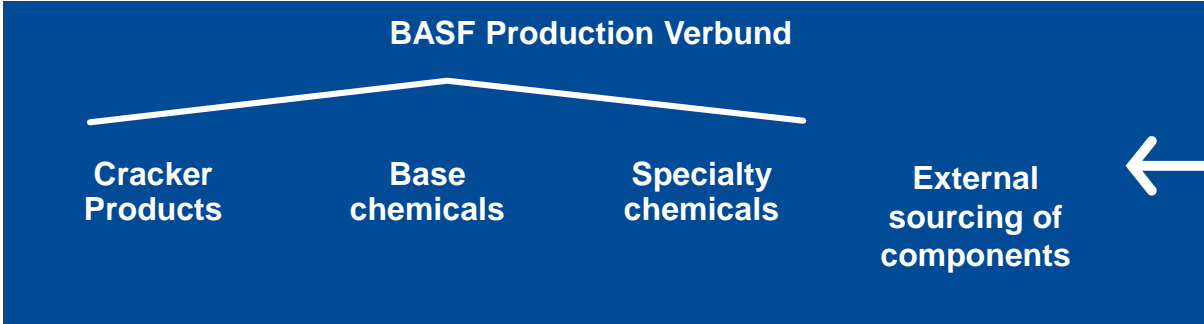
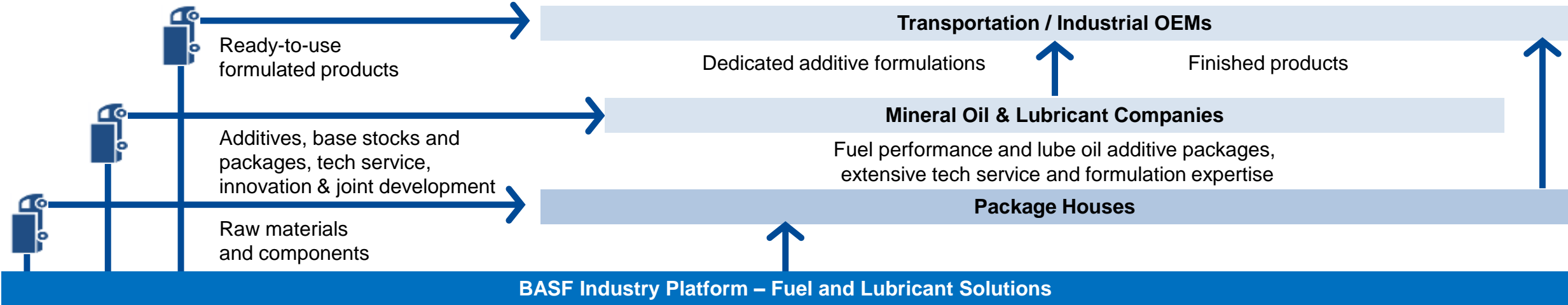
- Base Stocks
- Thickeners
- Emulsifiers
- Solubilizers

### Compounded Lubricants



- Transmission Fluids
- Axle Lubricants
- Industrial Gear Oils
- Biodegradable Hydraulic Fluids
- Industrial Compressor Lubricants
- Refrigeration Compressor Lubes

# Well Connected to the Industries We Serve



# BASF Aspires to be a Leading Fuel and Lubricant Solutions Provider

## What our aspiration is...

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- We want to leverage synergies between fuels and lubricants for the benefit of our customers, based on chemical knowledge
  - We aspire to be the partner of choice to offer innovative, sustainable solutions for your needs
  - We target a share of products younger than 5 years to be > 20%
  - We will support global growth ambitions for strategic customers in emerging markets by adequate investments in assets and capabilities
- 

## ... and what it also implies!

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- We will not become a major package provider for engine oils, however we will focus on developing differentiated components
  - We focus on developing sustainable solutions in base stocks, lubricant additives and compounded synthetic lubricants
  - We do not aspire to be an opportunistic supplier but build long-term positions with our customers
-

# Our Solutions Contribute to Sustainable Development ...



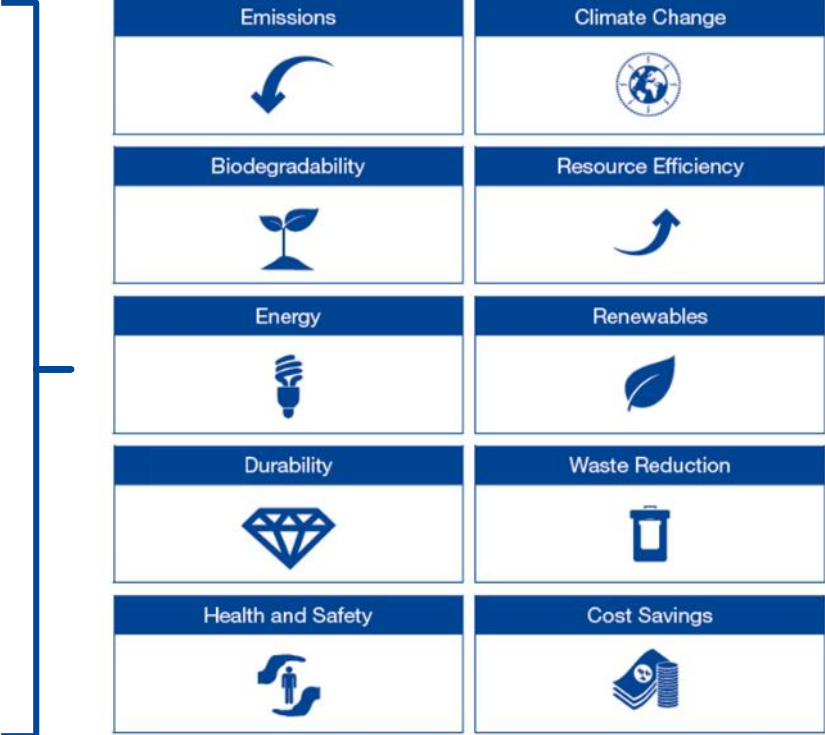
Automotive Fluids

Mineral Oil Additives

Lubricant Additives

Base Stocks for Lubricants & Components for Metalworking Fluids

Compounded Lubricants



... and support differentiation based on measurable performance

# Partner for Sustainable Solutions

## Example: Gasoline Performance Packages

Mineral Oil Additives

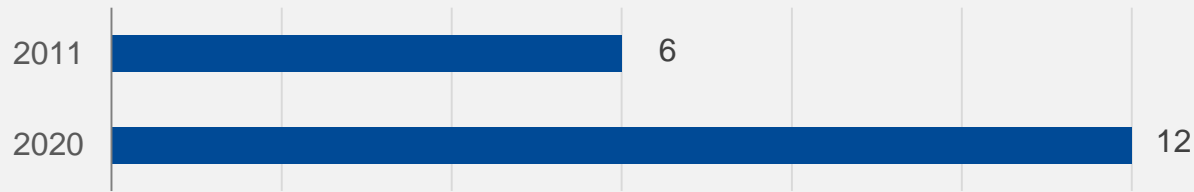


Fuel Additives

Aviation Fuel Additives

Refinery Additives

CO<sub>2</sub> Savings (million t.) by using BASF's Gasoline Performance Packages (GPP)



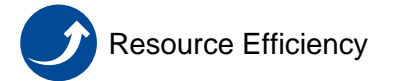
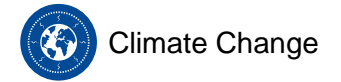
### Market Need

- Reduced CO<sub>2</sub> emissions to comply with environmental standard
- Differentiation in fuel markets

### Solution

- Fuel economy gains with BASF GPP can significantly save CO<sub>2</sub>

➤ >5 mio passenger cars can drive one month without CO<sub>2</sub> emission



→ Mitigate effects of low fuel quality / After Sales opportunities



# Partner for Sustainable Solutions

## Example: Engine Coolants

Automotive Fluids



Engine Coolants (Glysantin®)

Brake Fluids

### Engine Coolants for Fuel Cells



#### Market Need

- Safe and efficient fluids to support fuel cells in transportation



#### Solution

- BASF has developed a fuel cell coolant
- Development partnerships with leading OEMs exist



Climate Change



Resource Efficiency



Energy

→ We support the development of innovative engine technologies

# Partner for Sustainable Solutions

## Example: Axle Lubricants

### Compounded Lubricants



- Transmission Fluids
- Axle Lubricants
- Industrial Gear Oils
- Biodegradable Hydraulic Fluids
- Industrial Compressor Lubes
- Refrigeration Compressor Lubes

### Fuel Savings with BASF's Fuel Economy Axle Lubricants for Heavy Duty Trucks

	Ø Annual US production of HD trucks (200,000 units)	
	1 year	5 years cumm.
Fuel Savings	130 mn l/yr	~2,000 mn l/yr
CO <sub>2</sub> Reduction	350 kt/yr	~5,400 kt/yr

#### Market Need

- Reduced fuel consumption and carbon footprint

#### Solution

- An unique axle oil formula providing best heavy duty truck drive system performance and economy



Waste Reduction



Cost Savings



Climate Change



Resource Efficiency



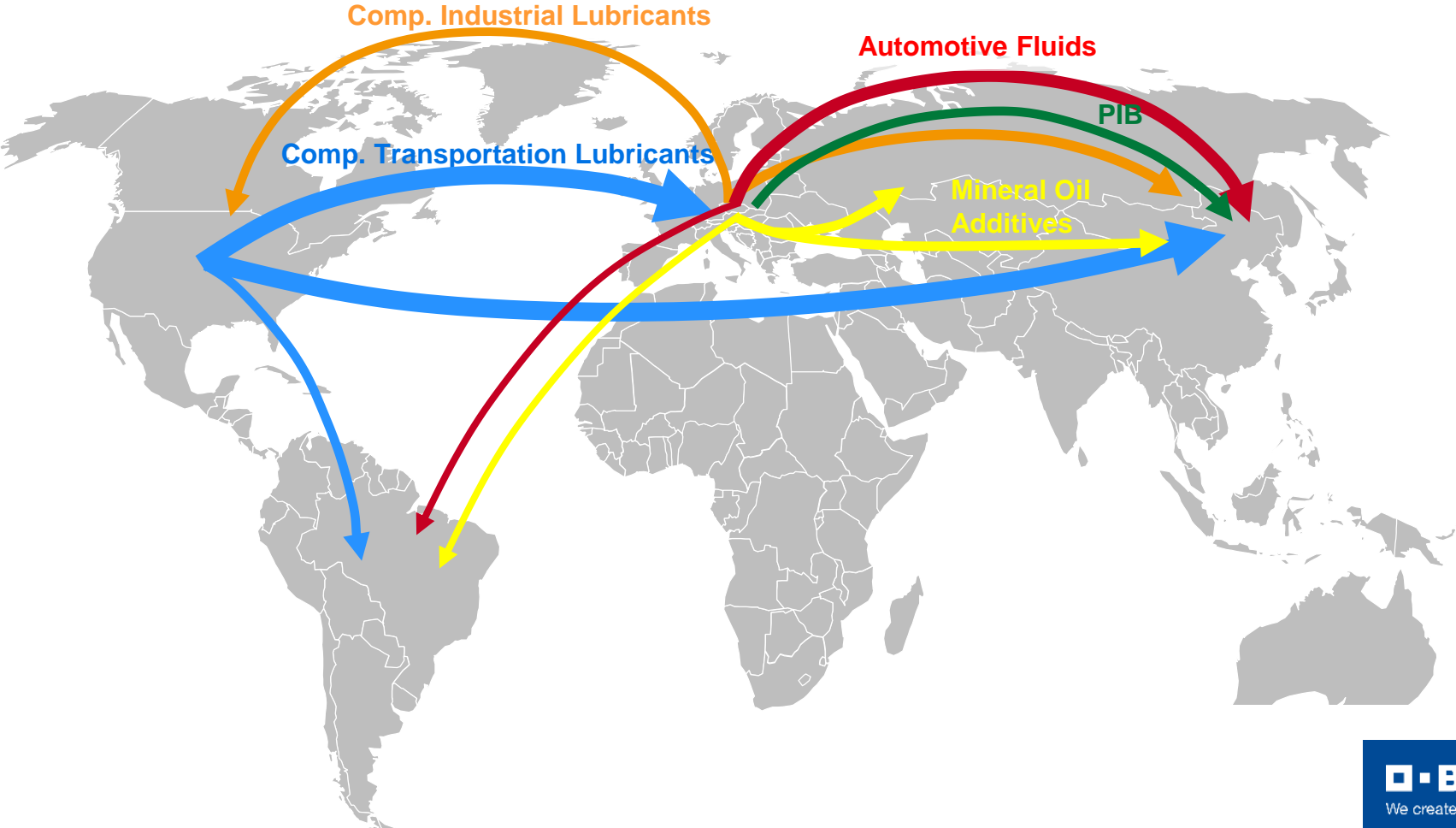
Durability



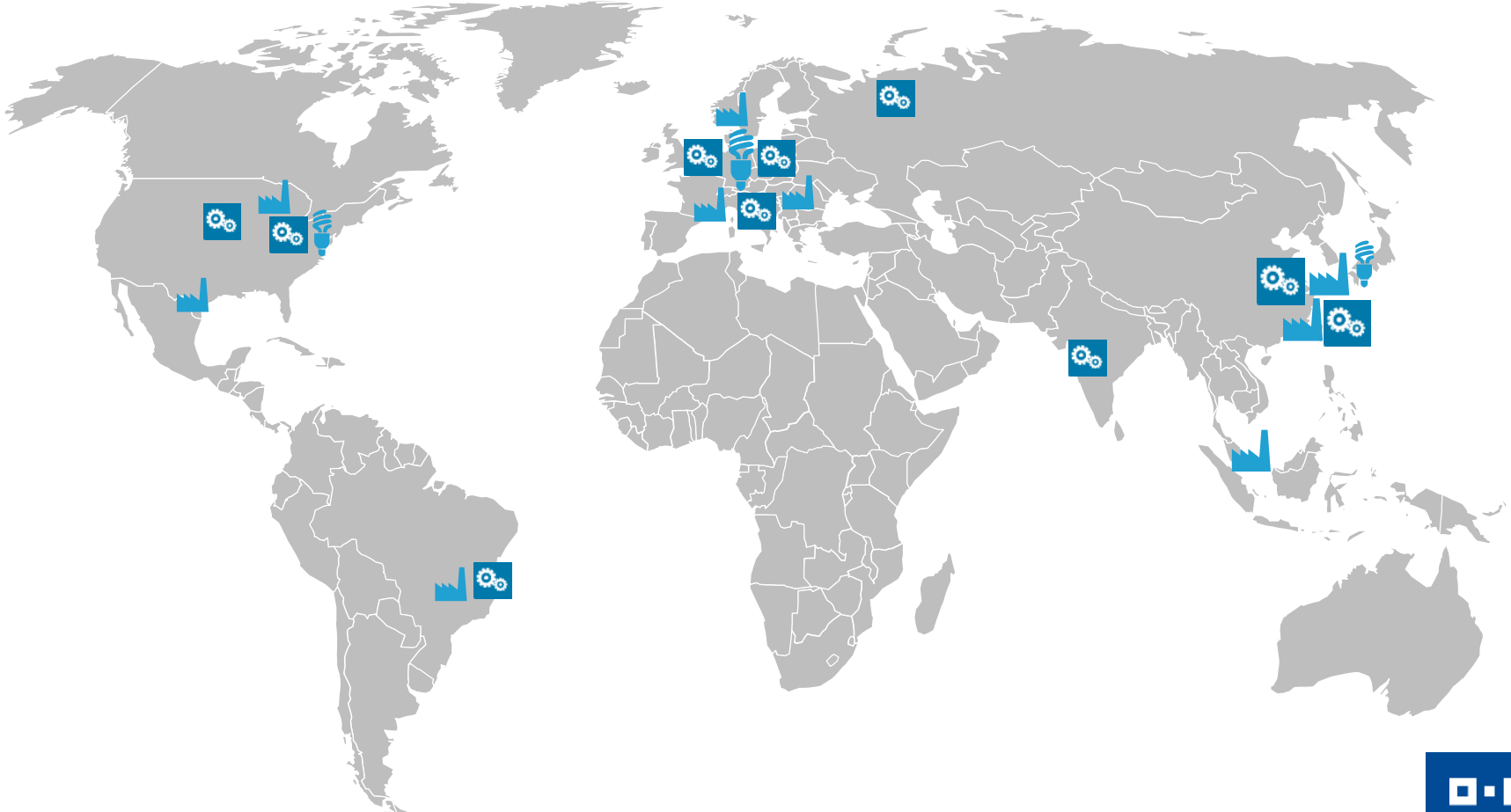
Energy




→ We provide you with selling points for your customers

# Cascade Technology and Business Models Globally



# Fuel and Lubricant Solutions is globally well connected across all functions



-  R&D center
-  Technical Service Centers
-  Production site

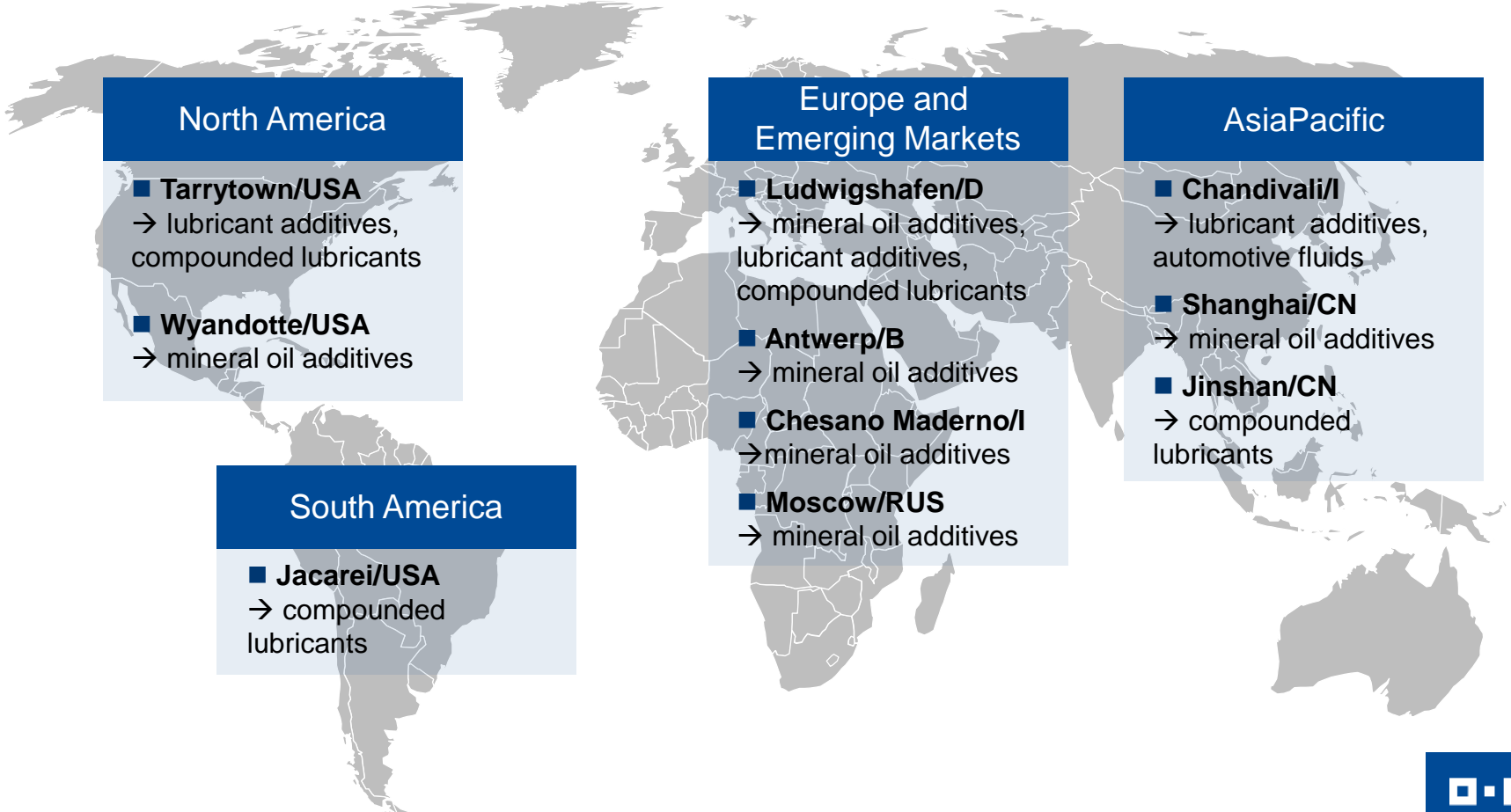
# Global Partner with Local Delivery Capabilities

## Lab Footprint for R&D



# Global Partner with Local Delivery Capabilities

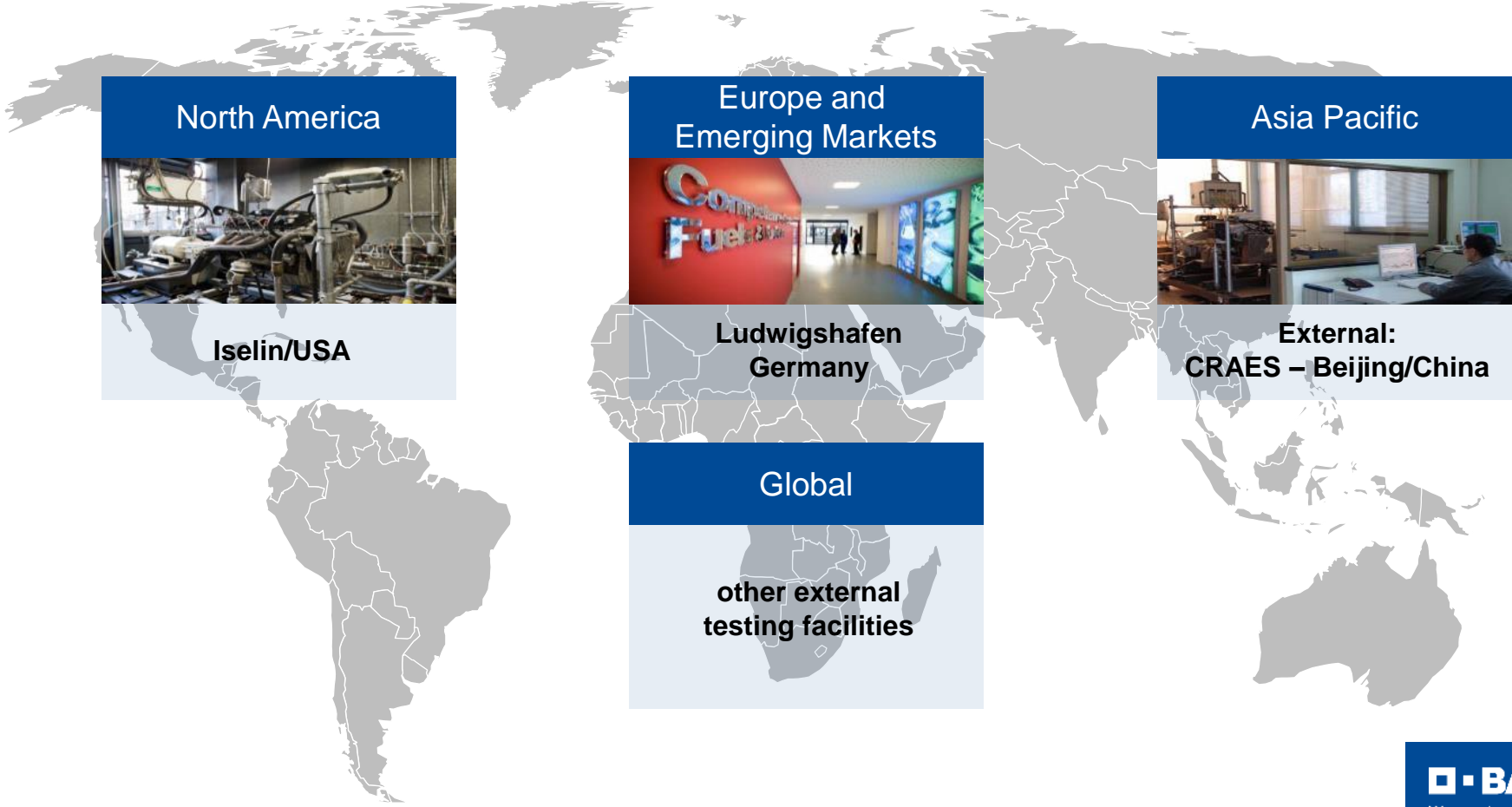
## Tech Service





# Global Partner with Local Delivery Capabilities

## Testing Facilities



North America



Iselin/USA

Europe and Emerging Markets



Ludwigshafen  
Germany

Asia Pacific



External:  
CRAES - Beijing/China

Global

other external  
testing facilities

# Competence Center Fuels & Lubes

## A leading facility for additive performance testing

- In-house test center to measure performance of high-quality fuel additives
- 13 full-size engines on test benches to support new product development
- Test procedures accredited and internationally recognized
- State-of-the-art hardware and software
- Linked with testing facilities of BASF Catalysts in Iselin, NJ, USA, and Hannover, Germany
- Global presence through co-operation with external engine labs: TRC (USA), Intertek (USA), MAUA (Brasil), CRAES (China), APL (Germany)

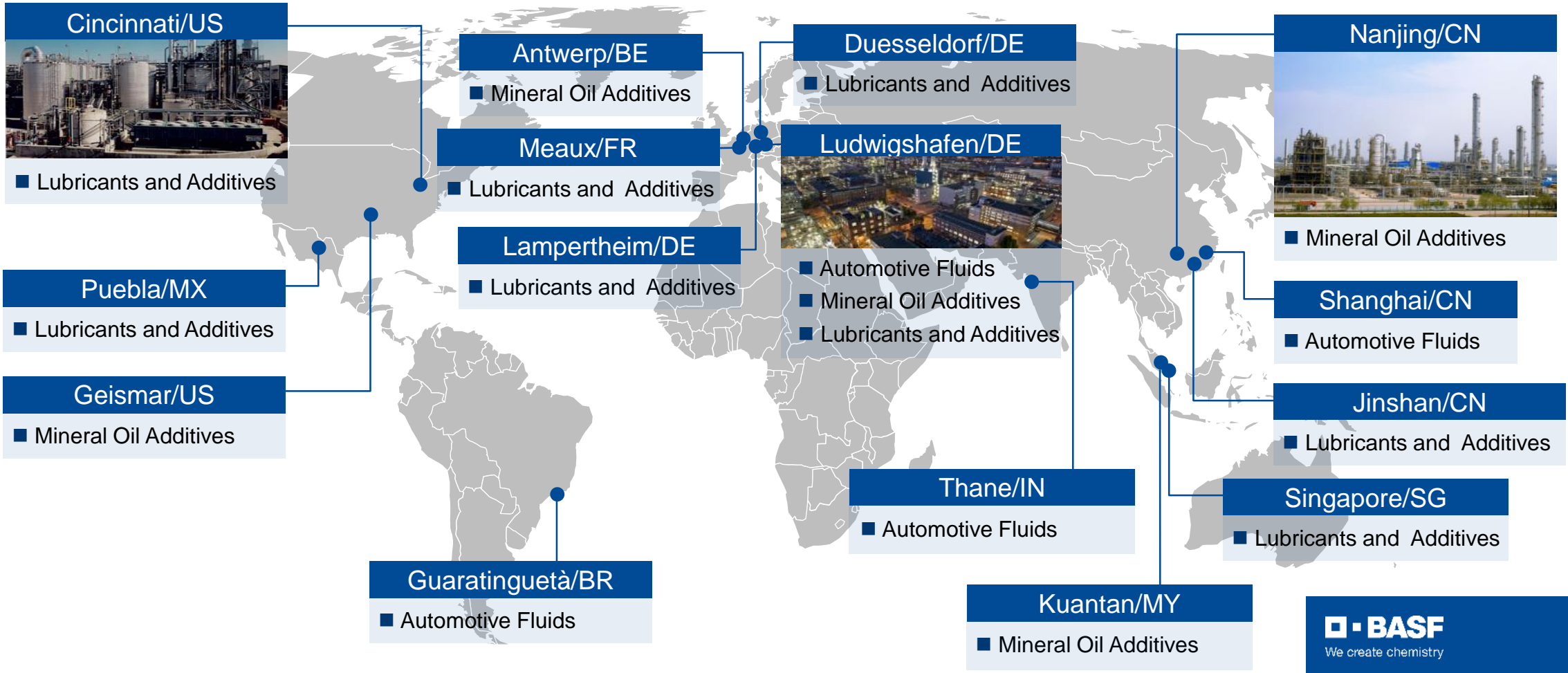
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DIN EN ISO/IEC 17025



# Global Partner with Local Delivery Capabilities

## Production Footprint



## The largest integrated chemical complex in the world

### Headquarter

Employees BASF SE	38,769 *
Site area	10 km <sup>2</sup>
Sales products metric tons p.a.	about 8.5 million
Road	106 km
Rail	230 km
Site traffic	2,100 trucks daily
Shipment	100,000 containers p.a.
Pipeline system	about 2,800 km
Production facilities plants	circa 160 production plants

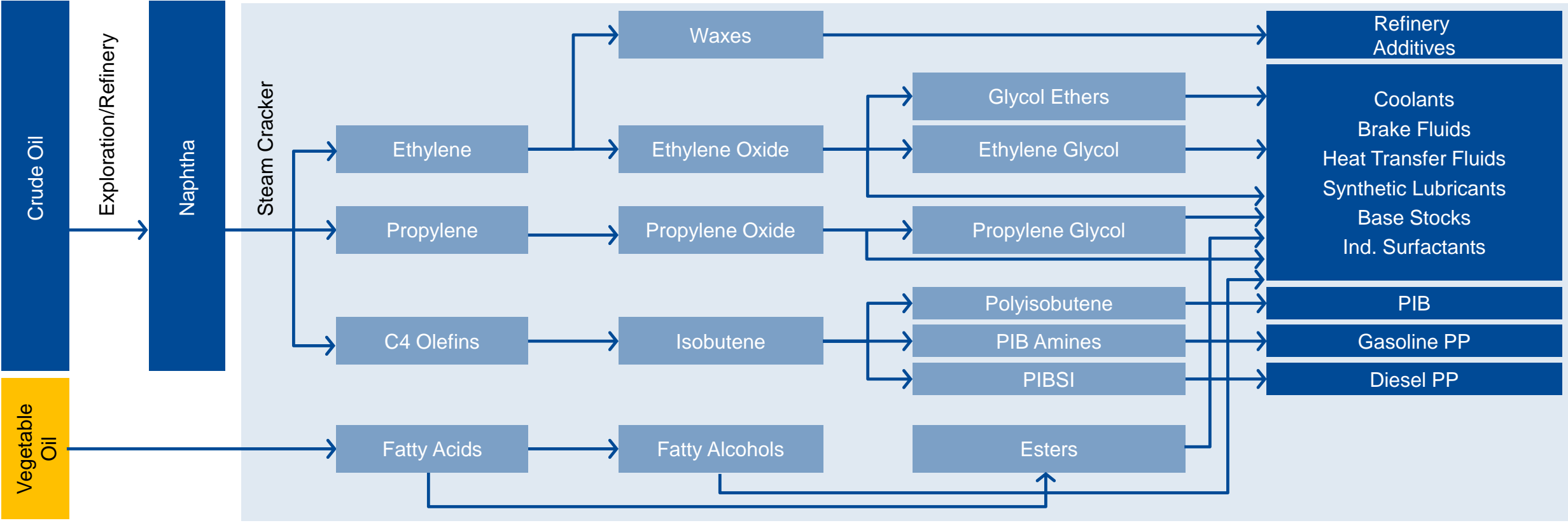


\* as of December 31, 2016

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# Production and Technology

## Benefits from BASF Verbund





We create chemistry