BDI – The Voice of German Industry

„Schwerpunkte der Energieforschung“

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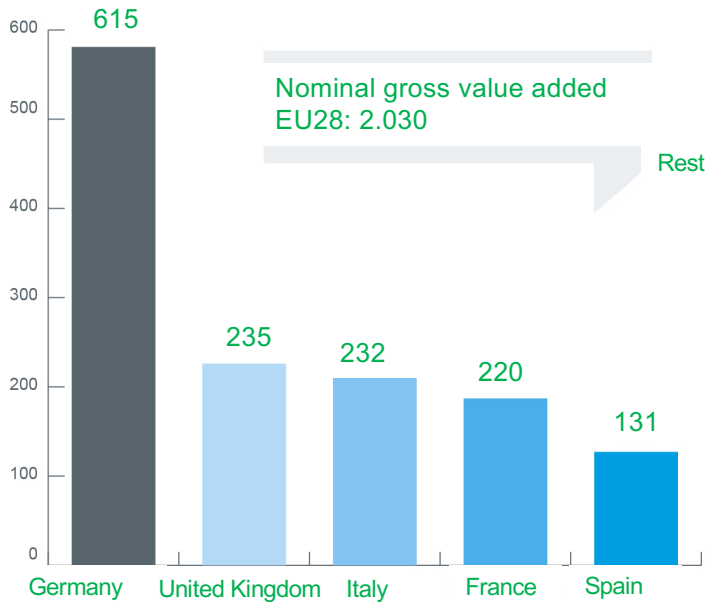
BDI
Bundesverband der
Deutschen Industrie e.V.

Our 36 Member Associations

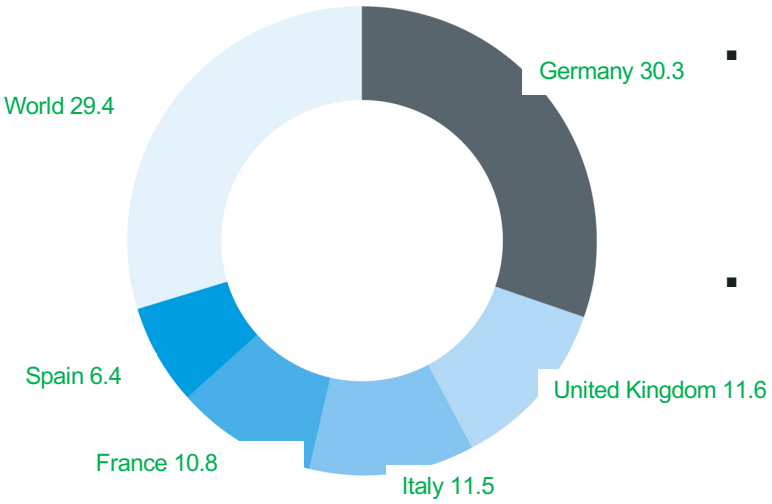
Germany is Europe’s leading industrial nation

Nominal Gross Value Added of Manufacturing, 2015

In billions of Euro



Share on EU28 in percent



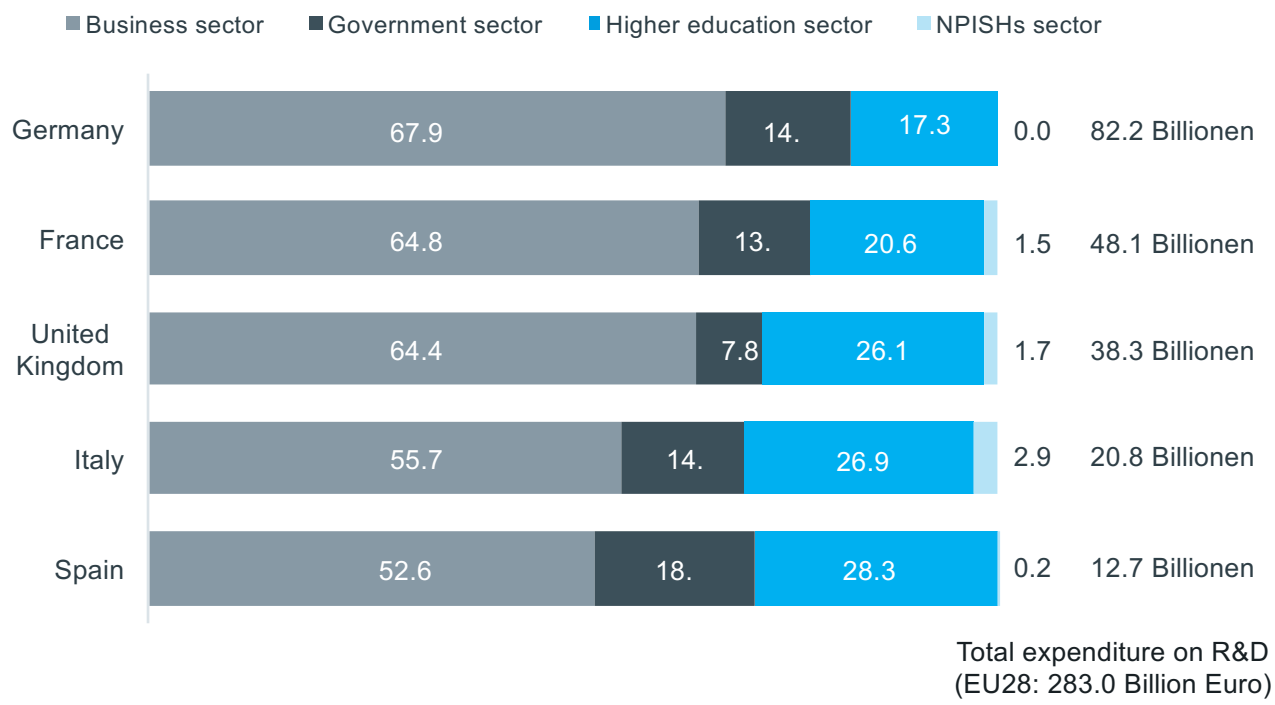
The biggest industrial nation in Europe

- Nominal gross value added of manufacturing, 2015
- Germany's share in Europe is about one third and about as much as the combined output of France, Italy and the UK combined
- UK is second largest manufacturing hub

Source: Eurostat

Germany is the biggest centre for research in Europe

Proportion of expenditure on R&D according to economic sector;
2014 (in billions of euros)



Total expenditure on R&D
(EU28: 283.0 Billion Euro)

Germany accounts for almost one third of all European R&D Spending

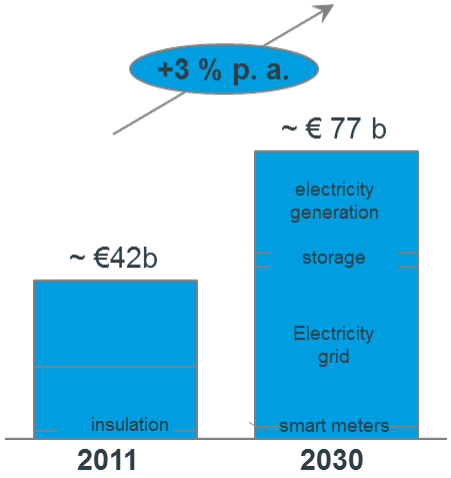
- At 82.2 billion euros, Germany accounts for almost one third of all R&D spending in Europe
- Two thirds of the R&D investment in Germany is carried out by the private sector
- Manufacturing industry accounts for the lion's share of these efforts

Based on solid foundations, German economy could benefit in multiple ways from ambitious energy transition policy

Forecast of revenue potentials, fuel imports and CO2 emissions:

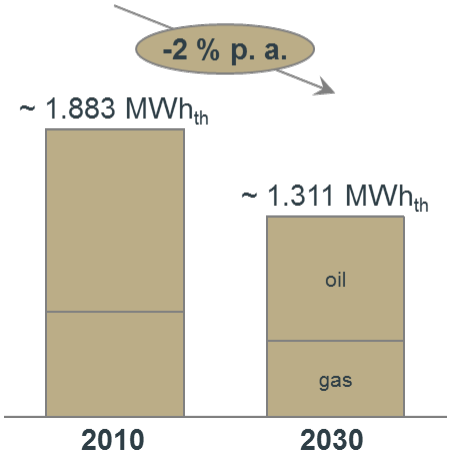
Revenues

Increase of revenue potentials for German technology producers



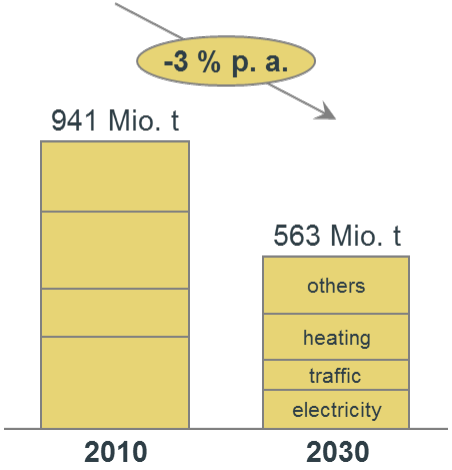
Energy Independence

Decrease of fuel imports



Climate Protection

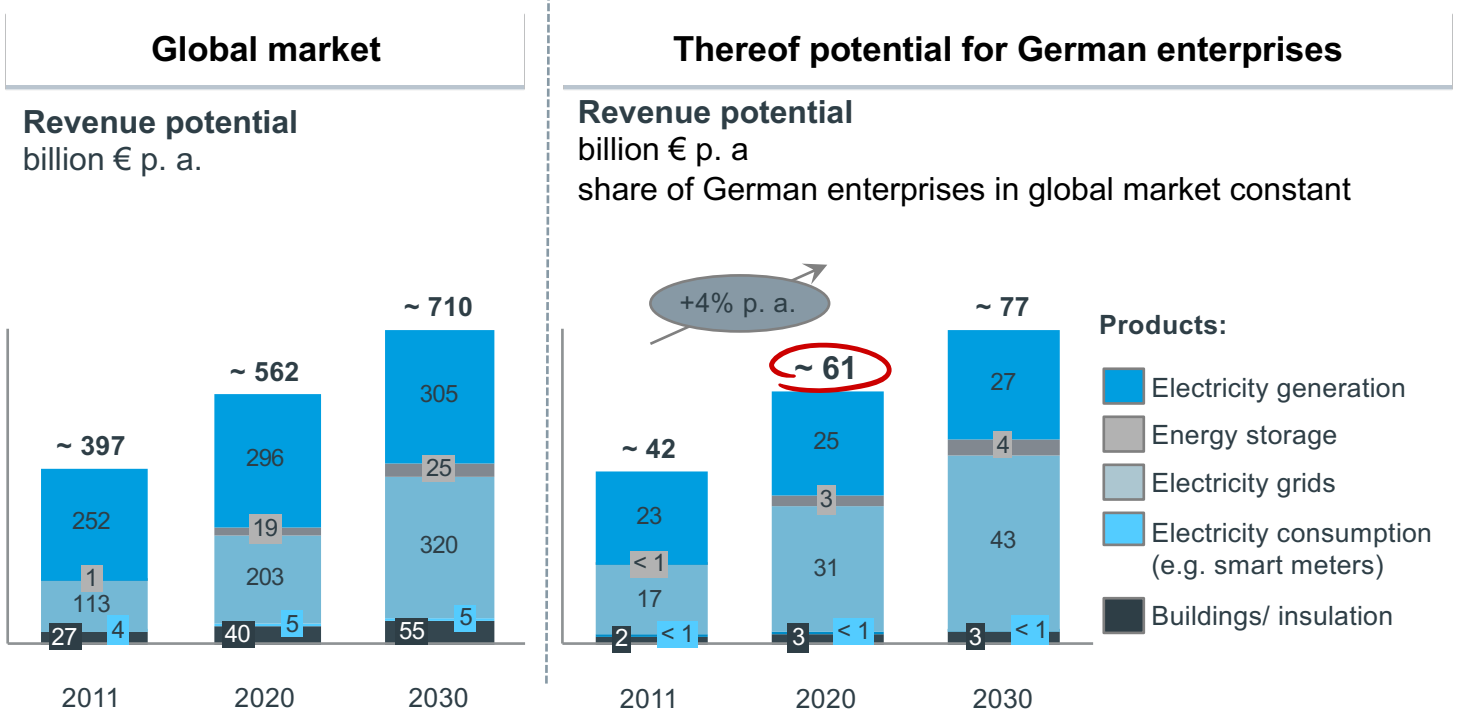
Reduction of CO_2 emissions in Germany



Source: BCG Trendstudie 2030 on behalf of BDI

Global revenue potentials with end products could be more than € 60 b p.a. for German enterprises in 2020

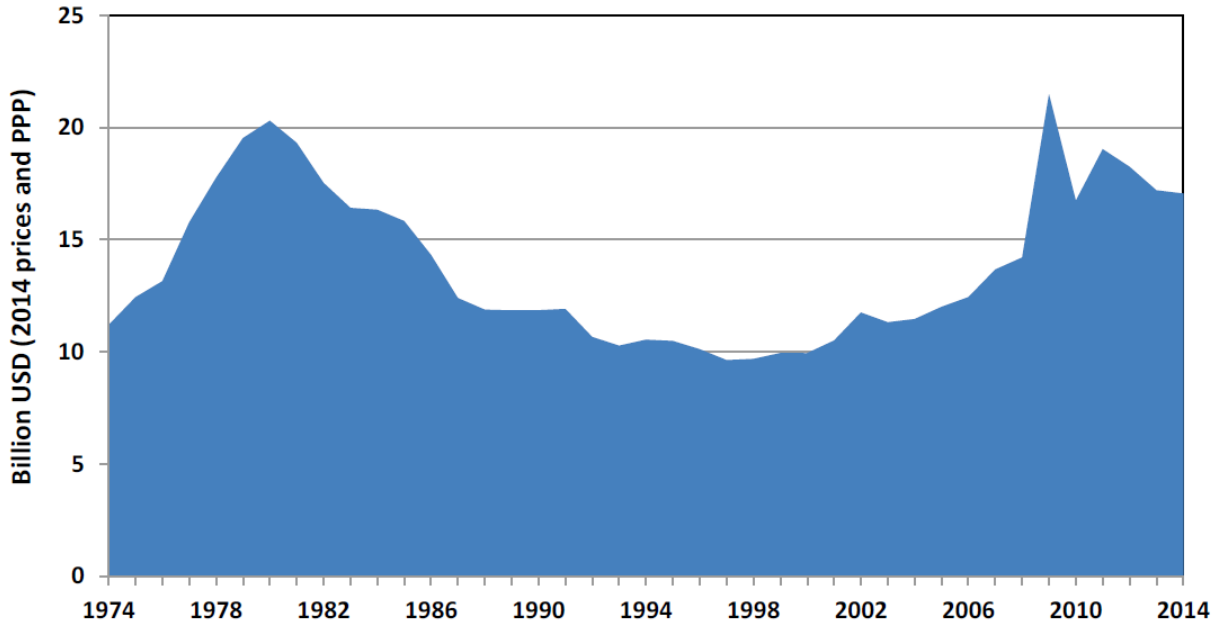
Forecast of revenue potentials with respect to different technologies:



Source: BCG Trendstudie 2030 on behalf of BDI

Governments have recognised need for higher spending and subsequently delivered after 20 years reduction

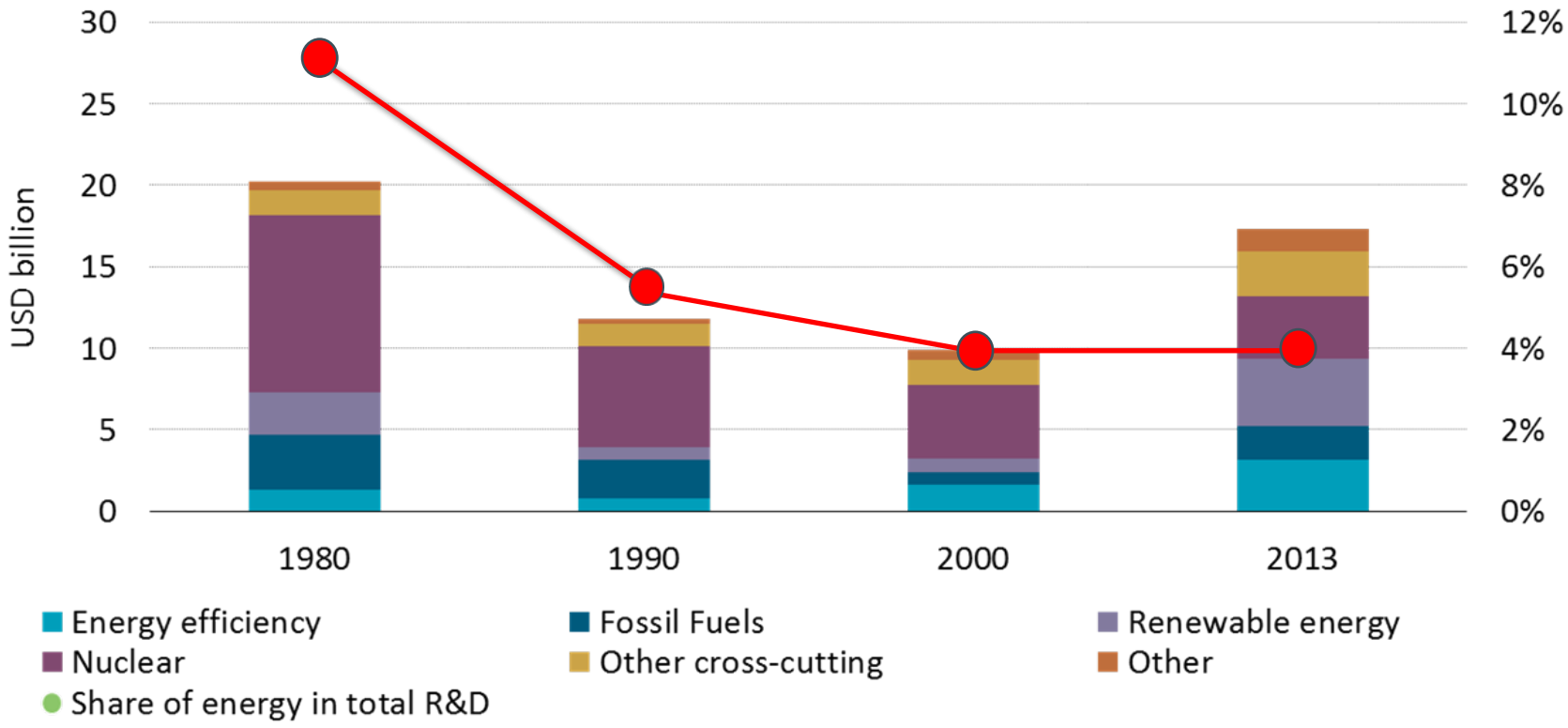
IEA Total Public Energy RD&D Budget:



Source: International Energy Agency, IEA 2015

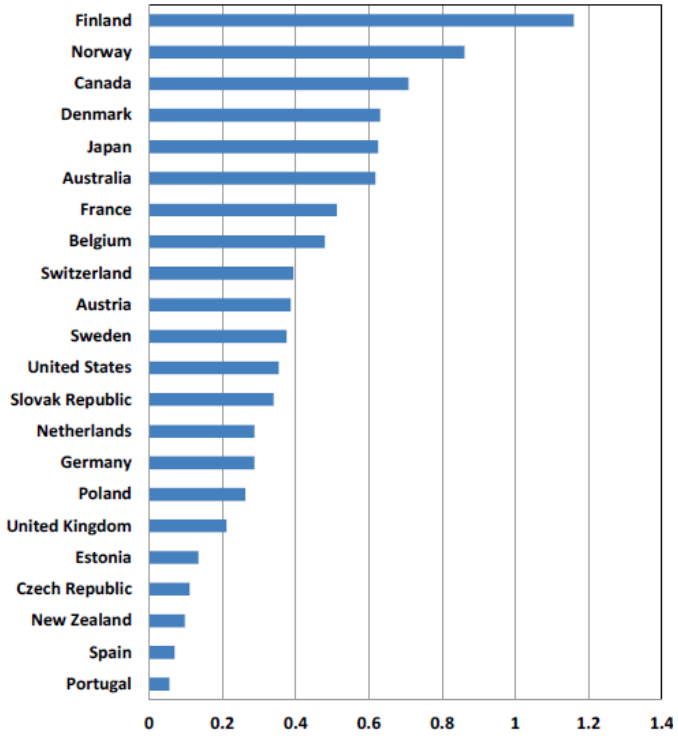
Relative importance of energy in public R&D funding has to rise

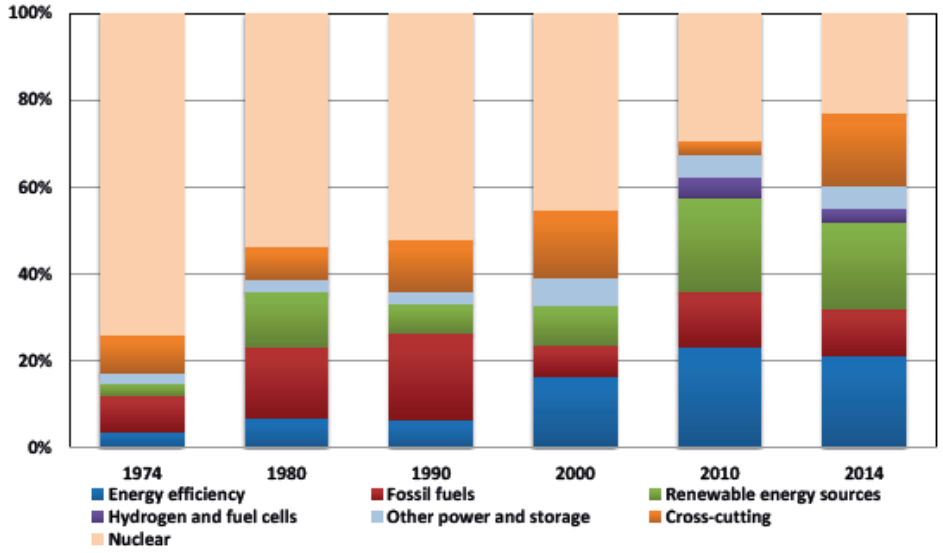
IEA Total Public Energy R&D Budget



Energy RD&D is pursed to different degrees in OECD member states. Shift in technology focus follows policy shift

Energy RD&D per thousand units of GDP in 2013 and IEA Total Public Energy RD&D

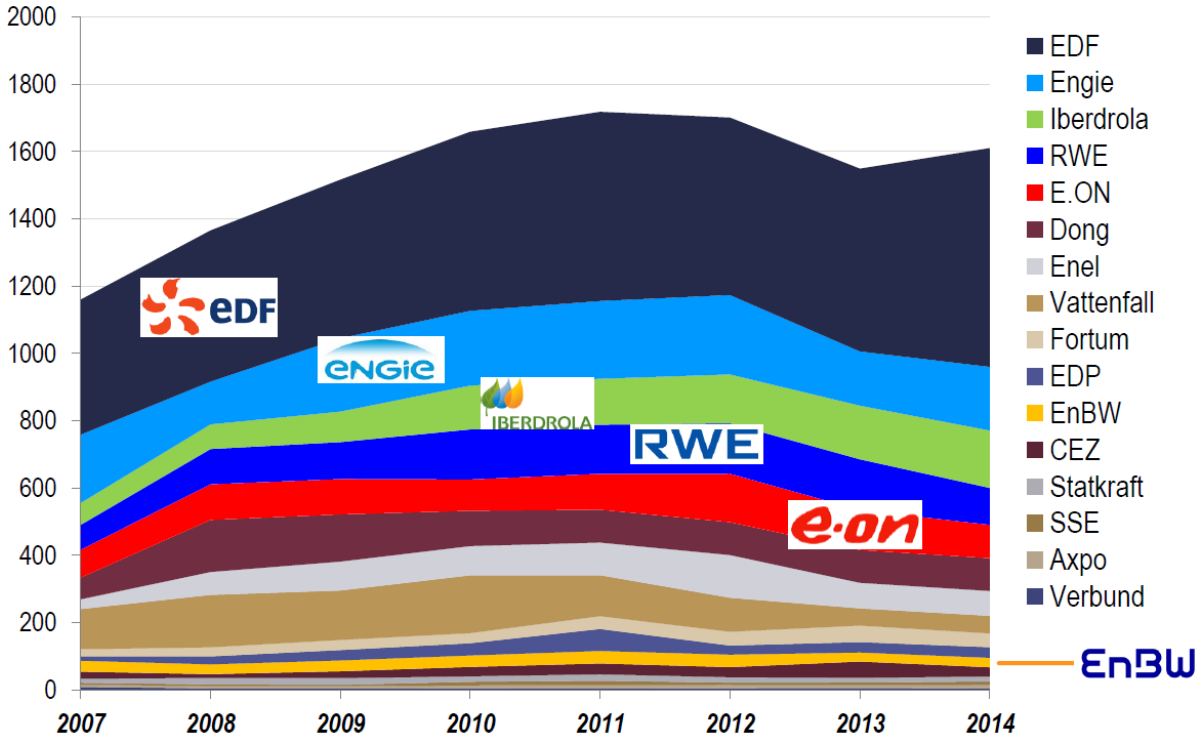




Source: International Energy Agency, IEA 2015

European utilities increased RD&D expenditures for the first time since 2011 in 2014 – mainly driven by EDF

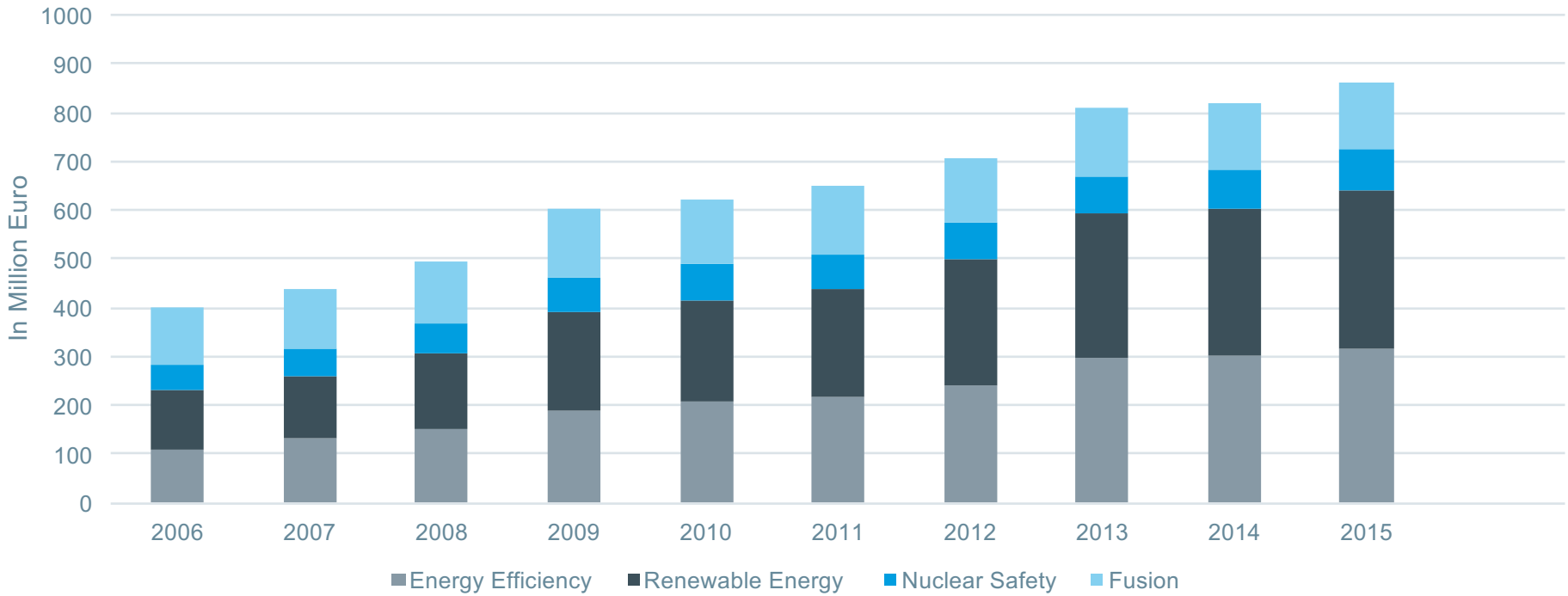
RD&D expenditures in million Euros:



Source: Burger, Pandit, Weinmann (2015)

Federal spendings on energy science has increased and generally responed to changed policy requirements in the wake of Energiewende

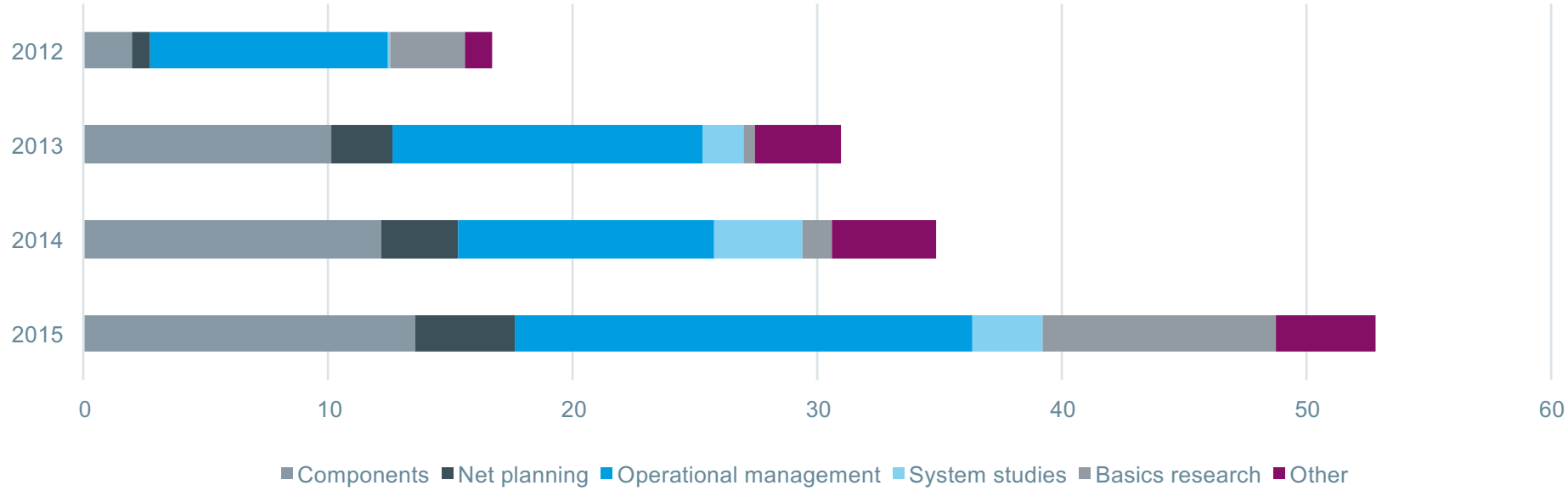
Overview of topics of the German Federal Energy Research Programm:



Source: German Federal Ministry of Economic Affairs and Energy; January 2016

Energiewende is more than generation technologies – grids are crucial

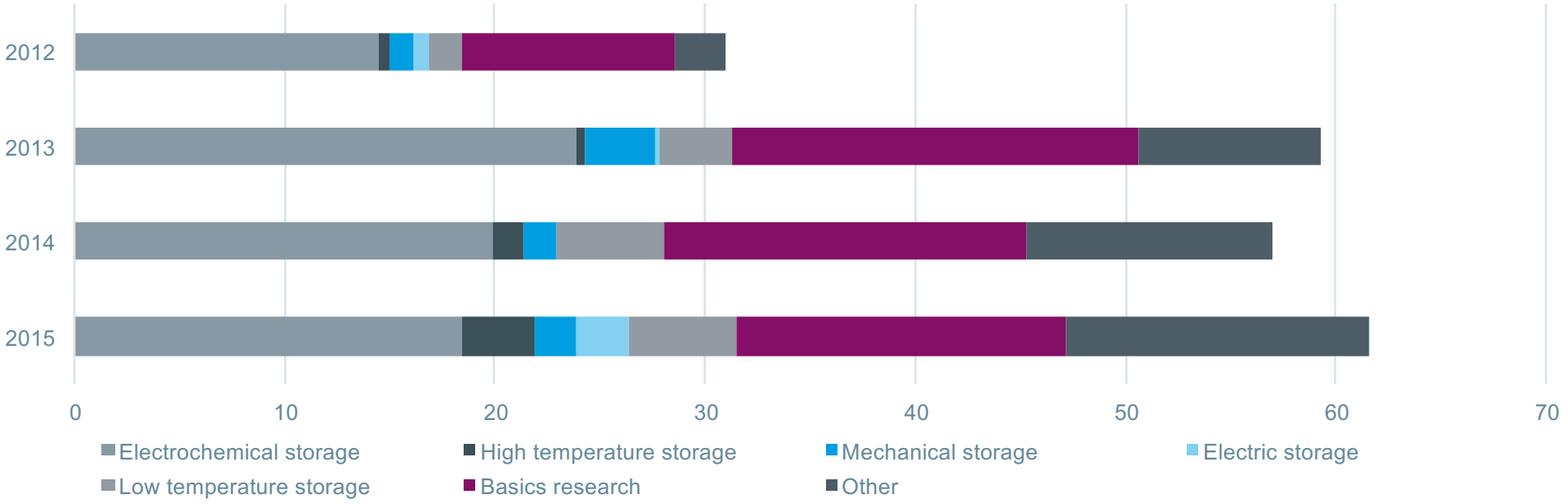
Federal funding of grid technologies sind 2012 in million Euros:



Source: German Federal Ministry of Economic Affairs and Energy; January 2016

So is storage… Winner technology not yet identified

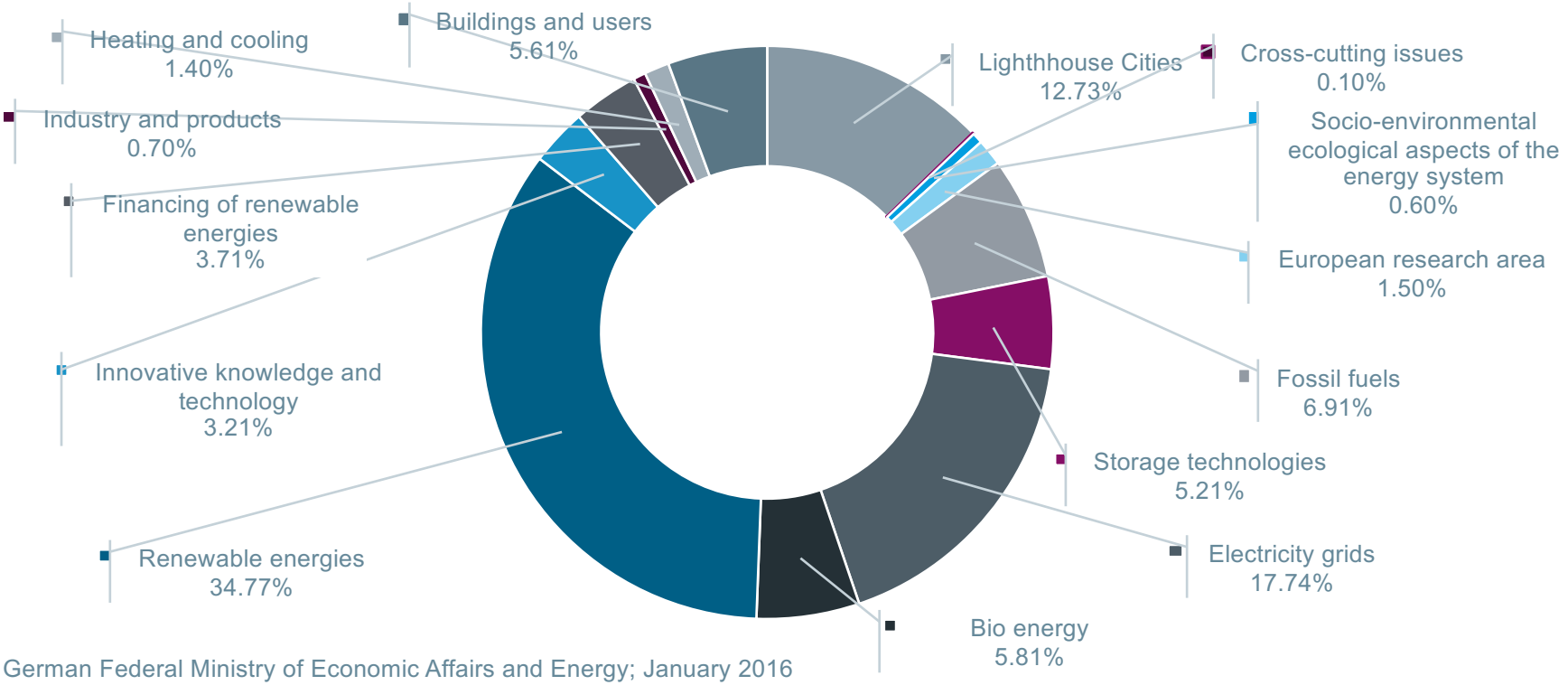
Subsidies for energy storage in million Euros



Source: German Federal Ministry of Economic Affairs and Energy; January 2016

Energiewende also reflected in EU spending on German beneficaries

Distribution of subsidies in Horizion to German beneficiaries, sorted by topics. (2014)



Source: German Federal Ministry of Economic Affairs and Energy; January 2016

BDI‘s committee on energy sciences and energy technology includes all actors and enables a balanced view on our energy future

Members come from industry associations, companies and institutes:

ALSTOM Deutschland
ArcelorMittal
AREVA
BASF
BridgingIT GmbH/BDI initiativ Internet der Energie
Bundesverband Glasindustrie
Robert Bosch
DLR Deutsches Zentrum für Luft- und Raumfahrt
EnBW Energie Baden-Württemberg
Forschungszentrum Jülich
Gesamtverband Steinkohle
Mitsubishi Hitachi Power Systems Europe GmbH
RWE
SCHOTT
SET Wirtschaftsverband Stahlbau
Siemens
VDMA Power Systems
Verband der Chemischen Industrie
Verband der deutschen Verbundwirtschaft
Verband der TÜV
Wirtschaftsverbands Erdöl- und Erdgasgewinnung

BDI‘s assessed 27 technology fields from all energy backgrounds

Overview of assessed technologies:

Fossil power plants:
- High efficiency/flexible power stations, CHP
- CCS/CCU

Exploration and production of energy resources, fossil fuels:
- Fracking
- Fuel research

Nuclear science:
- Reactor technology fusion
- Decommissioning, intermediate and final storage
- Reactor technology, radiation protection

Renewable energies:
- Hydro
- PV
- Wind onshore
- Wind offshore
- Marine energy
- Bioenergy (including second-generation fuels)
- Solarthermal electricity generation
- Geothermal energy, including heat applicatons

Electric and substance grids:
- Distribution networks, smart grids, new network technologies
- Offshore linkage, EU super grid, direct current
- Substance networks (Stoffnetze)

Systemic questions of the energy system:
- Sector linkage, multimodal systems
- Energy-efficient/flexible industrial processes
- ICT – digitdisation, information technology

Mobility:
- E-mobility (including batteries)
- Fuel cell

Energy storage solutions:
- Material storage (H2/methane, stationary)
- Electrochemical storage (including batteries)
- Stationary storage and storage systems (“flow” batteries, heat storage)

Gebäudetechnik/Lichttechnik:
- Energy-efficient buildings, building technology

Assessment is based on 4 broad categories and sub-categories

Overview of assessment criteria I:

1. Benefits of the technology (New weight 25 %, 2011: 40 %)
Effects of successful deployment of the technology (or the progress brought about by R&D) on a plausible future scale within the defined essential benefit dimensions (e.g. as reflected in the sides of the energy supply "triangle" – economy, ecology, security of supply). The evaluation should be determined irrespective of the country of deployment (by contrast with the "Economic importance" criterion, which is evaluated from the angle of the German economy).

1.1. Climate and environmental protection*:*
Can CO2 be saved, on a sustainable basis where possible? Are there other emissions and/or further environmental impacts such as exhaust gases, noise nuisance, etc. (compare with the state of the art)?

1.2. *Resource efficiency:*
Estimation of resources (raw materials, water, soil, air) saved in the production process/in use over the service life.

1.3. *Security of supply*:
Can materials and fuels be acquired easily and affordably, also in the future, from a secure source of supply? Contribution to ensuring a reliable energy supply. Estimate of the availability of resources taking economic viability from today's standpoint into consideration.

1.4. *Customer benefit:*
Are there economic advantages? Do further forms of customer benefit come into play beyond the pure benefit of energy supply (convenience, additional functions)?

Assessment is based on 4 broad categories and sub-categories

Overview of assessment criteria II:

2. R&D effectiveness (New weight 30 %, 2011: 20 %)
Can the State effect perceptible improvements in technology development (position on the learning curve) with relatively little research money?

3. Economic importance (New weight 25 %, 2011: 30 %)
The effect of public R&D on the German economy is evaluated in this category. A positive effect can arise as a result of production, value creation and research infrastructure in Germany being strengthened. Potential world market shares for German companies are also taken into consideration here.

4. Societal and political acceptance/relevance (New weight 20 %, 2011: 10 %)
4.1. *Acceptance:*
Is the technology under review seen in a positive light by large swathes of the population? Is there broad societal acceptance for the production and use of the technology?

4.2. Attractiveness*:*
Is use of the product positively perceived by individuals and in the public presentation (lifestyle, prestige, etc.)?

4.3. *Political relevance:*
Does the technology support policy goals? And vice versa: is the technology supported by policy-makers?

10 technology fields were identified as crucial priorities