

Highlights of Water, Energy and Resource Efficiency in Germany

Highlights of the German Health Industry

Business Opportunities

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- I. The Role of Germany Trade & Invest
- II. Highlights of Water, Energy and Resource Efficiency in Germany
- III. Highlights of the German Health Industry
- IV. Advantages of Germany as an Investment Location

- *Germany Trade & Invest* is the foreign trade and inward investment promotion agency of the Federal Republic of Germany.
- The agency is promoted by the Federal Ministry of Economics and Technology and the Federal Government Commissioner for the New Federal States in accordance with a German Parliament resolution.
- *Germany Trade & Invest...*
 - supports export-oriented companies based in Germany with comprehensive foreign market information.
 - promotes Germany abroad as a high-performance economic and technology location in order to attract investors who create/secure jobs in Germany.
 - consults potential foreign investors in terms of their settlement plans and realizes the required project management support in Germany.

An additional special focal point of activity lies in promoting the economic development of the new federal states including Berlin.

Areas of Activity

For Companies in Germany (Exporters/Investors)

Foreign Country and Market Information

- Macroeconomic analyses and forecasts
- Country and industry analyses (over 125 countries)
- International projects and tenders
- Foreign economic and tax law
- Customs information and tariffs
- Practical business tips
- Business contacts and addresses

For Companies Abroad (Foreign Investors)

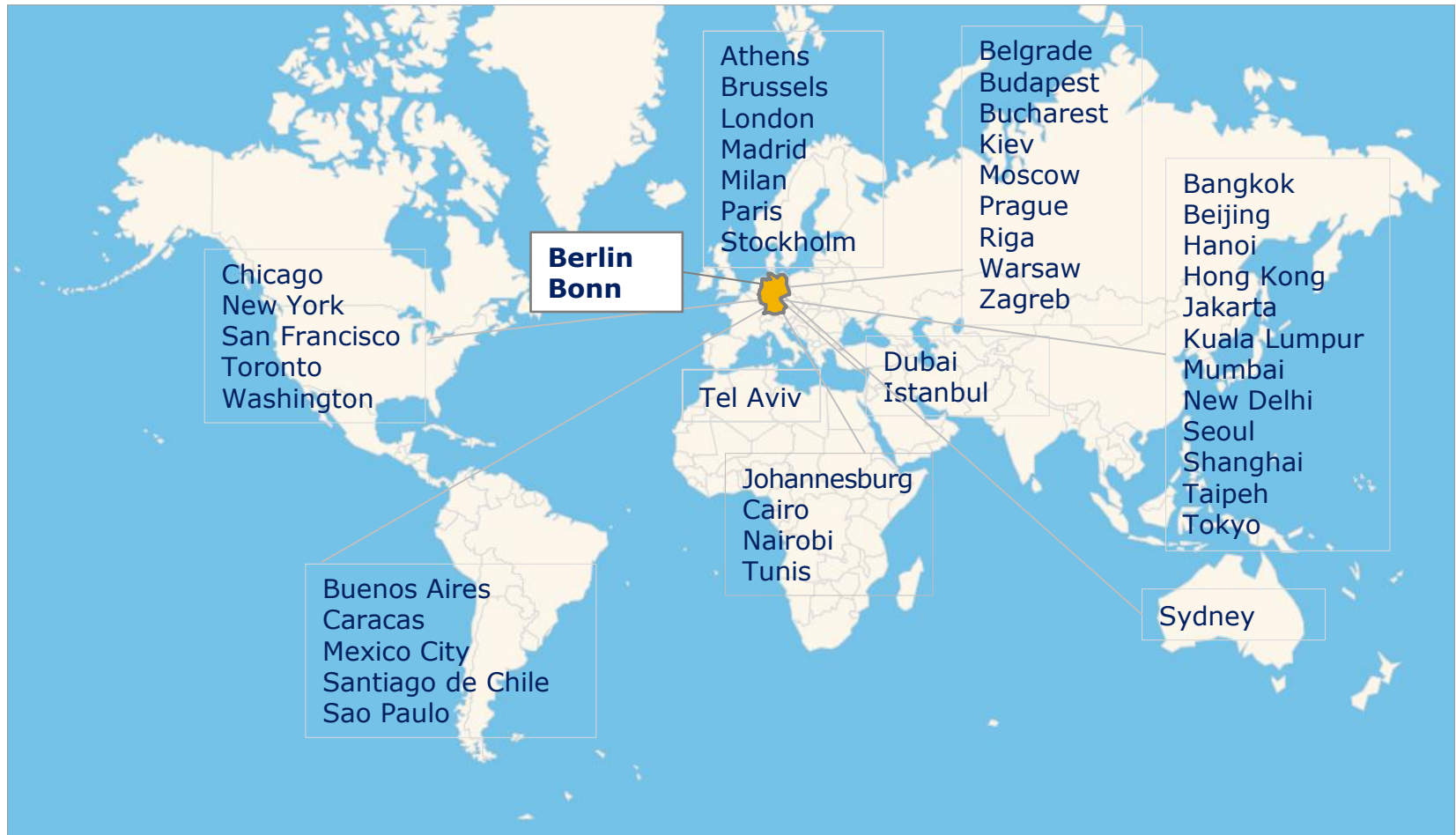
Information about Germany/Consultancy

- Identification of attractive markets and companies
- Economic framework in Germany
- Site specific information
- Industry specific information
- Direct contact with potential investors abroad
- Investor consultancy services
- Project management support

Partners

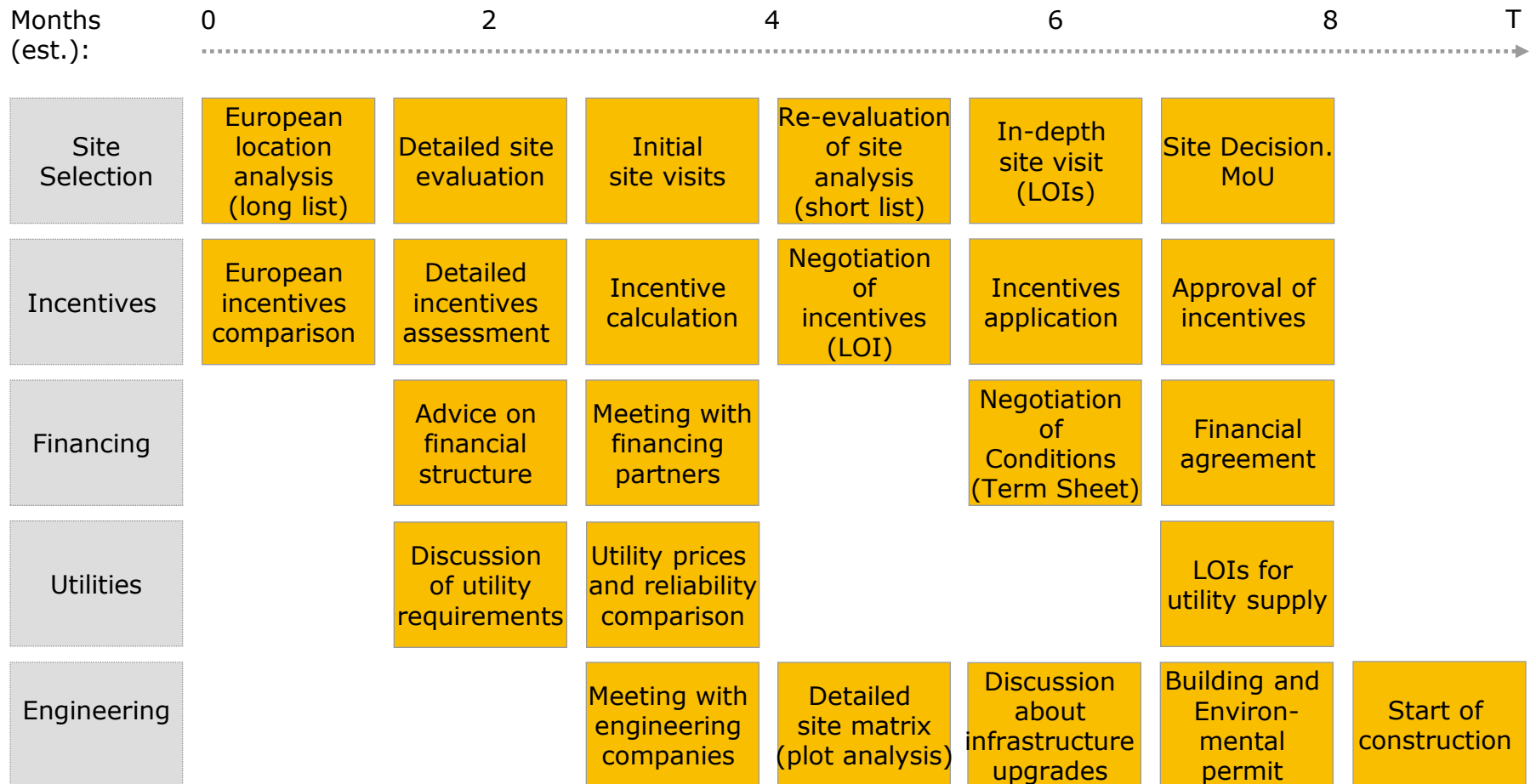
- *Germany Trade & Invest* works in close cooperation with the 120 German Chambers of Commerce Abroad (AHKs) in 80 countries across the globe.
- *Germany Trade & Invest* cooperates with all foreign trade promotion partners in Germany - and in particular with trade associations and chambers of commerce.
- The economic development agencies of the federal states are *Germany Trade & Invest's* partners within the investor settlement process in Germany.

Two Headquarters in Germany - 46 Locations Worldwide



Germany Trade & Invest closely supports the project team throughout the investment decision making process

Example: Milestones of a manufacturing project



The Entire Water Cycle Needs Energy:

Abstraction and Conveyance

- Pumping of groundwater, surface water and salt water
- Transfer of water from source to treatment plant or reservoir

Treatment and Distribution

- Filtration, Oxidation, Ultraviolet Treatment, Additives, Denitrification, Desalination, Pumping

End Use

- Heating, Cooling, Household appliances, Commercial appliances, Industrial processes

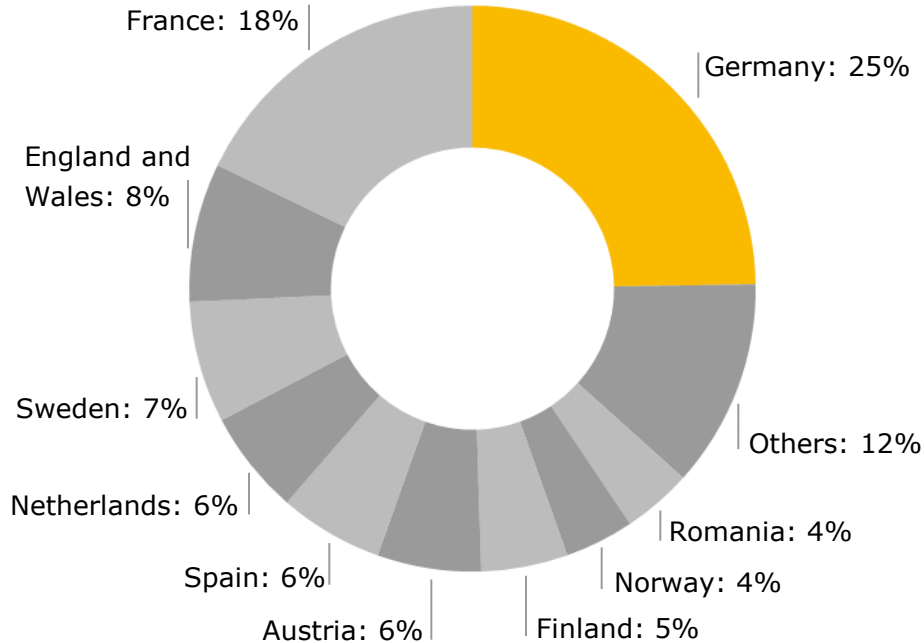
Waste Water Treatment

- Collection, Physical Treatment, Chemical Treatment, Sludge Treatment, Discharge

Source: A conceptual model of water-sector processes involving energy use, Greenhouse-gas emissions from energy use in the water sector by Sabrina G. S. A. Rothausen and Declan Conway, 2011

Water Abstraction for Manufacturing Industry in Europe

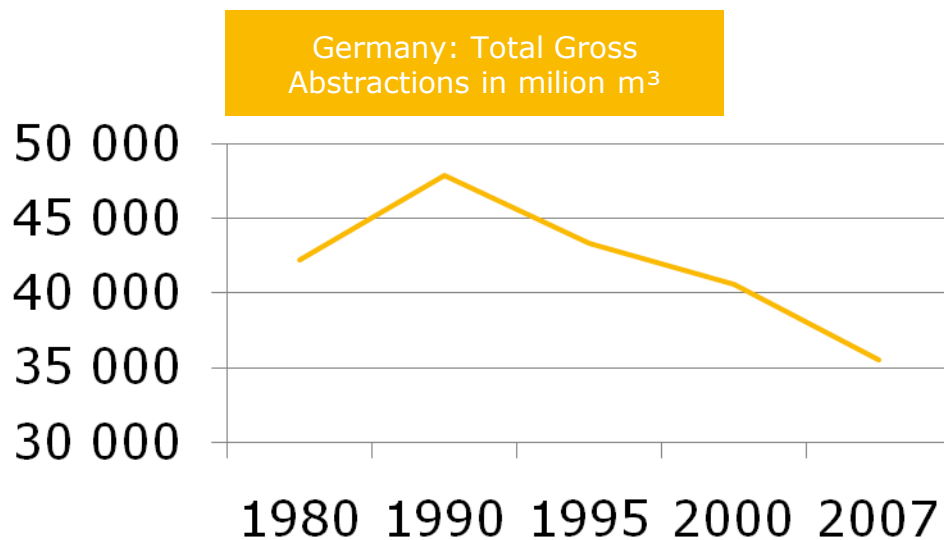
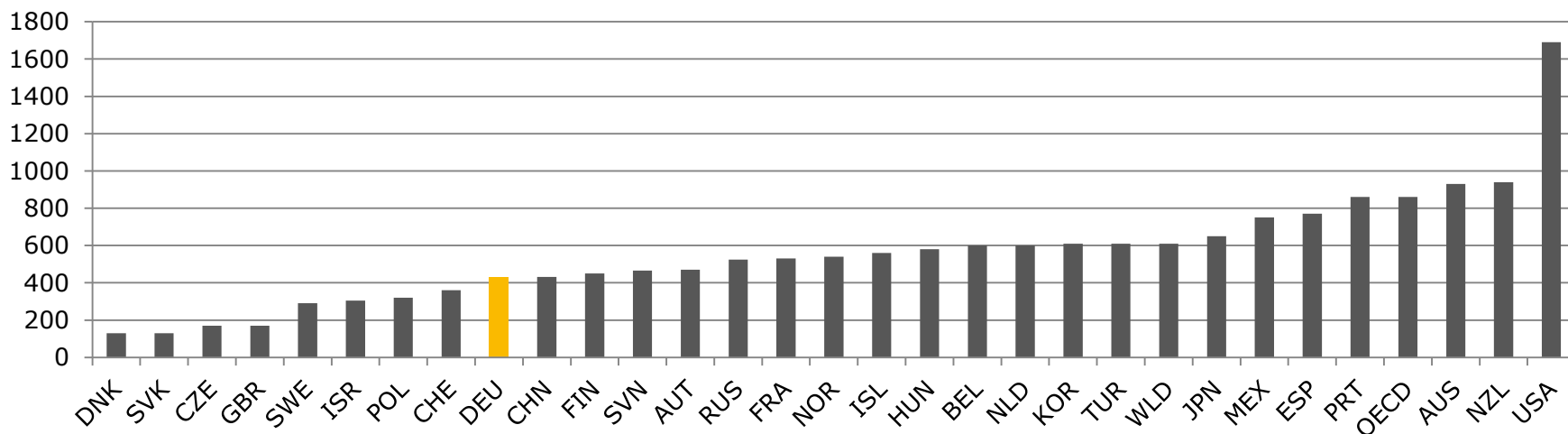
Country Share of Total Water Abstraction for Manufacturing Industry in Europe Share in %



- **Manufacturing industry** uses about **11%** of the total freshwater abstracted across Europe, with about half used for processing and the remainder for cooling
- Water is used by manufacturing industries for cleaning, heating and cooling; to generate steam; to transport dissolved substances or particulates; as a raw material; as a solvent; and as a constituent part of the product itself (e.g. in the beverage industry)
- Manufacturing industry is supplied both from the public water supply system and via 'self' abstraction processes; the more water-intensive industries generally undertake their own abstraction, with the principal source being surface water

Manufacturing industry can reduce its water use by recycling and reusing water, changing production processes and using more efficient technology, including measures to reduce leakage.

Water Abstractions in m³ per capita, 2007 or latest available year



Source: OECD Factbook 2010: Economic, Environmental and Social Statistics - ISBN 92-64-08356-1 - © OECD 2010

Germany already implemented EU law and developed it even further

Federal Water Act:

- Standardized nationwide regulation, binding provisions under EC law
- Basic provisions relating to water resource management (quantity and quality)
 - Precautionary principle: Waterbodies must be protected and be managed in public interest and are subject to government control
 - Integrated environmental protection: ensuring a high level of environmental protection

Wastewater Charges Act:

- Regulates the levying of charges for the direct discharge of wastewater into a waterbody
- Ensures that the polluter-pays principle is applied in practice

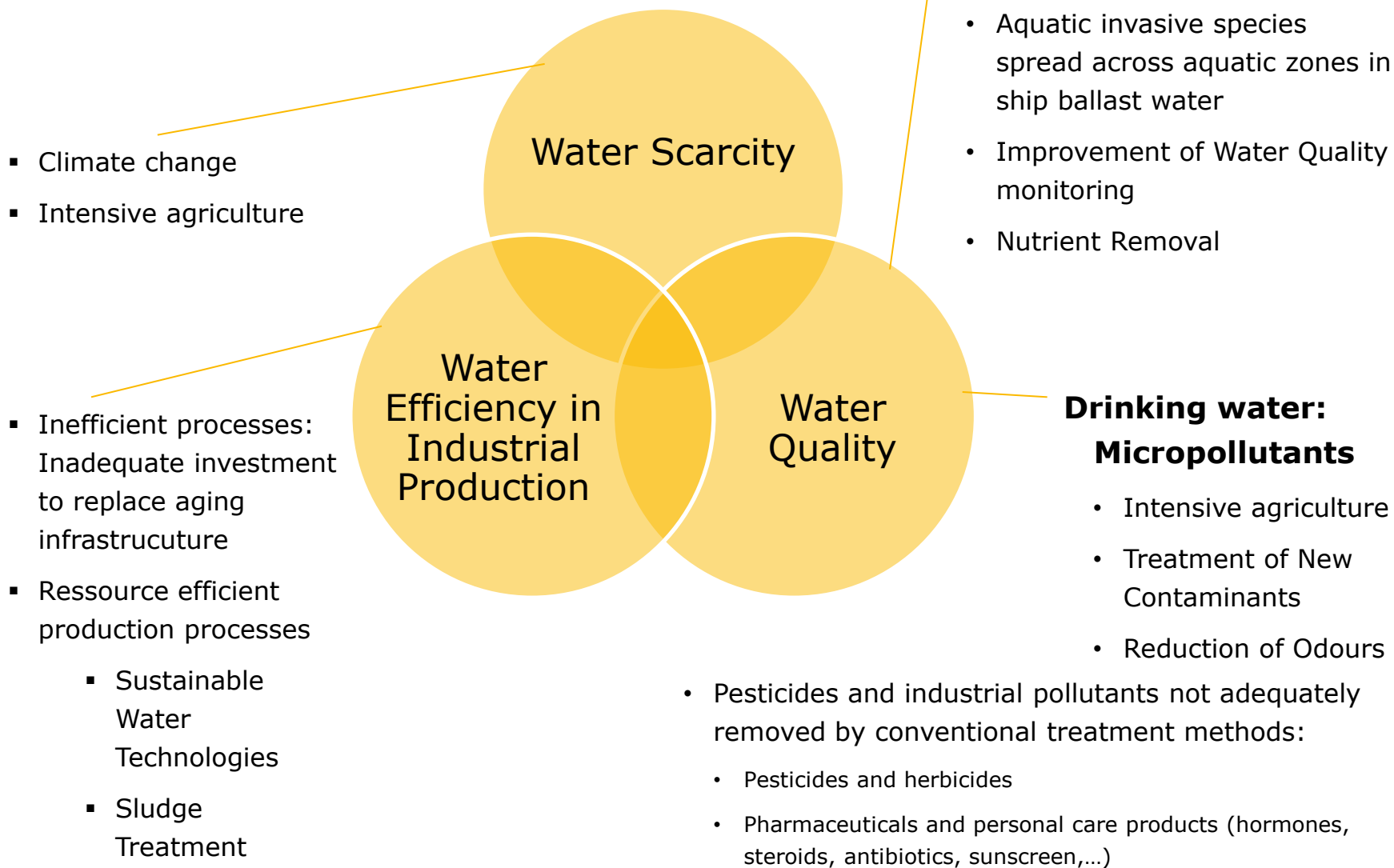
Drinking Water Ordinance:

- Implementation of the EC Drinking Water Directive
- Requirements for the quality of drinking water and its treatment

Groundwater Ordinance:

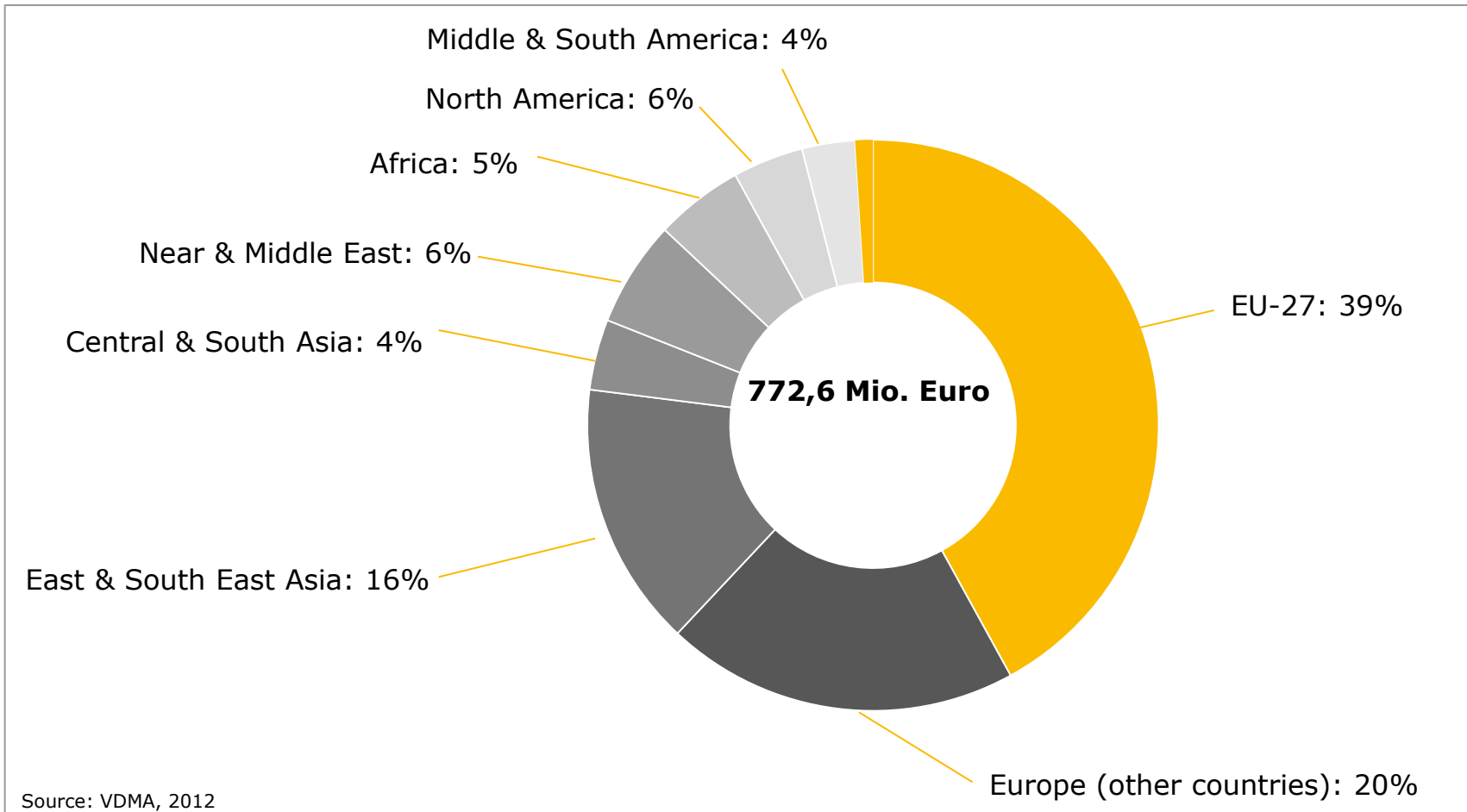
- Criteria for the characterization, classification and monitoring of the groundwater status and for the identification and reversal of significant growth in pollutant concentrations in groundwater bodies

Future Market Potentials



Gaining Advantages supplying local and global demands

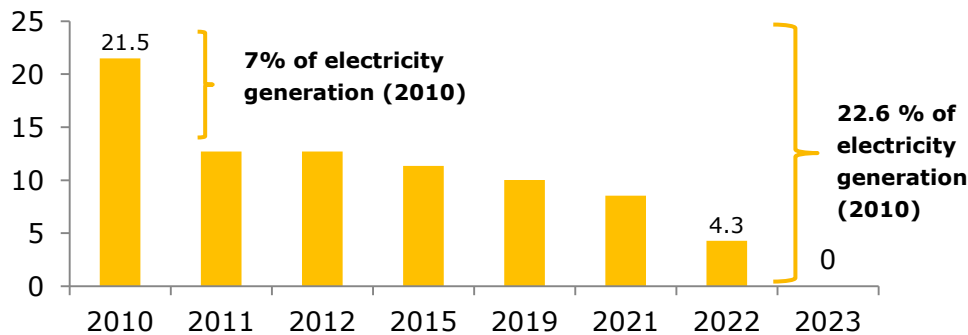
German Water Technologies Export Share (2011)



Germany's nuclear power phase-out

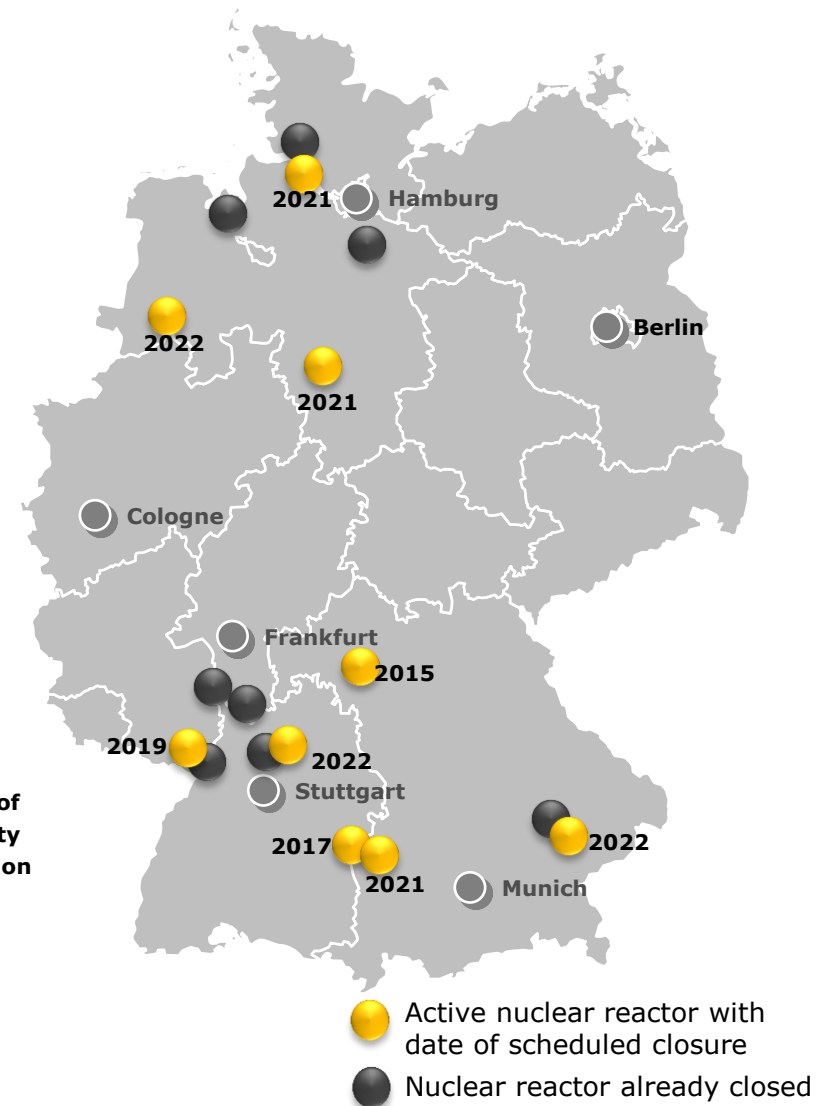
- Due to the nuclear disaster in Fukushima in 2011, closure of nuclear power plants was brought forward from 2036 to 2022
- 8 out of 17 nuclear power plants were already shut down in 2011
- 2011: 17.6% nuclear power of total energy consumption (2010: 22.6%)¹

Development of installed nuclear power plants capacity in GW²



1) Quelle: BMWi „Die Energiewende in Deutschland“, Februar 2012

2) Quelle: DATF, 2012



Main Objectives

Climate protection measures	2020	2050
CO2 cuts vs. 1990	-40%	-80%
Renewable share of...	2020	2050
Total energy consumption	18%	60%
Electricity consumption	35%	80%
Heat generation	14%	60%
Energy efficiency measures		
Increase in energy productiveness	2.1% p.a.	
Reduction of energy consumption	-50% (2050 vs. 2008)	
Reduction of electricity consumption	-25% (2050 vs. 2008)	
Renovation rate	2% p.a.	
Reduction of energy for transportation	-40% (2050 vs. 2005)	

Measures for implementing the new energy policy after the decision taken on the gradual phase-out of nuclear power by 2022

- Faster expansion of renewable energies
- Integration of renewable energies into the overall energy system, e.g. through a market premium
- Central component: wind energy
- Increase energy R&D levels - up to €0.5 bn will be made available
- Expansion of electricity and smart grids as well as increasing the level of energy storage capacity
- Restructuring the fossil power plant park towards more flexible power stations (e.g. gas plants as responsive power to intermittent renewable energies)
- Increase energy efficiency (particularly in buildings)
- Cost efficiency and efficient procurement
- European initiatives for energy efficiency

Source: http://www.bmu.de/energiewende/beschluesse_und_massnahmen/doc/47892.php

Bayerische Staatsbrauerei Weihenstephan



Facts

- Some 100 members of staff
- Produce around 250,000 hectolitres of beer per year
- In 2010, the brewery modernised and optimised the combustion plant with the aim of reducing emissions, energy consumption and costs
- Result: annual cost savings of **162,500 €**

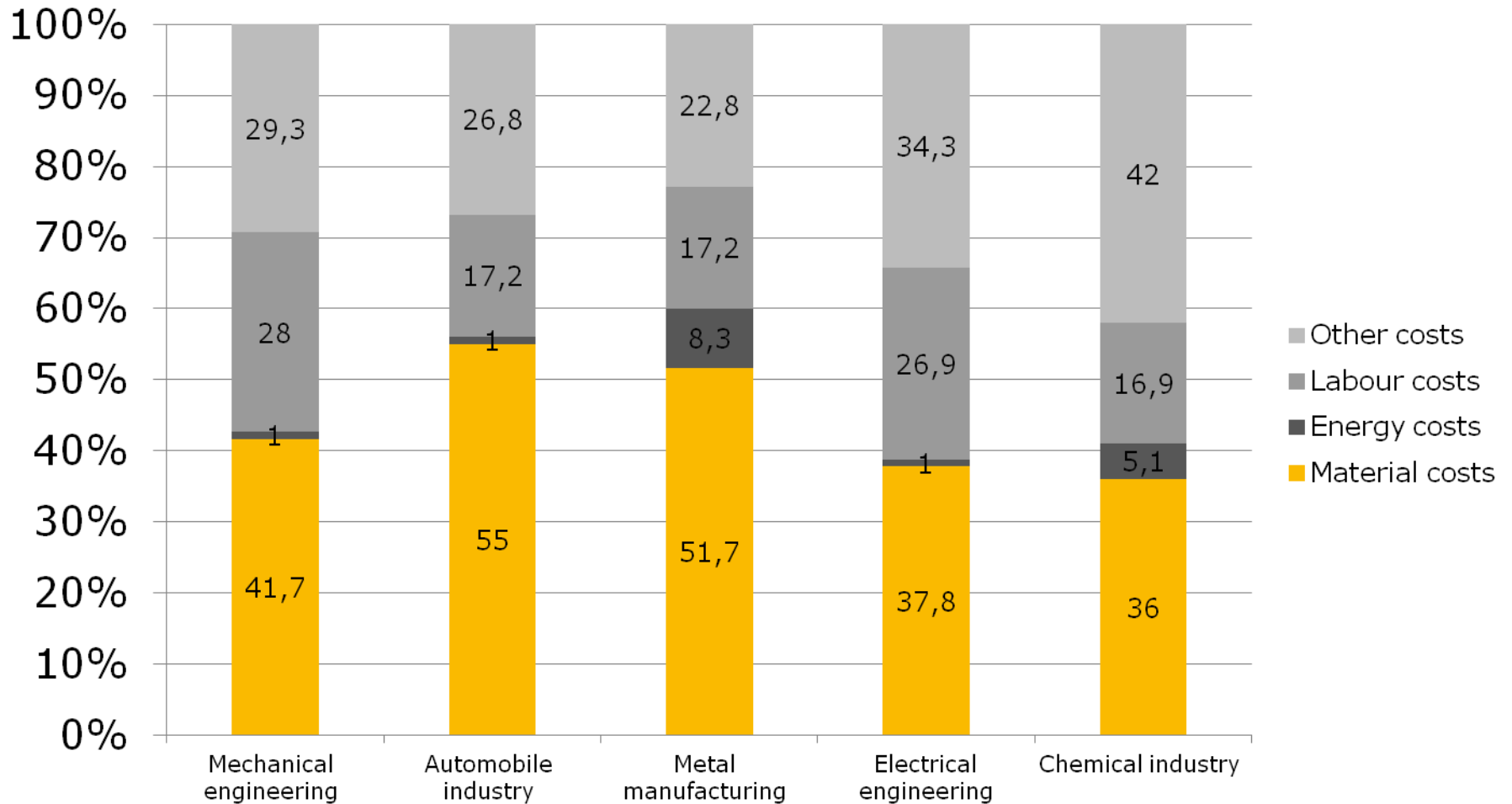
Energy Efficiency Measures

- Replacement of the existing heavy oil boiler
- Installation of a heat exchanger for preheating feed water
- Installation of a condensing heat exchanger for heating brewing water
- Installation of an air preheater (CAP) for utilising waste heat from the refrigeration plant
- Installation of a CO control system
- Speed control system for the combustion air blower

Energy Sources	Natural gas/heating oil	Electricity
Reduction in energy consumption	2,800,000 kWh/year	45,000 kWh/year
Percentage energy saving	10.5 %	45.5 %
CO2 reduction	2,230 t/year	28.5 t/year
Capital cost	154,800 €	5,500 €
Reduction in costs	153,500 €/year	9,000 €/year
Return on investment	99 %	164 %

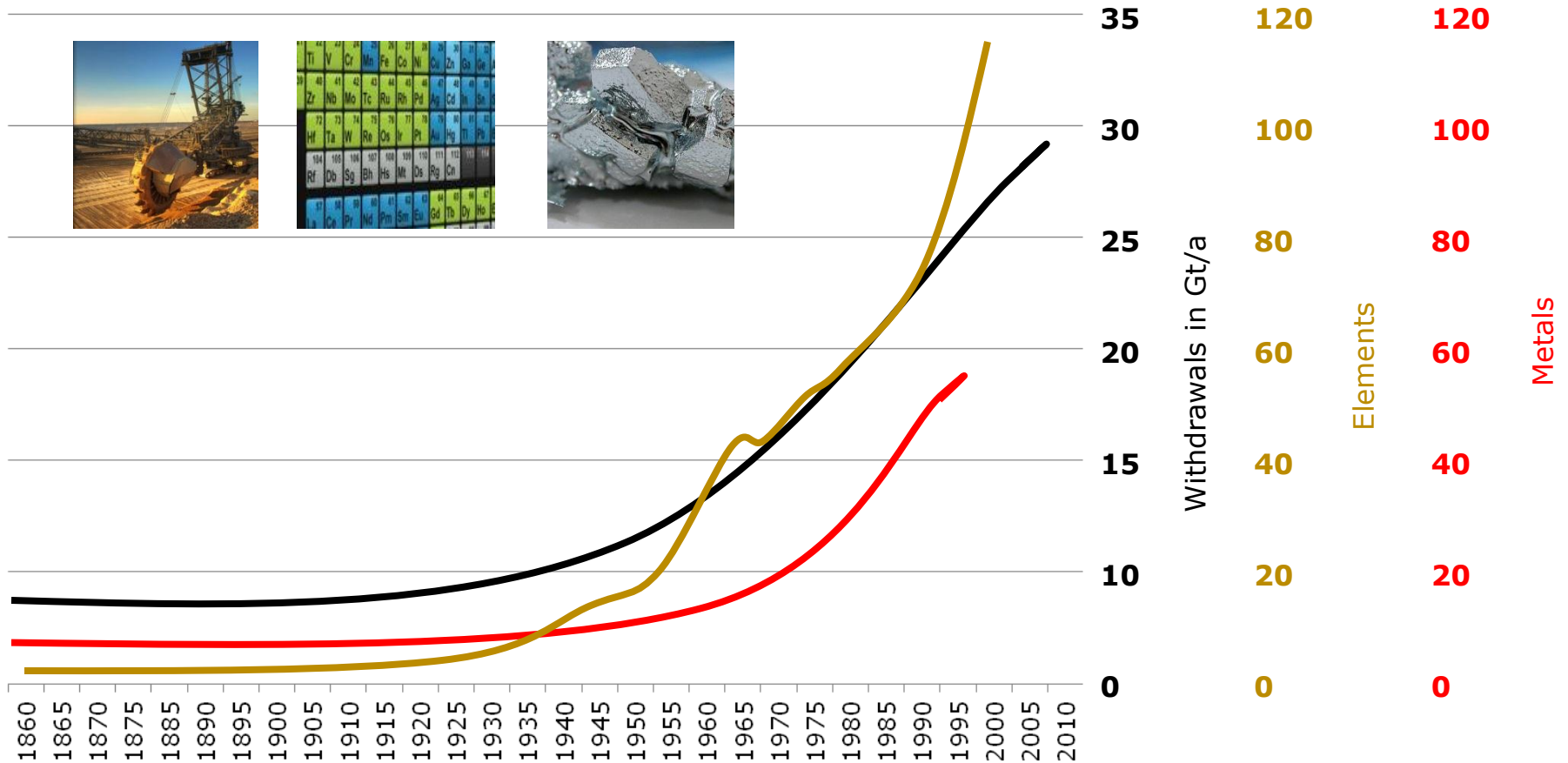
Source: dena Energy Efficiency in heating systems in industry and production, 2011

Raw materials are a major cost factor for the industry



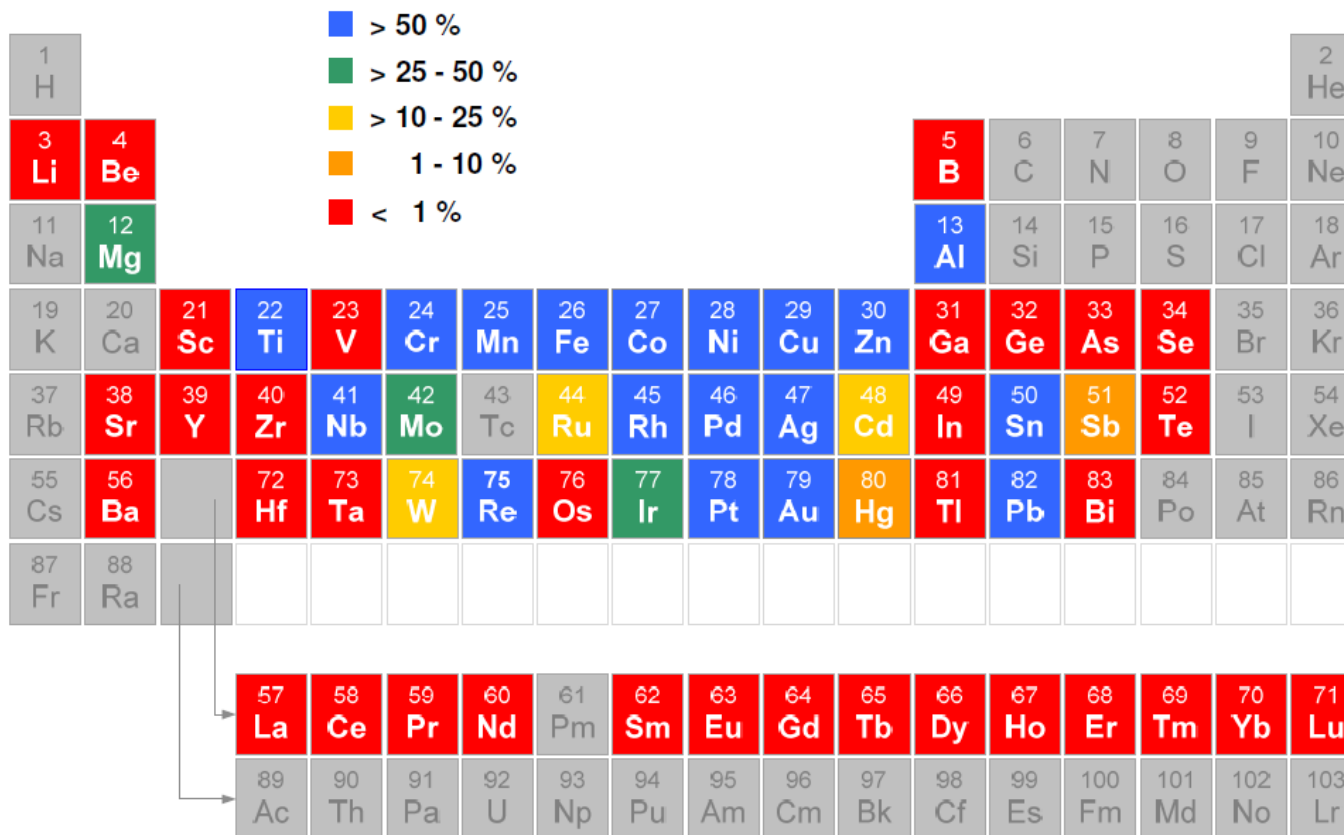
Source: DB Research, Josef Auer, 2011

Raw material- Exploitation



Source: Maddison 2008, SERI 2011, in Faulstich, 2012

Global Recycling Rates



Quelle: UNEP 2011, Hagelöken 2011

Source: UNEP 2011, Hagelöken 2011 in Faulstich 2012.

Magnets (20%)

- Motors and generators
 - Wind turbines
 - Electric vehicles
 - Hybrid vehicles
- Hard Discs
- Magnetic Resonance imaging (MRI)
- Speakers
- Magnetic cooling

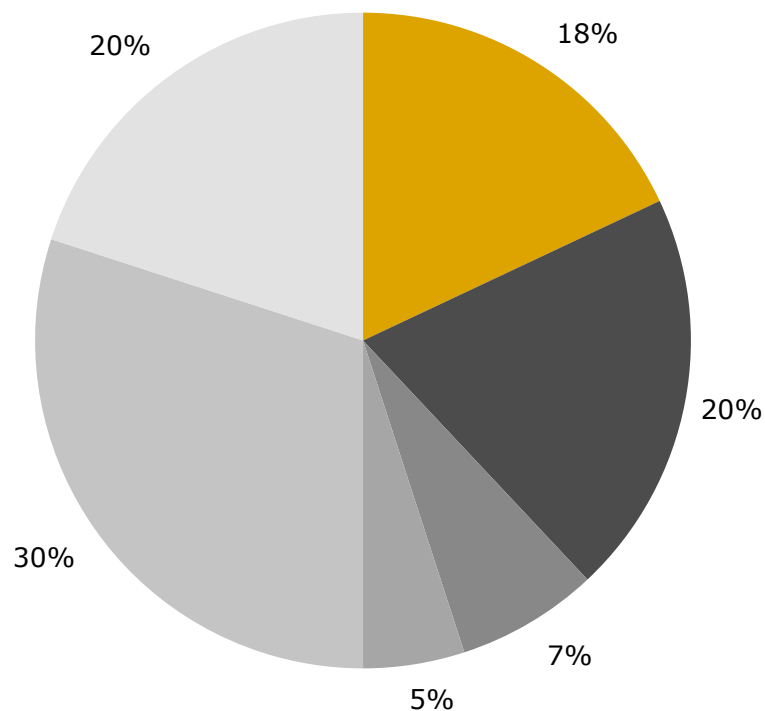
Glass, Polishing, Ceramics (30%)

- Polishing compounds
- Colouring and decolouring agent in glass
- Stabilizer in ceramics
- Ceramic capacitors
- UV adsorption

Others (5%)

- Water treatment
- Pigments
- Fertiliser
- Nuclear technology
- Defence

Global demand of rare earths by volume



Metal Alloys/Batteries (18%)

- Alloys for steel and iron casting
- Super alloys
- Flint ignition devices
- NiMH-battery
- Fuel cell
- H2-storage
- Light weight construction

Catalysts (20%)

- Automotive catalysts
- Catalysts in refining and chemical processing
- Diesel additive

Phosphors Luminescence (7%)

- Energy efficient lighting
- Light emitting Diode (LED)
- Liquid crystal display (LCD)
- Plasma display
- Laser

Source: Dr. Schüler et al., Study on Rare Earths and Their Recycling: Final Report for The Greens/EFA Group in the European Parliament, 2011

Efficient use of rare earths - Recycling

Catalysts

Ce, La, Pr, Nd, Y

- Due to rather low prices of REE in the past a recovery of the REE from catalysts was not yet interesting from an economic point of view.
- This is today an issue and within the automotive industry the catalyzers are being recycled

Magnets

Nd, Pr, Sm, La, Tb, Dy

Possibilities:

- remelting the scrap and recover in an un-oxidised state
- Recovery of rare earths as oxide
- Re-use of magnetic materials without separation of material mix
- Selective extraction of Neodium and Dysprosium directly from magnet scrap

The German Federal Ministry for Education and Research has set up an incentive directive for Innovative Technologies and ressource efficiency concerning strategic metals and minerals

Recycling

Lightning & Luminescence

Ce, La, Eu, Tb, Y, Gd

- Process:
 - By-product separation
 - Glass and aluminium stored
 - REE are isolated and extracted to be ready to re-use
- OSRAM holds a patent on the recycling of yttrium and europium from discharge lamps and fluorescent lamps

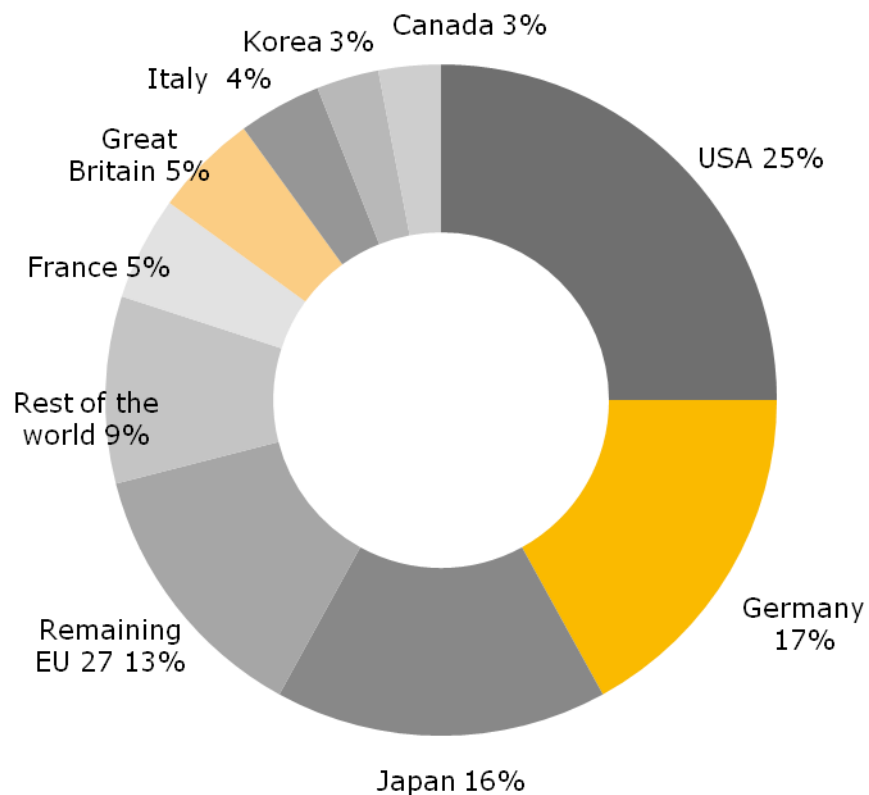
Batteries

La, Ce, Pr, Nd, Sm, Sc

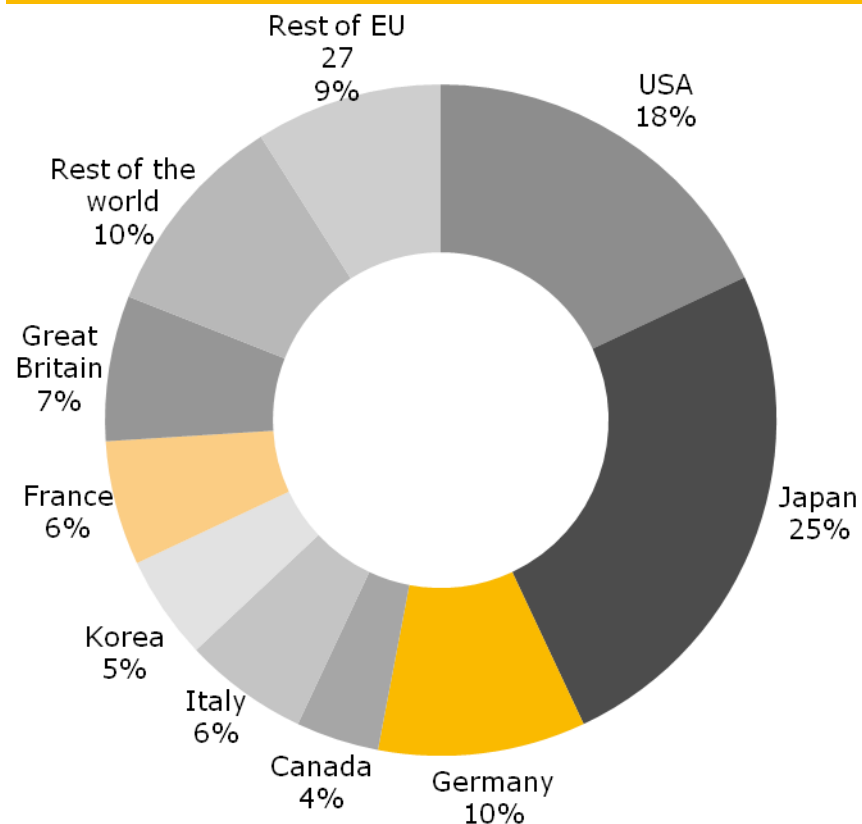
- Treatment of electrodes with a multi-element refinery process, then: separated reduction of the rare earths
- 90.5% of the collected batteries in Germany are recycled

Leading together worldwide

Global patent share in the recycling sector by country (2004-2007)



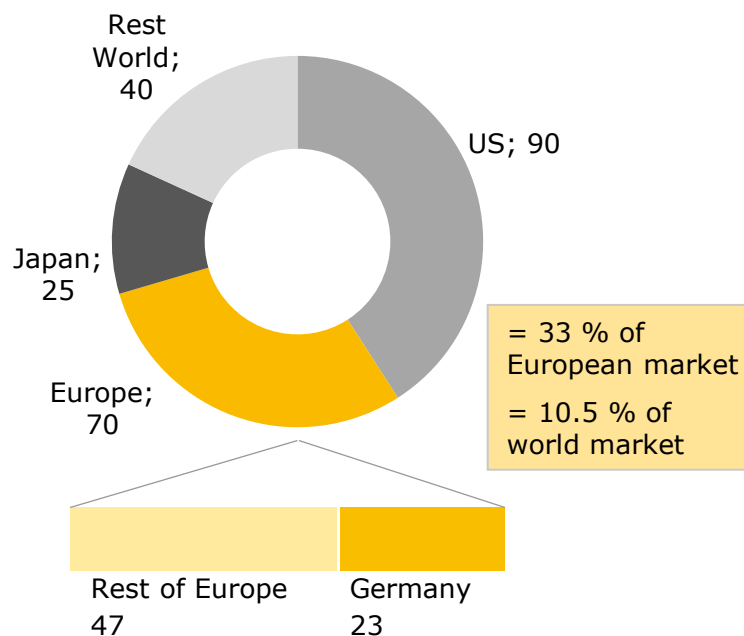
Global patent share in the waste management sector by country (2004-2007)



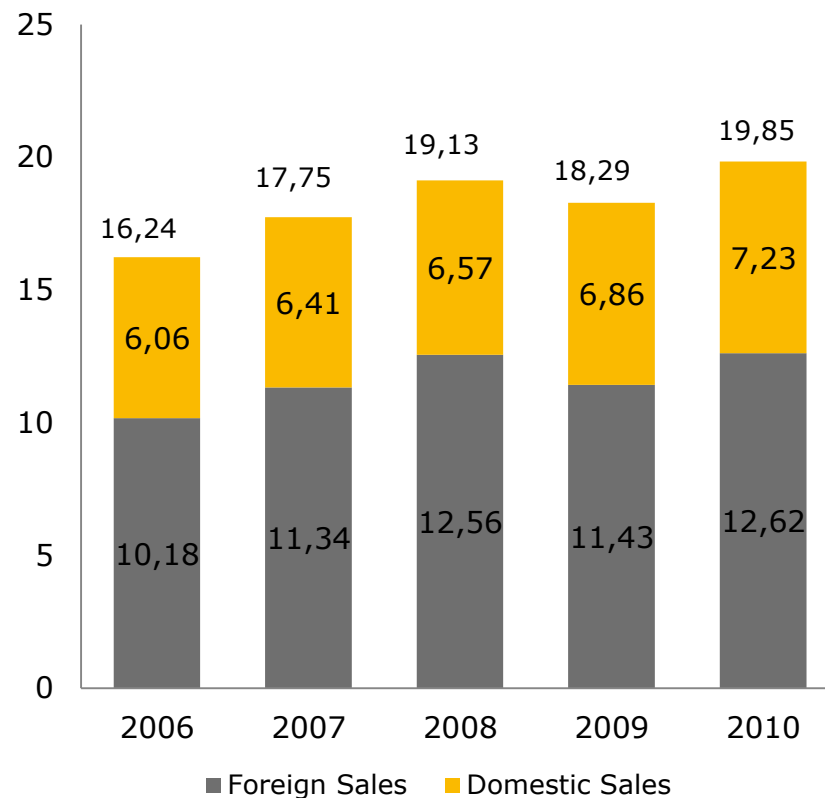
Source: Schasse u.a. 2010 – BMU 2012

The world market for medical devices in 2010 added up to € 220 bln.
Germany accounts for € 23 bln.

Market shares of the World MedTech Industry (in bln €)



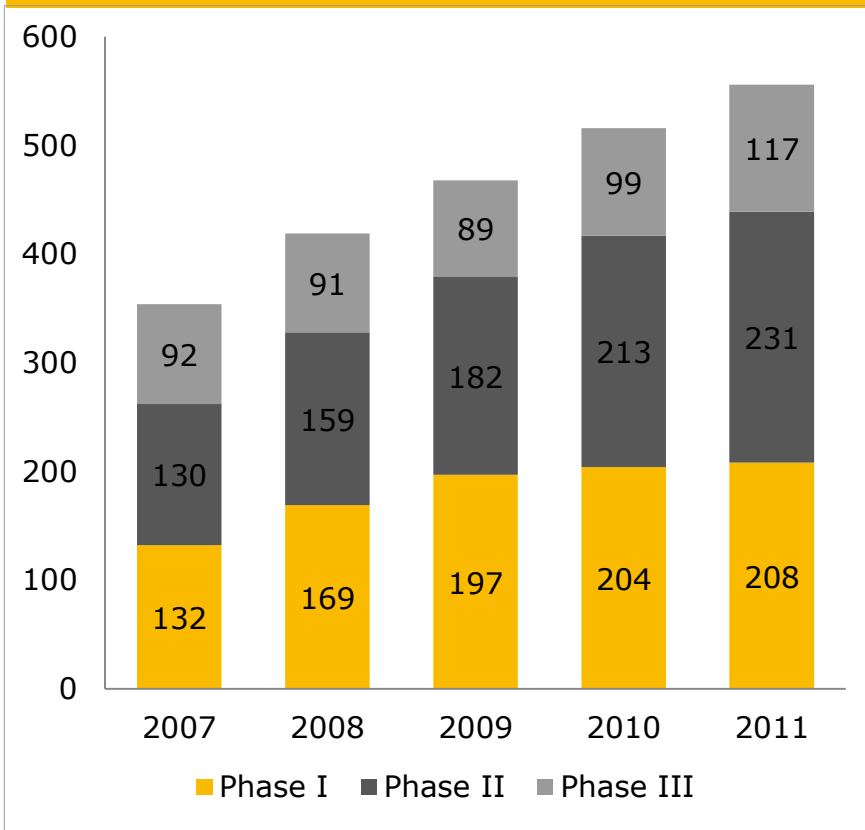
Total sales in the German Medical Technology industry (in bln €)



Source BVMed Industry Report 2011

Spotlight on market driver Bio-Pharma: € 5,4 bln share of total pharmaceuticals market worth 29,8 € bln.

Biopharmaceutical pipeline 2007-2011

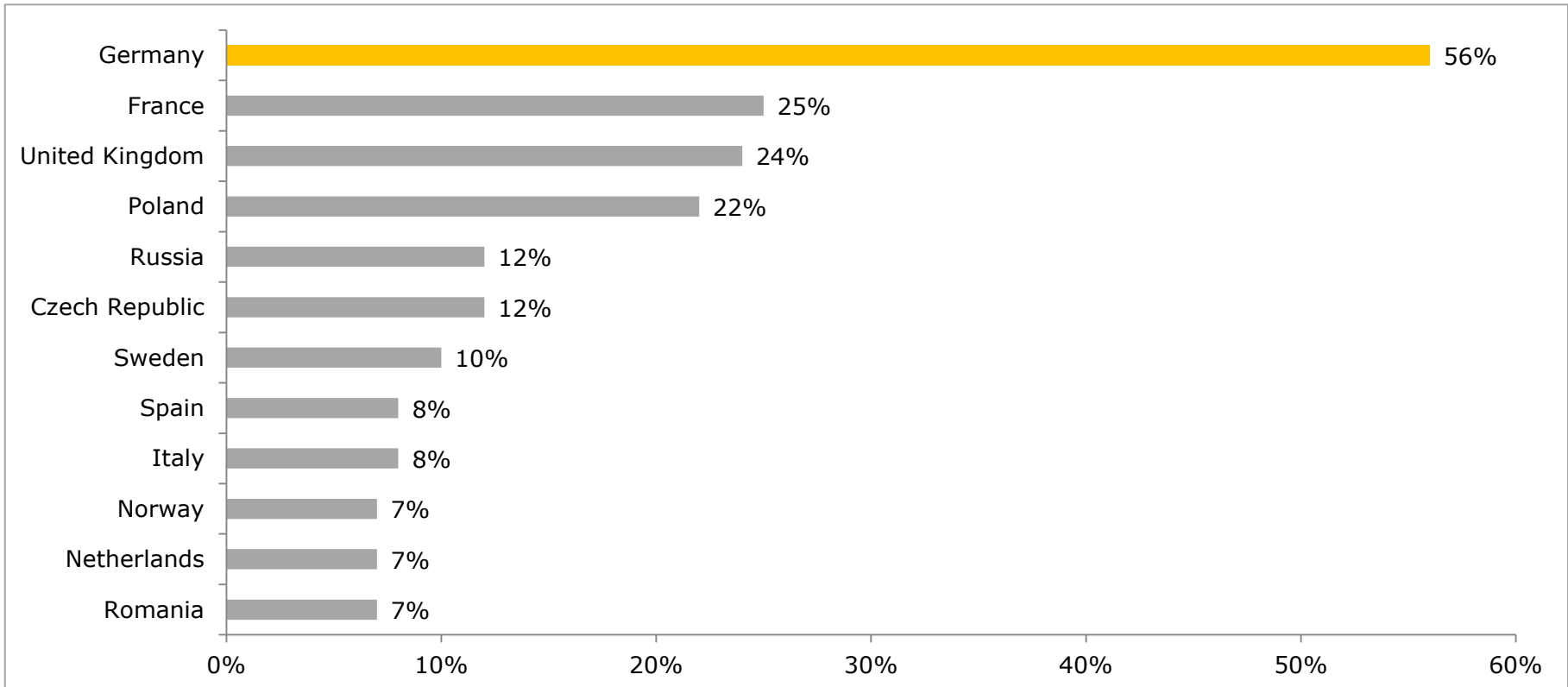


Source: BCG and vfa Report 2011

- Biopharmaceuticals
 - 556 biopharmaceuticals in clinical development in 2011
 - Main focus: monoclonal antibodies
 - 8% growth of clinical development pipeline on 2010 levels
 - 10 drug candidates approved for marketing since 2010
- Diagnostics
 - Growth driver in med biotech market
 - CAGR: 12%
- Regenerative Medicine
 - Market volume: € 150 mln

From the perspective of investors, in the next three years Germany is the most attractive investment location in Europe.

"Which three European countries, in your opinion, will be the most attractive investment locations in the next 3 years?"

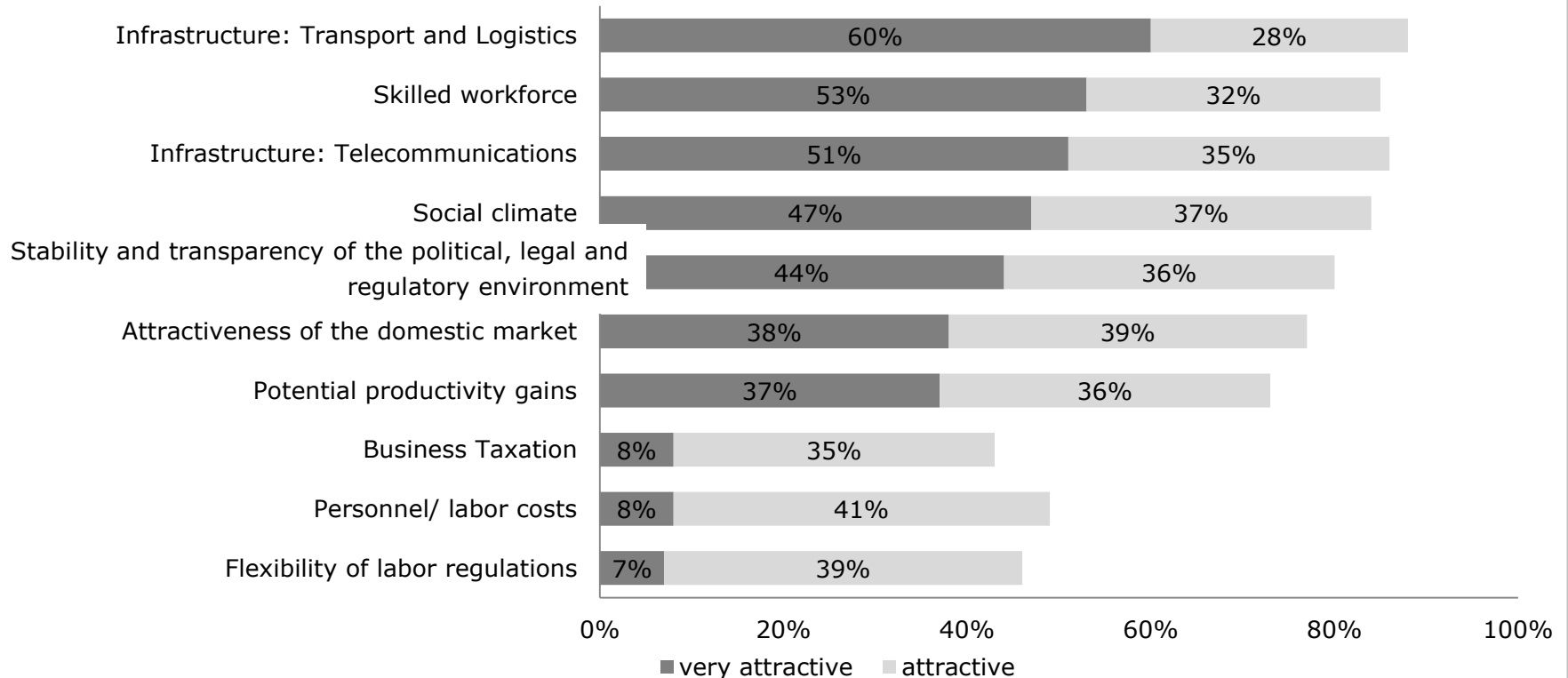


Ernst & Young 2012

Note: 840 respondents, up to three regions could be picked

Investors favor Germany for many, multifaceted reasons

"How do you rate Germany in regard to the following location factors?"

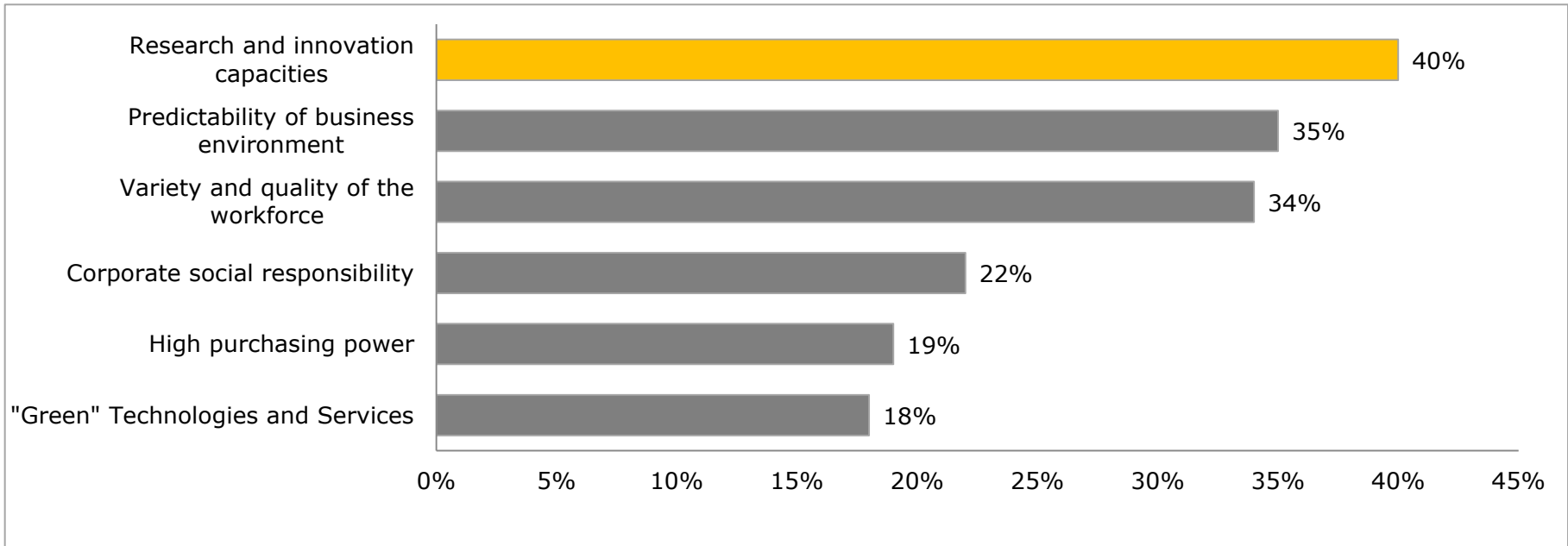


Ernst & Young 2012

Note: 201 respondents

Investors see German USP in its Research and Innovation capacities

"Which outstanding features, in your opinion, allow Germany to remain top location for investment?"



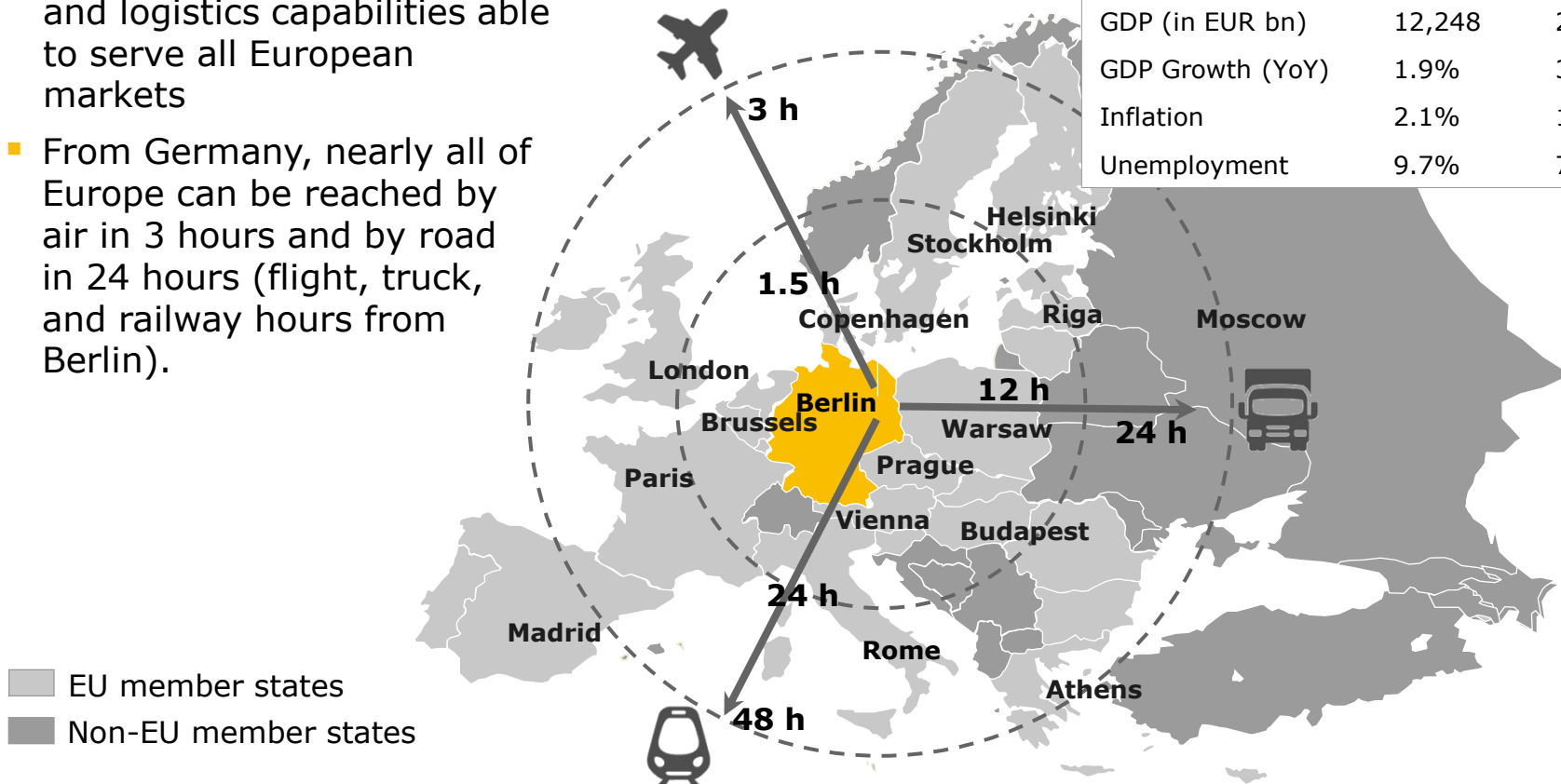
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Note: 201 respondents

Foreign investors see Germany's outstanding features, particularly in its research and innovation capacities, followed by the predictability of the business environment and the quality and diversity of its workforce.

EU's new geographic center is in Germany: Providing rapid and easy access to all European markets.

- A state-of-the-art transportation infrastructure and logistics capabilities able to serve all European markets
- From Germany, nearly all of Europe can be reached by air in 3 hours and by road in 24 hours (flight, truck, and railway hours from Berlin).



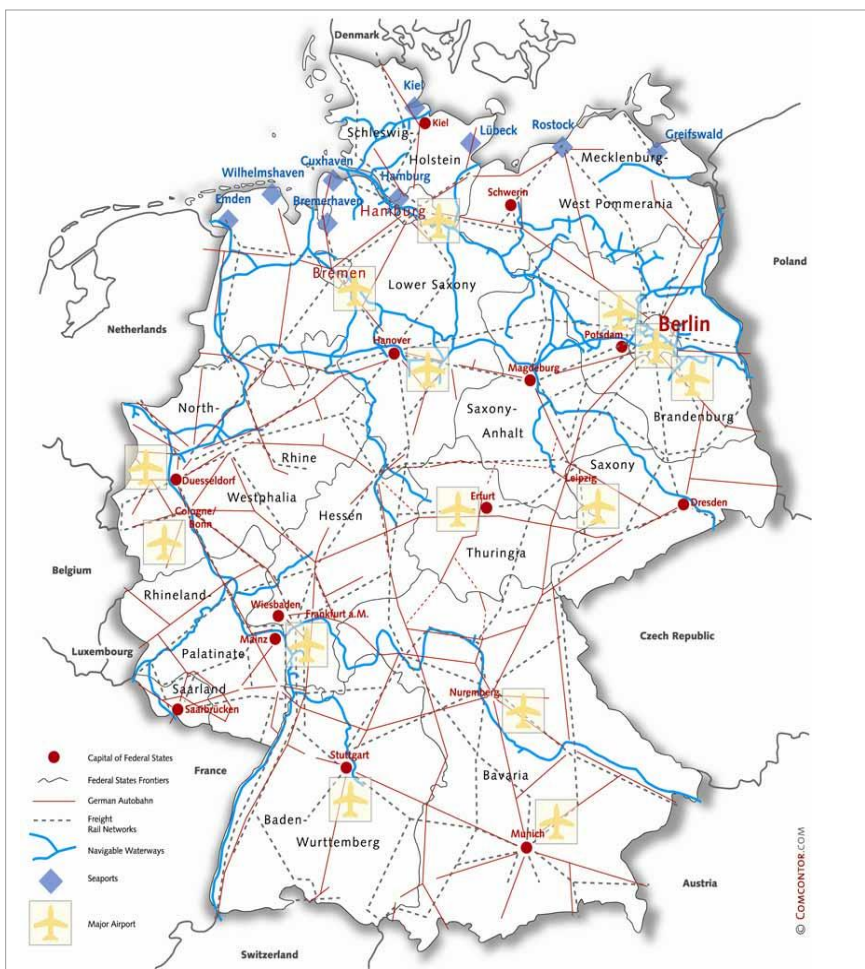
2010	EU27	Germany
Population (million)	501	82
GDP (in EUR bn)	12,248	2,477
GDP Growth (YoY)	1.9%	3.7%
Inflation	2.1%	1.2%
Unemployment	9.7%	7.1%

EU member states
 Non-EU member states

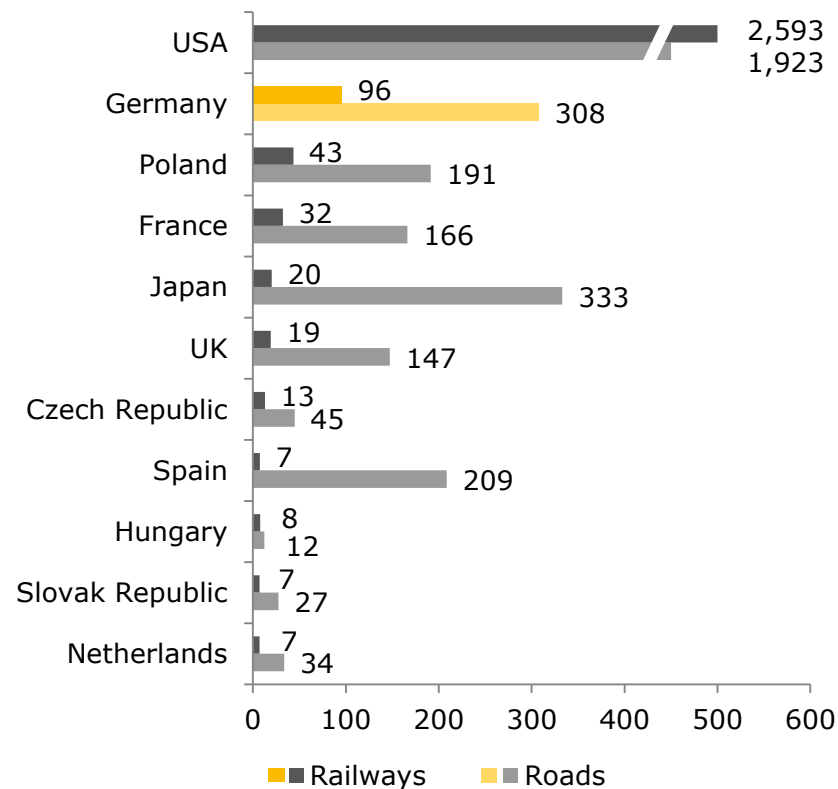
Source: Eurostat 2011

Note: EU-27's center: 42 km east of Frankfurt/Main in Meerholz, Hessen, *Estimates

Germany's highly advanced infrastructure is leading in Europe.



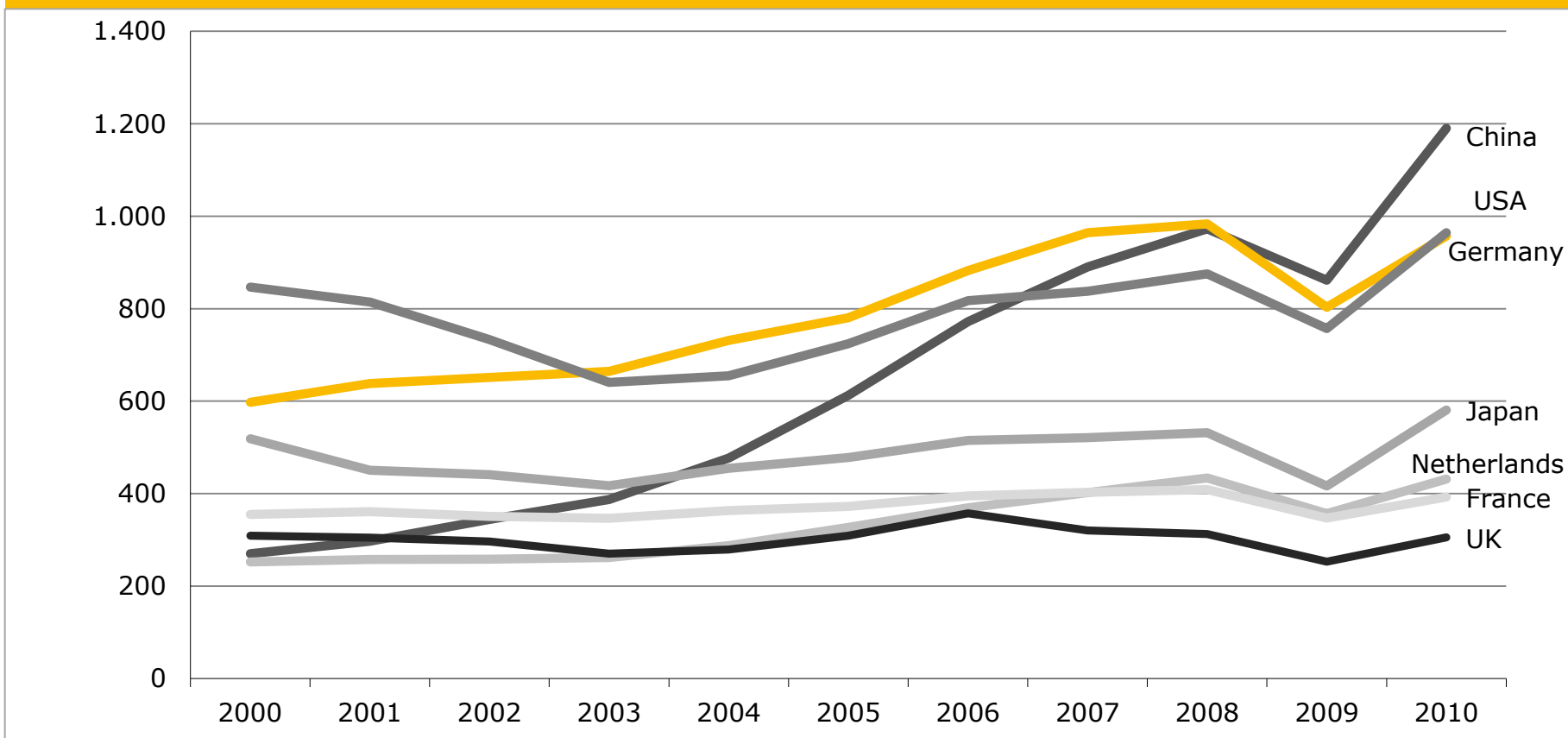
Freight Transport (in bn ton-km, 2009)



Source: OECD 2011 Note: Latest data available for USA (Road- and Railways) and Netherlands (Railways) refers to 2008

German products are world-renowned, making the country a global export leader.

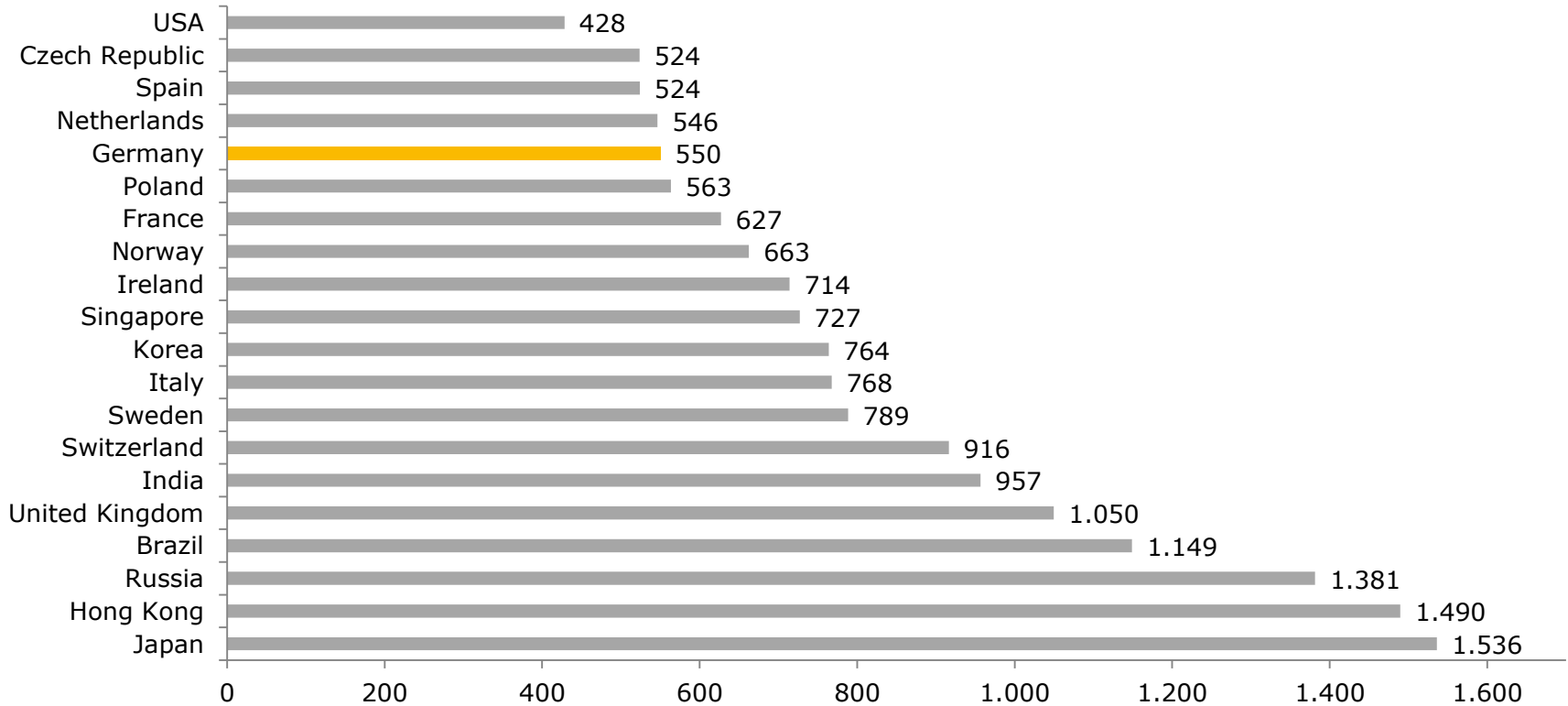
Development of Export of Goods (2000-2010, in EUR bn)



Source: World Trade Organization 2011

Germany provides a competitive environment for investors.

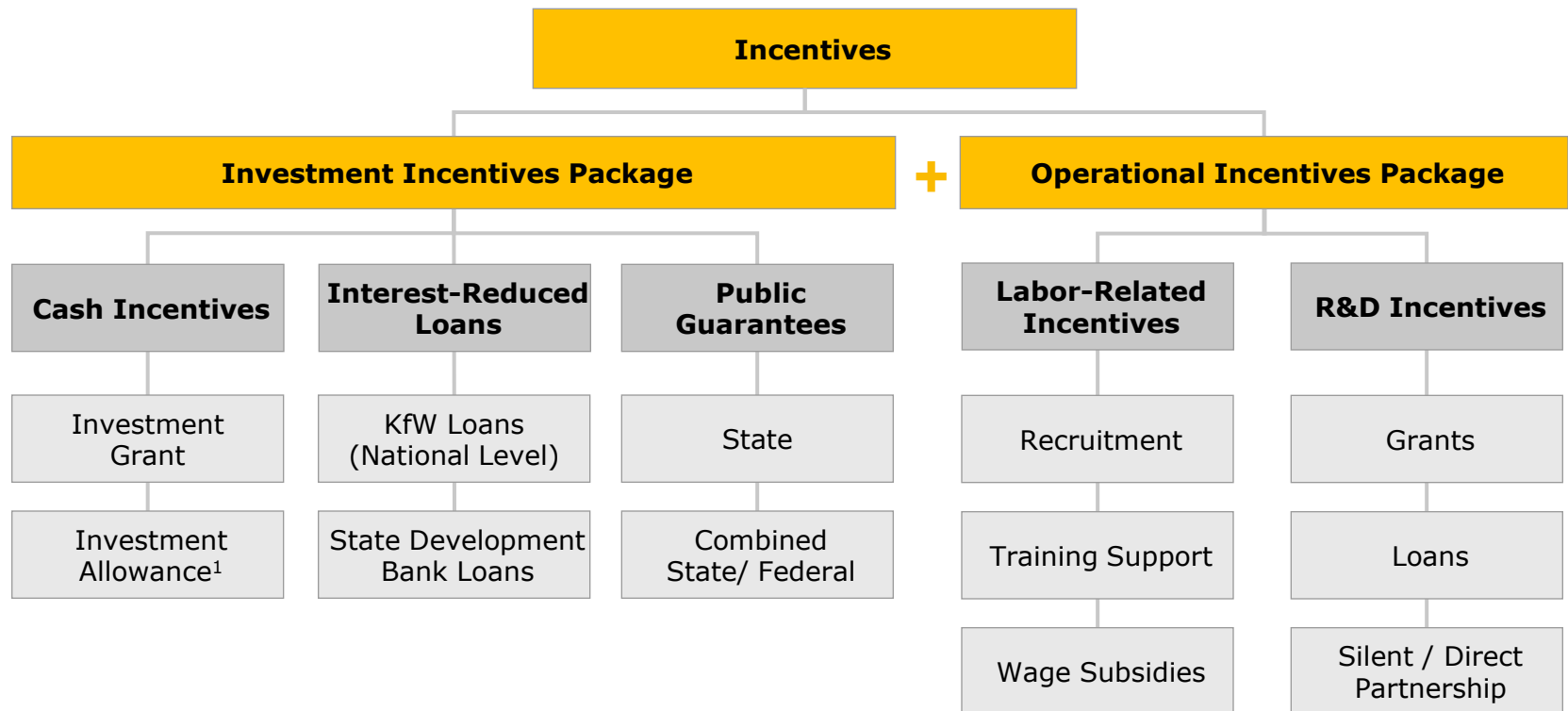
Monthly office rents (Total occupation cost, in USD/sqm per year, 2010)



Source: IMD World Competitiveness Database 2011

Germany offers different incentives packages to reimburse an investment project's expenditures.

Incentives Available to Investment Projects in Germany



¹ only available in Eastern Germany

Quality of Life

Germany is known for its honest and efficient business environment, and has a lot more to offer besides ideal investment conditions.

Scenic Attractions

2,389 km of beautiful coastline, 20 mountain ranges, 125 natural landscape protection areas and 10,200 km of bicycle tracks to ride through all of it.



Cultural Devotion

80 operas, world-renowned symphonic orchestras, 5,600 museums and over 550 annual classical festivals attracting millions of people.

Hearty Cuisine

1,250 breweries with more than 5,000 different kinds of beer and sausages along with more than 300 different kinds of bread.



Recreational Activities

12,000 km of German Autobahn alongside luxury vehicle manufacturers Porsche, BMW, Mercedes and Audi all based in Germany.

Sporting Enthusiasm

26,000 soccer clubs with 6.3 million active players. 1.8 million active tennis players and 646 golf courses.



Living History

More than 700 medieval castles and magnificent palaces, the longest castle wall within Europe and cities with histories dating back to Roman times.

Germany Trade & Invest

Contact for Water investments

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