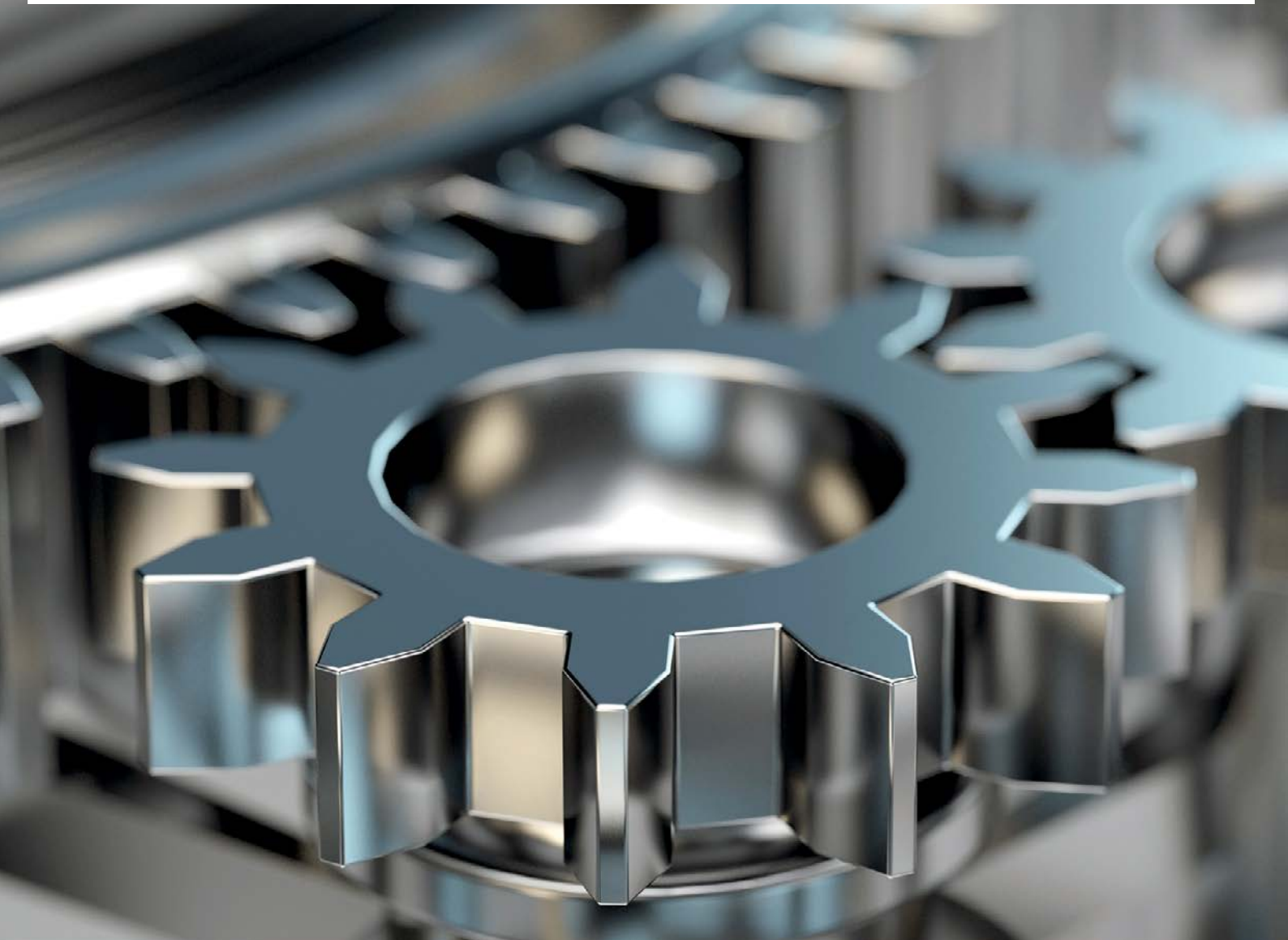




Federal Ministry for the
Environment, Nature Conservation,
Building and Nuclear Safety



German Resource Efficiency Programme II

Programme for the sustainable use and conservation
of natural resources

Imprint

Published by

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)
Public Relations Division · 11055 Berlin · Germany
Email: service@bmub.bund.de · Website: www.bmub.bund.de/english

Edited by

BMUB, Division WR III 1

Design

design.idee, Büro für Gestaltung, Erfurt

Printed by

Druck- und Verlagshaus Zarbock GmbH & Co. KG

Picture credits

Titelpage: Robert Kneschke/Fotolia.com
Page 6: Thomas Frey/imageBROKER/OKAPIA
Page 8: euroluftbild.de/Visum
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Page 44: by-studio/Fotolia.com
Page 80: alotofpeople/Fotolia.com
Page 130: katatonia/Fotolia.com

Date

November 2016

First Print

5,000 copies

Where to order this publication

Publikationsversand der Bundesregierung
Postfach 48 10 09 · 18132 Rostock · Germany
Tel.: +49 30 / 18 272 272 1 · Fax: +49 30 / 18 10 272 272 1
Email: publikationen@bundesregierung.de
Website: www.bmub.bund.de/en/service/publications

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German Resource Efficiency Programme II

Programme for the sustainable use and
conservation of natural resources

adopted by the Federal Cabinet on 2 March 2016



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1 Introduction

Natural resources are defined as all components of nature: biotic and abiotic resources, physical space (such as land), environmental media (water, soil and air), flow resources (such as geothermal, wind, tide and solar energy), and the diversity of all living organisms.

Natural resources are essential for life on our planet, and always will be. Many natural resources, however, are in limited supply. Conserving natural resources is therefore of vital importance, including for future generations.

Natural resources perform many functions: They are used as sources for the manufacture of products and as sinks that absorb emissions. Interacting in ecosystems, they supply provisioning, regulating and cultural ecosystem services. In the interests of present and future generations, any use of natural resources must be sustainable. And regardless of their current utility to humankind or of commercial interests, nature and its components must be protected in any case because of their intrinsic value.

Resource efficiency gains should deliver benefits along all three dimensions of sustainability and where possible should mean no loss of prosperity. They are intended to reduce pressures on the environment and boost the competitiveness and growth of the German economy while creating new and securing existing jobs. Voluntary action and incentives play a key part here. When developing and monitoring economic indicators to track resource efficiency, adequate account must be given to Germany's existing situation as an industrial and manufacturing base with the primary extractive industry that this involves.

Political debate has increasingly homed in on resource efficiency in recent years, both in Germany and at European Union level. Resource efficiency is also gaining importance internationally. Under the German G7 Presidency in 2015, the G7 states addressed resource efficiency and discussed measures to improve it. Among other things, they agreed to launch the G7 Alliance for Resource Efficiency as a voluntary forum for knowledge sharing and networking.

The Federal Government embraces its responsibility in this regard. As early as 2002, it set a target in the National Sustainable Development Strategy of doubling Germany's raw material productivity by 2020 relative to 1994. The German Resource Efficiency Programme (ProgRess) of 2012 was directed towards achieving this target.

» The aims include securing a sustainable supply of raw materials, enhancing resource efficiency in production, making products and consumption less resource-intensive, and building a resource-efficient circular economy. «

The programme's focus is not only on enhancing resource efficiency, but also on showing how in many cases the use of raw materials – such as in environmental technologies – can actually conserve natural resources.

In ProgRess, the Federal Government pledged to report every four years on the development of resource efficiency in Germany, assess progress, and further develop the resource efficiency programme. ProgRess II is the first of these progress reports.

ProgRess looked at resource efficiency gains in the use of abiotic and biotic resources along the entire value chain, but not at related energy efficiency issues. Material efficiency and energy efficiency are nonetheless closely related. ProgRess II therefore aims, where appropriate, to address energy and material flows together to a greater extent in order to exploit synergies between them.

ProgRess II is based on the same four guiding principles as ProgRess I:

- ◆ Combining ecological necessities with economic opportunities, innovation focus, and social responsibility
- ◆ Seeing global responsibility as a key guide of national resource policy
- ◆ Making economic and production activities in Germany depend less and less on primary resources, and developing and expanding the circular economy
- ◆ Securing sustainable resource use for the long term by guiding society towards quality growth

To translate these guiding principles into practice, the resource conservation indicators and targets under the German Sustainability Strategy are supplemented with additional indicators and targets, and options are shown for improving resource efficiency along the entire value chain. The aims include securing a sustainable supply of raw materials, enhancing resource efficiency in production, making products and consumption less resource-intensive, and building a resource-efficient circular economy. This involves launching measures in resource-relevant sectors such as construction, sustainable urban development, and information and communication technology. And it involves making use of cross-cutting legal, economic and information policy instruments.

Like ProgRess I, ProgRess II is a participative document. In the Appendix, the 16 German *Länder* and 40 sectoral associations and other institutions and organisations present their own contributions on resource efficiency under their own responsibility. A public consultation was also conducted as part of ProgRess II. Based on the outcomes of the consultation, citizen ambassadors formulated a set of recommendations that are included in the Appendix to ProgRess II.

The continuation of the German Resource Efficiency Programme advances and expands the government-supported process in the political, economic and societal arena.



2 Current challenges for sustainable use of natural resources



Natural resource use has increased continuously for many years. Primary material consumption has more than doubled in the last 30 years, from some 36 billion tonnes per year in 1980 to some 78 billion tonnes in 2011 (SERI/WU Vienna 2014). By 2050, if consumption patterns stay the same, an increased global population of up to 10 billion people will use more than 140 billion tonnes of minerals, ores, fossil fuels and biomass a year (UNEP 2011). Mainly as a result of growing demand, resources will increasingly be extracted in regions of the world that are especially vulnerable to human influence. Some resources will be increasingly extracted from low concentration deposits or from mineralogically or geologically complex formations. This can lead to energy and material-intensive resource extraction where the environmental impacts grow in severity disproportionately to output – an outcome that can be countered by improving resource efficiency. The required paradigm shift to more efficient resource use needs support from research and development, industry and policymakers. Extraction and processing costs must be weighed against the environmental, social and economic impacts of extraction.

» Climate change mitigation, biodiversity conservation and sustainable use of natural resources are closely linked by numerous interdependencies. «

Many of the future technologies that help make German industry successful will drive a sharp rise in demand for commercially strategic resources that are very hard to substitute today and cannot be quickly and easily extracted in larger volumes due to technical challenges. This spells potential price and supply risks that could affect economic development. As with energy resources, key material resources are concentrated in certain geographical locations, and deposits may be

located in conflict regions. Some countries have already started building reserves and limiting exports of strategic metals, or improving their access to resources in other regions through partnerships and corporate acquisitions. This once again highlights the key role of improving resource efficiency in reducing dependencies.

Depending on the technologies used, extraction and processing can pollute drinking water, surface waters, soils and the air, and thus cause harm to health in countries where abiotic resources are mined. Mining and processing are water and land-intensive, leading to land use conflicts that can threaten local livelihoods.

In developing and emerging economies, mining is often linked to severe human rights violations such as child and forced labour, land evictions and forced resettlement. Despite its positive effects in terms of economic development, in the absence of civil participation it can lead to the destruction of social structures and impoverishment of the local population. Compliance with broadly accepted environmental and social standards in mining is therefore a key element of sustainability in supplying German industry with raw materials.

An added concern with regard to biomass is that people all over the world suffer hunger and malnutrition. Some 60 percent of the agricultural biomass harvested worldwide is used today as animal feed, about another eight percent of the crop volume is used as regenerative energy and material resources, and only about 32 percent of the total is used in plant-based foods (UBA 2014). Biomass is not only a source of food and feed, a fuel and an industrial raw material, however, but also has numerous ecological functions, for example as habitat and carbon reservoir. Land and other natural resources for biomass production come under increasing pressure due to growing demand for agricultural and forest products and land take for housing and industry. Like marine resources, they are also affected by pollution. In many places, the environmental and socio-economic consequences of the demand-pull effect exacerbate the critical condition of global ecosystems and of their productive and regulatory capacity.

This all makes it all the more essential to take an integrated approach to the various areas of environmental policy. Climate change mitigation, biodiversity conservation and sustainable use of natural resources are closely linked by numerous interdependencies. It also becomes increasingly urgent to address the fair distribution of and access to resources, both among current generations (intragenerational equity) and between today's and future generations (intergenerational equity). In addition, good governance and where appropriate bilateral or multilateral agreements such as conventions, treaties and partnerships are needed to minimise the risk of armed conflict over resources.

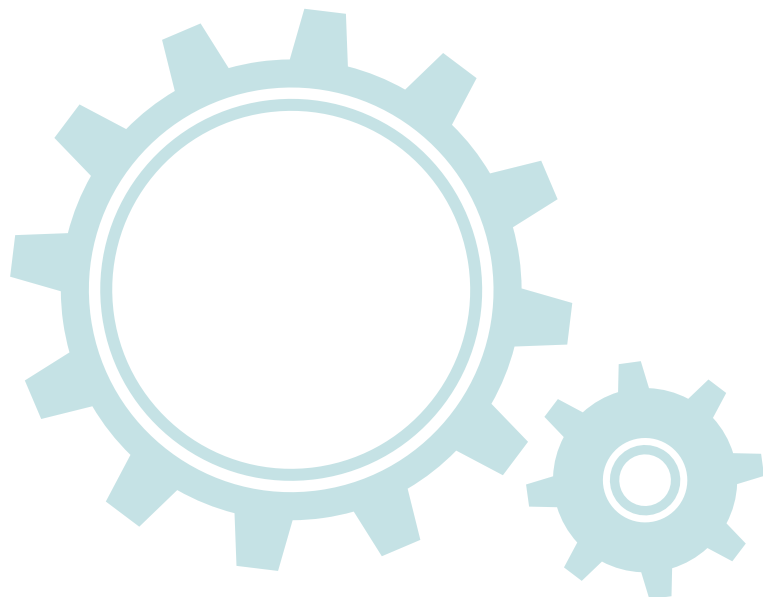
Successful present-day resource efficiency policy must thus address a wide range of challenges and issues. The way of using resources we practice today is not globally transferable. As far as possible, therefore, we must decouple resource use from economic growth.

Resource use policy based on the guiding principles of sustainable development must also address overlaps with other policy areas. Alongside other environmental policy areas such as climate change mitigation and biodiversity conservation, these include social and welfare policy, industrial and economic

policy, housing and construction policy, transport policy, energy policy, food, agriculture, forestry and fisheries policy, and fiscal policy. In this way, unwanted side-effects can be avoided, goal conflicts identified at an early stage and synergies exploited through better coordination between policies. Resource policy should also be flexible and proactive in terms of involvement in ongoing European and international processes.

An additional medium to long-term aim of ProgRes II is to help foster a global culture of using natural resources sustainably. As well as nurturing a culture of sustainable efficiency and enhancing the resilience of our economy, resource policy also aims at improving consistency, meaning the environmental compatibility of material streams.

In all of these challenges, a major role is assigned to research and its translation into practice. This involves all pillars of the German research scene. A prominent part is played by applied research with its links with practice. Timely collaboration between academics and practitioners in research projects is also key to ensuring that research outcomes are taken into account by policy makers, business, government and other players.





3 Germany's resource use

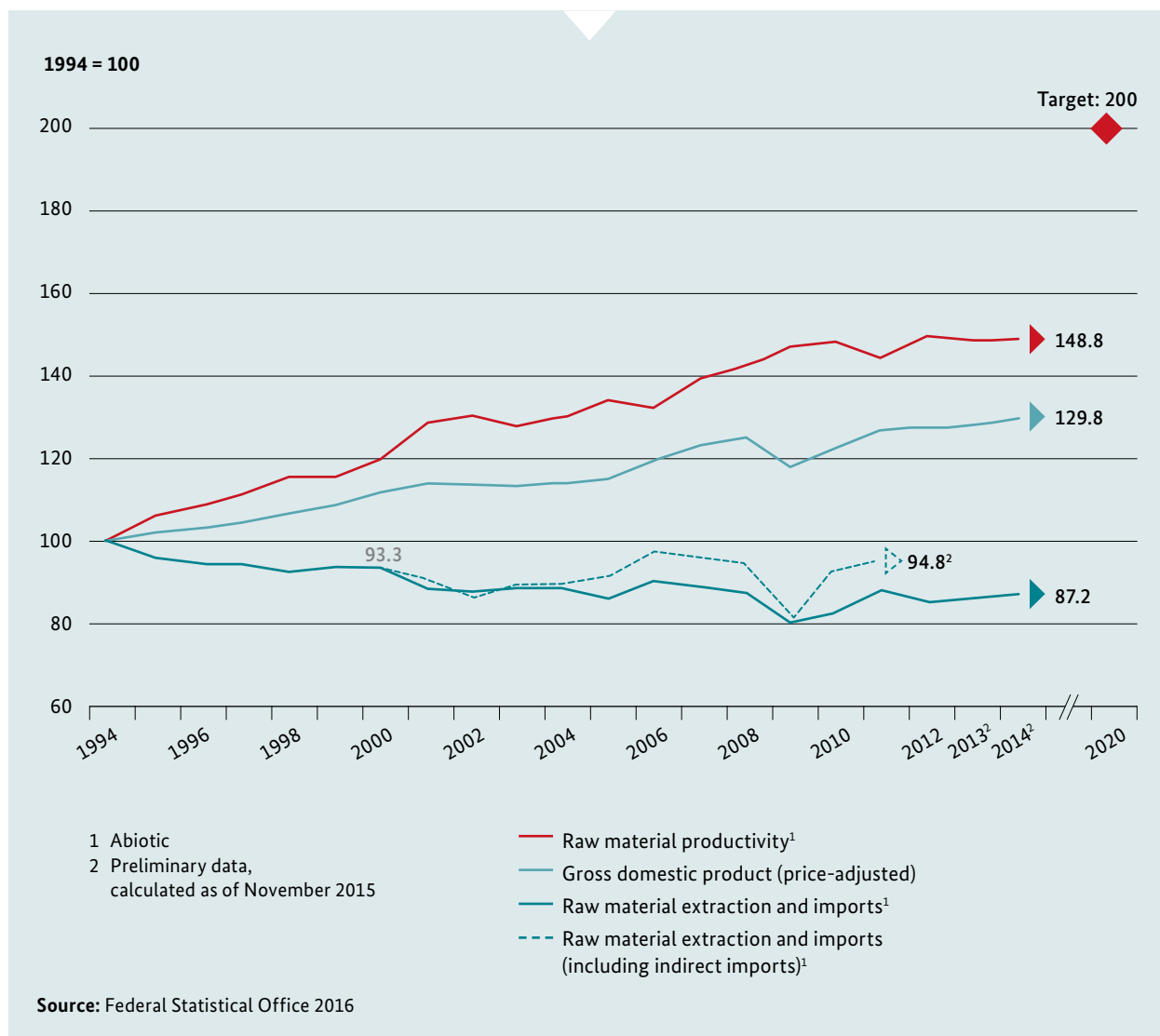
3.1 Raw material productivity

In its National Sustainable Development Strategy of 2002, the Federal Government set a target of doubling raw material productivity by 2020 (relative to 1994).

Raw material productivity expresses how much gross domestic product (GDP) is generated per tonne of abiotic primary material consumed. In contrast with biotic resources from farming, forestry and fishing, abiotic resources are not produced from plants or animals.

Abiotic primary material includes domestic resources such as lignite and construction minerals together with all imported abiotic materials (raw materials plus semi-finished and finished goods). Figure 1 shows how raw material productivity changed between 1994 and 2014 (preliminary figures). Raw material productivity increased over this period by 48.8 percent.

▶ **Figure 1: Raw material productivity and economic growth**



The rise in raw material productivity between 1994 and 2014 (preliminary figures) is mainly due to a 252 million tonne (31.1 percent) decrease in the use of construction raw materials. This contrasts with a 3.8 percent increase in fossil fuel consumption and about 48 percent growth (equivalent to about 42 million tonnes) in the consumption of ores and ore products. The illustrated productivity increase reflected the overall 12.8 percent decrease in material input combined with a 29.8 percent increase in gross domestic product.

Although economic growth has thus been decoupled from resource use and raw material productivity has

grown overall, the rate of growth so far would not be enough to meet the Federal Government's target. If the trend of the last five years continued, the indicator would only reach 50 percent of the target envisaged for 2020.

The trend in raw material productivity also depends on how much abiotic material is imported (referred to as direct imports). The proportion of primary material input accounted for by imported goods increased from 26 to 39 percent between 1994 and 2014. That increase was largely driven by import growth in metal-based semi-finished and finished goods (up 101 percent) and fossil fuels (up 43 percent).

Given this development, it was decided to supplement the raw material indicator by showing indirect imports in addition to raw material extraction in Germany and direct imports (see also section 3.3). Direct and indirect imports together comprise all raw materials used elsewhere in the production of imports to Germany (for example ore used in the manufacture of machinery or fuels in the production of steel). Direct imports of goods (biotic and abiotic) came to some 616 million tonnes in 2011. About 1,700 million tonnes of raw materials were used abroad to produce them, including about 1,500 million tonnes of abiotic materials. Abiotic raw material input – the sum of domestic raw material extraction and imports, including indirect imports – went up by approximately 1.7 percent between 2000 and 2011. Conversely, abiotic primary material input, which does not include indirect imports, went down in the same period by approximately 5.3 percent (Federal Statistical Office 2015a and 2016).

» In its National Sustainable Development Strategy of 2002, the Federal Government set a target of doubling raw material productivity by 2020 (relative to 1994). «

3.2 Unused material extraction

The extraction and use of resources gives rise to spoil, tailings and excavated material. This material is referred to as unused extraction as it is not directly used in production processes. Such material is put to further use nonetheless. In open cast mining, for example, spoil is reused straight away for land restoration at another part of the pit. Tailings are also put to economic use as construction material, for example in road building or in landscaping for land restoration purposes. Unused material extraction in Germany came to around two billion tonnes in 2013. The unused extraction volume

decreased by about 14 percent in Germany between 1994 and 2013 (Federal Statistical Office 2015b).

3.3 Cumulative resource use in imports and exports

Between 2000 and 2010, the tonnage of goods imported to Germany increased by 14 percent and finished goods imports by no less than 36 percent. Increased imports of finished goods mean that resource-intensive production processes are increasingly shifted abroad, together with their often severe environmental impacts.

Exports likewise increased substantially in the same period (by 26 percent), with Germany primarily exporting finished goods. The growing proportion of finished goods in foreign trade reflects increasing international division of labour.

The tonnage figures for imported and exported semi-finished and finished goods generally include only a fraction of the resources used to make them. To reflect this, the figures are supplemented with what are referred to as raw material equivalents. These capture all directly and indirectly used raw material inputs in imported and exported goods.

On average, each tonne of direct imports has a raw material equivalent of about three tonnes. The figure for exported goods is even higher at about four tonnes, as German exports tend to have a higher level of fabrication.

The measure of primary raw material use is raw material input (RMI). This comprises raw material extraction used domestically together with imports in raw material equivalents. Germany's RMI was 2.72 billion tonnes in 2010. Of this total, ores accounted for 826 million tonnes, fossil fuels for 755 million tonnes, construction minerals for 587 million tonnes, biomass for 431 million tonnes and industrial minerals for 117 million tonnes. More than 54 percent of raw material equivalents (1.48 billion tonnes) went

into exports. The remaining 1.24 billion tonnes went into domestic uses (Federal Statistical Office 2015b).

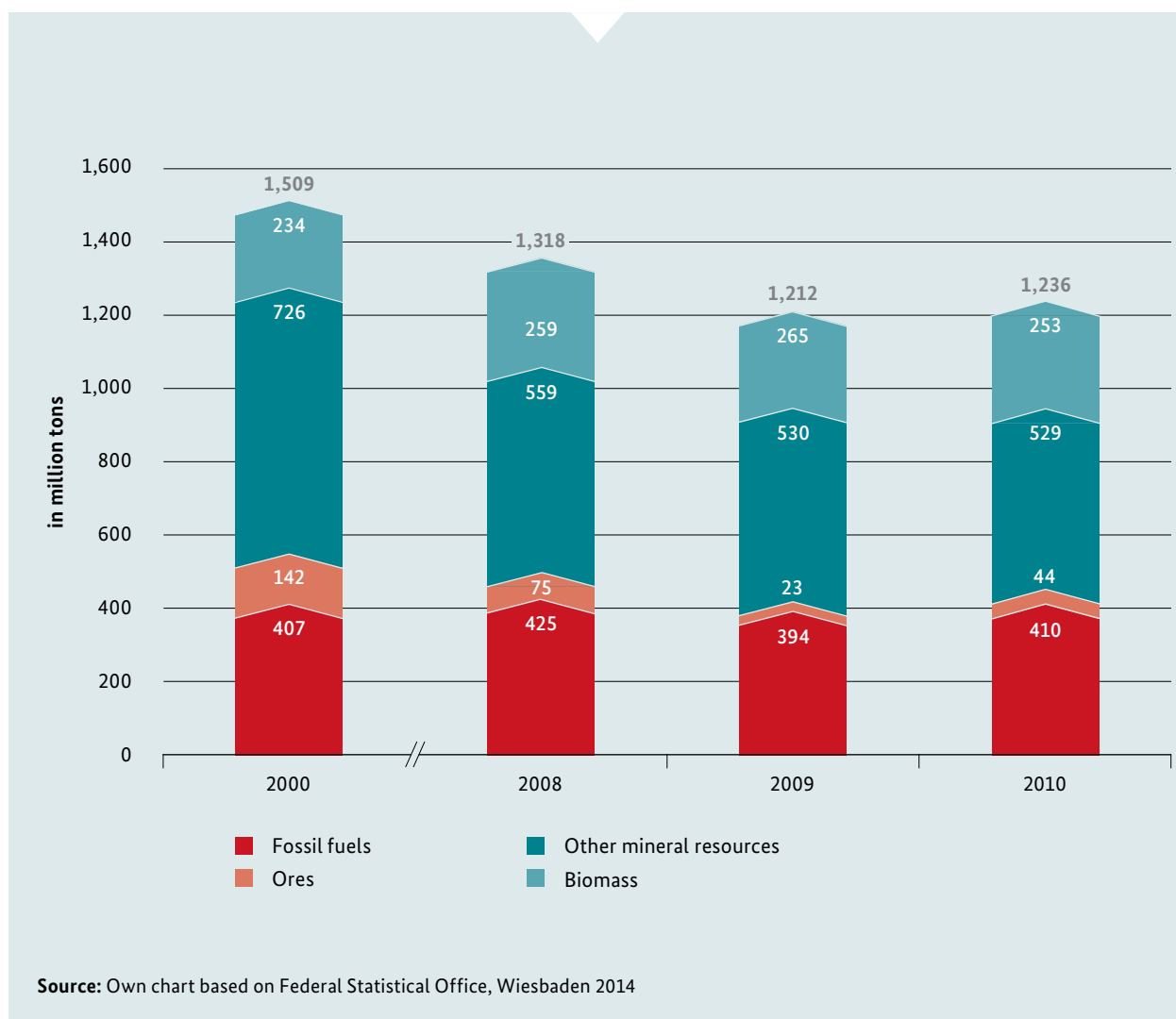
This figure is referred to as raw material consumption (RMC) and represents demand for primary resources for domestic consumption and domestic investment.

Private household and government raw material consumption totalled some 777 million tonnes in 2010. Investment accounted for about 674 million tonnes. Private and government consumption was dominated by the use of primary energy sources and biomass from agriculture and forestry, while investment consumption was dominated by construction materials (Federal Statistical Office 2015b).

RMC went down by about 18 percent between 2000 and 2010. This contrasts sharply with the trend in RMI, which went up between 2000 and 2010 by about three percent. The decrease in RMC reflects the fact that, measured in raw material equivalents, exports grew significantly faster than imports over the period concerned. Efficiency gains and innovations in industry also contributed towards this positive trend. An example is the smaller quantities of ore used in steelmaking due to primary raw materials being substituted with secondary raw materials.

Figure 2 shows how RMC has changed for Germany. Between 2000 and 2010, Germany's RMC fell from approximately 1,509 to 1,236 million tonnes.

Figure 2: Change in RMC, 2000 to 2010



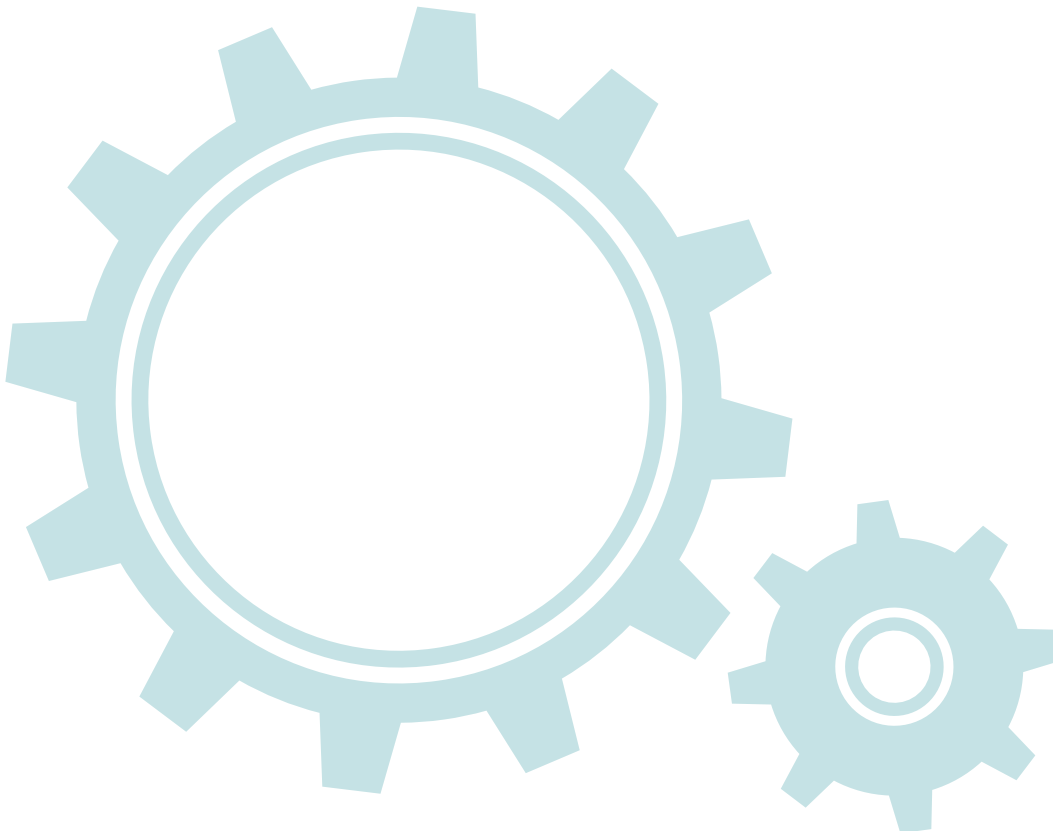
3.4 Savings in primary raw material due to use of secondary raw materials

Out of the total German net waste volume of some 339 million tonnes (2013), including hazardous waste, 78 percent (about 264 million tonnes) was recycled or used to generate energy. Using such secondary raw materials saves on primary raw materials. For example, modelling shows for steel, copper, gold and plastics that recycling and recovery of waste and production residues saved 49.5 million tonnes of abiotic primary material in 2007. In raw material equivalents, meaning including upstream value chains in other countries, this corresponds to a saving of 242 million tonnes of primary raw materials and thus about eight percent of RMI (UBA 2012c).

When developing recycling strategies for specific metals, it is important to ensure that reducing primary raw material extraction does not lead to scarcities in other metals that are mined as a co-product and are not yet available in sufficient quantities in existing material streams.

3.5 Anthropogenic stock

Additions to the anthropogenic material stock – meaning repositories of human origin such as buildings, infrastructure, etc. – from imports and domestic raw material extraction by far exceed withdrawals in the form of exports and discharges into the environment. Netting these inputs and outputs for Germany yields annual growth in the anthropogenic stock of some 0.82 billion tonnes of material (2010), or about 10 tonnes per capita per year. In this way, up to an estimated 42 billion tonnes of material has accumulated in the anthropogenic stock in just half a century (from 1960 to 2010). Not all of this can be assigned to specific goods categories. About 28 billion tonnes of material is accounted for by buildings, infrastructure, building systems and long-lived capital and consumer goods. That is about 75 times the amount of material used to make those goods each year (about 370 million tonnes). The anthropogenic stock of the materials referred to is made up of 26 billion tonnes of mineral materials (mainly loose stone and sand, concrete and masonry), 1.2 billion tonnes of metal (mostly steel), 350 million tonnes of timber, 250 million tonnes of plastics and 200 million tonnes of other materials (UBA 2015).



4 German Resource Efficiency Programme 2012 to 2015



4.1 Implementation process

The Federal Cabinet resolution launching the German Resource Efficiency Programme led to a broad-based political and social implementation process of which only a selection of activities can be presented here.

On 8 March 2012, the German Bundestag passed a supporting resolution on ProgRes and asked the Federal Government to report to the Bundestag every four years on the development of resource efficiency in Germany.

The first interdepartmental meeting on the implementation of ProgRes was held on 27 June 2012. On 8 October 2012, the State Secretaries' Committee for Sustainable Development set clear priorities for "rapid and comprehensive implementation of the German Resource Efficiency Programme ProgRes".

» **Reliable availability of raw materials is essential to German industry with its cutting-edge, high-tech products.** «

The German Conference of Economic Affairs Ministers and the German Conference of Environment Ministers adopted supporting resolutions on ProgRes on 4/5 June 2012 and 22 June 2012. Based on those resolutions, the two conferences once again addressed ProgRes on 13 November 2015 and 9/10 December 2015 and gave recommendations for updating the programme.

Intensive substantive consultations on resource efficiency were held in parallel by the German Bundestag Study Commission on Growth, Well-being and Quality of Life, which concluded in the consensus section of its final report: "The objective must be not just a decoupling of economic growth and environmental consumption, but an absolute reduction in environmental consumption" (Study Commission on Growth, Well-being and Quality of Life 2013).

A number of structures and institutions have been put in place or adapted to promote the social discourse and substantive work on resource efficiency: The German Mineral Resources Agency (DERA), which was established in 2010, continuously analyses and evaluates the international markets for mineral resources and fossil energy resources. The findings are published in various formats, including the two-yearly DERA Raw Materials List. DERA is part of the Federal Institute for Geosciences and Natural Resources (BGR).

Helmholtz Institute Freiberg for Resource Technology (HIF), which was established in 2011 with the support of the Federal Ministry of Education and Research (BMBF), develops innovative technologies for industry so that mineral and metalliferous raw materials can be made available and used more efficiently and recycled in an environmentally compatible manner. HIF is being built up in close collaboration between Helmholtz-Zentrum Dresden-Rossendorf and TU Bergakademie Freiberg.

In 2015, five German research institutions in the resources sector joined forces to launch a virtual institute, the German Resource Research Institute (GERRI). The project team is made up of TU Bergakademie Freiberg, RWTH Aachen, Clausthal University of Technology (TU Clausthal), the Fraunhofer Project Group for Materials Recycling and Resource Strategies (IWKS) of the Fraunhofer Institute for Silicate Research (ISC), and Helmholtz Institute Freiberg for Resource Technology (HIF). The plans are for all other German key players in resource research to be linked up in the virtual network. The aim of GERRI is to strengthen German resource research along the entire value chain in order to maintain its international competitiveness.



www.hzdr.de/db/Cms?pNid=2423

A variety of networks in the thematic area of resource efficiency have formed and perform successful work disseminating and accelerating the exchange of knowledge. Founded in 2007 and managed by the VDI Centre for Resource Efficiency (VDI ZRE), the Resource Efficiency Network (NeRes) now has 31 network partners.

The Resource Efficiency Competence Pool, which now has ten partner organisations, has worked since 2010 to better coordinate consulting services for small and medium-sized enterprises (SMEs). The BilRes Education for Resource Conservation and Resource Efficiency Network was launched on 22 September 2014. Bringing together policymakers, industry and researchers, BilRes provides a platform for exchange spanning all sectors of education. VDI ZRE took charge of continuing BilRes from March 2016.



www.neress.de
www.resource-germany.com
www.bilress.de

From 24 August 2011 to 31 December 2013, the Federal Environment Ministry (BMUB) carried out an information campaign promoting resource efficiency as a competitive advantage (“Wettbewerbsvorteil Ressourceneffizienz – Das zahlt sich aus”). Financed with funding from the National Climate Initiative, the successful campaign aimed to bring resource efficiency to the attention of decision makers in small and medium-sized enterprises and to highlight potential savings.

The implementation of ProgRes has been transparently communicated from a range of different thematic perspectives in half-yearly public Resource Efficiency Network (NeRes) meetings, half-yearly Federal Government-Länder meetings, and conferences of the European Resources Forum (ERF) and the National Resources Forum (NRF) staged by the Federal Environment Agency (UBA) in 2012 and 2014.

The National Resource Efficiency Platform (NaRes) was launched on 17 September 2013. Initially comprising the Federal Government and industry associations, membership of NaRes was extended in March 2015 to further groups such as environmental organisations, unions and local authority associations. NaRes serves as a platform for sharing information on members’ resource efficiency activities and supports the implementation and onward development of ProgRes.

Local authorities and local authority associations have had a more active part in the implementation and development of ProgRes since 2014. They not only take part in the NaRes platform and the NeRes and BilRes networks, but participate in various research projects

and are involved by VDI ZRE, among other things via a series of events on local resource efficiency.

The Round Table on Resource Efficiency in Building was formed on 3 April 2013 at the initiative of the Federal Government and construction industry associations. The Round Table serves as a joint information and transfer platform for a range of initiatives and promotes networking between stakeholders in the construction sector. It meets on a half-yearly basis and tracks current developments and progress in terms of construction resource efficiency. A key issue is sector-specific and accurate presentation of resource efficiency in construction.

To enhance awareness of resource and material efficiency, most of all in small and medium-sized enterprises, the Federal Ministry for Economic Affairs and Energy (BMWi) has presented the German Raw Material Efficiency Award since 2011 for the development and implementation of raw material and material-efficient products, processes and services. The award is presented annually to two companies and one research institute.

In July 2013, the Federal Environment Agency established the Resources Commission (KRU) to support the Agency with recommendations for the enhancement of resource efficiency policy. The Commission consists of experts from industry, research and government.

4.2 Outcomes

The work under the German Resource Efficiency Programme (ProgRes) and the measures listed in the programme have generated a wide variety of results. Specific outcomes are briefly presented in the following under the main approaches relating to resource efficiency.

4.2.1 Securing a sustainable raw material supply

Reliable availability of raw materials is essential to German industry with its cutting-edge, high-tech products. Germany is almost entirely dependent on imports of energy resources, metals and many key industrial minerals. Resources are also prospected for and mined in remote, ecologically sensitive or

politically unstable regions with low or poorly enforced environmental and social standards. There is increasing reliance on the mining of low metal content ores, often with increased use of energy, water and chemicals and correspondingly greater harm to the environment. German policies to secure supplies of raw materials must therefore deliver on Germany's responsibility towards producing countries, urge sustainable development in those countries and, as an objective of resource diplomacy, support peaceful, socially and environmentally compatible resource extraction.

Enhancing efficiency in the exploitation of deposits and resource use

The Federal Institute for Geosciences and Natural Resources (BGR) is conducting a project for the BMWi on efficiency in the exploitation of mineral deposits in order to develop options for more complete and sustainable exploitation. In its 'r'-series research priorities under the Research for Sustainable Development (FONA) research framework programme, the BMBF supports research projects that target smarter and more efficient resource use. The 1st funding measure launched on the basis of this strategic approach in 2013 advances supply-side resource research focused on economically strategic resources. The Federal Government will review the project outcomes and implement them in the appropriate manner.

 www.fona.de/en

Enhancing transparency in the value chain

In 2013, the Federal Ministry for Economic Cooperation and Development (BMZ) launched a Global Development Policy Raw Materials Initiative (GeRI). The initiative aimed to implement the Extractive Resources development policy strategy and to improve sustainability and transparency in resource extraction in partner countries of German development cooperation. In April 2015, the initiative was relaunched as a Resources and Development programme initially following the same objectives up to 2018 and offering specific advice and support for developing countries through BGR and the German Development Agency (GIZ).

 www.bmz.de/rue/en

At the end of 2015, the Federal Government submitted the German candidature application for the international Extractive Industries Transparency Initiative (EITI). National implementation of EITI in Germany centres on a multi-stakeholder group (MSG) comprising representatives of the Federal and *Länder* governments, industry and civil society. EITI enables the public and civil society organisations to scrutinise government decisions surrounding dealings in resources. This helps reduce corruption and ensures that revenues from resource extraction benefit sustainable development for the population as a whole. By joining EITI, Germany hopes to encourage other countries to become role models and commit their market power to the international transparency agenda.

 www.eiti.org

The Federal Government supports partner countries in East and Central Africa in the development and implementation of certification schemes to curb trade in conflict minerals and to improve compliance with social and environmental standards. Working together with partner institutions on behalf of BMWi and BMZ, BGR thus developed the Certified Trading Chains (CTC) certification scheme to verify compliance with environmental and social standards in mineral resource extraction and ensure trading chain transparency and traceability in order to reduce trade in conflict resources. In many cases, revenues from raw material extraction, rather than benefiting the development of the local population, flow into the funding of violent conflicts that go hand in hand with severe human rights violations. The purpose of the certification is to provide proof of origin and thus help reduce the scope for conflict finance.

» As part of bilateral and multi-lateral cooperation, the Federal Government supports partner countries in making resource extraction environmentally and socially compatible and resource-efficient. «

 www.bgr.bund.de/EN/Themen/Min_rohstoffe/CTC

Work on such certification schemes generally faces the challenge of not getting in the way of artisanal and small-scale mining, which is important in providing a livelihood for local populations but is poorly regulated and correspondingly hard to keep track of. The developed approach is elaborate and cannot be applied to all ores or even universally. However, it is an important step towards enhancing supply chain due diligence as required under the US Dodd-Frank Act and the European Commission proposal for a regulation concerning importers of tin, tantalum and tungsten, their ores, and gold originating in conflict-affected and high-risk areas.

Certificates on the basis of the CTC system have already been issued in Rwanda and the Democratic Republic of the Congo. The International Conference on the Great Lakes Region (ICGLR) is also provided with support in establishing a regional certification scheme to combat trade in conflict resources.

In its NamiRo research project on sustainably produced mineral resources, BMBF supports a multi-stakeholder process to explore the creation of a sustainability standard for mineral resource supply chains.

 www.namiro-projekt.org/english

Supporting sustainable resource extraction in partner countries

As part of bilateral and multilateral cooperation, the Federal Government supports partner countries in making resource extraction environmentally and socially compatible and resource-efficient.

The resource partnership established with Mongolia in 2011 is accompanied by development policy measures to improve environmental protection in mining, for example by establishing the German-Mongolian Institute for Resources and Technology and by cooperating in nature conservation. In economic policy there are various occupational safety projects, such as one to develop occupational safety legislation for mining.

In furtherance of a 2012 intergovernmental agreement with Kazakhstan on partnership in the fields of raw materials, industry and technology, BMZ has launched a regional development policy project on mineral

resources for development in Central Asia (Kazakhstan, Kyrgyzstan and Tajikistan).

In a 2013 declaration signed with Chile on cooperation in mining and mineral resources, the two parties pledged to support transparency and sustainability in the raw materials sector. Points of focus when it comes to stepping up cooperation include resource-efficient use of water and energy and the implementation of environmental and social standards in raw material extraction and processing.

Key elements of an intergovernmental agreement on cooperation in resources, industry and technology signed with Peru in 2014 are observance of human rights, protection of the indigenous population and compliance with environmental and social standards. The agreement reaffirms the internationally recognised United Nations Guiding Principles on Industry and Human Rights, the Equator Principles on compliance with environmental and social standards, and the support of EITI.

In the context of the G7-CONNEX initiative launched in 2014 and expanded under the German G7 Presidency, the Federal Government offers assistance for partner countries with cross-sectoral advice in negotiating complex investment agreements in the raw materials sector. Developing countries thus gain specific support in the form of legal, geological, industrial, ecological, socio-economic and technical expertise. The focus of the initiative is on integrating and providing access to information, assuring the independence and the quality of the advice provided, and capacity building in partner countries. The initiative starts with the raw materials sector, which in many countries is a key sector for economic growth. The support offered incorporates the findings of a study initiated by BMZ and BGR and published in 2015, "Raw Materials Contracts as a Tool for Managing the Mining Sector".

 www.bmz.de/g7/en/Entwicklungspolitische_Schwerpunkte/Connex

BMUB and UBA have launched several research projects on environmental issues relating to raw materials policy, including on the global adoption of and compliance with environmental and social standards in mining, on the development of a system to assess environmental sustainability in mining, and on the development of proposals for giving greater consideration to environmental aspects in raw material

criticality assessments. For validation of the findings, these projects are supported by an advisory board comprising representatives from industry, civil society, research and government.

Under the CLIENT funding programme, BMBF supports research and development projects with emerging and developing countries on sustainable raw material extraction, for example in Vietnam, South Africa and Chile.

Germany joined the Intergovernmental Forum on Mining, Minerals, Metals & Sustainable Development (IGF) in 2015, which includes many developing countries among its now 54 member states. Germany provides support for the forum and its initiatives on issues of sustainable development in the raw materials sector. Among other things, BMZ is presently supporting the compilation of guidance on small-scale mining.



www.igfmining.org

Purposefully increasing the material use of regenerative resources

A quantitatively and qualitatively secure supply of sustainably produced regenerative resources that does not compete with food production is a key requirement both for diversification of the resource base and for a resource-efficient economy. The Federal Government supports this process with a range of strategies and research programmes such as the National Research Strategy BioEconomy 2030 (NFSB 2030) and the National Policy Strategy on Bioeconomy. It is supported in this connection by a Bioeconomy Council established by BMBF and the Federal Ministry of Food and Agriculture (BMEL). The aim is to catalyse and support structural change towards a more strongly bio-based economy with research, innovation and social dialogue while delivering on the country's international responsibility for global food supplies, biomass material and energy supplies, climate change mitigation and environmental protection. The Federal Government reiterates that food security has priority where there is competition for land or resource use.



www.biooekonomierat.de/en

The bioeconomy also harbours opportunities for the production of high-quality speciality and basic chemicals and plastics, which with a view to overall environmental impacts are increasingly obtained from biological resources such as plants, algae and micro-organisms.

Activities to increase the use of regenerative resources must respect the priority on food security, ecosystem capacity and resilience, the limited availability of water resources and the finite availability of land, land use rights and the rights of indigenous groups. The Federal Government is committed to global compliance in land-use planning and investment under the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security published by the UN Committee on World Food Security (CFS).

Targeted research is needed to improve and fully exploit material efficiency in regenerative resources and technical process efficiency in resource processing. These principles can be supported by cascading use, which can lead to significant reductions in raw material input and is resource and climate-friendly, most of all when biomass is first used as a material resource and energy generation comes at the end of the use cascade. In various research projects, the Federal Government supports the development of the scientific basis for efficient cascading use of regenerative resources. It has taken up the issues of sufficiency and global equity in biomass production and utilisation, and incorporates these issues on a targeted basis in national and international processes on land and biomass use.

» The aim is to catalyse and support structural change towards a more strongly bio-based economy with research, innovation and social dialogue [...]. «

4.2.2 Raising resource efficiency in production

Promoting knowledge diffusion and competitiveness by expanding efficiency advice for companies

One objective of ProgRes I was the expansion of resource efficiency advice for businesses. Since 2009, with National Climate Initiative funding, BMU/BMUB has contracted out the activities of a Competence Centre for Resource Efficiency. The contract was awarded in 2009, 2012 and 2015 (up to 31 May 2019) to VDI ZRE.

Products developed by VDI ZRE notably comprise sector-specific aids, methodologies and information such as resource efficiency checks and process systematisation tools to assist manufacturing enterprises with internal resource efficiency improvement projects. Other activities of the Competence Centre include studies on resource efficiency technologies, regional information events (local resource efficiency, frequently in collaboration with local chambers of commerce and industry), sectoral events, films about successful resource efficiency projects, and education and training packages. In addition to the training for consultants provided so far, the programme has now been supplemented with training for in-house staff. Since 2011, VDI ZRE has also served as the secretariat for the Resource Efficiency Network (NeRes), which ensures that the networking activities are closely tied in with business practice.

A forum for exchange between the various parties involved in advice for businesses is provided by the Resource Efficiency Competence Pool, whose members are VDI ZRE, the German Agency for Material Efficiency (demea), the Association of German Chambers of Commerce and Industry (DIHK), the North Rhine-Westphalia Efficiency Agency (efa NRW), the Rationalisation and Innovation Centre for the German Economy, UBA, the Wuppertal Institute for Climate, Environment and Energy, and the REMake project. The aim of these networking activities is to promote the diffusion of resource efficiency, exploit synergies, prevent duplication of work, and promote interest in resource efficiency among business enterprises.



www.kompetenzpool-re.de

BMWi's go-Inno innovation vouchers scheme featured a module called 'go-efficient' under which targeted funding was provided for consulting services to enhance resource efficiency in business. BMWi continues to support business innovativeness and competitiveness through its Central Innovation Programme for SMEs (ZIM).



www.zim-bmwi.de/zim-overview

Consulting services are also provided at *Länder* level. Examples include the activities of the North Rhine-Westphalia Efficiency Agency (efa NRW) and of Umwelttechnik Baden-Württemberg, the EffCheck scheme in Rhineland-Palatinate and Hessen-PIUS in Hesse (see sections 7.2 and 8.2). The federal and *Länder* consulting services work in close collaboration in the Resource Efficiency Network (NeRes) and the PIUS network.

Development and dissemination of material-efficient and energy-efficient production and processing methods

BMUB's Environmental Innovation Programme (UIP) supports industrial-scale projects that demonstrate for the first time the implementation of advanced products, processes and systems to avoid or reduce environmental impacts. The programme provides an important link in environmental technology between R&D and market launch. Its aim is to translate innovative environmental technologies that advance the state of the art into practical application.



www.umweltinnovationsprogramm.de/englisch

In 2013, a new UIP funding programme was announced under the heading of material efficiency in production. This supports five innovative demonstration projects that implement material-efficient production processes, substitute material-intensive production methods, and use production residues and waste as secondary raw materials. Applications were assessed on the basis of a cradle-to-gate approach, looking beyond process boundaries to take into account environmental impacts in resource extraction and thus incorporating all processing, manufacturing, storage and transportation activities from resource extraction to the finished

product. The scope for improving resource efficiency in the materials and other resources used in production was quantified on the basis of material efficiency progress attained in the enterprise and with reference to selected environmental indicators. The UIP remains open for further resource efficiency projects. Since 2014, the BMBF 'r+Impuls' funding programme has promoted the transfer into industrial practice of R&D outcomes that offer large potential for improving raw material and energy efficiency in production (see section 4.2.5).

Since 1 January 2012, the KfW environmental programme has provided support in the form of low-interest loans for businesses investing in resource efficiency. Some 50 business resource efficiency projects were supported in this way in 2013 and 2014.

Integration of resource conservation into standardisation

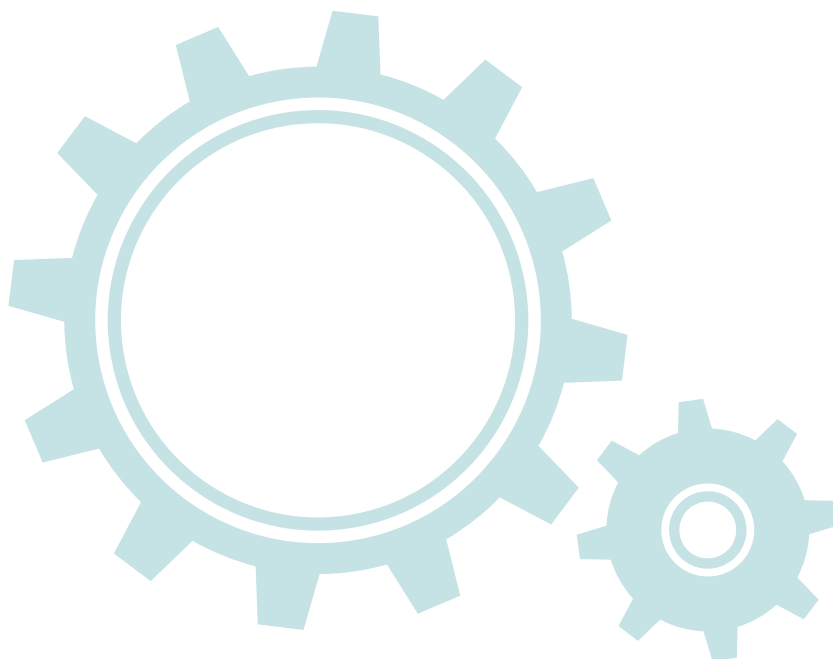
The Association of German Engineers (VDI) has launched the development of a series of VDI standards on methodological principles and strategies for the assessment of resource efficiency. The series currently consists of four standards or draft standards that aim to

enable business enterprises to assess the resource efficiency of products, services and processes:

- ◆ VDI 4800 Part 1 Resource efficiency – Methodological principles and strategies
- ◆ VDI 4800 Part 2 Resource efficiency – Evaluation of the use of raw materials
- ◆ VDI 4800 Part 3 Resource efficiency – Environmental indicators
- ◆ VDI 4600 Cumulative energy demand – Terms, definitions, methods of calculation

A further VDI standard currently in preparation – VDI 4801 Resource efficiency in small and medium-sized enterprises (SME) – aims to assist enterprises in improving resource efficiency.

An expert group on resource conservation issues was set up in 2012 by the DIN (German Institute for Standardization) Environmental Protection Helpdesk. The objective is to promote the integration of resource conservation concerns in standardisation.



4.2.3 Resource-efficient consumption

Increasing the supply of resource-efficient products

Work has continued on the further development of quantitative and qualitative assessment methods and standards together with supporting instruments to make products more resource-efficient. VDI 4800 Part 1 “Resource efficiency – Methodological principles and strategies” and related secondary standards are notable in helping to exploit the scope for resource efficiency improvements. The standard defines resource efficiency as the ratio of a quantifiable benefit and the associated resource input.

$$\text{Resource efficiency} = \frac{\text{Benefit (product, function, functional unit)}}{\text{Input (use of natural resources)}}$$

The Federal Government assisted the European Commission with policy support and accompanying research in the drive to gain greater consideration for resource efficiency, and in particular material efficiency, under the Ecodesign Directive. Material efficiency criteria were additionally taken into account from 2013 by supplementing the life cycle analysis tool in the Methodology for the Ecodesign of Energy-Related Products (MEErP) required to be used for preparatory studies. This provides the methodological basis enabling future preparatory studies to give better account to recycling content, recyclability, product lifetimes and critical material content.

The first minimum requirements for component lifetimes are laid down in the ecodesign regulations on domestic lighting and vacuum cleaners. The ecodesign regulation on computers also stipulates information requirements for notebook charging cycles and battery replaceability. This paves the way for future product-specific implementing regulations under the Ecodesign Directive to take material efficiency into account as well as energy efficiency.

In Germany, BMUB and UBA have launched the Federal Ecodesign Award – a competition for products, services and designs that excel both aesthetically and in environmental performance. Since 2012, numerous submissions have won the award

for material and resource-efficient design. UBA is currently developing higher education teaching modules on environmental design to ensure that tomorrow’s designers and product developers have basic knowledge and decision skills relating to ecodesign.

 www.bundespreis-ecodesign.de/en

Increasing demand for resource-efficient products and sustainable lifestyles

The Federal Government has carried out or supported a variety of projects to promote public awareness of resource-oriented consumption. Examples include:

- ◆ Development and launch of a consumer advice portal on green living, ‘Umweltbewusst leben: Der Verbraucher-Ratgeber’, as a gateway for resource-efficient consumption.
- ◆ Development of consulting expertise in consumer advice centres for the incorporation of social and environmental aspects in financial advice.
- ◆ Promotion of new consumption models, for example by supporting car sharing schemes.
- ◆ Commencement of regular reporting on the market development of resource-efficient products (Green Products in Germany).

Social innovations can provide key impetus for the establishment of sustainable consumption patterns and lifestyles. Such innovations promoting resource efficiency, such as repair cafés or urban gardening initiatives, create new ways of organising, practices and supply structures. The Federal Environment Agency has systematically collated social innovations for sustainable consumption and resource-efficient lifestyles and has detailed development and funding needs for such initiatives in a guidance on support for social innovations promoting sustainable consumption.

The Federal Government has also begun exploring options for promoting sustainable consumption by means of changes in civil and public law. The focus here lies on options available in law – in addition to those already provided for in the Circular Economy Act (KrWG) – in order to promote supply and demand of long-lived, repairable, efficient product alternatives.

Intensifying communication on resource-efficient products

So that consumers can incorporate resource conservation into their purchase decisions and to stimulate market demand for greater resource efficiency, new award criteria have been added in the 'protects resources' category for the Blue Angel ecolabel. Products for which the label is awarded in other categories also contribute significantly to resource conservation. Some 12,000 products in 120 product groups now carry the Blue Angel label. Advertising and promotion campaigns for the Blue Angel provide regular information on the topic of resource efficiency (such as a campaign on using recycled paper launched at the start of each school year).



www.blauer-engel.de/en

To provide consumers with guidance they can rely on in the growth area of online retailing, the Federal Government has started developing guidelines and quality requirements for environment-related product information in e-commerce. Credible product labels such as the Blue Angel are important in online shopping. In 2015, the Federal Government launched a consumer portal, siegelklarheit.de, providing guidance in the multitude of environmental and social labelling schemes. The service aims to help consumers and public procurement workers by separating and highlighting credible and ambitious, trustworthy labels in relation to untrustworthy, misleading labels. It initially covers environmental and social labelling schemes for textiles and is to be gradually expanded to take in other sectors such as wood, paper and IT products.

Use of public and private-sector procurement

Resource-efficient procurement is increasingly important at federal, *Länder* and local government level. Section 45 of the Circular Economy Act, for example, contains wide-ranging obligations to examine options of using resource-efficient products in the public sector.

The Competence Centre for Sustainable Procurement (KNB) works to ensure that sustainability criteria are applied to a greater extent in public procurement. A dedicated website, www.nachhaltige-beschaffung.info, provides federal, *Länder* and local government procurement agencies, non-governmental organisations and potential private-sector bidders with a wide range of information and guidance on sustainable and resource-efficient procurement. Since May 2014, KNB has provided training for public-sector contracting authorities.

Following the adoption of ProgRes, the Federal Government established an expert group within the Alliance for Sustainable Procurement to compile practical aids ensuring that greater consideration is given to resource efficiency in procurement. March 2014 saw publication of the first part of a set of guidelines covering resource-efficient procurement, on recycled construction materials. Alongside a general section on resource-efficient procurement, the guidelines contain a series of data sheets with minimum environmental standards for the use of recycled construction materials in building and civil engineering. The guidelines are available on the KNB website. The expert group on resource efficiency is now addressing how to ensure that greater consideration is given to resource efficiency in the procurement of information and communication technology.

The Federal Government's objective of aligning procurement more closely to resource efficiency concerns is supported by information provided by UBA. A UBA website on green procurement relaunched in 2013 provides practical guidance on resource-efficient public procurement along with information on the legal framework.

» Resource conservation makes it necessary to think in terms of material streams in a life cycle approach spanning the entire global value chain from resource extraction onwards. «



www.umweltbundesamt.de/en/topics/economics-consumption/green-public-procurement

BMZ's Sustainability Compass (www.oeffentliche-beschaffung.kompass-nachhaltigkeit.de) additionally offers specific guidance on how to incorporate sustainability criteria and labels in the procurement process together with information for local government procurement. Funded by BMZ, the municipal fair procurement network under Service Agency Communities in One World (a division of Engagement Global) advises communities and others on sustainable procurement and spreads the word to local government through professional promoters.

4.2.4 Enhancing resource-efficient closed cycle management

Resource conservation makes it necessary to think in terms of material streams in a life cycle approach spanning the entire global value chain from resource extraction onwards. Alongside material efficiency in production and sustainable consumption, a further major element in conserving natural resources is the circular economy. Substitution of primary resources also avoids environmental impacts in resource extraction.

In addressing these challenges, the waste management sector in Germany has undergone radical change. A new legal framework consisting of the 1994 Closed Substance Cycle and Waste Management Act (Kreislaufwirtschafts- und Abfallgesetz) and related secondary legislation and, most of all, the development of policy on product responsibility drove the major transition from conventional waste disposal towards the circular economy. Among other things, this also involved material stream-specific secondary legislation on organic waste, sewage sludge, commercial waste, waste oil and waste timber along with requirements on waste monitoring and traceability. The new Circular Economy Act (Kreislaufwirtschaftsgesetz, or KrWG) enacted in 2012 takes the process a stage further. This introduced a five-level waste hierarchy and laid down a general order of precedence

comprising waste prevention, preparation for reuse, recycling, other forms of recovery (including energy recovery), and waste disposal. Priority is given to the environmentally preferable option, taking into account technical, economic and social as well as environmental impacts.

» The idea is to prevent illegal disposal [...]. «

from the citizens' recommendations

The new act is thus highly effective in driving improvements in resource efficiency. It is aided in this by further waste-related provisions and initiatives, among other things to enhance product responsibility among manufacturers and retailers, to prevent illegal exports, notably of waste electrical and electronic equipment and end-of-life vehicles (for example with a major revision of the Electrical and Electronic Equipment Act dated 20 October 2015, which reversed the burden of proof so that exporters must demonstrate that goods being exported are in working order), and to promote recycling and recovery structures in emerging and developing countries. Activities to raise standards and for expertise and technology transfer take place with a range of partner countries via multilateral contacts – under the Basel Convention, OECD Working Party on Resource Productivity and Waste (WPRPW) and European legislation – and in bilateral cooperation. BMUB and other federal ministries additionally support German RETech Partnership e. V., an export network that primarily assists SMEs in their foreign activities. The environmental technology export initiative provided for in the current government coalition agreement is expected to provide added impetus.

Waste prevention programme

Closing material cycles and preventing waste are key in attaining sustainable resource use. After staying flat for a period, annual waste volumes returned in the last few years to a slight upward trend. Growing product diversity, shorter and shorter innovation cycles and rapidly changing fashion trends mean that new products are purchased increasingly frequently. This leads to short-lived products and rising waste volumes, in some cases with major environmental impacts.

On 31 July 2013, the Federal Cabinet adopted a waste prevention programme under Section 33 of the Circular Economy Act. Containing a range of government measures and approaches, the programme is based around product life cycles and is directed at the various stakeholders and responsible parties. The approaches include organisational and financial support for product reuse and multiple use schemes and repair centres, and promotion of the idea of sharing rather than owning consumer goods so that they are put to fuller use by larger numbers of consumers. Measures under the programme are to be implemented in an ongoing process. A priority during the programme's implementation is on networking and dialogue among the parties involved throughout the entire life cycle (such as producers, retailers and consumer associations) in order to dismantle barriers to waste prevention and tap into unused potential. Various thematic areas will be addressed in depth between 2015 and 2017 in dialogues on promoting reuse to extend the useful life of products, better prevention of food waste, enhancing waste prevention in the manufacturing industry, and waste prevention by promoting product service systems. The programme will be reviewed and updated after six years.

Strengthening product responsibility

The policy instrument of product responsibility under German waste management law is now well established – in some cases for more than 20 years – and in full effect with legislation and implementing measures such as take-back, recycling and financing obligations for

packaging, end-of-life vehicles, waste oil, used batteries, and waste electrical and electronic equipment. Greater account is to be given to resource conservation aspects in the further development of these arrangements.

The current Packaging Ordinance (Verpackungsverordnung) already allows joint collection of light packaging with non-packaging waste made of the same materials (plastic and metal waste). Nationwide introduction of kerbside recycling collection (recycling bins) has been prepared for in various research projects to identify the potential for such a system together with model schemes, notably with an accompanying simulation exercise involving all relevant stakeholders (Karpenstein & Schink 2011, UBA 2011a, UBA 2011b, UBA 2011c, UBA 2011d, BMUB 2012, UBA 2012a). The Packaging Ordinance is to be developed on this basis into a Recyclable Materials Act (Wertstoffgesetz).

Increasing the collection and recycling of precious and rare metals

Product responsibility within the waste electrical and electronic equipment and end-of-life vehicles waste streams promotes high-quality recycling of strategic metals. The Federal Government has funded a number of projects examining options for improving the waste management chain (collection schemes and processing and recovery methods) for waste electrical and electronic equipment and other waste streams with significant precious and rare metal content. These activities centred in part on a BMBF funding measure, “r³ – Innovative Technologies for Resource Efficiency: Strategic Metals and Minerals”, for example with the UPGRADE project to improve the recovery of rare metals from waste electrical and electronic equipment. In the environment policy portfolio, too, a number of projects have been carried out in order to analyse options and develop practicable policy measures and instruments for improving the collection, processing and recovery of precious and rare metals from various waste streams. Examples include the RePro project on waste electrical and electronic equipment, ReStra on other relevant waste streams, GELLED on gas discharge lamps, ORKAM on automotive electronics, and ElmoReL 2020 on

power electronics from electric vehicles. The project outcomes can be viewed on the website of the Federal Environment Agency (UBA).

Improving the recycling of resource-relevant bulk waste streams

The BMBF under its funding priority on Innovative Technologies for Resource Efficiency (r² and r³) and the BMUB under its Environmental Innovation Programme have supported a large number of projects for the selective recovery of recyclable materials and the separation of problem contaminants from difficult and unconventional waste streams, deposits and aggregates, including shredder sands, red mud lagoons, and mining tips.

The Circular Economy Act calls for universal collection and high-quality recycling of organic waste. Effective separate collection of organic waste supports nutrient recycling and maintains humus levels in farmland. Compost can be used as an organic fertiliser in place of mineral fertiliser in some cases and reduces the use of peat, notably in horticulture and landscape gardening.

Primarily to improve the recycling of additional waste streams, BMUB has begun preparing legislation as follows:

- ◆ Sewage Sludge Ordinance (AbfKlärV) to create a legal framework for harvesting recycled phosphorus for use in agriculture and industry
- ◆ Commercial Wastes Ordinance (GewAbfV) to intensify the recycling of high-quality commercial waste by specifying the detailed priority requirements to be met by separate collection and recycling of waste in the commercial sector (including construction and demolition waste)
- ◆ Substitute Building Materials Ordinance (ErsatzbaustoffV) to specify uniform national requirements for the production and deployment of mineral

substitute building materials in conformity with soil and groundwater conservation requirements.

One issue of importance when it comes to creating incentives to use recycled materials is end-of-waste status. The European Commission has developed criteria to determine the end-of-waste status of iron and steel, aluminium, copper and glass. Further end-of-waste criteria for plastics, organic waste and refuse-derived fuels are under discussion. BMUB supports this process in principle. A critical issue with regard to end-of-waste status, however, is the protection of human health and the environment, among other things by removing harmful substances. Here lies the real challenge. The European Commission launched a monitoring programme at the end of 2013 to evaluate the penetration of the European market with end-of-waste status materials.

Supporting recycling and recovery structures in emerging and developing countries

Germany supports the establishment of integrated waste and closed cycle management structures in emerging and developing countries by offering cooperation, through knowledge and technology transfer, and by advocacy in international bodies (such as under the Basel Convention partnership programmes on mobile phones and computer equipment, and under the German RETech Partnership e. V.). The German RETech Partnership e. V. was established in 2011 as a successor to the BMUB's Export Network on Recycling and Efficiency Technology and has the primary objective of knowledge transfer in waste management and the circular economy and of promoting exports of related environmental technologies.

» Closing material cycles and preventing waste are key in attaining sustainable resource use. «

4.2.5 Use of cross-cutting instruments

Economic instruments and review of subsidies with regard to resource use

Economic instruments to eliminate competitive distortions that put resource-efficient products at a disadvantage can make an important contribution in improving resource efficiency. All subsidies underwent sustainability impact assessments in the most recent 25th Subsidy Report of the Federal Government. The assessment findings are presented in data sheets in annexes seven and eight to the Subsidy Report. The pool of knowledge on economic incentives and instruments for resource conservation is supplemented by projects under the Environmental Research Plan.

Legal instruments

The new Circular Economy Act (KrWG) places greater emphasis than before on resource conservation. The Act also created a binding framework that includes recycling and implemented the transition from waste management law to a coherent body of law on the circular economy. This was achieved among other things by introducing a new five-level waste hierarchy and strengthening the product responsibility principle. The Act also requires the Federal Government to draw up waste prevention programmes and lays an important basis for improving resource efficiency with provisions requiring different types of waste to be kept separately and stipulating detailed recycling rates.

Related secondary legislation was also adapted and updated on the basis of the Act. This applies both for legislation governing the various specific waste streams and for the field of waste monitoring. Further additions to the body of law relating to the circular economy take the form of a comprehensive amendment to the Electrical and Electronic Equipment Act (ElektroG) and plans for a new Recyclable Materials Act (Wertstoffgesetz).

Projects under the BMUB departmental research programme are also being carried out to determine how suitable areas of law can be supplemented, elaborated or modified in order to provide effective support for resource conservation.

The Federal Government is urging the European Commission to ensure that European law is more effectively implemented.

» Economic instruments to eliminate competitive distortions that put resource-efficient products at a disadvantage can make an important contribution in improving resource efficiency. «

Funding for research and implementation

Under a range of funding programmes, the Federal Government supports research and development for resource-efficient technologies and their implementation in practice. BMWi presents the annual German Raw Material Efficiency Award to outstanding examples of resource and material-efficient products, processes and services. The award is presented each year to two companies and one research institution in recognition of outstanding solutions that enhance public awareness of the importance of resource efficiency.



www.deutscher-rohstoffeffizienz-preis.de
(only in German)

Alongside cross-sectoral, general-purpose programmes, there are also sector-specific programmes such as Zukunft Bau 2014 in support of sustainable and resource-efficient construction. Major cross-cutting activities by the various federal ministries include the following:

BMBF's FONA framework programme is directed at the development of sustainable technologies and solutions. A dedicated research priority on resource efficiency technologies contributes towards enhancing the knowledge base in relation to the efficient use of resources. There are four focus areas: resource-intensive production processes (r²), strategic metals and minerals (r³), raw materials of strategic economic importance (r⁴), and impetus for industrial resource efficiency (r+Impuls). The main focus of r+Impuls is on translating promising R&D outcomes into industrial practice for rapid

implementation of innovations. This places increasing importance on application-oriented research and development, testing in prototype, pilot and demonstration systems, and market launch of new technologies. The 'KMU-innovativ' (Innovative SMEs) resource efficiency and climate change funding initiative supports innovative R&D projects by small and medium-sized enterprises.

The implementation of specific solutions is also supported under BMUB's Environmental Innovation Programme (see also section 4.2.2) and a wide range of federal and *Länder*-level advisory and transfer services. Likewise initiated by BMUB, German RETech Partnership e.V. is an export network for the German recycling and waste management sector.

BMEL supports the *Länder* in implementation of the new European Innovation Partnership for Agricultural Productivity and Sustainability (EIP AGRI) with federal-level networking and coordination activities provided by a German Rural Network Unit at the Federal Office for Agriculture and Food (BLE). EIP AGRI aims to create a bridge between researchers, practitioners and other sectors by supporting innovative projects on more efficient resource use in agriculture and rural value chains. A BMEL funding directive, Big Data in Agriculture, likewise supports the development of innovations in agricultural technology to enhance resource efficiency.



www.ec.europa.eu/eip/agriculture

Under the Renewable Resources funding programme, BMEL notably supports the goals of the National Policy Strategy on Bioeconomy and the Federal Government's climate and energy targets. Focus areas in the re-designed programme include sustainable production and supply of renewable resources, recovery and processing of materials and waste products, recycling, cascading use, and the development of sustainability standards.

The resource and material efficiency module of the BMWi's go-Inno programme provides funding for professional advice on profitably improving resource

and material efficiency in production or in the use of products by customers, using potential analysis and in-depth consulting by external consulting services.

BMZ supports technology/knowledge transfer and related exports of resource-efficient technologies. Working in partner countries, BMZ provides advice on innovations in environmental and resource management in enterprise, on establishing consulting markets for environmental services, and on the development of sustainable industrial zones. Transfer of resource-efficient technologies is promoted via development partnerships with German industry.

Activities at European and international level

The Federal Government has campaigned intensively at European and international level since the adoption of ProgRes for ambitious policies to enhance resource efficiency.

Germany has been successful in promoting and shaping activities relating to resource efficiency at European level. Impetus is provided both by the European Commission's Roadmap to a Resource Efficient Europe (2011) and by the 7th EU Environment Action Programme (2014 to 2020). The latter makes express reference to planetary boundaries and sets the priority objective of a resource-efficient, competitive European economy by 2050.

Resource efficiency has featured on various occasions as the subject of resolutions of the European Environment Council and Competitiveness Council. In October 2014, for example, the Environment Council adopted conclusions on greening the Europe 2020 strategy, emphasising the potential of a resource-efficient circular economy for jobs and growth in Europe. Similarly, the Competitiveness Council noted in its resolutions on the European Commission Communication on a Roadmap to a Resource Efficient Europe that policy measures to enhance resource efficiency should be balanced and have positive impacts on the competitiveness of EU industry.

In 2012, at the suggestion of the Federal Environment Ministry, the European Commission established an expert group of the member states on resource efficiency. This provides a forum for exchange of experience between European Commission representatives and representatives of all member states. The Federal Environment Ministry also conducted workshops for member state representatives in 2012 and 2014 to facilitate the informal exchange on European and national resource efficiency policy.

The Federal Government has campaigned at European level for greater support of SMEs in improving resource efficiency. A European network of national and regional resource efficiency agencies was established at the initiative of VDI ZRE and the British Waste and Resources Action Program (WRAP UK). Under the Green Action Plan for SMEs and the COSME programme, the European Commission has taken up suggestions from the Federal Government for greater promotion of SMEs and published a tender at the end of 2015 for the establishment of a European Resource Efficiency Excellence Centre.

In 2012, the European Commission launched the European Resource Efficiency Platform (EREP), a high-ranking advisory body consisting of industry, research, civil society and policy representatives, which developed recommendations on the implementation and onward development of European resource efficiency policy and adopted them on 31 March 2014. The successive German Federal Environment Ministers who were members of EREP at the time were involved in shaping the EREP's recommendations in close consultation with other federal ministries.



www.ec.europa.eu/environment/resource_efficiency/re_platform/index_en.htm

In the European Innovation Partnership on Raw Materials (EIP RM), the European Union has joined

forces with industry, researchers and universities to create a network to address challenges relating to natural raw materials for non-energy, industrial use.



www.ec.europa.eu/eip/raw-materials/en/content/european-innovation-partnership-eip-raw-materials

Resource efficiency has also gained in importance in European law. As an example, the Ecodesign Directive – which addresses one aspect of resource conservation in stipulating on the energy and water consumption of certain products – has been amended to cover new product groups such as air conditioning units, household tumble driers, water heaters and hot water storage tanks, and resource efficiency is being incorporated stage by stage into work in connection with the Directive. This has been expressly provided for since 2013 in the European Commission's Work Programme on the Ecodesign Directive.

The Waste Framework Directive, too, has contributed towards resource efficiency, notably with the requirement for member states to develop waste prevention programmes by the end of 2013. Directive 2012/19/EU on waste electrical and electronic equipment (WEEE) stipulated additional measures to protect the environment and human health designed to reduce the overall impacts of resource use and improve resource efficiency. Measures such as higher recycling targets and extension of the scope of the Directive to include items such as solar panels make it possible to tap into large volumes of high-quality secondary raw materials. A further contribution to resource efficiency came with the revision of the Batteries Directive (2006/66/EC) in conjunction with Commission Regulation (EU) No 493/2012, notably with rules regarding the calculation of recycling efficiencies of recycling processes for waste batteries and accumulators in order to encourage the improvement of existing and the development of new recycling and treatment technologies.

» The use of plastic bags must be cut dramatically. «

from the citizens' recommendations

In EU consultations on the Green Paper on a European Strategy on Plastic Waste in the Environment, the Federal Government contributed proposals for resource-efficient use of plastic-based products, stepping up the recycling and recovery of plastics and plastic waste along with the use of recycled plastic materials in new products. In the interests of resource conservation, waste prevention and the fight against litter in the environment, the Federal Government also supports the EU's reduction targets with regard to the use of disposable plastic carrier bags and took active part in the legislative process leading to Directive (EU) 2015/720 as regards reducing the consumption of lightweight plastic carrier bags.

The Federal Government has also been successful in putting resource conservation and resource efficiency issues on the international agenda.

- ◆ Under the German Presidency, resource efficiency was made a focus topic of the G7 for the first time in 2015. At its summit at Schloss Elmau on 7 to 8 June 2015, the G7 adopted trailblazing resolutions on resource efficiency that are enshrined in the final communiqué and an annex. Key elements include a clear commitment by the G7 states to ambitious measures to improve resource efficiency and the establishment of a G7 Alliance for Resource Efficiency.

 www.bmub.bund.de/en/topics/europe-international/international-environmental-policy/g7g8-and-g20/german-g7-presidency/

- ◆ The G7 Alliance for Resource Efficiency is intended to serve as a permanent forum for the exchange of best practices between the G7 states and relevant stakeholder groups in industry, research and civil society. To this end, future G7 presidencies will each conduct workshops on the diverse resource

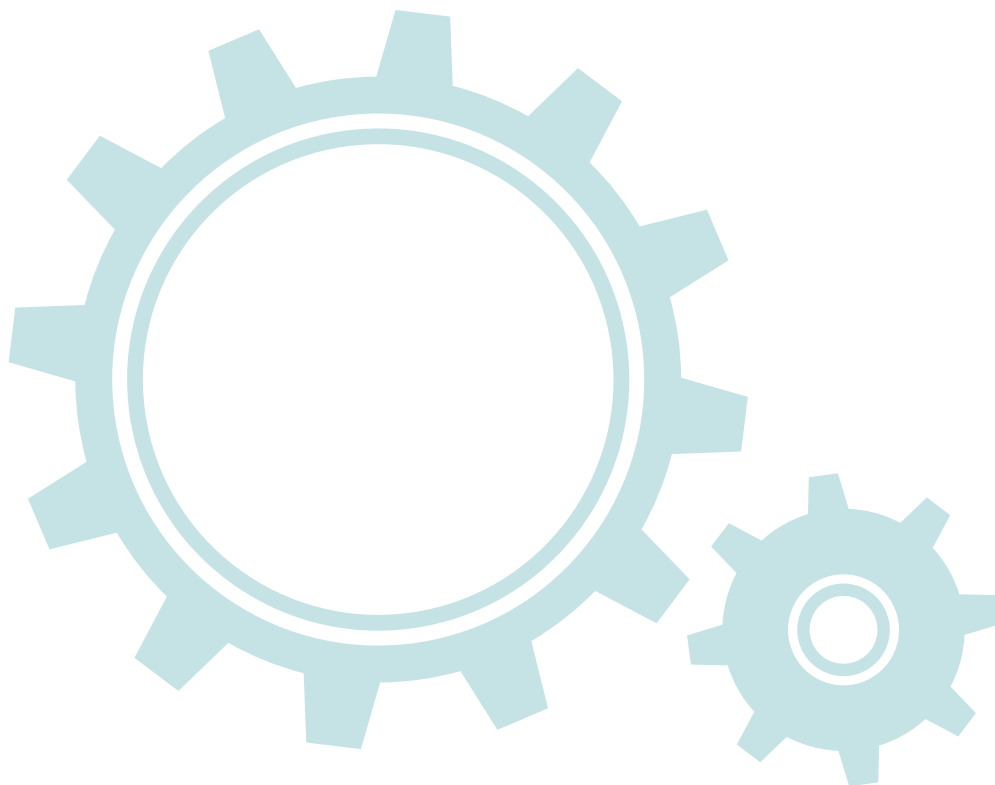
efficiency-related issues. The Federal Government launched the work of the Alliance during the German Presidency with a high-ranking kick-off event and several workshops. The workshops in Germany and the United Kingdom addressed best practice examples from business, research and innovation, multilateral cooperation and networking with international organisations, industrial symbioses and the substitution of abiotic raw materials with sustainably produced renewable resources. The G7 Alliance for Resource Efficiency will continue in 2016 with workshops in Japan and the USA.

- ◆ The G7 has asked the International Resource Panel (IRP) of the United Nations Environment Programme to compile a synthesis report highlighting the most promising solutions for enhancing resource efficiency both in industrialised countries and in emerging economies and developing countries. The synthesis report is to build upon the existing work and the main findings of the IRP and other relevant international organisations, such as the OECD and UNEP, and take into account relevant international processes. The G7 further invited the OECD to develop policy guidance supplementing the synthesis report.

 www.unep.org/resourcepanel

- ◆ The Federal Government has supported the work of the IRP since its inception. The Federal Environment Ministry staged the 11th meeting of the International Resource Panel in Berlin in 2013. In October 2014, the Federal Environment Ministry conducted an expert workshop together with IRP in Berlin on the potential of remanufacturing.
- ◆ At United Nations level, the Federal Government campaigned for resource efficiency to be incorporated in the final document of the 2012 Rio+20 conference, "The future we want". During negotiation of the sustainable development goals (SDGs) under the United Nations 2030 Agenda for Sustainable Development, the Federal Government likewise successfully campaigned for resource efficiency, waste management and the circular economy to feature extensively in the goals. Resource efficiency is primarily addressed in the following targets:

- ◆ **Target 8.4:** Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production, with developed countries taking the lead
- ◆ **Target 9.4:** By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
- ◆ **Target 11.10 (originally 11b):** By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015 to 2030, holistic disaster risk management at all levels
- ◆ **Target 12.2:** By 2030, achieve the sustainable management and efficient use of natural resources
- ◆ The approaches provided for in ProgRes II take these targets into account and are intended to contribute towards attaining them.



5 Onward development of the German Resource Efficiency Programme



Like ProgRess I, ProgRess II considers improvements in resource efficiency along the entire value chain. The focus as before is on the material use of abiotic and biotic resources. Food and feedstuffs are not taken into consideration (see Figure 3). The use of fossil and biotic resources for energy generation is addressed by the Federal Government in a range of strategies and measures in connection with Germany's energy transition.¹ Where it makes sense to do so, however, ProgRess II aims to look to a greater extent at energy and material flows in combination. This approach is presented in the following, and interaction with other natural resources is described. In the evaluation of individual measures, the impacts on resource use as a whole should continue to be analysed. Public participation was already an element in drawing up ProgRess I. This participation was broadened for the compilation of ProgRess II with a public dialogue on resource-efficient living that is reported on in section 5.3.

5.1 Combined analysis of material efficiency and energy efficiency

The focus in ProgRess II continues to be on the material use of resources, including related environmental impacts. Measures to improve resource efficiency in material use can also have an impact on energy consumption. Two categories of measures can be identified: Measures that lead to material and energy savings in all circumstances and measures that only lead to an improvement in material and energy efficiency in certain conditions. There are many practical examples for both.

Examples of measures to improve material efficiency that simultaneously enable substantial energy savings and hence synergies include the following:

- ◆ The manufacture of materials always involves energy consumption at the front end of the value chain, from resource extraction to the production of the materials or semi-finished goods. Material savings therefore normally also mean energy savings. Examples of measures in this regard include

reducing offcut waste and rejects, and cascading use of auxiliary materials.

- ◆ Most metal processing operations consume significant amounts of energy. A reduction in the volume processed and hence in the quantity of material lost therefore also leads to a reduction in energy consumption.
- ◆ Substituting primary with secondary raw materials yields major energy savings, especially when it comes to materials that are energy-intensive to make. The cumulative energy expenditure (CEE) in aluminium production is nearly nine times as high for primary aluminium as it is for secondary aluminium. In plastics processing, too, substituting virgin plastics with recycled plastic granulate saves energy as well as material. In-house recycling and in-house use of recycled material offer the greatest potential for savings in plastics processing.
- ◆ Reprocessing of components and products (re-manufacturing) offers material and energy savings in a range of applications. As this means fewer new components and assemblies need to be produced, it not only saves primary material, but also the energy used for intermediate processing operations. Examples of remanufactured products include generators, brake callipers and ignition distributors.
- ◆ High asphalt recycling rates cut both cumulative raw material consumption and cumulative energy expenditure in roadbuilding.

Goal conflicts can arise where material and energy efficiency diverge. The net benefit of such measures can only be evaluated on a whole life cycle basis. Examples:

- ◆ Systems that convert renewable energy into electrical energy – such as wind and solar systems – are material and energy-intensive to make. Such systems must make up for this input of natural resources when they come into use.
- ◆ Lightweight construction leads to use-phase energy savings in mobile products and in products involving a mass that is frequently accelerated. In many

1 www.bmwi.de/EN/Topics/Energy/energy-transition.html

cases, however, such savings are countered by added expenditure in manufacture or disposal.

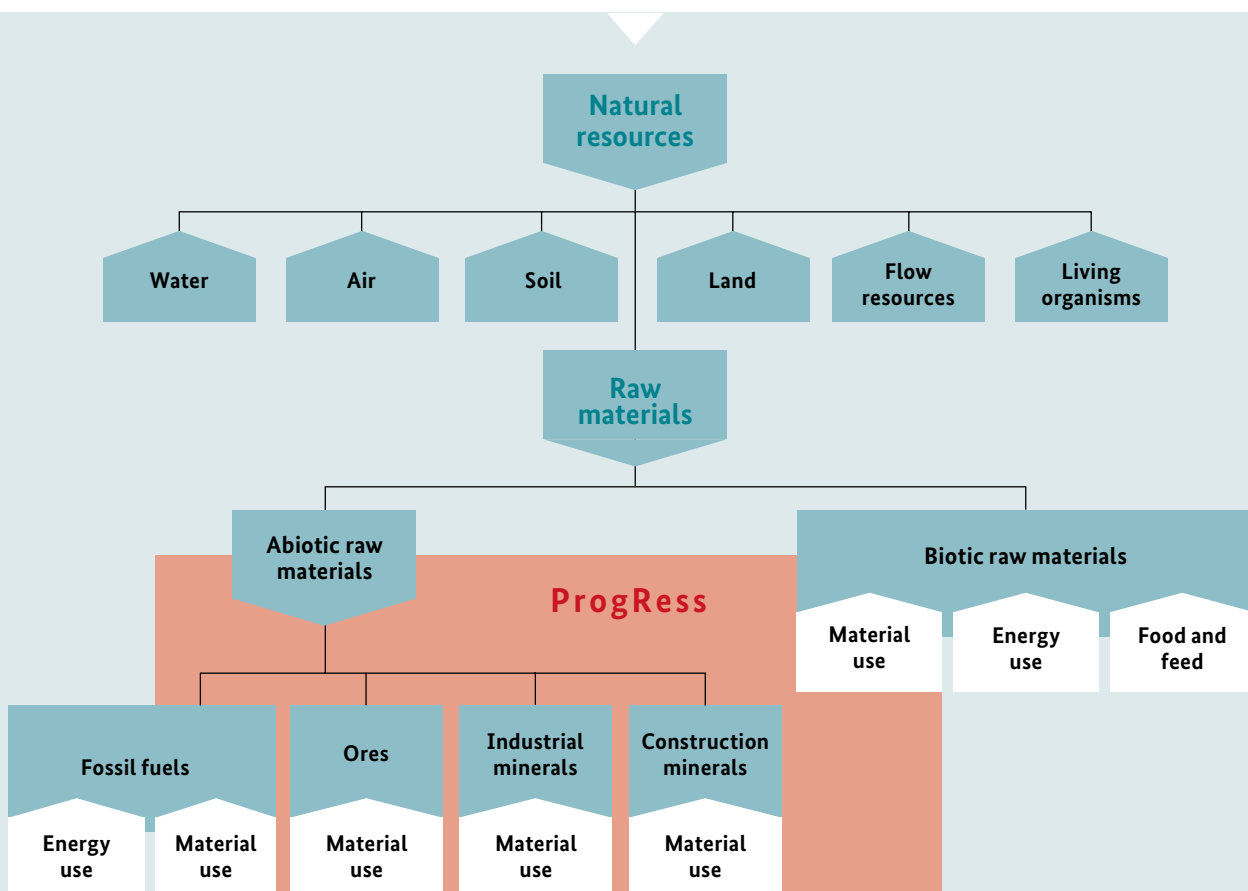
- ◆ Recycling materials from end-of-life products requires energy for waste management logistics and the recycling processes themselves. In most cases, however, the use of the harvested secondary materials offsets the additional energy needed for logistics and recycling.
- ◆ Building heat energy requirements can be reduced significantly in the use phase if additional material is employed to insulate the building envelope. When planning and evaluating building measures, therefore, it is necessary to balance the expenditure for making insulation material against the potential savings in heating energy.
- ◆ Using CO₂ as a chemical feedstock leads to substitution of fossil primary resources such as petroleum

and natural gas, but requires large quantities of (renewable) energy that must be taken into account on the other side of the equation.

Using ‘green’ concrete allows up to 45 percent of primary aggregates to be substituted with secondary material. The impact on energy consumption here depends on the haul distance from the source of the concrete rubble to the new construction site, and hence on the amount of energy used in transportation.

The Federal Government will take these various inter-relationships between material efficiency and energy efficiency into account during the implementation of ProgRes II. An objective of the work within this programme is better integration of efforts for energy and material efficiency so that they mutually support each other.

► **Figure 3:** Focus of ProgRes II



Quelle: Environmental Policy Research Centre (FFU)/IFOK GmbH on behalf of the BMU

5.2 Interaction with other natural resources

In the onward development of ProgRes, the Federal Government will consider extending its scope to include additional natural resources. Care will be taken at the same time to maintain consistency with other Federal Government strategies.

5.2.1 Water

Germany is a country rich in water, and increasingly efficient and economic use of water has significantly reduced water abstraction across all sectors in the last 20 years. There is therefore no risk of general water shortages in Germany, even with climate change. Temporary shortages can nonetheless arise in limited geographic areas, for example due to seasonal variation in precipitation and evaporation and to fluctuating demand. These can be avoided, however, by modifying water catchment and distribution systems.

Account must also be taken of Germany's 'virtual' water balance: quantities used elsewhere in the manufacture of products that are imported into Germany and quantities used domestically for exports. The resulting water footprint can be used to develop options for sustainable use of renewable water resources for regions where water use has negative social and environmental impacts due to virtual water exports.

Initial consideration was given to this in the formulation of sustainability criteria for water in implementation of Article 17 of the EU Renewable Energy Directive (2009/28/EC). A UFOPLAN project to develop strategies and sustainability standards for the certification of biomass for international trade (FKZ 3707 93 100) illuminated a number of aspects but also highlighted the major problems in compiling and operationalising of criteria.

» An objective of the work within this programme is better integration of efforts for energy and material efficiency so that they mutually support each other. «

Recommendations are also currently being developed at EU level on how to achieve sustainable water reuse in industry, urban development and agriculture. This can also provide stimulus (via technology transfer) for resource conservation in other countries. The same applies with regard to more widespread adoption of water stewardship approaches, where business enterprises cooperate beyond the boundaries of their own operating locations with local and regional stakeholders in the sustainable management of water resources. Certification schemes such as the European Water Stewardship Standard are now beginning to become established for companies that implement such approaches.

5.2.2 Air

Clean air is an essential resource for human, animal and plant life. The main component used as a resource – for example in all forms of combustion – is atmospheric oxygen. Some chemical processes also use atmospheric nitrogen. Prevention and limitation of atmospheric pollution and thus the safeguarding of clean air as a resource are comprehensively governed in Germany by the Federal Immission Control Act (Bundes-Immissionsschutzgesetz) and secondary implementing legislation.

5.2.3 Soil

Soil is a basis of life for humans, animals and plants and at the same time is a resource of major importance for Germany's economic development. Its sustainable use is important for food security and the conservation of biodiversity. The majority of natural chemical conversion and degradation processes take place in the soil. The soil also serves as a filter and reservoir for water and nutrient cycles. Soil conservation is also an element of flood control. However, soils are increasingly under pressure due to the nature and intensity of land use. Additional pressures result from climate change. Protection of the soil from harmful changes and the conservation and sustainable improvement of the diverse functions of the soil are addressed in soil protection law, building and planning law, nature conservation law, and farming law. Amendments to agricultural subsidies law (implementing the Common Agricultural Policy) in particular allow for the introduction of provisions to supplement farming law, for example rules on erosion control and soil organic matter retention.

Under the National Research Strategy BioEconomy 2030, BMBF supports research on the conservation and ideally improvement of soil fertility. The objective is to lay the scientific foundations for deriving reliable, socially acceptable options for sustainable use of soils.

5.2.4 Land

A notable problem is the rapid rate of land take for development and transportation. Approximately half of all land thus used is made impermeable (surface sealing). According to the Federal Statistical Office, land use for housing and transport in Germany increased by a total of 4,543 square kilometre between 2000 and 2013. While there has been a decrease in daily land take – with the four-year running average already significantly down from 129 hectare per day between 1997 and 2000 to 73 hectare per day between 2010 and 2013 – the current figure is still far from the 2020 target of 30 hectare per day set by the Federal Government in the National Sustainable Development Strategy. The greatest scope for changes in the law to cut land take is to be found in the Federal Building Code (Baugesetzbuch) and the Federal Spatial Planning Act (Raumordnungsgesetz). The Federal Government has already

started taking action here, for example with a major revision of the Federal Building Code to increase urban infill development.

5.2.5 Living organisms

Sustainable use of ecosystems secures the long-term needs of current and future generations. Waters and soils must be preserved and used sustainably as important natural resources that also provide habitats for many plants and animals. Together, all of these resources form the natural basis of human well-being.

Ecosystem biodiversity continues to be in large-scale, rapid global decline. The United Nations consequently declared the years 2011 to 2020 the UN Decade on Biodiversity. Biodiversity is an essential prerequisite for the provision of ecosystem services – regardless of use – but is neither an ecosystem service nor a natural resource in its own right.

The main causes of biodiversity loss are, to regionally varying degrees, intensive farming, landscape fragmentation and urban sprawl, soil sealing, and pollutants affecting large areas such as acidifying chemicals and nutrients. In human settlements, negative impacts are brought about by the loss of near-natural habitats and village structures due to building and soil sealing.

To conserve ecosystems and biodiversity, the Federal Government adopted the National Strategy on Biological Diversity (NBS) as early as 2007. This contains targets and specific measures for target attainment. A majority of the targets are to be achieved in the period 2010 to 2020. Implementation of the strategy is reported on once every two years against an indicator set (in an Indicator Report under the NBS).

Measures to increase resource efficiency are generally also beneficial to biodiversity conservation. It is significantly harder to weigh the benefits and costs to biodiversity of substituting one resource for another.

5.2.6 Resources as food and feedstuffs

The Federal Government aspires to agriculture that conserves the environment and resources and is committed to animal welfare. Modern agriculture

» For the first time, compilation of this progress report included broad public participation using a specially developed public dialogue approach. «

makes sustainable use of the productive base by being environment-friendly, resource-conserving and efficient, and by providing conditions for farm animals in accordance with their needs. It maintains a diverse, species-rich cultural landscape. Establishing and enabling this throughout the country is a central concern of German agricultural policy. Measures and arrangements to this end include:

- ◆ Environmental rules to be met by farms of differing sizes and structures
- ◆ Enabling conditions to ensure efficient land use and production
- ◆ A sustainable bioeconomy for the production of high-quality food and the provision of biomass for energy generation and as a regenerative material resource.

5.3 Public participation

For the first time, compilation of this progress report included broad public participation using a specially developed public dialogue approach.

The public dialogue had the title “GesprächStoff – Ressourcenschonend leben” (“Resource-efficient living”). It consisted of five public workshops held across Germany in early summer 2015 with a total of 200 civil society participants. Participants were invited by random selection from the civil register. People were also able to take part in the public dialogue online.



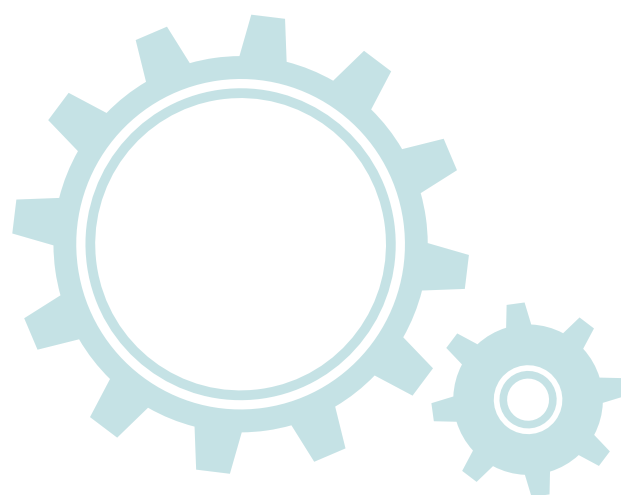
www.gespraechstoff-ressourcen.de
(only in German)

In the workshops and the online dialogue, people discussed resource efficiency and resource conservation, contributed their own ideas and developed practical solutions. The solutions developed were either cross-cutting in nature or came under one of five predefined thematic areas: packaging and waste prevention; transport, tourism and leisure; clothing and textiles; IT and telecommunication; and living and housing. Outcomes of the dialogue were subsequently evaluated and recorded in a final report.

On the basis of the final report, nine citizens’ ambassadors met in a workshop at the end of September 2015 to formulate a set of citizens’ recommendations representing the five workshops and the online dialogue. Bringing together key concerns from the entire citizens’ dialogue, the document comprises twelve recommendations on resource conservation.

The recommendations are reprinted in the annex, in section 8.5. Individual recommendations have already been incorporated in the relevant sections of ProgRes II.

The public will continue to be suitably consulted in the ongoing development of the German Resource Efficiency Programme.





6 Indicators and targets



6.1 Resources

The following indicators and targets are used:

► **Table 1:** Economic indicators and targets for resource use

Economic indicators and targets		
Approach	Indicator	Target
Continuous improvement in the resource efficiency of domestic production	Raw material productivity (GDP/DMI _{abiotic materials}) (indicator under the German Sustainable Development Strategy)	Doubling of raw material productivity from 1994 to 2020
Continuous improvement in resource efficiency, including biotic resources and making adequate allowance for imports	Total raw material productivity (GDP + imports)/RMI (including biotic materials)	Trend from 2000 to 2010 to be sustained to 2030

Source: BMUB

The raw material productivity indicator from the German Sustainable Development Strategy is a key point of reference for the German Resource Efficiency Programme. It is supplemented here with a new indicator: total raw material productivity. Total raw material productivity includes biotic resources as well as abiotic resources. Most of all, imports are taken into account not only by weight of imported goods, but with the associated total primary raw material input. This prevents productivity gains being reported just because resource-intensive processes are moved abroad.

To provide a matching monetary reference unit for the total raw material input in the denominator (domestic consumption plus imports in raw material equivalents), the figure used for total raw material productivity in the numerator is gross domestic product plus the value of imported goods.

The figures are to be subjected to regular decomposition analysis in collaboration with the Federal Statistical Office. This enables a better understanding and separate presentation of the various factors influencing productivity, such as growth, structural effects and displacement effects.

The economic indicators and targets are provided for guidance. The Federal Government does not intend to derive any legal measures directly from them.

6.2 Recycling and recovery indicators

The Circular Economy Act (KrWG) lays down a binding hierarchy of objectives for closed cycle management, with top priority given to waste prevention. The objectives that come after prevention in the waste hierarchy – preparation for reuse; recycling; and other recovery, in particular energy recovery – also play a major part in saving resources.

Priority is given in each instance to the option that best ensures the protection of human health and the environment in the generation and management of waste, taking into account the precautionary principle and sustainability. Technical, economic and social implications must also be considered for this purpose as well as environmental impacts.

A key focus area in the federal waste prevention programme is household waste, the volume of which closely reflects trends in consumption patterns. Household waste includes residual waste, organic waste, bulky waste, and separately collected materials such as paper, glass, packaging waste, and waste electrical and electronic equipment. At some 453 kilogram per capita per year (2013), Germany generates relatively large quantities of household waste. The volume of

household waste needs to be reduced overall. Household waste volumes are to be cut by using measures such as preventing food waste and increasing reuse. Separate collection of waste is to be improved.

Compared with other European countries, Germany already subjected very large volumes of waste to recycling or recovery in 2013, with a net total of 339 million tonnes. Some 78 percent of all waste goes to recycling or energy recovery. Putting waste to use as a secondary raw material saves primary raw materials.

While there are already highly advanced and effective recycling and recovery systems for many waste streams, a challenge for many individual material streams lies in improving the quality of recycling where economically and environmentally beneficial, or at least in enabling cascading use. This is a precondition for the use of quality assured recycled material in new products in order to close the loop as effectively as possible. Depending on the material stream, action needed and policy support, emphasis is placed on separate collection, treatment/recycling pathways or the use of secondary raw materials.

► **Table 2:** Recycling and recovery indicators and targets

Recycling and recovery indicators and targets		
Approach	Indicator	Target
Increase in the recycling rate of municipal solid waste	Percentage of waste recycled	Permanent increase in the recycling rate of municipal solid waste to over 65 percent from 2020
Increase in the recycling of plastic waste (from which harmful substances have been removed)	Recycling rate for plastic waste	Significant increase in recycling rate by 2020
Increase in the use of recycled construction materials – recycled aggregates as concrete aggregate	Percentage of recycled aggregate used as concrete aggregate relative to total volume of mineral recycled construction materials	Significant increase by 2030
Increase in the high-quality use of recycled construction materials – separation of gypsum from construction and demolition waste and establishment of recycling	Percentage of recycled material in manufacture of gypsum board (plasterboard)	Significant increase by 2030
Improvement of end-of-life vehicle recycling – separation of automotive electronic components (primarily circuit boards and rare earth magnets) from end-of-life vehicles before shredding	Mass of separated automotive electronics per end-of-life vehicle	Largest possible proportion of automotive electronics removed from each end-of-life vehicle by 2020
Increase in collection and recycling of waste electrical and electronic equipment (WEEE)	Ratio of total weight of collected WEEE to average weight of electrical and electronic equipment placed on the market in the three preceding years	Permanent increase in the collection rate: collection rate must be at least 65 percent from 2019
Increase in collection and recycling/recovery of organic waste	Quantity of organic waste collected	50 percent increase in the quantity of separately collected organic waste and high-quality recycling/recovery of such waste – primarily cascading use – by 2020 relative to 2010
Increase in the recovery of economically usable phosphorus from secondary sources	Recovery rate of phosphorus (for example in readily plant-available form) from wastewater/sewage sludge	Significant increase no later than ten years after entry into force of the new Sewage Sludge Ordinance

Source: BMUB

Table 2 provides an overview of recycling and recovery indicators and targets.

The two indicators DERec (direct effects of recovery) and DIERec (direct and indirect effects of recovery) developed on behalf of BMUB (see Table 3) make it possible to present the direct and indirect effects of substituting primary raw materials with secondary raw materials. DERec is a virtual indicator reflecting the extent to which primary raw materials, semi-finished and finished goods – assuming like production patterns and technologies – would have to be imported or produced domestically if no secondary raw materials were to be used in production. DIERec additionally reflects the extent to which primary raw materials – assuming like production patterns and technologies – would have to be produced not only domestically, but also globally. Following the completion of studies to determine DERec and DIERec for specific material streams, an evaluation must then be carried out to identify what rates of increase in DERec as a percentage of DMI and DIERec as a percentage of RMI are appropriate environmentally and economically and are realistically attainable.

6.3 Looking ahead

The indicators will be reviewed with regard to their quality and information value and improved in the onward development of the German Resource Efficiency Programme.

In addition, macro-level models are in development that will make it possible to add key indicators revealing the economic, social and environmental effects

of resource policy. This will allow the identification of synergies with other environmental policy areas (such as climate change and biodiversity conservation) and for the overall economy (such as in terms of jobs, competitiveness, and exports by providers of efficiency technologies).

Meso-level approaches for the evaluation of resource efficiency are also to be developed. Such an approach is currently in development for the construction sector. It is based on a broad definition of resources. The plan is to integrate the specific needs of the construction industry into the analysis. The evaluation of resource efficiency will then span the entire construction value chain in a life-cycle approach.

The environmental situation in Germany is subject to regular reporting. Information on the use of water, soil, land, energy and raw materials, on emissions of air pollutants and on the state of biodiversity provide an overview of the pressures on natural resources in Germany. What has been subjected to very little analysis so far is the use of natural resources abroad as a result of German imports of goods.

Rising import volumes make this aspect of German resource use increasingly significant. Future analyses will therefore additionally measure and separately present the use of soil, water, land, energy and raw materials associated with the production and transportation of imported goods together with the impacts on air quality, the climate and biodiversity. This will make it possible to present the magnitude of ‘exported’ resource use and to identify displacement effects where resource use is transferred abroad.

► **Table 3:** Recycling and recovery indicators in development

Recycling and recovery indicators (in development)	
Approach	Indicator
Reduction in the primary material requirement (including for imported products) by the use of secondary raw materials (from which harmful substances have been removed)	Direct effects of recovery (DERec) as a percentage of direct material input (DMI)
Reduction in the primary material requirement (including for imports of raw materials used abroad) by the use of secondary raw materials (from which harmful substances have been removed)	Direct and indirect effects of recovery (DIERec) as a percentage of raw material input (RMI)

Source: BMUB



7 ▶ Action areas 2016 to 2019

Successful implementation of resource policy

There is no single instrument in the resource policy toolkit that meets the needs of all areas. An important building block has already been put in place with the Circular Economy Act (KrWG). It is necessary to go beyond this, however, and identify a policy package that, as the net outcome of individual measures and instruments, is capable of effectively attaining the goals of resource policy in the various application areas and across different levels of value creation and value chains.

ProgRes II is designed as a 'learning' programme. The Federal Government will continuously develop the measures and instruments individually and in combination on the basis of the outcomes achieved, and will adapt them to changes as they arise. It will once again report on the implementation status and ongoing development of the programme in 2020 (ProgRes III).

The policy approaches presented in the programme are the responsibility of the respective federal ministries and – subject to available budgetary resources – are funded under prevailing budgetary and fiscal planning allocations (including budgeted staff positions).

The Federal Government aims to make use of the scope for improvements in resource efficiency in order to safeguard prosperity, protect the environment and strengthen the competitiveness of German industry. Voluntary action and incentives play a key part here.

Further development of adequate stakeholder participation

Strengthening the resource efficiency programme means fleshing it out, enhancing its impact and where necessary adding new instruments.

Stakeholder participation – bringing on board relevant players such as industry, environmental and consumer organisations, the academic and research community, the *Länder*, local government and the unions – can provide key impetus for further development of the programme's substance and for practical and innovation-fostering implementation. In the future development

of ProgRes, the Federal Government will continue to involve relevant parties from across society. This also includes adequate public participation.

Ensuring coherence with other policies

To ensure policy coherence, unlock synergies and resolve potential conflicts, resource policy must be dovetailed with other policy areas such as industrial policy, social policy and other areas of environmental policy. This is done in order to make use of available synergies and to identify and as far as possible to resolve goal conflicts at an early stage.

The Federal Government aims for a holistic resource policy approach with the closest possible integration of all national and international policy levels in the area of resource policy. As early as 2010 in its Raw Material Strategy, the Federal Government pledged to provide the policy, legal and institutional framework to help secure a sustainable, internationally competitive supply of raw materials for German industry. It will implement measures on a balanced basis in keeping with the guiding principle of sustainable development. Economic, environmental and social aspects of a sustainable resource economy are to be given equal consideration in the process.

To this end, in its Raw Material Strategy of 2010, the Federal Government announced the development of a national resource efficiency programme directed in particular at the minimisation of impacts on environmental media due to resource extraction and processing. ProgRes II, like ProgRes I, therefore analyses the entire value chain from sustainable resource extraction, production and product design through to consumption and closing material cycles.

Ensuring efficiency in the design of policy measures

The Federal Government aims across the board to limit and where possible reduce the administrative burden for the public, industry and especially SMEs. Before adopting any measures, it will therefore weigh the benefit in terms of resource efficiency gains against the cost.

7.1 Securing a sustainable raw material supply

A sustainable supply of mineral resources to match demand is of critical importance to German industry. Raw materials policy and the raw materials industry accordingly have a special responsibility to conserve and protect the natural foundations of life for future generations. The guiding principle of sustainable development must therefore be applied as fully as possible in the extraction and use of natural resources, in the design, production and use of goods, and in the recycling and recovery of materials in waste streams.

7.1.1 More environment-friendly extraction of mineral and fossil raw materials

Policy approach

- ◆ Ongoing improvement of best available techniques in mining activities

The Federal Government is committed to continuous improvement in the environmental performance of raw material extraction at national and European level. Among other things, it is active in the process of revising the Reference Document on Best Available Techniques for Management of Tailings and Waste-Rock in Mining Activities, which lays down the technical requirements for implementation of the EU Mining Waste Directive (2006/21/EC).

It will also campaign intensively for strict environmental requirements in the Mining Codes of the International Seabed Authority and subject them to practical review in connection with the two German exploration licences (in the Pacific and in the Indian Ocean).

7.1.2 Strengthening environmental, social and transparency standards internationally and making supply chains more sustainable

Policy approaches

- ◆ Strengthening of the development policy component of the German Raw Material Strategy
- ◆ Intensification and expansion of raw material certification for compliance with environmental and social standards, for example on similar lines to certified trading chains (CTC)
- ◆ Incorporation of binding and specific stipulations on compliance with environmental, social and transparency standards in resource partnerships and similar arrangements
- ◆ Support for implementation of the EITI standard in Germany
- ◆ Compilation of a national action plan for implementation of the United Nations Guiding Principles on Business and Human Rights
- ◆ Promotion of compliance with social and environmental minimum standards in the production and supply chains of raw materials and goods imported to Germany
- ◆ Support for implementation of the OECD Due Diligence Guidance for Responsible Mineral Supply Chains
- ◆ Support for business enterprises in improving sustainable supply chain management



The Federal Government will further strengthen the development policy component of the German Raw Material Strategy in bilateral and international programmes carried out by BMZ in order to contribute towards globally equitable raw materials policy. It will continue to work for the raw materials industry to be made more sustainable and for observance of human rights and of internationally recognised social and environmental standards.

Accordingly, in resource diplomacy and in international negotiations and other relevant processes, the Federal Government advocates the coordination, dissemination and observance of environmental and social standards in mining. With its longstanding experience, most of all in research, it will also contribute to the setting of high international standards for sustainable and developmentally equitable deep sea mining.

Good governance is of fundamental importance to the raw materials sector, both as a precondition for compliance with and improvement of social and environmental standards and in the area of public finances. This is the only way to ensure that revenue from the raw materials sector benefits the people, and most of all that it is also invested in education, infrastructure, healthcare and environmental protection. Resource partnerships under the Raw Material Strategy therefore aim as part of a comprehensive development strategy to help improve resource governance in partner countries.

In the context of its resource partnerships, the Federal Government therefore works in partner countries to reduce environmental impacts from the mining of raw materials, improve the human rights situation, promote good governance and strengthen state institutions that support these goals.

It continues to urge partner countries to implement the Extractive Industries Transparency Initiative (EITI). To lead by example, the Federal Government itself resolved to implement the EITI standard in 2014 and submitted the German candidature application in 2015.

The Federal Government also encourages partner countries to recognise and implement the rights set out in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) and to pledge compliance

with the International Labor Organization (ILO) Convention concerning Indigenous and Tribal Peoples in Independent Countries (C169).

With all funding instruments under the Raw Material Strategy, eligibility is verified with regard to internationally recognised standards of due diligence regarding human rights, transparency, participation, environmental protection and occupational safety and health. These include the OECD Guidelines for Multinational Enterprises, the UN Guiding Principles on Business and Human Rights, the ILO Core Labour Standards, the Convention concerning Indigenous and Tribal Peoples in Independent Countries (ILO 169), the World Bank Safeguard Policies, the Extractive Industries Transparency Initiative (EITI) and, where relevant, the EU Accounting and Transparency Directives and the United Nations Convention on Mercury (Minamata Convention).

Since 2014, with the Federal Foreign Office as lead agency, the Federal Government has been compiling a National Action Plan on Implementation of the UN Guiding Principles on Business and Human Rights. These are the central framework on corporate human rights responsibility in the globalising economy. Their aim is to encourage companies, especially in risk sectors, to exercise worldwide responsibility with regard to human rights, and to provide them with active support in meeting this requirement.

BGR and BMZ continue their work in support of the further development and practical implementation of existing certified trading chain (CTC) systems in the African Great Lakes region.

The Federal Government endorses the European Commission's aim of preventing revenue from trade in raw materials from being used to fund armed conflicts. Curbing conflict financing should help stabilise the regions concerned, and improve the human rights situation, environmental conditions and hence socio-economic development.

The Federal Government is committed to obtaining rigorous wording and enforcement of the EU regulation on raw materials from conflict-affected areas under consultation at the time of adoption of this progress report.

It will support companies in applying the regulation and act to promote sustainable supply chain management.

The Federal Government will urge compliance with social and environmental minimum standards in the production and supply chains of raw materials and goods imported to Germany. In connection with the G7 initiative for better application of social, labour and environmental standards in global supply chains, the Federal Government provides support among other things for multi-stakeholder approaches to enhance transparency in supply chains.

7.1.3 Considering ecological limits and social inequalities in the appraisal of raw material availability

Policy approaches

- ◆ Consideration of nature conservation, environmental and social aspects in resource criticality assessment
- ◆ Support for projects to develop means of assessing the environmental and social sustainability of resource extraction activities

The Federal Government is committed to ensuring that nature conservation, environmental and social aspects are given greater consideration in raw material criticality assessment at national and European level. The German Raw Material Strategy calls for cost-benefit analysis including externalised costs, notably from damage to the environment or inhumane working conditions. Performance of this analysis requires the refinement and review of methods for systematic assessment of externalities. To this end, the German Government supports projects to develop systems for assessing the

environmental and social sustainability of raw material extraction activities. The project's findings will be made available for the updating of the report on critical raw material for the EU, making it possible to incorporate environmental and social aspects into raw material criticality assessment and to align measures to secure supplies of raw materials more precisely to environmental and social criteria.

7.1.4 Reducing dependence on critical raw materials by substitution

Policy approach

- ◆ Development and implementation of a strategy for and intensification of research on substitution of critical raw materials

Innovative environmental technologies can help improve resource efficiency, for example in the areas of innovative material, catalyst, control and propulsion technologies. Many environmental technologies are based on the use of functional, critical raw materials that are already subject to structural, geopolitical, social, economic and/or environmental risks on a global scale. It is likely that efficiency and recycling strategies will not be sufficient on their own to substantially alleviate the critical status of materials such as gallium, indium, antimony and heavy rare earths and to ensure the widespread establishment of key environmental technologies not only in Germany, but worldwide. To meet Germany's special interests as consumer, producer, exporter and technology leader, the Federal Government will systematically invest in research on substitution, and will develop and implement a strategy on the substitution of critical raw materials for environmental and other technologies. Due consideration will be given in this process to the concept of remanufacturing.

7.1.5 Environment-friendly expansion of material use of regenerative resources

Policy approaches

- ◆ Nature-friendly and environment-friendly use of biomass materials
- ◆ Establishment of support structures for sustainable cascading use

In line with the guiding principle under the National Policy Strategy on Bioeconomy of prioritising higher value-added uses, increased focus is to be placed on the material use of biomass.

Security of supply is not the only reason to highlight the role of biomass as a regenerative source of carbon. Comparing the environmental impacts of material-only and energy-only use of biomass shows that a combination of material and energy use (cascading use) has advantages in terms of environmental and climate footprint. Food security has priority. Where technically and economically feasible and viable, sustainably produced excess quantities should preferably be channelled to material uses (for example in the chemical industry). A central aim of the bioeconomy is to achieve a sustainable balance between all uses of biogenic resources – from food and feed production to material and energy use.

Usable organic waste is universally collected and recycled to high standards as a substitute for material and energy resources. The target is a 50 percent increase in the quantity of organic waste collected by 2020 relative to 2010 (see section 6.2.2). In collaboration with research and industry partners, the Federal Government will exhaust all possibilities for ensuring the sustainable and efficient production and use of biomass and promoting the establishment of support structures for cascading use. The legal basis for the cascading use of waste in the circular economy is provided in the Circular Economy Act (see section 8 (2), second sentence, KrWG). On the research side,

support is additionally provided under the BMBF Research for Sustainable Development (FONA³) programme for the development and implementation of integrated approaches for sustainable land use and regional resource cycles.

7.1.6 Adding to the resource base by using CO₂ as a feedstock

Policy approaches

- ◆ Transfer of research outcomes to the market through targeted support for 'power to X' pilot plants
- ◆ Boosting research into incorporating CO₂ into the existing carbon value chain
- ◆ Intensification of the cross-sector approach for exploiting large-volume CO₂ streams

Using CO₂ as a feedstock can add to the resource base for the chemical industry. Even bigger improvements in resource efficiency can be obtained by plugging the chemical industry into the CO₂ streams produced as a waste product by energy-intensive industries such as steel and cement making. The Federal Government will therefore step up research funding on the use of CO₂ as a feedstock and its incorporation into existing value chains, most of all in cross-sectoral approaches.

CO₂ can also be used in combination with renewable energy sources in what are referred to as 'power to X' technologies. This also helps secure long-term supplies of liquid fuels that continue to be needed for the transport sector (aviation, heavy transport, shipping and the automotive sector), and can serve as a means of chemical storage for 'surplus' renewable energy. Based on the research outcomes so far, the Federal Government will provide funding on a targeted basis for pilot projects to demonstrate the technical and economic feasibility of the processes concerned, and will ease market access, for example with changes in regulatory and tax law.

7.2 Increasing resource efficiency in production

7.2.1 Developing and disseminating resource-efficient production and processing methods

Policy approaches

- ◆ Continuation and expansion of funding programmes for material and energy-efficient technologies and processes
- ◆ Intensification of information exchange on material and energy-efficient technologies in the Seville process to disseminate such technologies in Germany and the EU

Outcomes of the Environmental Innovation Programme (UIP) provide an important basis for advancing the technological state of the art and environmental law. The Federal Government will therefore continue with the UIP and incorporate the knowledge gained in processes at national and European level.

Voluntary exchange of information under Article 13 of the Industrial Emissions Directive (2010/75/EU) and the resulting derivation of emission levels to harmonise European industrial installations law is the right means of identifying innovative production processes with low material and resource use in Europe. Work is underway at European level to determine to what extent such processes and technologies can serve as best available technologies (BAT) for emission reduction. The conditions attached to permits must not allow the emission ranges attained under BAT to be exceeded. BAT conclusions thus describe the environmental protection standard in the EU and at the same time form the basis for national environmental law. The Federal Government plans to intensify the necessary data transfer for data provision.

The Federal Government is also committed to continuation and improvement of the Seville process. Standards and directives can serve as a further step towards codifying the state of the art and ensuring its widest possible adoption.

The concept of industrial symbiosis has been discussed in research and policymaking for some time. The general definition of industrial symbiosis is where a company or sector uses waste or by-products (such as energy, water or material) from another company or sector, resulting in an exchange relationship of benefit to both sides. Industrial symbiosis can contribute substantially to resource efficiency of companies. Such symbiosis is already a reality at many production locations, for example in the chemical industry.

The Federal Government supports such processes by promoting industrial networks. In this, it goes beyond industry-industry relationships and also supports symbiotic relationships between industry and residential areas.

7.2.2 Expanding efficiency consulting for companies

Policy approaches

- ◆ Nationwide expansion of resource efficiency consulting
- ◆ Improvement of the infrastructure for training of business consultants
- ◆ Further enhancement of the Resource Efficiency Competence Pool to exploit synergies

The Federal Government and the governments of the *Länder* have already created a range of institutions that provide information and consulting services for businesses in the area of resource efficiency. Presented

in user-friendly form, this includes information on innovative resource-efficient solutions in all major areas of the manufacturing industry, made available through websites, events and publications. The already established close collaboration with key intermediaries such as chambers of commerce and industry, industry associations, research institutions and others is to be continued. Institutions in Germany that are important in the area of business resource efficiency participate in a regular exchange in the Resource Efficiency Competence Pool. A wider group takes part in exchange within the Resource Efficiency Network.

For many businesses, however, and especially SMEs, information alone is not enough for them to identify and implement suitable resource efficiency measures in their operations. A number of the federal and *Länder* institutions just mentioned have therefore adopted the task of supporting businesses with tailored consulting services or funding for such services.

The Federal Government supports the nationwide expansion of efficiency consulting and better interlinking of material and energy efficiency advice services. The established infrastructure for workforce and consultant training is to be further enhanced. An important Federal Government contribution towards the enhancement of business efficiency consulting consists of the resources of the Competence Centre for Resource Efficiency, which is funded under the BMUB National Climate Initiative and operated under contract by VDI ZRE.

Use can also be made of the EDIT Value Tool² developed as part of a transnational EU project, PRESOURCE³. The Edit Value Tool uses comprehensive analysis to help SMEs in particular tap their potential for resource efficiency⁴.

 www.presource.eu/competence/toolkit

The various consulting agencies at federal and *Länder* level continue to collaborate in the Resource Efficiency Competence Pool in order to avoid duplication of work between agencies, exploit synergies and coordinate the services provided for SMEs.

7.2.3 Creating incentives to use energy and environmental management systems

Policy approaches

- ◆ Greater prominence given to EMAS and ISO 50001 in funding programmes and to EMAS companies and, with regard to energy issues, ISO 50001-certified companies in the public procurement of goods and services
- ◆ Reduction in the effort and expense involved in introducing energy and environmental management systems, among other things by developing practical aids
- ◆ Linking of state incentives to the adoption of energy and environmental management systems
- ◆ Examination of further administrative simplifications for EMAS companies
- ◆ Improvement of the conditions for introducing EMAS and energy management systems
- ◆ Participation in the onward development of standards for energy management systems
- ◆ Development of services relating to adoption of energy management systems in SMEs

Companies that operate environmental management systems in accordance with EMAS or the ISO 14001 standard or energy management systems in accordance with the ISO 50001 standard can systematically identify and make use of their potential for resource savings. The Federal Government therefore encourages substantially greater involvement of companies, public entities and organisations of all kinds in the implementation and further

2 Promotion of Resource Efficiency in SMEs in Central Europe.

3 Eco Innovation Diagnosis and Implementation Tool for Increase of Enterprise Value.

4 Further information is available at www.resourceefficiencyatlas.eu/toolkit

development of standards relating to such management systems and will further improve the conditions for this. It is committed to EMAS as the most comprehensive environmental management and audit system.

To promote EMAS, the Federal Government and the *Länder* already provide a range of administrative simplifications and financial incentives such as reduced fees in administrative procedures and regulatory monitoring. The Federal Government also supports the introduction of energy management systems with grants, for example under a Federal Ministry for Economic Affairs and Energy (BMWi) directive on funding for energy management systems. Further incentives are needed, however, to make EMAS and energy management systems more attractive. In small and medium-sized enterprises especially, there is a need for more attractive introductory services for energy and environmental management systems, without the barrier of major effort and expense.

This also requires targeted advice for SMEs and involvement in sector-specific adaptation and further development of standards for energy management systems. The Federal Government will follow a dual strategy of both increasing the benefits of EMAS and energy management systems and reducing the effort and expense involved. It also plans to reduce the effort and expense for businesses by providing practical aids such as templates for semi-standardised EMAS environmental statements that are designed to meet official information requirements. It also communicates with the European Commission with regard to the need to give greater prominence to EMAS in EU environmental law.

A number of state incentives for businesses are already tied to adoption of an environmental or energy management system, such as energy and electricity tax relief in connection with peak equalisation ('Spitzenausgleich') and the special equalisation scheme ('besondere Ausgleichsregelung') under the Renewable Energy Sources Act (EEG). The Federal Government will therefore assess the suitability of similar arrangements to promote resource efficiency, subject to conformity with the law being a condition for certification. The Federal Government will additionally assess how support for

enterprises can be better tied to the promotion of environmental and energy management systems. It will also consider introducing resource efficiency audits for non-SMEs. State enforcement monitoring is to be reduced in circumstances where environmental auditors have verified conformity with the law in on-site appraisal of EMAS companies.

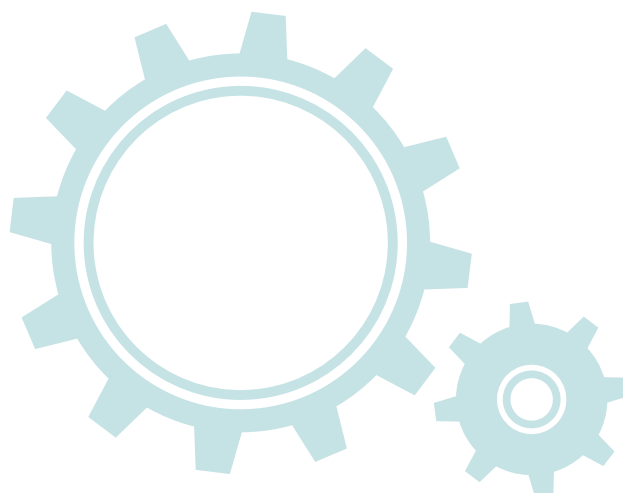
7.3. Making production and consumption more resource-efficient

7.3.1 Implementing the National Programme for Sustainable Consumption

Policy approach

- ◆ Implementation of the National Programme for Sustainable Consumption by the Federal Government

In the National Programme for Sustainable Consumption, the Federal Government aims to identify and exploit environmental, social and economic potential for sustainable consumption. The programme features approaches and measures for sustainable consumption in areas such as mobility, nutrition, and housing and the household. The programme also includes cross-cutting approaches.



7.3.2 Introducing resource efficiency as a criterion for retailers and consumers

Policy approaches

- ◆ Increased use of the potential of wholesale and retail (including online retail) or better positioning of resource-efficient products
- ◆ Improved consumer information on resource-efficient products
- ◆ Promotion of resource-efficient lifestyles

» Statutory labelling requirements should be introduced for all products and goods stating the resources used in production and those necessary for disposal. [...] Among other things, labelling should show a product's minimum shelf-life, resource origin, durability and suitability for recycling. «

from the citizens' recommendations

The wholesale and retail sector is a key player and should be recruited to enhance the market placement of resource-efficient products and consumer awareness. This could be achieved by means such as providing information exemplifying the sustainability of supply chains in a consumer-friendly form and increasing awareness of independent and credible environmental and social labelling.

The 'Umweltbewusst leben' ('Green Living') consumer guidance portal is to be expanded as a central metaportal and promoted in campaigns tailored to the various target

groups. Further information products on sustainable consumption and explaining environmental marks and labels are to be developed on an ongoing basis and coordinated with each other. This will serve to support and positively communicate sustainable lifestyles.

The Federal Government will support local consumer advice and develop information products that relate to consumers' everyday experience. Greater emphasis will also be given to advice on capital and savings-related topics such as resource-efficient home improvements and green investments.

The Federal Government's consumer portal on labelling, siegelklarheit.de, is to be expanded to cover environmental and social labels in additional resource-related sectors and supplemented for use in public procurement.

7.3.3 Incorporating resource efficiency in product development

Policy approaches

- ◆ Investigation and, if appropriate, introduction of minimum requirements and information requirements for producers on the material efficiency, lifetime and recyclability of products in implementation of the EU Ecodesign Directive and the EU Energy Labelling Directive
- ◆ Assessment of the adoption and enhancement of legal instruments in favour of longer lived products and sustainable consumption
- ◆ Greater support for resource efficiency through standard setting
- ◆ Retention of the Federal Ecodesign Award as a platform for product excellence in environmental performance and design
- ◆ Establishment of study modules on ecodesign in the academic training of designers and technical product developers

The Federal Government will urge for central elements of resource efficiency to be incorporated in existing legislation. The implementing regulations on the Ecodesign Directive (2009/125/EC) and the Energy Labelling Directive (2010/30/EU) provide a good basis for this purpose. Going beyond the previous focus on energy consumption, first steps have now been taken to extend work under the EU Ecodesign Directive to cover material efficiency, for example with preliminary studies on a material efficiency tool. Greater consideration will also be given to minimum standards and information requirements on the lifetime of products and to requirements on recyclability.

At both national and European level, the Federal Government works for greater prominence to be given to resource conservation in standard setting. Standards can contribute in diverse ways to resource efficiency by lengthening product lifetimes (for example with better repairability, reuse and continued use) or improving their recycling. Standardisation of modular design, for example, makes batteries easier to replace. Power adapters and connectors that are compatible with all mobile information technology devices (smartphones, tablets, laptops, etc.) can continue to be used with a new device. This reduces waste and saves both natural resources and money.

» Technical products should be durable and repairable. «

from the citizens' recommendations

The Federal Government will also consider national legislative measures to promote supply and demand for resource-efficient products with longer lifetimes in use and/or functional lifetimes.

Continuation of the Federal Ecodesign Award has been secured to 2018 and the awards are also to be retained beyond 2018. The aim is to establish the Federal Ecodesign Award as an important brand for producers and

consumers and to further boost competition in the design scene. The best practice platform associated with the Federal Ecodesign Award is to be further expanded. Study aids on ecodesign developed for the Federal Environment Agency are to be disseminated to and established at as many universities and other institutions of higher education as possible.

7.3.4 Using social innovations and (product) service systems to enhance resource efficiency

Policy approaches

- ◆ Strengthening social innovation for more conscious resource use
- ◆ Promoting sharing economy models, projects and stakeholders
- ◆ Extending products' lifetime by promoting trade in used goods

Reductions in natural resource use cannot be achieved by technical innovation alone. Social innovation is also needed. Social innovations relate to new practices, lifestyles and consumption forms such as shared use (car sharing, flat sharing and product sharing arrangements), institutionalised forms of mutual help with repairs (repair cafés, DIY garages and similar), and cooperatives. They can change attitudes and spark off learning processes. Appreciation of value, shared use, product serviceability and reparability and longer lifetimes in use can lead to reduced resource use.

The Federal Government will support social innovation in various ways: Promotion of public dialogue on the potential of social innovation for resource efficiency (for example by establishing a futures forum), establishment of a national network as a platform for social experiment and learning, launching of a round table involving banks, foundations and social networks to establish new funding models for social innovation (such as crowd-funding and joint venture capital), and establishment of

a national contact point on social innovation and collaborative consumption.

A wide variety of new business models have developed in recent years, such as web-based services, distribution channels and used goods stores. The Federal Government supports the market entry and establishment of such models with a range of measures, such as establishing (regional) sharing economy networks (including funding for peer-to-peer platforms), assistance for do-it-yourself garages, and promoting the use of community gardens. In all such models, it is important to ensure continued observance of labour law requirements, trade regulations and the social protection of affected workers.

The Federal Government supports public procurement services in the purchase of used equipment and recycled products and is improving the conditions for the resale of used equipment by the administration.

7.3.5 Expanding incentives for better market penetration with resource-efficient products and services

Policy approaches

- ◆ Establishment of regular monitoring of market developments in resource-efficient products, including introduction of a market index
- ◆ Increased product diversity in the Blue Angel 'protects resources' category
- ◆ Support and identification of measures to provide information on the availability of spare parts and repair manuals, most of all for independent repairers

The Federal Government will systematically monitor the development of the market for resource-efficient products and continue work to establish an index tracking market developments.

The Federal Government is committed to the spread and harmonisation of voluntary environmental labels

promoting high environmental standards. The basis of this work is the Blue Angel environmental label, under which product diversity is to be increased in the 'protects resources' category. Additionally, resource-related requirements are to be given greater emphasis in the existing award criteria for the Blue Angel.

At European level, the Federal Government supports the identification of measures to provide information on the availability of spare parts and repair manuals, most of all for independent repairers.

7.3.6 Promoting resource efficiency in procurement

Policy approaches

- ◆ Additions to resource conservation requirements, notably in federal framework contracts for the procurement of standard products (procurement of goods and services)
- ◆ Further development of the information provided by and the procurement recommendations of the Competence Centre for Sustainable Procurement (KNB) and the Federal Environment Agency in relation to resource efficiency
- ◆ Procurement for the federal administration to change over to recycled paper

The public sector and its many institutions constitute a major source of demand for products and consumption of resources. Because of the large quantities purchased, the public sector can deliberately support the market launch and diffusion of environment-friendly products, most of all when it comes to standard products such as office equipment (furniture, monitors, computers, etc.).

Demand for resource-efficient products and services is therefore to be promoted in public procurement and among large-scale consumers. A good platform for this purpose is provided by the Alliance for Sustainable Procurement, which also includes the *Länder* and

local authority associations. The Federal Government will examine whether tenders for goods and services can be made to include resource conservation requirements that go beyond existing rules, for example under section 45 of the Circular Economy Act. Any such requirements would have to be compatible with other applicable laws.

The overriding precept of cost-effectiveness must be observed in all public procurement activities. Where possible, as is already provided for in procurement law, the most economic proposal is to be determined on the basis of monetary life-cycle costs and not just cost of purchase. In view of the leverage effect, this applies most of all in connection with framework contracts for standard products. More recycled paper labelled with the Blue Angel and more green IT products are being procured for the federal administration.

For greater consideration to be given to resource conservation requirements, most of all with regard to life-cycle costing, it is necessary for the relevant agencies in the Federal Government – primarily BMUB and UBA – to compile and provide public-sector procurers with specific guidance on how to include resource efficiency criteria and how to calculate life-cycle costs for specific products and product groups. In order for such criteria to be applied, the effort and expense involved in doing so must be reasonable. An initial selection of working aids are already available free of charge on the websites of the Competence Centre for Sustainable Procurement and UBA.



www.nachhaltige-beschaffung.info
www.beschaffung.info.de
(only in German)

Resource-efficient procurement also means ensuring – subject to cost-effectiveness – that products are used as long as possible and that pre-owned or reconditioned products and materials are included in the procurement process.

7.4 Developing a resource-efficient circular economy

7.4.1 Avoiding waste

Policy approaches

- ◆ Strengthening waste prevention initiatives by establishing dialogues and networking between political and social actors
- ◆ Strengthening the reuse of used products

The Federal Government will support and further develop the measures proposed in the Waste Prevention Programme of the German Government with the involvement of the Federal *Länder*. An important part is played by the establishment of professional dialogues and networking between relevant players in business, research, the media, environmental and consumer organisations, the Federal Government, the *Länder* and local authorities in order to spread information about best practices, exchange experience of successful approaches and remove obstacles.

The dialogue process (see also section 4.2.4) is accompanied by activities such as continuation of the European Week for Waste Reduction and the review of measures under the Waste Prevention Programme where the programme identifies a need for review. On the basis of these activities, the Waste Prevention Programme is to be evaluated and updated as necessary in accordance with section 33 (5) of the Circular Economy Act.



7.4.2 Strengthening product responsibility

Policy approaches

- ◆ Assessment of whether product responsibility can be meaningfully applied to additional product groups with untapped recycling potential
- ◆ Promotion of voluntary commitments by producers to reuse and recycle the products they place on the market
- ◆ Examination of possible measures to increase the use of secondary plastics
- ◆ Increasing quantities collected by involving the retail trade in consumer-oriented collection schemes, and increasing the recycling of waste electrical and electronic equipment by making use of the power to issue secondary legislation laying down treatment requirements
- ◆ Collection of packaging and of non-packaging items made of the same materials in uniform kerbside recycling collection schemes throughout the country
- ◆ Increasing the recycling of plastics by better separation of high recycling content waste streams and advancement of sorting technology

The legal definition of waste is sufficiently broad to include novel products at the end of their useful lives. However, novel products and materials pose a challenge when it comes to implementing the waste hierarchy. The focus here is once again on realising any potential for resource efficiency. Among other things, this makes it necessary to assess whether product responsibility can be extended to novel products.

Wind turbines are an example. There were about 24,500 wind turbines in Germany in 2014, with more being added all the time. A single unit can weigh over 300 tonnes. Assuming an approximately 20-year lifetime, there will be some 20,000 tonnes a year of rotor blades

alone to be dealt with from 2020, with the quantity projected to rise to about 31,000 tonnes a year from 2027. This means a system needs to be developed and put in place for the high-quality recycling of these elaborately manufactured fibre-reinforced composites. Product responsibility can also be assumed on a voluntary basis. An example is AGRAPA – an alliance of paper industry associations and organisations, paper importers, paper wholesalers, the printing industry and publishers – which gave a voluntary commitment as early as 1994 to increase the recycling of waste printing paper in several stages. Implementation of this voluntary commitment has been very successful, with recycling rates today generally over 80 percent.

» Instead of materials which are difficult to recycle, simple basic substances which enable easy, environmentally-sound recycling must be used. «

from the citizens' recommendations

The Federal Government will adopt arrangements to increase the recycling of plastics by improving the separate collection of plastic waste, among other things in commercial waste. The Federal Government will develop the Packaging Ordinance into a Recyclable Materials Act (Wertstoffgesetz) in order to realise unexploited potential for recycling.

The Recyclable Materials Act will lay down ambitious recycling rates.

The increasing use of critical, environmentally relevant metals in products calls for new and adapted collection and logistics systems and treatment methods to reclaim such metals by recycling. The Federal Government has improved the provision for collecting waste electrical and electronic equipment (for example by imposing a take-back obligation on retailers) in the recent major revision of the Electrical and Electronic Equipment Act (ElektroG) and will lay down requirements for high-quality recycling in secondary legislation issued under

the new act. Preparatory work for the drafting of the secondary legislation has already begun. Maximising the collection of such waste generates commercially attractive quantities and allows economic recycling, with positive impacts on investment and research.

Another area being looked into is the potential for and the possibility of supporting collaboration with German and international business enterprises outside of Europe on recycling and/or take-back schemes for their products. BMZ has already scored initial successes here in strategic alliances with businesses, for example in the environment-friendly management of chemical waste in Southeast Asia and support for the recycling of discarded mobile phones in South Africa.

7.4.3 Supporting recycling and recovery structures in emerging and developing countries

Policy approach

- ◆ Supporting the establishment of suitable infrastructure for economically and environmentally efficient waste management and a resource-efficient circular economy in developing countries through cooperation and through information and technology transfer

Germany helps developing countries build viable waste management and recycling systems for environment-friendly and hygienic waste collection and processing with maximum levels of material and energy recovery. BMZ's existing development cooperation work is supplemented here by other promising activities to speed up the establishment of regional recycling infrastructure (notably in collaboration with German RETech Partnership e. V.) under an environmental technologies export initiative supported jointly by BMWi and BMUB. German RETech Partnership e. V. was established in 2011 as a successor to the Federal Environment Ministry's Recycling and Efficiency Technology Initiative. Its main focus is on supporting the application of the German

recycling industry's sustainable environmental technologies abroad, with projects so far in countries including Serbia and Croatia. It serves as a point of contact for all public and private organisations and entities in Germany and abroad with an interest in German resource and efficiency technologies, and provides a neutral platform for companies interested in technologies for recycling and waste management needs and the export of such technologies. German RETech Partnership e. V. supports the Federal Government's export promotion activities for the recycling market and promotes Germany's leadership in environmental technology. BMUB, BMWi and BMZ represent the Federal Government on the RETech Advisory Board.

7.4.4 Improving the collection and recycling of resource-relevant bulk waste streams

Policy approaches

- ◆ Analysis and where appropriate exploitation of previously untapped or little-used potential for metals in scrap, and in particular alloy content in scrap
- ◆ Increased use of recycled aggregates
- ◆ Removal of hazardous substances from recycling processes

Nonferrous and ferrous metals are efficiently collected and recycled in Germany, both in production and at the end of the product lifecycle. Reclaiming metals contained or alloyed in scrap offers substantial potential for improving resource efficiency. The Federal Government will support the development of economic metal recycling processes and industrial-scale pilot trials of such processes, together with the development of ultra-sensitive analysis and separation technologies (such as for alloyed steel and aluminium scrap) to prevent 'downcycling' and further improve recycling as a whole.

The Federal Government supports the increased use of recycled and quality-assured aggregates in building and civil engineering. The Federal Government will assess the economic and environmental rationale for higher recycling rates in light of the 90-percent-plus recycling rates already attained with mineral construction and demolition waste. A binding legal framework for requirements relating to the production and use of mineral substitute building materials in engineering structures is provided in the Substitute Building Materials Ordinance. The Federal Government will modify the Federal Soil Protection and Contaminated Sites Ordinance to stipulate uniform national environmental and precautionary requirements for backfilling excavated material. Another measure to attain high recycling rates is the obligation for separate collection of mineral demolition waste in the revised Commercial Wastes Ordinance. It is also necessary to ensure a level playing field for quality-assured recycled aggregates (substitute building materials) in public procurement.

The Federal Government will investigate the extent to which paper recycling is affected by the presence of specific substances (such as mineral oils) in waste paper. Contaminants should be avoided as far as possible in the manufacture and processing of paper products.

Mixed commercial municipal solid waste offers previously unexploited potential for recycling, notably with regard to plastics. Better use can be made of this potential by specifying detailed priority requirements to be met by separate collection of waste in the commercial sector (including construction and demolition waste) and the separation of mixed materials in connection with minimum technical standards for sorting systems.

The material standards of water, soil and waste law are to be harmonised across Germany in an omnibus ordinance (Mantelverordnung/MantelV) comprising a revised Groundwater Ordinance (GrwV), a recast Federal Soil Protection and Contaminated Sites Ordinance (BBodSchV) and a new Substitute Building Materials Ordinance (ErsatzbaustoffV). This also leads to consequential changes in the Landfill Ordinance (DepV) and the Commercial Wastes Ordinance (Gew-AbfV). The aims of the new legislation, which is currently in its third working draft, are as follows:

- ◆ To protect people and the environment, and in particular the soil and groundwater, from contamination with harmful substances when mineral substitute building materials are used in engineering structures and when soil material is used for backfilling
- ◆ To provide legal certainty with and thereby enhance the acceptance of uniform national requirements that apply when discharging substances into groundwater, when constructing engineering structures with the use of mineral substitute building materials, and when backfilling with soil material
- ◆ To simplify administration by dispensing with approvals and official assessments where possible

7.4.5 Better exploiting recycling potential in organic and green waste

Policy approach

- ◆ Increase in the quantity of organic waste collected

From 1 January 2015, under section 11 (1) of the Circular Economy Act, organic waste that is required to be transferred to a public waste management organisation must be collected separately. In 2010, 76 of 402 rural districts and urban municipalities did not provide organic waste bins; 10.8 million people were affected by this. Efforts to introduce separate collection of organic waste were evident in a number of these authorities by the end of 2014. However organic waste was not yet collected nationwide.

Universal collection of organic waste must be paralleled by high-quality recycling and recovery. A suitable approach for this purpose generally consists of fermentation followed by composting. Where possible, existing composting facilities should be retrofitted with a fermentation stage. The Federal Government supports this approach with funding (for example under the Renewable Energy Sources Act).

7.4.6 Increasing the collection and recycling of precious and rare metals

Policy approach

- ◆ Development of innovative collection schemes based on a register to be compiled of waste streams with similar metal content (waste stream pooling)

Making information on waste content available to producers and waste management operators can help in enabling the reclamation of precious and rare metals that are often only used in trace quantities. This makes it important to bring together relevant players in order to resolve information deficits, in particular with regard to complex products and those whose composition varies, such as vehicles, electrical and electronic equipment, and also items such as environmental catalysts used in the non-industrial sector. If producers provide consumers and waste management operators with information about the recyclable content of their products, then the separate collection and processing of precious and rare metals can be improved. Conversely, if recyclers provide feedback and information on developments in their industry, then products can be better designed with recycling in mind.

In many waste streams, the quantities of precious and rare metals are very small. For industrial-scale reclamation processes to be economic, it may make sense to pool such waste streams so as to increase the recyclable content. Wind turbines, electrical and electronic equipment and vehicles, for example, in some cases make use of similar materials, but those materials are not collected and recycled as efficiently as they could be because the different industries do not share the same collection infrastructure.

This is to be addressed with a research project to discuss and develop innovative collection schemes within the existing legal framework that pool waste streams with similar metal content for recycling.

7.4.7 Improving phosphorus recycling

Policy approaches

- ◆ In an initial phase, further research and support for industrial-scale implementation of phosphorus recovery techniques and ongoing trials with the resulting recycled fertiliser
- ◆ Creation of a legal framework for agricultural use of sewage sludge, recovery of phosphorus and the use of recycled phosphorus, in particular in agriculture

Phosphorus recovery in Germany is almost exclusively limited to wastewater treatment, mostly due to process-related advantages. Techniques to recover phosphorus from sewage sludge ash often have the benefit of offering higher recovery rates. Obstacles to the use of such techniques so far include process complexity and hence their uncertain economic viability.

The Federal Government will therefore continue to support the industrial-scale deployment and diffusion of new phosphorus recovery technologies. It may also consider additional incentives for phosphorus recovery and the use of recycled phosphorus products.

The Federal Government will revise the Sewage Sludge Ordinance (AbfKlärV) and hence the framework for agricultural use of sewage sludge and, in accordance with the stipulations made in the Coalition Agreement, will add requirements for phosphorus recovery, including mono-incineration with subsequent mono-landfilling. In fertiliser law, the Federal Government will create the conditions for the use of recycled materials of proven nutrient content as fertiliser and will lay down requirements for the spreading of sewage sludge.

7.4.8 Urban mining: extracting secondary raw materials from anthropogenic stocks

Policy approach

- ◆ Development of models for assessment of anthropogenic material stocks

Germany has a vast wealth of resources in the anthropogenic material stock, which includes landfills and mining tips ('landfill mines') and notably also built structures, infrastructure and other long-lived assets ('urban mines'). Research shows that the material stock in urban mines is continuously growing (see section 3.5). In light of increasing international competition for the availability of and access to resources, these anthropogenic stocks are a valuable source of secondary raw materials that can contribute significantly towards securing the foundations of life for current and future generations and reducing adverse impacts on the environment.

The Federal Government will improve the knowledge and decision base for the secondary raw material sector with databases and dynamic forecasting models that are currently under development. This will permit targeted analysis and assessment of what percentage of the stock will be available as a source of secondary raw materials in the future, how to exploit that resource potential and how to establish high-quality recycling and recovery pathways. The necessary databases and dynamic forecasting models are currently being developed in a research project on urban mining in Germany, among other things with a view to compiling an urban mining strategy for Germany.

7.5 Sustainable building and sustainable urban development

Sustainable urban development is one of the key challenges of the future. In urban spaces, changes in the environment, the climate, the economy and society are concentrated as in a lens, making the great challenges of our times – including resource availability – stand out in sharp relief. The situation of cities is contradictory in several ways. Cities are centres of innovation, growth and social exchange, and they are often where changes in the area of governance first emerge. At the same time, it is in cities where social disparities tend to be at their most pronounced. Cities are at the focus of attention when it comes to attaining global development and sustainability goals and implementing sustainable urban development. They also take the brunt of global changes. Cities are particularly vulnerable to the effects of climate change, but at the same time have potential of their own for improving resource and energy efficiency. Exploiting this diverse potential is a special challenge.

According to the housing market forecast for 2030 published by the Federal Institute for Research on Building, Urban Affairs and Spatial Development (BBSR), some 272,000 new housing units a year are needed between 2015 and 2020 (BBSR 2015). Adding in catch-up demand from previous years and additional demand due to higher immigration, demand for new housing in the years ahead comes to 350,000 to 400,000 units a year.



7.5.1 Resource-efficient neighbourhood and building development, construction, refurbishment and use

Policy approaches

- ◆ Funding of research on resource-efficient, integrated solutions for planning, design, construction and refurbishment, including initial and further training
- ◆ Revision of the Guideline for Sustainable Building for federal built structures and wider application by *Länder* and municipalities
- ◆ Increased use of building products based on regenerative resources
- ◆ Support for assessment systems for sustainable building in the housing sector and promotion of soil protection measures in construction

Building is one of the most resource-intensive sectors of the German economy. It accounts for a major share of resource and energy consumption: 560 million tonnes or about 90 percent of all mineral resources consumed in Germany are used to produce building materials and products each year. The building sector also generates over 54 percent of waste in Germany. In total, about 40 percent of total final energy demand relates to energy consumption in buildings for space heating, water heating and electric power.

Buildings contain valuable resources such as iron, steel, copper, aluminium, timber, and materials such as gypsum and concrete. The reuse of such resources and materials makes a significant contribution to improving resource efficiency in construction and in conserving primary raw materials. Such use is to be kept up and where possible increased.

The proportion of timber frame units is gradually increasing in Germany and is currently around 17 percent. In new builds, using timber in the primary structure can improve a building's carbon footprint. Improvements in materials and structure in building construction and refurbishment are therefore just as

important for resource conservation as energy efficiency in a building's operation. Owners and planners are to be provided with more information on the use of timber and regenerative building materials.

Buildings usually have a lifespan of several generations. Sustainable building therefore starts in planning, which should take into account the building's life cycle and if applicable any future changes in use. Local and regional planning authorities can promote land and resource conservation by safeguarding and developing compact, mixed-used urban structures. Central instruments at the local planning level are the preparatory and binding land-use plans provided for in the Federal Building Code (BauGB) together with additional informal instruments – primarily integrated urban development plans, which are expected to take account of resource efficiency aspects as well as urban and infrastructure development. Land-use plans must be brought into line with the objectives of (supra-local) spatial plans so that spatial planning principles and objectives that have a bearing on resource conservation can have an effect at local level. The Federal Government will support stakeholders by compiling recommendations for integrated solutions where land and resource conservation are reconciled with the objectives of other environmental policy areas (such as noise control, air pollution control, and climate change mitigation and adaptation).

Integrated planning and construction of sustainable buildings is a challenging task with regard to the design and selection of technologies and materials taking into account resource consumption in upstream supply chains and building lifespans.

Sustainable building also includes the reuse of building elements, the use of environment-friendly raw materials and recycled construction products, and deployment of energy and resource-efficient building systems. The Federal Government supports the development and implementation of optimised building design (such as dismantling-friendly design and components with separable layers that result in unmixed recycled material classes), modular construction, the development of assessment scales for optimised manufacturing and construction processes and designs, and measures to increase the useful life of buildings (for example with the provision of information resources). Construction site processes are

additionally to be further improved in federal construction projects.

Sustainable building further entails protecting the soil as a natural resource in planning, construction and also when construction work is complete, for example in exterior landscaping.

The specific options available depend on the construction phase and are directed at objectives such as avoiding the use of harmful substances, proper handling of excavated soil, and preventing ground compaction.

The Federal Government is the largest public developer in the country and sets an example in questions of energy-efficient, resource-friendly, sustainable building.

A key implementation and management tool in this regard is the Guideline for Sustainable Building, which is regularly updated and has been binding for federal construction projects since 2011. Application of the Guideline is closely linked to the Assessment System for Sustainable Building, which contains detailed calculation and assessment requirements.

The assessment system covers a wide variety of applications, from office and administrative buildings, schools and laboratories to the exterior landscaping of federal properties. For federal building projects abroad, any departures from the Guideline and the specifications in the Assessment System for Sustainable Building must be cleared with the conformity review body on a project-specific and region-specific basis and decided as appropriate.

Federal buildings must normally attain Silver certification by exceeding the requirements laid down by law and in the applicable standards. This is roughly equivalent to exceeding the statutory minimum

standards in Germany by about 15 to 20 percent across all criteria. A 30 percent improvement in energy efficiency over the current Energy Saving Ordinance (EnEV) must also be aimed for.

Approximately 30 federal construction projects targeting Silver or Gold certification are currently in progress.

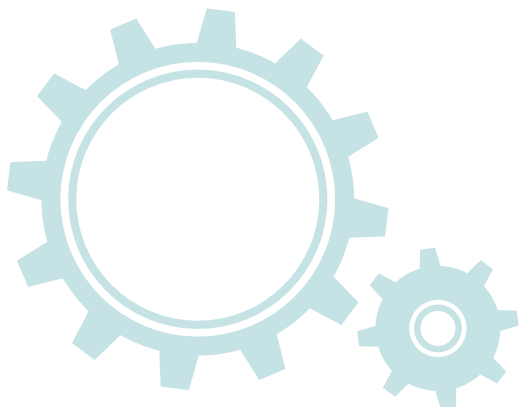
With selected buildings, it is possible to aim for the Gold standard. As part of the revised programme of sustainability measures, the aim is for new construction projects within the departmental portfolio of BMUB – subject to cost-effectiveness – generally to be built to the Gold standard. This standard is also to be trialled in selected refurbishment projects.

Current building projects such as the Federal Environment Agency extension in Dessau and the new main building for BMBF in Berlin already show that even the highest standards in the assessment system can be attained cost-effectively with the right planning.

A special focus for the years ahead is on persuading the *Länder* and local authorities to implement the federal strategies for sustainable construction and urban development. To this end, BMUB has supported housing sector and consumer associations in developing sustainability rules for residential buildings (containing upwards of six units).

In April 2015, a certification scheme became available for newly built detached and semidetached homes. The scheme was developed with the support of BMUB and is based on the Assessment System for Sustainable Building. Certification quality is to be verified by an independent body that checks ratings and provides training. In a similar way to the support for the efficiency house standard, it is planned for the KfW Group to support the sustainability certificate for single-unit to five-unit residential dwellings from 2016.

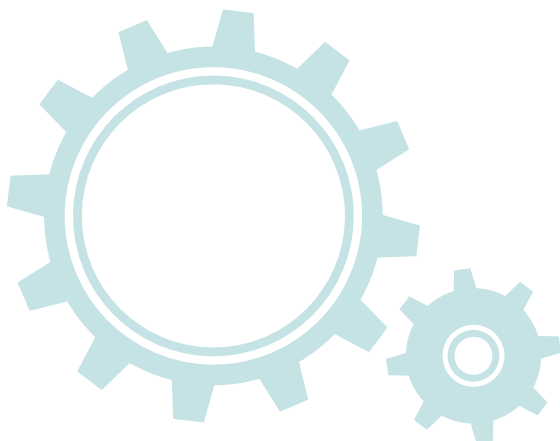
Länder and local authorities are kept informed about the ongoing discussion process via the Sustainable Building Round Table, which advises BMUB in the implementation of sustainability issues in the construction sector.



A further focus is on innovations in construction to link up resource efficiency with new efficiency requirements and on making energy-plus houses and sustainable smart city approaches ready for market. A BMUB research initiative, Future Building, consequently supports applied construction research to strengthen the competitiveness of the German construction industry.

Based on the vision of a carbon-neutral, resource-efficient, liveable city, the Federal Government launched the National Platform for the City of the Future (NPZ) with BMBF as the lead agency. Under a cross-cutting strategic research and innovation agenda, the initial stage spanning the years 2015 to 2020 consists of developing and trying out sustainable systems innovations for the urban transformation process.

An energy-efficient refurbishment roadmap is being drawn up for federal properties. Targets include a 20 percent reduction in heat consumption (that is savings in final energy) by 2020 and around an 80 percent reduction in primary energy consumption by 2050 relative to the 2010 base year, in each case subject to observance of the precept of cost-effectiveness.



7.5.2 Resource-efficient infrastructure

Policy approaches

- ◆ Dismantling, where feasible, of obsolete built structures and recovery of construction materials for recycling and reuse
- ◆ Compilation of guidance on resource-efficient sewer rehabilitation
- ◆ Promotion of innovative technologies for sustainable modernisation of sewerage infrastructure

The Federal Government will study how resources can be conserved and infrastructure designed and dimensioned in accordance with user and future needs, that is made resilient to climate change, robust, long-lasting, and adaptable to pressures such as more frequent and/or severe rainfall and droughts. The Federal Government will support activities to this end, conduct research into possible alternatives and innovative approaches for the improvement of infrastructure, and develop solutions. This also includes dismantling unusable built structures and recovering construction materials. Spatial and urban structure planning and development should also take resource efficiency aspects into account.

Local authorities report a need for major investment in sewer rehabilitation. Federal-level activities to assist local authorities therefore include the compilation of guidance on resource-efficient sewer rehabilitation. The guidance is to include technical and organisational recommendations for the inspection and rehabilitation of public and private sewers, provide information on funding, and incorporate environmental sustainability criteria in the choice of rehabilitation approaches.

The Federal Government will continue to carry out research in this connection and promote innovative technologies to support the sustainable improvement of sewerage infrastructure. Important research outcomes for the transformation process have been

provided among other things by Federal Environment Agency research projects and joint projects under the BMBF Sustainable Water Management (NaWaM) funding priority, which is part of the BMBF's Research for Sustainable Development (FONA) framework programme. Continued use will also be made of the existing information resources provided by BBSR.

7.5.3 Labelling of building products with regard to environmental performance, resource use and health

Policy approaches

- ◆ The Federal Government supports ongoing work at EU level for the provision of harmonised information on construction products with regard to health and environmental protection, notably in terms of soil/groundwater and indoor air.
- ◆ Ongoing development and completion of the BBSR ÖkoBau (green building) database providing product information on the construction of sustainable buildings and engineering structures
- ◆ Support in the provision of information on construction projects through environmental product declarations, and allocation of research and other funding

For all construction products used in building interiors and building envelopes, the Federal Government advocates the establishment of labelling that ensures a high level of protection, is meaningful to consumers and is based on uniform and verifiable criteria. This is to be implemented by means of harmonised European testing standards for the measurement of emissions from construction products in building interiors and of environmental releases of hazardous substances from construction products. The result will be reliable

information on environmental and health impacts in performance declarations and CE markings for construction products. These harmonised standards are also to be used with voluntary labelling schemes such as the Blue Angel. Environmental product declarations providing information on construction products (based on harmonised EU standards) are already available for numerous products and have proven very useful in sustainable construction. The Federal Government is committed to further increasing the use of this tool and securing its even wider adoption in practice. Research funding is made available for this purpose, among other things to supplement the ÖkoBau database. At EU level, the Federal Government advocates enhancements to environmental product declarations for construction products and ultimately for information on construction products from declarations of performance and CE marking to be combined.

7.5.4 Increasing the use of recycling in construction processes

Policy approaches

- ◆ Transfer the tools and lessons learned from the recycling-oriented documentation of federal construction projects to public construction projects at *Länder* and local level
- ◆ Promotion of selective dismantling and examination of options in large demolition/construction projects for processing construction waste on site or nearby
- ◆ Information portal to enhance the acceptance and promote the use of recycled construction materials
- ◆ The Federal Government will set material parameters in the new omnibus ordinance (Mantelverordnung/MantelV) allowing the continued use of recycled construction materials in compliance with precautionary groundwater and soil protection requirements and will aim to increase the use of such materials.

Considering that more than 90 percent of mineral construction and demolition waste is already recycled, at first glance there would seem to be little scope for increasing the proportion of secondary raw materials in construction products. Regionally, however, some recycling pathways such as landfilling and roadbuilding are close to saturation and will decrease in capacity. The scope for recycling will therefore no longer be exhausted in future and recycling rates may fall as a result. To maximise secondary raw material recycling and conserve primary raw materials and landfill capacity, it may be necessary to find new options such as the use of recycled aggregate in building construction. To meet required quality standards, construction waste should be separated at source by selective dismantling with safe removal and disposal of waste fractions containing hazardous substances.

The Federal Government will work to improve the acceptance of construction products based on secondary raw materials among developers, planners and the public administration. To this end, the UBA will set up an information portal for all stakeholders in the value chain, featuring current (technical and legal) information, tendering recommendations, and points of contact. For the same purpose, it will also commission end-to-end comparisons based on life cycle analysis and life cycle costing.

Federal construction projects are to be fully documented with regard to the construction products used. The *Länder* and local authorities can build on experience acquired at federal level and likewise require mandatory documentation of public building projects. The Federal Government will make its experience available to the *Länder* and local authorities to aid future demolition and recycling.

Information events have been seen to be effective in promoting the use of quality-assured recycled aggregates for recycled concrete and recycled gypsum plasterboard. Positive experience has been gained with annual events of this kind when it comes to identifying and removing obstacles to gypsum recycling and to the increased use of quality assured recycled aggregates. These events are to be further expanded.

7.6 Resource-efficient information and communication technology

Information and communication technology (ICT) is used in almost all areas of society and the economy. ICT develops rapidly: New products and applications quickly penetrate the market. Short product development cycles, new concepts such as the networked home and new products such as data glasses and smart textiles are among the trends driving further increases in resource use by ICT.

In the age of increasing digitisation, however, ICT is not an end in itself and cannot be viewed in isolation from economic growth. Increased use of ICT, rising computing power and growing storage capacities are driven by the growth of the German economy and by increasing digitisation with the backing of government policy.

ICT can also aid the conservation of natural resources, for example where smart systems such as computer-aided product design help minimise energy and raw material consumption. Digitisation also includes the increasing convergence of the physical and virtual worlds, whose implications and opportunities for industrial value creation processes are discussed under the heading of Industry 4.0. Technological trends such as machine-to-machine communication and the Internet of Things can lead to efficiency gains in production and services. The ICT industry is the major contributor here.

Regardless of what ICT is used for, natural resources are needed in its production, use and disposal. The term 'green IT' is often used to mean just improvements in energy consumption during the use of ICT. That is not enough to make ICT environment-friendly. The manufacture of ICT equipment is resource-intensive and often uses more energy than devices consume in use. Alongside larger quantities of metals such as iron, copper, aluminium, nickel and zinc, ICT devices also use rare and precious metals of which – frequently for economic reasons – at best only a small percentage is recovered in recycling.

ProgRes therefore aims to show how the environmental performance of ICT can be improved.

7.6.1 Improving the resource efficiency of ICT products

Policy approaches

- ◆ Assessment of the resource use of ICT products across the entire life cycle
- ◆ Examination of requirements for ICT products to maximise service life
- ◆ Promotion of the separate sale of mobile devices and chargers
- ◆ Continuation of existing initiatives for the transfer of green technologies for the management of waste ICT equipment to third countries

The current trend towards frequent replacement of ICT products has varied reasons that lead to shorter and shorter product lifetimes. This must be countered with new strategies that take a holistic view of all phases of the product life cycle and all environmental impacts. Products should be designed for durability and a long lifetime in use. This can be linked to requirements as to spare part availability, modularity, upgradeability, reparability, and backward compatibility for hardware and software.

Standardisation can also help in extending the useful life of products (for example by enabling reuse or continued use). Standardisation of modular design, for example, makes batteries easier to replace. Power adapters and connectors that are compatible with all mobile information technology devices (smartphone, tablets, laptops, etc.) can continue to be used with a new device.

» Connectors on mains adaptors, charger cables, accessories and batteries for electronic devices should be standardised regardless of who produces them. [...] The device and the adaptor must be sold separately. «

from the citizens' recommendations

Fourteen smartphone manufacturers signed a voluntary memorandum of understanding in 2009 in which they pledged to standardise chargers and connectors for their devices. This commitment has now expired and there are no plans to renew it as the EU Radio Equipment Directive has since entered into force, which requires standardisation for chargers. Member states must transpose the directive into national law by 12 June 2016.

Most chargers and connectors for smartphones and tablets are already standardised as a result of the memorandum of understanding and the impending change in the law. The Federal Government is currently assessing the feasibility of standardising chargers and connectors for other electronic devices such as MP3 players and laptops.

Only a small quantity of mobile devices are so far marketed without a charger and connector. The Federal Government will examine whether suitable means can be found to increase this quantity.

Exported devices, in some cases in non-working condition, can lead to significant environmental and social impacts abroad. It is necessary to further expand existing efforts such as those under the RETech Initiative to ensure environment-friendly and efficient waste management abroad.

7.6.2 Reducing ICT resource use with efficient software

Policy approaches

- ◆ Support for the development and use of software that reduces the use of natural resources by ICT systems
- ◆ Labelling of environment-friendly software

Software is an integral part of information and communication technology (ICT). Although software is intangible, it has a major impact on the use of natural resources. The interplay of hardware and software has produced a longstanding trend towards faster and faster hardware to keep up with software requirements. At the same time, the energy efficiency potential of hardware cannot be exploited to the full unless efficient software architectures and programming methods are available for the purpose. It is necessary to identify and measure the interdependencies between hardware and software in order to develop ways of making ICT more efficient in the use of natural resources.

7.6.3 Preferential procurement of resource-efficient ICT products and services

Policy approaches

- ◆ Full observance of guidelines on green public procurement in federal administration tenders for PCs, notebooks, monitors and printers
- ◆ Resource efficiency requirements for ICT products and services must be continuously enhanced and made mandatory in public procurement. These requirements must also be incorporated in federal framework contracts for the procurement of standard ICT products.

Public procurement is the biggest source of demand for ICT products and services in Germany with a volume of some 17 billion euros a year. This makes it the most important factor driving the market penetration of environment-friendly alternative products.

Guidelines on the procurement of environment-friendly desktop PCs, monitors, notebooks and printers have already been published in a cooperation project between UBA, the Procurement Office of the Federal Ministry of the Interior and BITKOM e. V. under the umbrella of the national dialogue process for the promotion of sustainable consumption and production patterns. The environmental criteria contained in these guidelines are to be applied in all future federal tenders.

Resource conservation requirements for ICT products and services must be continuously enhanced and made mandatory in public procurement. These requirements must also be incorporated in federal framework contracts for the procurement of standard ICT products.

The procurement of resource-efficient ICT products also means ensuring that ICT equipment is used as long as possible and that pre-owned or reconditioned equipment and materials are included in the procurement process. Preparing for the reuse of electronic equipment for the German or the wider European market is only worthwhile if there is corresponding market demand. Some of this demand is to be generated in public procurement.

The Alliance for Sustainable Procurement passed a resolution in 2014 for the expert group on resource efficiency to address the topic of green IT. The Federal Government, the *Länder* and local authorities share the objective of promoting resource-efficient ICT, removing barriers such as in the procurement of environment-friendly equipment, and mutually learning from best practice examples.

7.6.4 Making data centres more resource-efficient

Policy approaches

- ◆ Implementation of Blue Angel criteria for energy-efficient operation of federal administration data centres by 2017
- ◆ Voluntary commitment by industry, the *Länder* and local authorities to operate data centres in accordance with the Blue Angel criteria
- ◆ Onward development of directionally robust performance indicators for resource-efficient data centres
- ◆ Standardisation and consolidation of federal administration data centres

The growing use of IT in all areas of life goes hand in hand with the spread of technical infrastructure to support it. Attainment of the targets in the Federal Government's Digital Agenda 2014 to 2017 will further advance this process. This makes it increasingly important to make use of the potential for resource and energy-efficient construction and operation of ICT infrastructure.

Taken together, data centres in Germany consume enormous amounts of energy. They need some ten terawatt-hours of electricity per year, and the trend is rising. There is nonetheless a lack of clearly formulated targets and coordinated measures for implementing energy efficiency in all data centres in Germany.

The Federal IT Council called for the energy-efficient operation of IT in the federal administration as long ago as 2008. The Green IT Initiative has been a success, attaining its goal of a 40 percent reduction in energy consumption for the operation of information technology by the end of 2013 compared with 2009.

This voluntary commitment was supplemented with qualitative targets in 2014. As well as consolidating IT energy consumption at the level reached at the end of 2013 (390 gigawatt-hours/year) and sustainable IT procurement, the Blue Angel criteria for energy-efficient data centre operation are now to be implemented in federal administration data centres by 2017. Implementing these criteria makes it possible to exploit further potential for improvements in energy and resource efficiency.

Industry, the *Länder* and local authorities are likewise to enter into voluntary commitments to make their data centres more environment-friendly by operating them in accordance with the Blue Angel criteria. To ensure the success of these measures, operators need to continuously monitor data centre energy consumption.

The resulting annual monitoring reports should be reviewed by the relevant industry associations and *Länder* and local government administrations.

Researchers, the IT industry and policymakers continue to seek new solutions for energy and material-intensive data centres. The effectiveness of such solutions has so far been measured solely in relation to the energy balance of the technology used. This does not say anything about resource efficiency per unit of computing power, which is what data centres produce. Key performance indicators for data centre efficiency are therefore currently being developed on behalf of the Federal Government.

On 20 May 2015, the Federal Government additionally adopted a resolution to consolidate the IT service centres of the BMF, the BMI and the BMVI and to integrate further federal administration data centres over time. In this way, the number of data centres and server rooms is to be reduced from some 1,300 today to as few as possible by 2022.



7.7 Cross-cutting instruments

7.7.1 Establishing strategic early warning systems and data pool

Policy approaches

- ◆ Establishing and enhancing strategic foresight with capacity building
- ◆ Creation of an open data platform with data on resource conservation

Resource and sustainability policy are complex and link up both with each other and with other policy areas. Decisions made, or not made, often have long-term implications. Some effects only emerge later on. At the same time, targeted outcomes can be impacted by prevailing circumstances, unforeseen events or feedback effects. In addition, synergies and competing interests can arise between policy areas and ought to be exploited or countered as appropriate. Resource policy therefore calls for integrated, long-term approaches. To this end, it is necessary to apply strategic foresight in order to think through future developments and assumptions and to play out the various options for action. The Federal Government therefore aims to build capacity in strategic foresight with regard to resource policy, integrate strategic foresight to a greater extent in departmental units, and apply it in the future shaping of resource policy.

Strategic foresight with regard to adverse developments also requires analysis based on valid data and monitoring of relevant trends in order to identify any need for action in good time (early warning function). This relates to demographic, economic, environmental and social trends that affect the resource system. The Federal Government is therefore planning initial steps to present freely available data on resource conservation on an open data platform accessible to a wide audience in the medium term.

Work will also continue on improving the data base (and most of all the international data base) and on solving unresolved methodological issues.

One component of the open data platform will be ProBas (Process Oriented Data Base for Environmental Management Systems), an established database which is internationally integrated and professionally highly regarded. ProBas includes specific data records on resource use for transportation, energy supply, selected semi-finished and finished goods, and economically and environmentally significant raw materials. It is to be adapted to current standards with regard to data interfaces and formats and linked to ÖKOBAUDAT, a freely available German construction materials database for life cycle analysis at building level. Adapting ProBas to the needs of an open data platform will make available data on resource conservation accessible to the public free of charge.

7.7.2 Making the financial sector and financial services more resource-efficient

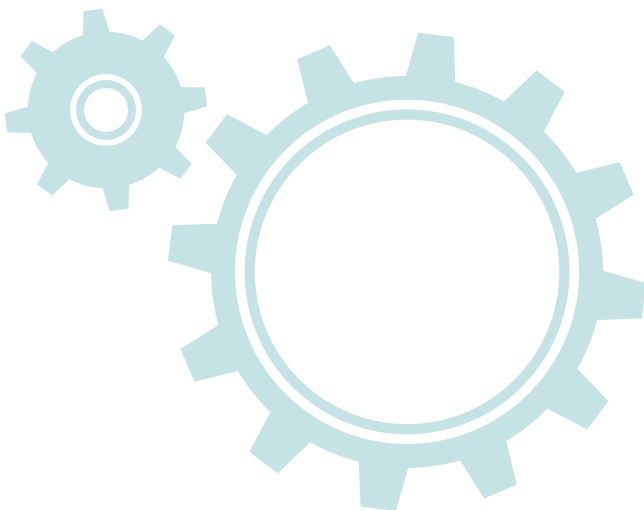
Policy approaches

- ◆ Consideration of resource-relevant aspects where applicable (including suitable consideration of risks in financial market regulation while adhering to overarching goals such as financial market stability and protection of insurance holders)
- ◆ Resource efficiency programmes by public development banks and other players and development and use of innovative resource efficiency funding instruments

In the European financial market regulation process, the Federal Government will continue to work for overarching goals such as financial market stability and protection of insurance holders. It will also take a range of additional relevant aspects into account from this perspective, including risk-appropriate treatment of investments in resource efficiency in the context of the

Basel III and Solvency II capital requirements for banks and insurers and the requirements for risk management systems.

From a business point of view, investment in projects to improve resource efficiency requires an attractive risk-return ratio. Public development banks can contribute to funding in various ways in order to improve the risk-return ratio of resource efficiency projects. For example, they can assume risk and lower borrowing costs by providing subordinate loans, guarantees or equity capital. The Federal Government will make greater use of these options for the public sector, among other things by using existing programmes offered by KfW. It will urge the establishment of new funding instruments to facilitate investment in resource-efficient projects. Examples include green bonds, where public or private institutions issue fixed-interest securities to fund climate change mitigation or resource efficiency projects, or public participation instruments enabling small investors to buy at low risk into investments that fund resource efficiency measures. It will also promote the development of instruments that allow local authorities, despite prevailing budget restrictions, to implement resource efficiency measures that are profitable and thus relieve the public purse in the medium to long term.



7.7.3 Making use of market instruments and reducing subsidies that promote resource use

Policy approaches

- ◆ Creation of a suitable framework for the enhancement of resource efficiency
- ◆ Sustainability impact assessment for subsidies
- ◆ Onward development and expansion of national funding programmes on resource efficiency
- ◆ Support for EU initiatives to create incentives for improved resource conservation

Efficient and economic resource use and full exploitation of the scope for recycling and reuse require market conditions that set the right incentives. The Federal Government will therefore further improve such conditions.

State programmes that specifically promote measures to enhance resource efficiency and the development and market diffusion of innovative, resource-efficient products and production processes are indispensable in this connection. The Federal Government will consequently continue the existing funding programmes to improve resource efficiency in accordance with the objectives set in ProgRes II.

The Federal Government set itself the goal in the coalition agreement of subjecting federal subsidies to sustainability impact assessment. It delivered on this commitment with a cabinet resolution of 28 January 2015 supplementing the Federal Government Subsidy Policy Guidelines dating from 2006. The newly established sustainability impact assessment was applied for the first time during the compilation of the Federal Government's 25th Subsidy Report of 2015.

The Federal Government will also continue to work at EU level for greater consideration of resource efficiency

in the formulation of funding and selection criteria for major infrastructure measures. The Partnership Agreement between Germany and the European Commission for the implementation of the European Structural and Investment Funds in the 2014 to 2020 funding period confers on the *Länder* the ability through their funding programmes to finance resource efficiency projects with EU resources.

» More incentive schemes are needed to promote the use of local public transport services and car sharing schemes. «

from the citizens' recommendations

The Federal Government wishes to systematically promote sharing economy business models. It will accordingly draw up a roadmap for the promotion of car sharing to provide planning and investment certainty for businesses and consumers.

Climate targets indirectly affect resource use, as cutting energy and material resource consumption is one way of reducing CO₂ emissions. Economically optimum allocation of such reductions can be attained by improving emissions trading. The Federal Government has therefore campaigned in negotiations at EU level to reform emissions trading well before 2020. The recently approved market stability reserve is thus to start operating on 1 January 2019.

7.7.4 Integration of resource efficiency in the development of the national legal framework

Policy approach

- ◆ Assessment of the feasibility of incorporating resource conservation aspects into suitable sectoral legislation

The Federal Government will continue to look into more closely integrating resource conservation concepts into suitable areas of the law. By elaborating, enhancing and supplementing existing provisions and instruments, the concept of resource efficiency can be established on a broader base, leading to more efficient and economic resource use. A coherent and future-ready legal framework for the circular economy is already in place. This will be further developed in areas such as enhancing product responsibility in waste management law and ensuring product recycling and the management of commercial waste, sewage sludge and mineral construction and demolition waste, for example under the Commercial Wastes Ordinance, the Sewage Sludge Ordinance and the Substitute Building Materials Ordinance.

Licensing of raw material extraction is mainly governed in German law by the Federal Mining Act (*Bundesberggesetz/BBergG*). This is to be supplemented in specific points as part of the ongoing legislative process with regard to fracking, among other things with additions to the obligations to carry out environmental impact assessments and stricter requirements for the approval of oil, gas and geothermal drilling activities. The Federal Government will continue to monitor for future needs for adjustment.

7.7.5 Developing methods of assessing resource efficiency

Policy approaches

- ◆ Development of methods and criteria for the assessment of resource efficiency
- ◆ Assessment with regard to incorporating resource conservation aspects in standardisation

Robust assessment of resource efficiency strategies in many cases calls for standardised calculation methods, resource accounting rules and criteria for the evaluation of resource efficiency that take a life cycle approach and cater to the diversity of natural resources.

Approaches developed for federal construction projects in Germany include the Assessment System for

Sustainable Building (BNB), which covers key sustainability criteria on a sound methodological basis with some 50 measurable indicators. To minimise environmental impacts and for optimum building design, the system requires a life cycle analysis to be compiled for a 50-year analysis period, taking in the construction, use, maintenance and removal of the building. The analysis is based on construction material data from the ÖKOBAUDAT database, which BMUB has made freely available, including for private sector use, on a website since 2009. The current version contains some 1,300 data sheets. These describe with reference to indicators the potential environmental and climate effects of each construction material and product.



www.oekobaudat.de
(only in German)

The database includes both generic base data as well as company or industry association records for environmental product declarations (EPDs). EPDs are based on international standards (ISO 14025; ISO 14040 series) along with the European and DIN standard DIN EN 15804. The generic data provides suitable average figures for the environmental indicators for each construction material. These estimated figures are stated with safety margins (of between 10 and 30 percent) to adequately reflect the quality of the data in terms of comprehensiveness and representativeness, and also to give an incentive to compile product-specific figures in EPDs.

The life cycle analysis for a building can be carried out using a freely available software tool, eLCA. The parts of a building are entered using the classification from the DIN 276 building costs standard, allowing initial rough estimates to be made at a very early stage as to where a project stands with regard to its global environmental impacts.



www.bauteileditor.de
(only in German)

The Federal Government continues to support the development and application of harmonised methodologies (such as ISO, DIN and VDI standards) to quantify, assess and compare the use of natural resources for products, processes, services and organisations.

The Federal Government welcomes the continuation of work by the German Institute for Standardization (DIN) on a guide for considering resource conservation aspects in standards on the basis of DIN SPEC 59/ISO Guide 64:2008, "Guide for addressing environmental issues in product standards".

7.7.6 Strengthening research and innovation together with their use in and with business enterprises

Policy approaches

- ◆ Continuation, expansion, implementation and transfer of basic and applied research on resource issues carried out for government departments
- ◆ Systematic extension of the scope of research to include social, cultural and economic aspects
- ◆ Research capability and capacity building

» Financing is needed for research and innovation in the development of resource-efficient materials and products. «

from the citizens' recommendations

The Federal Government will continue and expand basic and applied research, including departmental research on resource issues, and support its transfer into practice. This includes FONA³, the UFOPLAN Environmental Research Plan, the ZUKUNFT BAU building research initiative, 'From Material to Innovation', 'Innovations for the Production, Services and Workplace of Tomorrow', the National Research Strategy BioEconomy 2030, and research on regenerative resources. Energy research and material (efficiency) research are to be better linked up in the process, and there may also be a focus on specific sectors or fields

of action. To promote knowledge transfer, outcomes will be presented and communicated in target group-oriented form and support will be provided for turning research findings into commercial innovations.

Looking ahead, a number of key research issues can be identified in the field of resources, all of which address intersections between different areas (such as between resources, policies, stages of the value chain, success factors, etc.):

- ◆ Research on points of intersection and interdependencies between the various resources (abiotic and biotic materials and fuels, water, land, soil and biodiversity as factors of production)
- ◆ Research on the links between climate change mitigation and resource conservation (including resource-side requirements for a greenhouse gas-neutral Germany; CO₂ reuse)
- ◆ Research addressing the entire value chain (including the use phase and consumption patterns) and value networks
- ◆ Research incorporating social aspects of the sustainable provision of biotic resources, substitution of products and processes that use finite resources with others that use (non-food) biological resources
- ◆ Research focusing on cross-cutting technologies and product-service systems
- ◆ Research on success factors and obstacles for implementation of the proposed instruments and measures for the conservation of resources and on the political and social environment they require

The intelligent and wise use of resources is a focus of precautionary research under the BMBF Framework Programme on Research for Sustainable Development (FONA³) (2015 to 2020). Resource efficiency research issues are also part of the three implementation-oriented flagship initiatives under FONA³: Green Economy, City of the Future, and the Transformation of the Energy System (Energiewende). Interdisciplinary and trans-disciplinary collaboration between researchers and business enterprises is to be further intensified, as are participatory approaches for involving stakeholders in the development of funding programmes.

A further Federal Government focus will be on widening the group of potential research contractors in order to strengthen and diversify research capabilities. The Federal Government will step up interdepartmental activities to increase the impact of research and implementation activities and will develop additional forms of interdepartmental coordination on resource conservation.

7.7.7 Creating public awareness of resource conservation

Policy approaches

- ◆ Refinement of target group-specific communication strategies for resource conservation and a sustainable resource mindset, and identification and systematic application of success factors for resource conservation and resource conservation policy
- ◆ Information campaign on less resource-intensive consumption
- ◆ Stronger emphasis on resource conservation in consumer advice
- ◆ Expansion of financial support for associations and initiatives as facilitators for sustainable resource use
- ◆ Expansion of support for civil society initiatives carrying out pioneer projects relating to sustainable lifestyles
- ◆ Information resources for planners and developers on sustainable building options and the use of environmental product services for construction products
- ◆ Information and dialogue events on the bioeconomy and sustainably produced bio-based products

» *Do I really need that? A Federal Government educational and advertising campaign should be launched to make people take a critical look at their behaviour as consumers.* «

from the citizens' recommendations

Lack of information on the potential for saving resources and lack of awareness about the resource-intensity of products and services are major obstacles to improving material and resource efficiency. By providing education on ways of saving resources and by ensuring that information is passed along the value chain, consumers in particular – but also producers – can be encouraged and empowered to be more efficient in resource use. Means to this end include ecolabels in retailing, advice for businesses and consumers, information collection and disclosure obligations, and information campaigns. The Federal Government will make the related instruments and activities more effective while ensuring good integration with existing activities surrounding energy issues.

The diverse networks in the field of resource efficiency are to be retained and where necessary further extended. These notably include the Resource Efficiency Network (NeRess), the Resource Efficiency Competence Pool, and the Education for Resource Conservation and Resource Efficiency Network (BilRess).

The Federal Government will continue to support projects by associations, initiatives and local authorities as facilitators for suitable sustainable resource use. Under the framework of the National Research Strategy BioEconomy 2030 and the National Policy Strategy on Bioeconomy, the Federal Government will step up public dialogue between non-governmental organisations (NGOs), civil society groups, policymakers, researchers and business in order, via greater societal involvement, to attain a thorough understanding of the bioeconomy and hence greater resource awareness.

The National Resource Efficiency Platform (NaRess) will be retained as the central information platform on resource efficiency issues, as will the Round Table on

Resource Efficiency in Building for the construction sector.

A sustainable society requires a shift in production and consumption patterns. Further research is needed so that the findings of work done so far on successful change processes can be used in policymaking. The Federal Government will include relevant issues in its research programmes and take account of the outcomes of this transformation research in the further development of its policies. In parallel, support will be stepped up for civil society initiatives carrying out pioneer projects relating to sustainable lifestyles.

7.7.8 Integrating resource issues in the education system

Policy approaches

- ◆ Integration of resource (conservation) issues in all areas of education
- ◆ Continuation of the Education for Resource Conservation and Resource Efficiency Network (BilRess)

The Federal Government will support the integration of resource issues in all areas of education. Schools and non-school education institutions can contribute significantly to awareness raising. They teach an understanding of resource use along with knowledge and arguments in favour of wise use of resources so that young people can form their opinion on the issues involved. Rather than as a stand-alone topic, however, education for resource conservation should be presented along the same lines as education for sustainable development (ESD) in order to make use of the same structures and education approaches.

A good understanding of resources is already taught in many vocational training courses in which material resources are used, as resources are viewed as production materials that have value and incur a cost (materials management). A campaign on resource issues will further enhance that understanding. Above all, the aim of such a campaign will be to awaken the interest of trainers and trainees, and enable vocational training schools and chambers of crafts and trades to approach

the subject from other perspectives besides materials management.

In institutions of higher education, it is necessary to develop a broad-based fundamental introduction to resource conservation for different courses of study that the specific curricula (technical and non-technical) can build upon.

The Education for Resource Conservation and Resource Efficiency Network (BilRes) was established as part of a resource project in the BMUB departmental research portfolio. The network helps build awareness of resource conservation and resource efficiency in all areas of education as an important element of education for sustainable development, develops ideas for an enabling framework to give incentives and remove obstacles, provides a platform for exchange on educational materials and brings together education sector representatives with their opposite numbers in policymaking, business, associations, chambers, unions and research. The Federal Government will continue to promote the establishment and continuation of the BilRes network and thus provide support for the issues in the areas of education referred to.

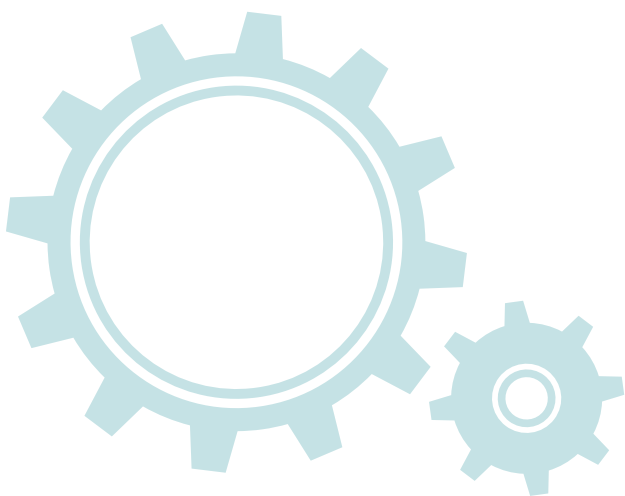
7.8 Exploiting synergies with other policy areas and resolving goal conflicts

Policy approach

- ◆ Broad identification and exploitation of synergies and resolution of goal conflicts and adverse interactions

Since at least the 1992 Rio Summit, considerable attention has been given in the sustainability discourse to natural resources as 'global natural capital', with the prime focus on renewable and non-renewable raw materials, the atmosphere and climate, biodiversity, the soil and water as the foundation of all economic activity.

The concept of natural resources therefore includes not only energy and material sources but also genetic inventories, ecosystem services and carbon sinks, thus further elaborating on the idea of the global commons. The issue of land use was added in recent years as a potential cross-cutting category encompassing both a point of intersection between natural resources (such as atmosphere/soil, fossil fuel deposits/biodiversity, renewable energy sources/water) and socioeconomic interactions and appropriations (land as a space for economic activity and as a property and allocation category). The Federal Government will give greater consideration to these interdependencies between policy areas and strategies in future environmental policy. This involves screening for and exploiting synergies and reducing goal conflicts and adverse interactions with other areas of environmental policy at the nexus of climate change, energy, raw materials, land, soil, biodiversity, water and chemicals, and also at points of intersection with other policy areas such as economic, health and social welfare policy. A focus in this connection will be on the interplay between resource and climate policy and the question of how to make Germany greenhouse gas-neutral in the long term, including with regard to sustainable use of natural resources.



7.9 Supporting resource efficiency policy at local and regional level

Policy approaches

- ◆ Establishing and strengthening the vision of the 'sustainable community' with a focus on resource conservation
- ◆ Establishing special information and consulting services for municipalities
- ◆ Support for local government activities to better align economic development policies with resource efficiency objectives and closing regional material cycles

Within the framework of established consulting infrastructure, the German Government supports local government activities to better align economic development policies with resource efficiency objectives and closing regional material cycles. Working in consultation with associations and organisations operating at local government level, it will also make available information and consulting services for further resource-relevant areas of municipal activity (such as procurement, housing associations, recycling companies, municipal utilities and local transport services).

Due to their large activity range, municipalities have broad scope for resource efficiency measures, most of all in connection with infrastructure and public buildings, waste and wastewater management, energy, land use and public procurement. Many resource-relevant activity areas at municipal level are linked into regionally organised material streams. Many such material streams offer greater potential for improvements in resource efficiency if they are operated in regional circular economy arrangements such as 100 RES Regions projects and the bio-energy villages approach for renewable energy. The Federal Government will support local authorities in establishing and strengthening the vision of the

sustainable community in order to mobilise local potential for resource conservation. This requires awareness building among municipal and business decision makers and intensive public relations work. The opening up of the German Sustainability Award for municipalities is a step in this direction.

On the research side, in its 'Kommunen innovativ' ('Innovative Municipalities') programme, the BMBF aims to strengthen the role of municipalities as initiators, partners and addressees of research, development and innovation for sustainable, demographically resilient regions in Germany. A central aspect of this consists of shaping the regional impacts of demographic change with sustainable regional development of land resources in Germany. Collaboration between local authorities and research, business and civil society organisations will give new impetus for the future of Germany's regions. The call for funding is part of the BMBF Framework Programme on Research for Sustainable Development (FONA3) and also contributes to the Federal Government's sustainable development and demographic strategies.

7.10 Strengthening resource policy at international and EU level

7.10.1 Promoting the international establishment of resource efficiency

Policy approaches

- ◆ Advocacy for greater integration of resource efficiency in international processes and institutions
- ◆ Advocacy for greater emphasis on resource efficiency in international agreements and activities

The international dimension of resource efficiency policy and the onward development of the policy framework in the international context are of special

importance to the Federal Government. Germany is aware of its global responsibility for the impacts and conditions of resource extraction, use and disposal. Furthermore, with regard to the exploitation of resources in third countries, Germany will work to ensure observance of traditional ownership and access rights to land and waters along with human rights and fundamental labour rights (such as compliance with ILO conventions), as well as ensuring that food security is not compromised and that local populations receive an adequate share of value creation.

The Federal Government will implement the requirements with regard to improving resource efficiency under the global sustainable development goals and will support its emerging and developing country partners in doing the same. In bilateral cooperation activities, for example, the Federal Government supports partner countries in developing and implementing their own national resource efficiency programmes and other instruments of resource efficiency policy.

The German G7 Presidency successfully made resource efficiency a focus of the international intergovernmental process. It also succeeded in putting resource efficiency on the international agenda for the long term – beyond the duration of the German G7 Presidency – with the launch of the G7 Alliance for Resource Efficiency as a permanent forum for exchange on best practices and with the requests for the International Resource Panel (IRP) to compile a synthesis report and for the OECD to present policy recommendations. The G7 Alliance for Resource Efficiency can contribute greatly in strengthening and shaping international resource efficiency policy. The Federal Government will continue this thrust in suitable international processes such as the G20.

Germany supports the further development of relevant activities to improve resource efficiency at international level. The Federal Government will urge greater integration of resource efficiency issues in existing bilateral and multilateral agreements and will study whether there are barriers to resource efficiency. The Federal Government will continue Germany's involvement in international bodies such as the IRP and call for broad international stakeholder dialogues on the necessity for improvements in resource efficiency

and in internationally harmonised resource efficiency policy.

In the long term, the Federal Government aims for an international convention on enhancing resource efficiency. This would help create a level playing field for German businesses in international competition, secure jobs and conserve natural resources. In this way, it would build on the successful process established with the G7 Alliance for Resource Efficiency.

The Federal Government will urge for greater international cooperation on resource efficiency issues, for example in the development and establishment of the policy framework for improving resource efficiency, creation of robust base data on global resource use and flows, technology and knowledge transfer, and capacity building. It aims to hold an international intergovernmental conference on resource efficiency.

7.10.2 Supporting and implementing resource efficiency in Europe

Policy approaches

- ◆ Support for activities to improve resource efficiency in the EU
- ◆ Promotion of resource efficiency indicators and targets at EU level
- ◆ Support for the establishment of a European Resource Efficiency Excellence Centre

The Federal Government will continue to support implementation of the 7th Environment Action Programme (EAP) for EU environmental policy to 2020, notably with regard to its goal of a transition to a resource-efficient economy, and the onward development and further elaboration of the flagship initiative under the Europe 2020 strategy including the Roadmap to a Resource Efficient Europe (European Commission 2011), and likewise the EU initiatives for revision of existing instruments and implementation of new instruments to strengthen resource

conservation in product-related environmental protection (such as in connection with the Ecodesign Directive, the European Eco-Label, and standardisation).

The Federal Government welcomes the recommendations of the European Resource Efficiency Platform (EREP 2014) as important impetus for future resource policy in the European Union, and notably for greater support for small and medium-sized enterprises (SMEs) in implementing resource efficiency, even more ambitious and coherent shaping of product policy, and the promotion of product responsibility under waste management law. The Federal Government urges the development of resource efficiency indicators and targets at European level that are both based on the German national target of doubling raw material productivity by 2020 relative to 1994 and support the EU's industrial policy objectives.

The Federal Government welcomes the establishment of the EIT Raw Materials as a knowledge and innovation community under the European Institute of Innovation and Technology (EIT) operated by the European Commission and the member states. Headquartered in Berlin, EIT Raw Materials will link up more than 100 European entities (higher education institutions, research institutions and business enterprises) in the resources sector across 22 EU member states. It is supported by BMBF. Its aim is to secure a sustainable supply of urgently needed raw materials for European industry. To this end, training, research and innovation are to be improved along the entire length of the primary and secondary mineral raw material value chain.



www.eitrawmaterials.eu

The Federal Government supports the establishment of a European Resource Efficiency Excellence Centre planned by the European Commission. This will aim in particular to provide SMEs across Europe with effective support in implementing resource efficiency.

The Federal Government will continue its efforts in future to advance the debate for successful resource policy at European level.

BMUB will continue to support the regular European Resources Forum (ERF) under the direction of the Federal Environment Agency as a European discussion platform on the conservation of natural resources.

7.10.3 Expanding cooperation and technology/knowledge transfer with developing and emerging countries

Policy approach

- ◆ Expanding bilateral cooperation with emerging and developing countries on resource efficiency

To deliver on its shared responsibility for sustainable resource management in export countries, the Federal Government will work closely with government and civil society in those countries to establish the appropriate enabling conditions (such as certification schemes and environmental/social standards).

BMBF will continue and further develop the CLIENT (International Partnerships for Sustainable Innovations) funding measure as part of FONA3. The focus here is on demand-driven R&D cooperation with emerging and developing countries to develop and implement innovative resource efficiency technologies and services in line with demand. This will further establish resource efficiency internationally and boost export opportunities for German providers of resource efficiency technologies.

In bilateral development cooperation and under the International Climate Initiative, BMZ and BMUB support partner countries in developing and implementing ambitious policies for improving resource efficiency. The Federal Government will further expand this involvement.



8 Appendix



8.1 Activities of the Federal Ministries

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB)

Activities developed by BMUB to enhance resource efficiency include the following:

- a) In September 2013, BMUB set up a National Resource Efficiency Platform (NaRes) for coordination with industry associations. Membership of the platform was extended in 2015 to include environmental and consumer protection organisations and trade unions. NaRes serves as the central platform for sharing information on members' resource efficiency activities and supports the implementation and onward development of ProgRes.
- b) The Round Table on Resource Efficiency in Building initiative launched in the then Federal Ministry of Transport, Building and Urban Development (BMVBS) has been carried on by the Building directorate-general of BMUB. The objective is to promote resource-efficient building through scientific studies. The Round Table on Resource Efficiency follows current policy developments and technical issues. It also serves as a shared information platform for members from the construction industry. The current focus is on developing and establishing an assessment methodology for resource efficiency in construction.
- c) The Assessment System for Sustainable Building (BNB) bindingly adopted by the Federal Government for all Federal building projects provides a highly sophisticated set of tools for verifying resource efficiency in construction. The tools can also be used by others who commission buildings.
- d) To continue supporting the transfer of knowledge about the potential for resource efficiency into operating practice, BMUB has kept in place the successful Competence Centre for Resource Efficiency, whose funding is provided through the National Climate Initiative. The VDI Centre for Resource Efficiency (VDI ZRE) has once again been contracted to perform this function through to mid-2019. The Competence Centre has the task of developing information, advice and training tools to help mostly small and medium-sized enterprises (SMEs) in improving resource efficiency. BMUB and VDI ZRE also hold a twice-yearly Federal-Länder meeting to exchange on developments in resource efficiency with Länder government departments and agencies.
- e) The Resource Efficiency Network (NeRes) established in 2007 continues to bring together interdisciplinary expertise and experience in resource-efficient production, products and management. The network links up and provides information to a wide variety of different players. Network members include industry associations, special-interest associations, chambers, research institutions, and Federal and Länder bodies. NeRes is to be further developed and new partners recruited in the coming years.
- f) In cooperation with the Federal Environment Agency (UBA), BMUB launched the PolRes research project in January 2012 and successfully completed the project in May 2015. The aim of the project was to analyse the evolving debate about resource policy in Germany from a policy, legal and economic perspective, to support the debate, provide impetus and help link up stakeholders. A follow-on project, PolRes II, underpins the implementation and onward development of ProgRes with parallel research.
- g) To advance resource policy goals with an education strategy, BMUB and the Federal Environment Agency awarded the contract in 2012 for the BilRes research project on education for resource conservation and resource efficiency. The aim is to boost public awareness of resource policy issues by integrating resource conservation and resource efficiency in the education context.
- h) In activities to enhance resource efficiency, it is important to give increased consideration to the demand side and to connect this up with activities on the supply or products side. BMUB therefore drew up a National Programme for Sustainable Consumption which was adopted by the Federal Cabinet in spring 2016. The programme serves as a platform and is intended to augment successful existing instruments and approaches (such as Blue

Angel labelling) and launch new projects (such as measures to counter obsolescence). The aim of the programme is to promote sustainable, resource-efficient consumption and to strengthen consumer competence.

- i) Resource extraction has wide-ranging impacts on biodiversity. As part of BMUB's 'Unternehmen Biologische Vielfalt 2020' ('Enterprise Biological Diversity 2020') initiative, BMUB and the Federal Agency for Nature Conservation (BfN) staged a workshop to highlight the overlaps between resource efficiency and conservation of biodiversity.
- j) The Federal Government's Green IT Initiative launched in 2008 is being continued to the end of 2017. BMUB remains the lead agency. New qualitative targets have been adopted to improve overall resource efficiency: consolidation of the 390 Gigawatt hour target set for Federal Government energy consumption in 2008, implementation of sustainable IT procurement by explicitly labelling standardised sustainable products in framework agreements, and general application of the Blue Angel criteria for energy-conscious operation of data centres.
- k) The Federal Environmental Agency (UBA), the Procurement Office of the Federal Ministry of the Interior (BeschA/BMI) and Bitkom e.V. have jointly developed a set of guidelines for the procurement of green IT products. BMUB, BMI, BeschA and UBA have agreed to use the guidelines in framework contracts for IT products and that only products that meet the prescribed environmental criteria should be offered in federal procurement. It was also agreed that the Federal Government's electronic procurement platform (Kaufhaus des Bundes) will describe the environmental compatibility of such products in a transparent way.
- l) In the Alliance for Sustainable Procurement commissioned by the Federal Chancellery in 2010, the Federal Government, *Länder* governments and local authorities have worked to significantly increase the share of sustainable products and services procured by the state and to promote exchange

between these administrative levels. The Alliance comprises five expert groups who work on key issues regarding sustainable procurement. Since 2014, the Resource Efficiency Working Group headed by UBA has focused on the topic of green IT. Apart from the general responsibilities of the Alliance, the experts look for ways both to increase the useful life of IT devices and to ensure procurement of resource-efficient data centre services.

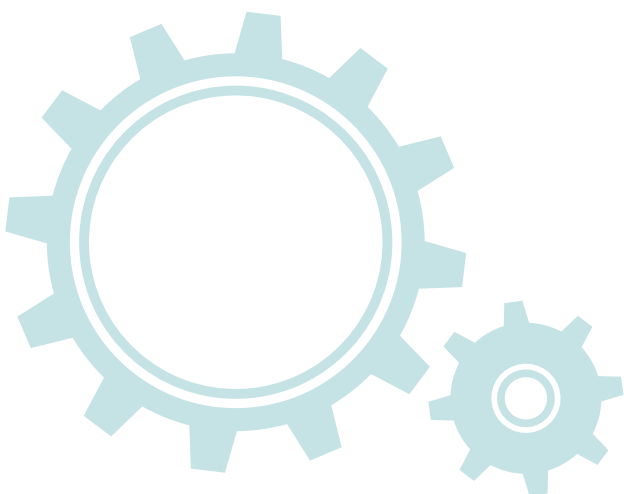
- m) Germany operates an ambitious raw materials policy aiming for sustained long-term improvements in resource efficiency and raw material availability. The availability of primary raw materials is partly determined by environmental limits. A number of research projects conducted by UBA look at the associated challenges, thus supporting Germany's raw materials policy from an environmental standpoint. To ensure the projects are based on sound information, are as practice-related as possible and are accepted by a broad public, they have been supported since 2013 by a joint advisory council comprising representatives from industry, science and research, civil society and government.
- n) In 2012, the European Commission established a Member State Group on Resource Efficiency. This ensures regular exchange between members of the European Commission and representatives of all member states. BMUB oversees and coordinates collaboration within the working group.
- o) As a member of the Steering Committee, BMUB continues to be active on the United Nations Development Programme (UNEP) International Resource Panel (IRP). International experts from industry, emerging economies and developing countries prepare analyses and recommendations on more sustainable management of natural resources. At the G7 Summit in Schloss Elmau in 2015, the IRP was commissioned with the preparation of a synthesis report on the most promising resource efficiency methods and solutions. To complement the report, the OECD will develop policy guidelines. The results are expected in the course of 2016.

- p) BMUB supports innovative recycling technology for the international markets, among other things through its RETech export initiative.
- q) Since 2009, a three-country initiative involving the environment ministries and environment agencies in Germany, Austria and Switzerland has conducted a series of ReSource conferences under the joint leadership of BMUB and UBA. The fourth conference, held in April 2016, focused on wise resource management along the entire product value chain, with special attention being given to the circular economy.
- r) Under KfW Bank's Urban Energy-Efficient Rehabilitation programme (432), grants have been awarded since late 2011 for integrated plans for energy-efficient urban neighbourhoods and also for redevelopment management activities. Under a second programme component, District Supply (201/202), KfW Bank offers affordable loans and repayment grants for investment in sustainable improvement of energy efficiency in municipal utility systems (district heating and cooling, and energy-efficient water supply and wastewater disposal). An annual 50 million euros in funding is made available from the Energy and Climate Fund (EKF). From the time the programme was launched in 2011 up to the end of December 2015, 863 grants worth some 352 million euros have been awarded for the two programmes.
- s) Under a federal funding programme to support investment in national urban development projects, BMUB made an initial 50 million euros available to promote outstanding urban development projects in 2014. Funds are awarded for investment and conceptual projects. One of the programme's main areas of focus in 2014 and 2015 was energy-efficient redevelopment of urban neighbourhoods. This enabled the promotion of a large number of projects which either directly or indirectly served to improve the energy efficiency of buildings and systems. To date, BMUB has provided some 200 million euros for the implementation of what the programme defines as 'premium projects' throughout Germany. The programme will be continued in 2016 with a different focus.

Federal Ministry for Economic Affairs and Energy (BMWi)

The German Mineral Resources Agency (DERA) was founded in autumn 2010 as an arm of the Federal Institute for Geosciences and Natural Resources (BGR) in Hanover. DERA is the national competence centre for natural resources and the central information and advisory platform for mineral and energy resources for German industry. It advises the German government and German industry in matters concerning secure and sustainably managed raw materials supply. It conducts the BMWi-run competition for the German Raw Material Efficiency Award, which recognises outstanding innovative accomplishments on the part of businesses and research institutes in achieving raw material efficiency. BGR also develops methodologies for certification of mineral resources along with standardised methods for analytical proof of origin of resources sourced from conflict regions such as tantalum (coltan), tin and tungsten. Other work performed by BGR includes the identification of the raw material potential to be had from primary terrestrial and marine mineral resources and mining waste.

The Federal Institute for Materials Research and Testing (BAM) conducts a wide range of research projects involving sustainable use of natural resources and production of secondary raw materials from waste. For this purpose, BAM operates pilot plants for trials of



thermo-chemical and wet-mechanical processes. BAM also makes a significant contribution to the safe and efficient use of materials, returning materials to the materials cycle and making reference materials available, for example for waste electrical and electronic equipment. Through its involvement in expert bodies, BAM's resource efficiency expertise also finds its way into various norms and standards.

Through its participation in the European Metrology Programme for Innovation and Research (EMPIR) – the successor to the European Metrology Research Programme (EMRP) – BMWi also plays an active role in improving resource efficiency. With EMPIR, metrology institutes in Europe conduct research and development work to assist in tackling the global challenges involved in achieving efficient energy and resource use, climate change mitigation and meeting the metrology needs of industry and new technology. In particular, BMWi participates in EMPIR through its activities at the National Metrology Institute of Germany (PTB) and the Federal Institute for Materials Research and Testing (BAM).

German Raw Material Efficiency Award

With the German Raw Material Efficiency Award, BMWi recognises outstanding examples of products, processes and services that demonstrate efficient use of natural resources and materials. There are three annual awards which go to two businesses and a research institute, recognising best practice solutions with the aim of sensitising industry and the general public to the importance of resource efficiency.



www.deutscher-rohstoffeffizienz-preis.de
(only in German)

ZIM

The Central Innovation Programme for SMEs (ZIM) funding programme enables small and medium-sized enterprises (SMEs) to invest more in research and development and work more closely with research institutes. By developing new products and services,

they boost their own competitiveness and are able to create new jobs.

The programme is not restricted to particular thematic areas or technologies because companies in the competitive market are better placed when it comes to knowing what the market needs in their specific sector.

Resource efficiency plays a key role in a large number of projects because this is what the market expects – for example, with the design of resource-efficient products: durability, longevity, low energy consumption, minimal use of materials, low-waste production and the development of systems to enable resource-efficient production. These aspects are often found in combination, making for resource-efficient products produced using resource-efficient processes.

Projects selected for funding are classified according to technology types, sectors and applications. It is thus impossible to state the precise amount of resource efficiency funding by ZIM. However, in the past six years and with a combined funding volume of one billion euros, ZIM supported some 7,200 R&D projects in which resource efficiency played a major role. The actual total amount is likely to exceed the funding awarded to projects with resource efficiency in their title and brief description.

Technology sectors such as production, materials, measurement and control, sensors, construction technology and environmental technology focus to a considerable extent on efficient resource management. Because these are the areas ZIM supports most, it can be assumed that resource efficiency likewise accounts for a major share of ZIM funding.

Because, due to policy requirements and the increasing cost of energy and raw materials, resource efficiency continues to play an important role for industry and consumers, SMEs will take this into account in their research and development activities and intensify their efforts with regard to resource efficiency.

With the new ZIM Directive for 2015, the programme has been further enhanced to provide greater incentives for SMEs to step up their innovation activities.

The role of resource efficiency is thus largely determined by the benefits it offers a company and what its customers want.

Foreign trade promotion

As part of BMWi's foreign trade promotion activities, German SMEs receive support in developing foreign markets. The support received involves the following three phases:

Phase 1 – Market Analysis: The company looks at which foreign markets are attractive, studies market reports and attends informational events to obtain a first-hand insight into the target market.

Phase 2 – Market Access: The company decides on a foreign market and, for example, tries to establish business partnerships in the target country, visits trade fairs, assesses the feasibility of entering the market and so on.

Phase 3 – Market Capture: The company is active in the foreign market and wants to maintain/improve its competitive standing at home.

To ensure strategic foreign market entry on this basis, various modules can be applied which BMWi has developed using its longstanding experience in this area. These basic modules include greater provision of information at home, networking and market exploration trips by German businesses abroad, informational trips for foreign decision-makers and trips to Germany for buyers from foreign companies, participation in trade fairs at home and abroad, and project-supporting measures such as the arrangement of project-related finance services. And with a range of export initiatives, BMWi also offers tailored activities to target the respective export sector; these include exhibitions, development of beacon projects, manager training and project development programmes in emerging economies and developing countries in conjunction with the German Development Agency (GIZ).

Synergies also exist with other BMWi export initiatives to promote energy efficiency and renewable

energy use, and which cover the subject of foreign trade in their project portfolios.

These programmes are highly successful because they are in great demand from industry and also because they enable German technology to be used to transfer ambitious environmental standards to emerging economies and developing countries.

Innovation for resource efficiency in construction

Information and recommendations are developed and disseminated for stakeholders in the building and construction value chain in a project on innovation for resource-efficient construction conducted by the RG-Bau rationalisation alliance within the Rationalisation and Innovation Centre of German Industry (RKW Kompetenzzentrum). In particular, the project focuses on the potential innovative materials and technologies have for improved energy efficiency in buildings and for sustainable use and protection of natural resources.

The core of this work lies in designing and operating the online platform, www.ressinnobau.de. The website provides numerous best practice examples of how innovation can be used for efficient use of energy and other resources, while constructing a built environment that meets all the requirements of functionality and comfort. The examples are combined with information regarding the legal framework and other background information. This is rounded off with links and contact details for sources and experts. The platform gives an excellent overview of this broad subject area and is designed to provide an initial introduction to the subject as well as easy access to the vast amount of related information available online.

Federal Ministry of Finance (BMF)

Under Germany's programme of sustainability measures, authorities and institutions of the federal administration housed in properties managed by the Institute for Federal Real Estate (BImA) participate in a multiphase energy and environmental management

programme (LUMAS®) run by BIWA. The programme promotes resource efficiency in the operation of federal properties used for civilian purposes. In line with the programme of sustainability measures, all federal ministries assess whether, given their special role model function and in addition to the LUMASPlus activities, they should strive to obtain high-profile EMAS certification.

Federal Ministry of Education and Research (BMBF)

By promoting research, development and innovation in conjunction with business enterprises, the Federal Ministry of Education and Research (BMBF) makes a considerable contribution to improving resource efficiency. This includes new approaches, technologies and services along the entire value chain for efficient use of abiotic and biotic raw materials and wise use of other natural resources. When announcing funding programmes, competitions are used to select the best proposals from research institutions and commercial enterprise, often in conjunction with other stakeholders. The following is a selection of BMBF's current activities in this field:

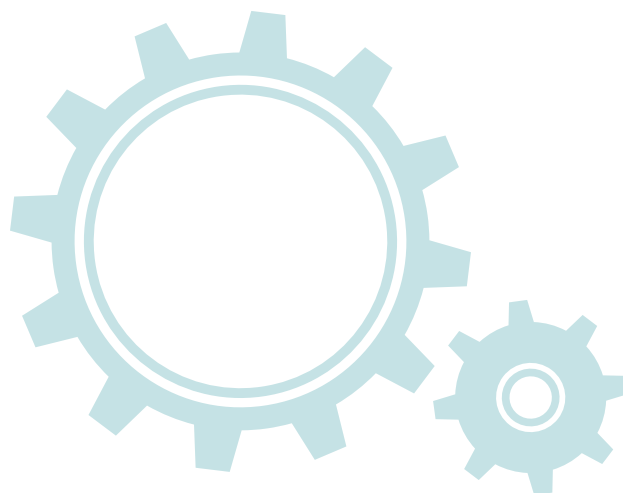
Research into intelligent and wise use of resources is a focal point of the Framework Research Programme for Sustainable Development (FONA³), with its three flagship initiatives, Green Economy, the City of the Future and Energy Transition in Germany. An R&D programme, Raw Materials of Strategic Economic Importance for High-Tech Made in Germany, targets efficient sourcing of strategically important raw materials, such as metals used in electronics, steel refinement and rare earths (r⁴ – Research to Supply Raw Materials of Strategic Economic Importance). Recycling and substitution, and urban mining to obtain raw materials are part of the r³ – Strategic Metals and Minerals funding programme. The increase in scale up to demonstration facility dimensions is the subject of research conducted under the promotion programme r+Impuls – Impulses for Industrial Resource Efficiency. Under the CO₂Plus – Broadening the raw material base by utilisation of CO₂ funding programme, research is promoted on the use of CO₂ as a feedstock for the chemical industry and downstream sectors. Using model R&D projects with partners in emerging economies and developing countries, the CLIENT funding programme helps to promote the subject of resource efficiency at international level. The natural resources of water and land are a funding priority

under the Sustainable Water Management (NaWaM) and Sustainable Land Management programmes. New business models, sustainable consumption and transformation processes are addressed as a funding priority under the Social-Ecological Research programme (SÖF).

BMBF is the lead ministry in implementing the Green Economy Research Agenda and the Strategic Research and Innovation Agenda (FINA) of the National Platform for the City of the Future.

In achieving an organic-based, low-resource economy, the National Research Strategy BioEconomy 2030 focuses on biotic resources and sustainable bio-economic products and processes (Farming Systems of the Future). Products and processes which have so far been reliant on the use of finite raw materials are to be substituted by others which use organic (non-food) resources and, ideally, enable an efficient circular economy (Biotechnology 2020+, Leading-Edge Cluster BioEconomy, Industrial Biotechnology Innovation Initiative). To raise international awareness of resources management, bilateral projects are being promoted, in particular with Vietnam, Russia, Argentina and Brazil. These are supported by research on the bio-economy and social change.

The cross-technology funding initiative KMU-innovativ (covering issues such as resource efficiency and climate change) targets innovative small and medium-sized enterprises (SMEs) aiming either to establish themselves in the efficiency technologies market or improve their existing position in it. Research on sustainable space management has been included as a new funding priority as part of this initiative.



Resource efficiency is also a central focus of the BMBF funding programmes From Material to Innovation and Innovation for Tomorrow's Production, Services and Work. Under its 6th Energy Research Programme, BMBF promotes projects for sustainable energy supply and improved energy efficiency, for example as part of the funding initiative Material Research for the Energy Transition.

Federal Ministry for Food and Agriculture (BMEL)

1. With its revised Renewable Resources funding programme, BMEL has since May 2015 promoted initiatives for improved sustainability and increased resource efficiency using biogenic resources at all stages of the value chain. The programme focuses in particular on:

- ◆ Innovation to improve the resource efficiency and quality of crops
- ◆ Development, testing and assessment of new processes to improve energy and resource efficiency
- ◆ Practical testing and, in particular, economic evaluation of selected beacon projects in the heating, electricity and/or mobility sectors. To receive funding, projects and approaches must contribute to the efficient supply of biofuels, reduce greenhouse gas emissions, increase resource efficiency and be integrated in agricultural value chains, preferentially those with cascading uses.

2. BMEL announced its Pflanzenzüchtung zur Ressourceneffizienz (Cultivation for Resource Efficiency) programme in 2015. By integrating various BMEL programmes – the BMEL Innovation programme, the Federal Organic Farming Programme (BÖL) and the Renewable Resources funding programme – together with the Protein Crop Production Strategy, this umbrella programme covers virtually all areas of crop cultivation in Germany.

The associated funding directive to promote innovation to improve the resource efficiency and quality of crops through cultivation is part of a joint funding

initiative of the Federal Ministry for Education and Research (BMBF) and the Federal Ministry for Food and Agriculture (BMEL). The measure comprises two coordinated directives to promote research, development and innovation in crop research with the aim of incentivising cultivation projects designed to improve and secure crop yields and quality, increase resistance/tolerance to damage caused by biotic and abiotic factors, and improve nutrient and water-use efficiency, thus effecting wise use of natural resources.

Federal Ministry for Economic Cooperation and Development (BMZ)

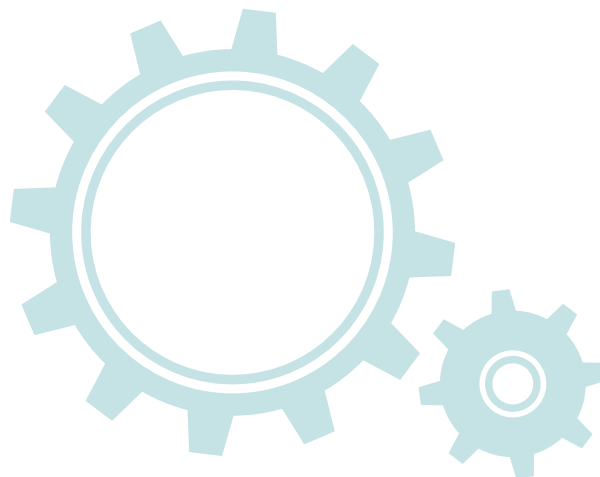
Germany is a resource-hungry nation, is dependent on imports of raw materials and its economy is closely linked with global supplies chains. It thus bears an international responsibility for environmental pressures caused beyond its national borders. As a result, the protection and sustainable use of natural resources are key aims of German development policy. BMZ-developed activities to improve resource efficiency include:

- a) BMZ promotes environment policy activities aimed at more efficient, sustainable use of natural resources in industry in partner countries. It supports both state and non-state actors in formulating and implementing policy strategies such as resource efficiency programmes.
- b) Activities involving economic policy consultancy promote approaches for improved macro-economic conditions for resource efficiency. Examples include the provision of advice in designing and implementing eco-tax reforms and in dismantling environmentally harmful subsidies.
- c) In the promotion of private enterprise, BMZ advises partner countries in the development of environmentally sustainable entrepreneurship and markets. This takes place, for example, through the transfer of business operating instruments and innovations for environment and resource management and the establishment of consultancy markets for environmental services. Joint use of services, materials and by-products among companies (industrial symbiosis) is also promoted.

- d) BMZ also supports partner countries in establishing and promoting stable financial systems which are needed for investment in resource-efficient sectors and technology. In particular, this gives small and medium-sized enterprises (SMEs) access to long-term, low-interest loans which they can use to invest in innovative, more sustainable production methods. In addition, BMZ supports the transfer of resource-efficient technologies by means of development partnerships involving German industry.
- e) Via financial and technical cooperation activities in several developing countries and emerging economies, BMZ promotes the establishment and expansion of sustainable waste management practices and strategies for waste prevention and recycling. These approaches are also promoted by a sectoral project on sustainability in waste management and the circular economy conducted by the German Development Agency (GIZ).
- f) BMZ also supports projects to improve urban-industrial environment protection. This involves combining measures involving waste management and the circular economy, mobility and food security.
- g) In addition, BMZ continues to strive for wise use of resources at the nexus of water, energy and food security, for example through reuse of treated wastewater in farming.
- h) BMZ supports the G7 CONNEX Initiative to improve the capacity of resource-rich partner countries in negotiating complex raw materials contracts. Under the initiative, developing countries receive expert legal, geological, economic and technical advice.
- i) BMZ promotes product certification and environment and social standards in global supply chains, for example in multi-stakeholder initiatives such as the Partnership for Sustainable Textiles. The Partnership supports fair extraction and use of raw materials and more sustainable production of biomass resources in their countries of origin. In this connection, BMZ participates in corporate social responsibility (CSR) initiatives operated by German businesses.
- j) Via the information portal Siegelklarheit.de, BMZ (in cooperation with BMUB, BMAS, BMWi, BMEL and BMJV) provides transparency and guidance regarding environmental and social labels. The portal helps consumers to make sustainable purchasing decisions. Public procurement departments are similarly assisted by the BMZ-funded Kompass Nachhaltigkeit (sustainability compass) website, to promote socially equitable and environmentally compatible purchases.



www.textilbuendnis.com/en



8.2 Länder activities

Material and energy resources are vital both to manufacturing industry and to the material prosperity of society. Increasing use of resources worldwide, the diversity of raw materials used, the ever-increasing effort involved in their extraction along with growing environmental and social pressures call for sustainable management of resources.

The German *Länder* thus see reducing resource use as a key responsibility. Resource efficiency also offers the opportunity to sustain industrialisation, strengthen competitiveness and develop new markets using efficiency technologies. Resource efficiency is thus a core component of future-focused environmental and industrial policy, and is aimed at ensuring that resource use is economically, ecologically and socially compatible.

The *Länder* play a key role in achieving efficient use of natural resources. They have already developed a wide range of activities which are implemented in conjunction with other actors such as industry, science and research, and civil society. *Länder* measures supplement and support Federal Government activities whose true potential can only be achieved in this way. The *Länder* know the regional and local situations and can make a significant contribution to successful design and implementation of federal-level measures.

Given the wide range of measures at both national and *Länder* level, there is an increasing need for a coordinated approach. To this end, the German Environment Ministers Conference has set up LAGRE, a cross-*Länder* working group on resource efficiency. The working group supports the further development of the German Resource Efficiency Programme (ProgRess II) and, in light of the importance of the issue, is tasked with developing a proposal for addressing resource efficiency within the Conference itself. LAGRE incorporates *Länder* input, provides feedback to the Federal Government regarding the programme's implementation and informs the government regarding *Länder* expectations.

The ultimate aim is to obtain a better overview of the interactive impacts of resource efficiency-related measures and areas of activity at Federal and *Länder* level. This will also highlight the specific action needed

to implement the visions and goals of the ProgRess II programme. The activities at Federal and *Länder* level should ideally be integrative and mutually enhancing.

The resolution on item 51 of the agenda of the 85th Environment Ministers Conference establishing the cross-*Länder* working group on resource efficiency (LAGRE) and statements by the *Länder* on the Draft ProgRess II are published (in German) online at:



www.umweltministerkonferenz.de/documents/endgueltiges_UMK-Protokoll_Augsburg_3.pdf
(only in German)

The following lists a selection of activities carried out by the *Länder*.

Baden-Wuerttemberg

For a highly developed industrial region like Baden-Wuerttemberg (BW), resource efficiency presents an opportunity to sustain industrialisation, strengthen competitiveness and develop new markets with efficiency technologies. For Baden-Wuerttemberg, resource efficiency is a core strategic component of its future-focused environmental and industrial policy, and is designed to achieve resource management practices that are economically, ecologically and socially.

Aims

- I. Decouple economic growth from resource use while maintaining the existing high proportion of manufacturing industry and Baden-Wuerttemberg's economic structure.
- II. Baden-Württemberg supports the goal of the National Sustainable Development Strategy to double raw material productivity in the period 1994 to 2020.
- III. Through the use and production of resource efficiency technology, Baden-Wuerttemberg will become both a leading market and a leading provider, making it one of the most resource-efficient regions.
- IV. Increased resource efficiency, a stronger circular economy, efficient use of materials of strategic economic importance, avoidance and substitution of

environmentally harmful substances and greater use of regenerative resources in areas where it is environmentally, technically and economically viable form the basis of Baden-Wuerttemberg's resource policy.

Action areas

- ◆ Promote innovation and technological development
- ◆ Increase material and energy efficiency in business
- ◆ Greater use of secondary raw materials and strengthening of the circular economy
- ◆ Boost resource-efficient raw materials extraction and security of supply
- ◆ Develop reliable indicators, metrics and parameters for resource efficiency

Measures

1. Adoption by the Council of Ministers of a Land-specific resource efficiency strategy based on recommendations from the Baden-Wuerttemberg Resource Efficiency Stakeholders Platform and focusing on industrial production and the abiotic and biotic resources used
2. Establish a BW Agency for Environmental Technology to support industry in implementing resource efficiency measures, initiate projects and foster the establishment of networks
3. Establish a Baden-Wuerttemberg Alliance for Resource Efficiency as a joint industry and government initiative and the 100 Betriebe für Ressourceneffizienz ('100 companies for resource efficiency') initiative
4. Annual Baden-Wuerttemberg resource efficiency and circular economy congress to provide a broad platform for the exchange of experience and information
5. Collaborative research project on an ultra-efficient factory in the urban environment as a best practice model for industrial production and a dismantling factory in an urban setting to provide secondary raw materials of strategic economic importance

6. A resource funding programme to promote investment in resource-efficient technologies using interest grants and low interest rates and investment grants awarded under ReTech BW
7. Support for businesses with tools like bw!sanky and bw!MFCA, appropriate training and information events and the creation of regional networks
8. Demonstration projects for the recovery of industry-strategic raw materials such as phosphorus and industrial metals



www.umwelttechnik-bw.de/de

www.wwww.baden-wuerttemberg.de/de/service/presse/pressemitteilung/pid/land-und-wirtschaft-bilden-allianz-fuer-mehreressourceneffizienz-baden-wuerttemberg

www.pure-bw.de/de/100betriebe/overview

www.ressourceneffizienzkongress.de

www.ultraeffizienzfabrik.de

www.l-bank.de/lbank/inhalt/nav/foerderung-und-finanzierungen/alle-foerderangebote/wf-wirtschaftsfoerderung/ressourceneffizienzfinanzierung.xml?ceid=124542

www.pure-bw.de/de/retech-bw

(only in German)

Bavaria

Bavaria is to become a model for environment-economy symbiosis. Resource efficiency is an important key to combining intelligent growth with environmental innovation – the focus lies in the use of (a) biotic raw materials.

Aims

- I. Economic growth is to be decoupled from resource use, while maintaining and further developing Bavaria's economic structure.
- II. Bavaria supports the aim under the National Sustainable Development Strategy of doubling raw material productivity by 2020 compared with 1994 levels and wants to become the most resource-efficient of the German *Länder*.

III. Key pillars of Bavaria's resource policy include increased resource efficiency, successive transition from a primary to a secondary raw materials economy, removal of environmentally harmful substances, substitution of critical raw materials and greater use of regenerative resources where environmentally, technically and economically viable.

Action areas in Bavaria's resources transition

- ◆ Resource efficiency in industry
- ◆ Research and development to protect available resources
- ◆ Education and awareness building to promote wise resource use

Selected measures in Bavaria's resource policy

- ◆ Sustainable resource use and integrated product policy (IPP) are the focus of Bavaria's Environment Pact (Umweltpakt) and are supported by a working forum
- ◆ Resource efficiency networks to consolidate knowledge and link stakeholders
- ◆ Formulation of a bio-economy strategy
- ◆ Conclusion of the ForCycle collaborative research project and launch of an application-oriented research alliance to promote sustainable resource use in SMEs and crafts and trades
- ◆ Continuation of research activities concerning resource strategies, recycling, material cycles and substitution via the activities of the Fraunhofer project group Materials Recycling and Resource Strategies (IWKS)
- ◆ Research projects on increased acceptance of the use of mineral secondary raw materials in building construction and civil engineering



www.forcycle.de
www.iwks.fraunhofer.de
(only in German)

Berlin

Aims

- I. The state of Berlin intends to increase resource efficiency by 20 percent by 2020, mainly by reducing resource use and increasing both the use and development of efficiency technology.
- II. As part of a resource conservation-focused materials management strategy, Berlin aims to further decouple the volume of waste from economic growth.
- III. The aim of Berlin's Waste Management Plan 2010 to 2020 is to establish a resource-efficient circular economy, largely by means of increased use of waste as a resource.

Focus/Action Areas

Key areas of action and the instruments designed to increase resource efficiency in the state of Berlin:

- ◆ Establishment of a modern circular economy – greater recovery of waste
- ◆ Regular materials flow, greenhouse gas and environmental impact analysis of Berlin's waste – leading to verification of scope for improvement
- ◆ Public procurement according to an administrative guideline on the application of environmental criteria in the procurement of supplies, construction activities and services (Verwaltungsvorschrift Beschaffung und Umwelt, VwVBU) – to boost demand for resource-efficient products and services
- ◆ Berlin Innovation – a platform for innovative products, processes and services
- ◆ BENE – The Berlin Programme for Sustainable Development
- ◆ Sustainability agreements with industry (for example with Vattenfall on the sustainability of woody biomass procurement for CHP plants in Berlin)

Selected measures implemented in the State of Berlin

- ◆ Annual savings achieved of (currently) over two million tons of natural stone and some 350,000 tons of timber by recycling relevant types of waste
- ◆ Development of other relevant resource-saving potential planned for the period up to 2020 (for example using recycled concrete not just in road construction, but also in building construction, the use of recycled concrete chippings to grit roads in winter, processing gypsum plasterboard to supply recycled gypsum for plasterworks)
- ◆ Demand for resource-efficient products and services in public procurement (for example LED lighting, IT equipment, recycling of used tyres and plastics, phosphate recovery, construction supplies)
- ◆ Concerted use of biogenic waste as a material and to generate energy (for example grass cuttings and leaves)
- ◆ Expansion and optimisation of separate waste collection and reuse of dry materials (such as metals and plastics)



www.stadtentwicklung.berlin.de/umwelt/abfall/konzept_berlin

www.stadtentwicklung.berlin.de/umwelt/abfall/entsorgung/de/bilanz_2012.shtml

www.stadtentwicklung.berlin.de/service/gesetzestexte/de/beschaffung/index.shtml

www.berlin-innovation.de/startseite.html

www.stadtentwicklung.berlin.de/umwelt/foerderprogramme/bene

www.stadtentwicklung.berlin.de/umwelt/klimaschutz/aktiv/vereinbarung/download/nh-vereinbarung_vattenfall.pdf

(only in German)

Brandenburg

Aims

The state of Brandenburg has made reduced resource use and increased resource efficiency an integral component of a range of its strategies.

Brandenburg's Sustainability Strategy aims to boost the circular economy and improve resource efficiency, while its Energy Strategy 2030 contains six strategic

goals, one of which is to improve energy efficiency and reduce energy consumption. In its cornerstones for a Mobility Strategy 2030, the Brandenburg state government has set out the goal of reducing traffic volumes with the aim of conserving key resources such as energy, the environment and land. Brandenburg's Operational Programme 2014 to 2020 under the EU Regional Development Fund sets out the goal of increasing resource efficiency and promoting sustainable business practices.

Action Areas

- ◆ Circular economy, energy and construction
- ◆ The bio-economy, agriculture, forestry and food
- ◆ Mobility, logistics
- ◆ Business energy and environmental management
- ◆ Funding policy

Selected Measures

Key Energy Strategy 2030 activities:

- ◆ Development of an action plan to optimise energy use in public buildings
- ◆ Agreement of energy-saving targets with housing associations
- ◆ Support for industry in the implementation of energy management systems
- ◆ Energy-efficient transport design taking demographic change into account

Circular economy:

- ◆ A project to increase resource efficiency in the recycling of mineral construction and demolition waste in collaboration with industry and research (including the development of guidelines for building demolition)

Brandenburg State Sustainability Strategy:

- ◆ Phased application of the BMUB Guideline for Sustainable Building in state-managed building projects

Free Hanseatic City of Bremen


Improving resource and energy efficiency is a central policy concern in Bremen. With the aim of protecting the environment and the climate, and conserving resources, the Free Hanseatic City of Bremen promotes local entrepreneurial engagement and research activities by means of funding programmes, initiatives, networks, awards and incentive schemes. Funding is provided to promote research, development and use of innovative environmental products, processes and services, as well as increased environmental efficiency and corporate social responsibility (CSR) in companies located in Bremen.

The 'Klimaschutzbetrieb CO₂-20' environmental and climate award recognises environmentally active and resource-efficient business practices, while the 'partnerschaft umwelt unternehmen' (environmental company partnership) provides an important platform for the promotion of resource efficiency with campaigns, events, awards and a broad information strategy.

In its resource conservation activities, Bremen places special focus on wind power for the environment, industry and science. The 'wab' network, a wind energy agency, is used by more than 350 companies and research establishments.


Research into resource efficiency is carried out at Bremen University under a separate chair for sustainable management in the school of economic sciences at the 'artec' Sustainability Research Centre and at the UFT Centre for Environmental Research and Sustainable Technologies. At the Bremen University of Applied Sciences, work conducted by the Institute for Energy, Recycling and Environmental Protection (IEKrW) focuses on related issues. To consolidate Bremen's industry and science expertise on the subject of innovative materials and surface technology, a Center for Eco-efficient Materials & Technologies (EcoMaT) is currently being set up, where some 500 employees from industry and science will work together on research and development projects.

Under the Metropolregion Northwest programme, Bremen joins forces with partners from throughout the region to promote the Ressourceneffizienz Northwest (Resource Efficiency North-West) initiative.

 www.umwelt-unternehmen.bremen.de
www.wiwi.uni-bremen.de/gmc
www.artec.uni-bremen.de
www.uft.uni-bremen.de/uft
www.ecomat-bremen.de/de/about
www.ressourceneffizienz-nordwest.de
(only in German)


Funding Programmes:

- ◆ Applied Environmental Research (AUF) funding programme
- ◆ Programme for the promotion of Application-Oriented Environmental Technologies (PFAU)
- ◆ Programme for the promotion of sparing, efficient energy use and conversion in trade and industry (REN)
- ◆ 'Klimaschutzbetrieb CO₂-20' environmental and climate award

 www.umwelt-unternehmen.bremen.de/Angewandte_Umweltforschung.html
www.umwelt-unternehmen.bremen.de/Frderung.html
www.bauumwelt.bremen.de/umwelt/klima_und_energie/detail.php?gsid=bremen213.c.24849.de
www.umwelt-unternehmen.bremen.de/Auszeichnung_Klimaschutzbetrieb_CO2-20_-_Machen_Sie_mit.html
(only in German)

Networks:

- ◆ 'partnerschaft umwelt unternehmen' (puu) industry-environment pact
- ◆ NeMat innovative materials network
- ◆ MultiMat Bremen network for multifunctional materials and technologies
- ◆ wab e. V. (wind energy) with germanwind GmbH (project company)

 www.umwelt-unternehmen.bremen.de/partnerschaft_umwelt_unternehmen.html
www.wfb-bremen.de/de/wfb-branchen-materialwirtschaft
www.ifam.fraunhofer.de/de/Institutsprofil/Projekte/MultiMaT.html
www.windenergie-agentur.de
(only in German)

Incentive and Award Schemes

- ◆ 'Klimaschutzbetrieb CO₂-20' award



www.umwelt-unternehmen.bremen.de/Auszeichnung_Klimaschutzbetrieb_CO2-20_-_Machen_Sie_mit.html
(only in German)

Free and Hanseatic City of Hamburg Department for the Environment and Energy

Hamburg has united various different projects under the umbrella of UmweltPartnerschaft Hamburg (Environmental Partnership Hamburg). The core of this Environmental Partnership is formed by Hamburg-based companies that are actively engaged in environmental and climate protection on a voluntary basis. The Environmental Partnership offers companies numerous possibilities relating to climate action and resource conservation:

- ◆ Free advice on improving company energy efficiency
- ◆ Promotion of investment in resource-conserving measures under the Companies for Resource Conservation (Unternehmen für Ressourcenschutz) programme
- ◆ The 'Umweltinno' funding programme for innovations in material efficiency
- ◆ Advice on and funding for energy-efficient heating systems, renewable energy sources, energy-efficient building, energy-efficient rehabilitation of non-residential buildings, green roofs, low-emission mobility
- ◆ Adaptation to climate change, funding of green roofs
- ◆ Exchange of knowledge and experience in the Environmental Partnership network

In addition to the existing environmental management schemes, Hamburg also promotes the Ökoprofit (Ecoprofit) and 'QuB-Qualitätsverbund umweltbewusster Betriebe' (Quality Alliance for Environmentally Friendly Businesses) programmes. The latter targets small crafts and trades businesses for which the usual systems would be too complex.

In the UmweltPartnerschaft Hamburg network, various information and advice services have been

developed in conjunction with industry associations. In UmweltPartner-Dialog events, best practice examples are presented along with opportunities for exchange between participants during workshops.



www.hamburg.de/umweltpartnerschaft
(only in German)

Federal Government projects to establish a resource-efficient circular economy are also expressly welcomed – especially measures to promote product responsibility:

Separate collection of organic waste called for by Germany's Circular Economy Act (Kreislaufwirtschaftsgesetz) and optimised use of organic waste for energy generation and resource use by means of fermentation and downstream composting have been in practice in Hamburg since 2011.

A pilot facility for the recovery of phosphorus from sewage sludge recently went into operation in Hamburg.

Hesse

Aims

The Hesse state government is committed to the further, sustainable development of a social and ecological market economy for the benefit of current and future generations. In line with a state government decision, Hesse is to become climate-neutral by the end of 2050, with greenhouse gas emissions reduced by at least 90 percent compared with 1990 levels. Protecting vital natural resources is the main focus in accepting responsibility for future generations. The state government sees particular potential in collaboration with industry when it comes to sparing resources, using them efficiently and securing resource availability. Hesse is thus developing a resource conservation strategy which both consolidates the activities of the state government and involves science and research, industry and industry associations.

Focus Areas

- ◆ Conserving resources and increasing resource efficiency
- ◆ Closing material cycles
- ◆ Greater use of secondary raw materials
- ◆ Opportunity-oriented communication regarding resource efficiency

- ◆ Research into sustainable resource use and management

Integrated Climate Change Plan 2025

Hesse is working on an Integrated Climate Change Plan 2025 to ensure its climate policy goals are met. When complete, the plan will contain measures to be implemented in various areas and by a range of stakeholder groups in the period up to 2025 in an effort to meet the state's Climate-Neutral Hesse 2050 goal.

Building Awareness for the Conservation and Management of Natural Resources as Part of Education for Sustainable Development (ESD)

Hesse's 'Umweltschule' (Environment School) programme sees children from all types of schools implementing model practices in self-selected projects on topics such as water, resources, soil protection and food. In the programme's regional networks, representatives from schools, clubs and associations, local administrations and industry initiate projects for their respective region, choosing topics such as avoiding the use of plastic bags when shopping. Networking between the various actors is a core component of the programme. In the 'Schuljahr der Nachhaltigkeit' (School Year for Sustainable Development), children in the fourth grade tackle subjects such as material cycles and foods from an ESD perspective. This links the topic of food with the global effects of the consumer society and fair trade.

Phosphorus Recovery from Sewage Sludge and Sewage Sludge Ash

Against the backdrop of the new Sewage Sludge Ordinance (Klärschlammverordnung), the Hessian Ministry for the Environment, Climate Change, Agriculture and Consumer Protection is developing a waste management plan for municipal sewage sludge to enable efficient recovery of phosphorus.

Greater Use of Recycled Construction Materials

Obstacles to the use of recycled construction materials stem from a lack of acceptance among various market players. The Hessian Ministry for the Environment, Climate Change, Agriculture and Consumer Protection uses events and campaigns to boost acceptance through the use of recycled concrete in building construction and civil engineering.

Valuing Food – Reducing Food Waste

From 2016, representatives from food producers, processors, retail, hotels and restaurants, and catering

companies will work to develop measures and solutions to reduce the volume of food waste in Hesse. With activities targeting consumers, the value of food will be brought to the attention of the public eye.

Separate Organic Waste Collection

In the course of 2016, the Hessian Ministry for the Environment, Climate Change, Agriculture and Consumer Protection will support a municipal-level initiative entitled 'Küchenabfälle gehören in die Biotonne' (Kitchen Waste Belongs in the Organic Bin) to relieve residual waste containers from organic waste.

Technologielinie Hessen-Umwelttech

'Technologielinie Hessen-Umwelttech' is the Hessian Ministry of Economics, Transport, Urban and Regional Development's central platform for the environmental technology sector. It boosts the competitiveness and innovative power of environmental technology manufacturers in Hesse and serves as an interface with users, especially when it comes to resource efficiency and production-integrated environmental protection (PIUS).

Hessen-PIUS

Operated by the Hessian Ministry of Economics, Transport, Urban and Regional Development, PIUS is a consulting programme to promote production-integrated environmental protection in small and medium-sized enterprises (SMEs) in Hesse.

The primary aim of the PIUS programme is to exploit available potential within material cycles, both to protect the environment and help SMEs significantly reduce their business costs.

Industrieplatzinitiative Hessen

The Hesse Ministry of Economics and the Vereinigung der hessischen Unternehmerverbände (VhU) (Federation of Business Associations in Hesse) founded Industriplatzinitiative Hesse in 2012. This jointly developed concept of Hesse as an industry location sets out the overarching issues for successful and sustainable industry development in Hesse. The two main areas of action identified are improved resource efficiency and innovation in industry.

Promoting investment to reduce carbon emissions in industry

SME investment in high-efficiency solutions to reduce carbon emissions is often thwarted by the comparatively high costs of standard solutions and the associated need to borrow large sums in finance. Voluntary

investment on the part of SMEs is thus to be promoted, especially regarding efforts to reduce resource use and establish material cycles through the use of high-efficiency technologies already on the market.

Fraunhofer Project Group for Materials Recycling and Resource Strategies

Against the backdrop of ever-scarcer and increasingly costly raw materials, the Fraunhofer Institute for Silicate Research (ISC) founded the Fraunhofer Project Group for Materials Recycling and Resource Strategies (IWKS) on 5 September 2011. The state of Hesse has made 24 million euros in funding available to promote the establishment of the IWKS in Hanau and Alzenau. Together with industry partners, research will be conducted into innovative separation, sorting, processing and substitution solutions, and strategies developed for sustainable management of valuable resources.

LOEWE Response Research Cluster

With the LOEWE RESPONSE (Resource-Efficient Permanent Magnets by Optimised Use of Rare Earths) research cluster, TU Darmstadt in collaboration with the Fraunhofer Project Group IWKS intends to conduct complementary basic research in the field of magnetic materials at university level. The idea is to consolidate internationally recognised expertise and excellence in the field of magnetic materials and develop strategies for sustainable resource use. The project focuses on innovative, resource-efficient materials science concepts for the use of permanent magnets in wind farms and electric motors.

Institute for Social-Ecological Research (ISOE)

Based in Frankfurt am Main, the Institute for Social-Ecological Research (ISOE) is one of Germany's leading independent institutes for sustainability research and is funded by the state of Hesse. Research conducted by ISOE focuses on water, energy, mobility and food.



www.iso-e.de

www.hessen-nachhaltig.de/de/bildungsinitiative_nachhaltigkeit.html

www.hessen-pius.de

www.industrieplatz-hessen.de

www.iwks.fraunhofer.de

www.response.tu-darmstadt.de

www.iso-e.de

(only in German)

Mecklenburg-Western Pomerania

The Mecklenburg-Western Pomerania Energy Policy ('Energiepolitische Konzeption') was developed in 2014 and presented to the state parliament in February 2015 (Publication 6/3724 dated 20 February 2015). The state's Climate Action Plan is a component of this policy.

The energy policy aims are directly linked to resource efficiency and reducing resource use.

This includes the following measures:

- ◆ Energy-efficient facility optimisation
- ◆ Greater use of LED lighting
- ◆ Local-level environmentally compatible use of logging residues in decentralised heating supply
- ◆ Use of agricultural waste and organic waste in energy generation

The Climate Protection Action Plan 2010 was re-evaluated in 2015. This involved the identification and adoption of measures to reduce carbon emissions.

In many cases, resource efficiency and reduction of energy are directly linked. As part of the participative process, new initiatives such as sustainable building and ecological farming were included in the plan.



Direct links to both these approaches exist in transport modal shift and alternative mobility measures.

Climate protection projects involving increased resource efficiency also receive a bonus in the form of an additional 10 percent in funding under the state's climate protection promotion directive. This bonus is available to businesses, local administrations and grass-roots associations.

The latest version of the Action Plan will be published online in 2016:



www.klimaschutzaktionen-mv.de
(only in German)

Lower Saxony

Knowledge and Innovation Community for Raw Materials

At the start of 2015, the European Institute for Innovation and Technology (EIT) commissioned an international consortium to establish a Knowledge and Innovation Community (KIC) for the raw materials sector. Some 410 million three in funding has been made available to promote the KIC's establishment over the next seven years. The KIC RawMatTERS will bring together more than 100 European institutions from the resources sector, among them several partners from Lower Saxony whose engagement is promoted by the Lower Saxony state government. The University of Clausthal and the CUTEC Institute along with the companies Recylex GmbH and H.C. Stark – four major partners from the Harz region – are members of the KIC and plan to significantly expand vocational education and training, research and innovation in southern Lower Saxony in the fields of recycling and securing supplies of raw materials. This opens up opportunities to establish new clusters of expertise and the creation of jobs in the environmental and resource technology sector, and to develop the Harz/southern Lower Saxony region into a 'silicon valley' for recycling.

EU Funding Programme on Resource and Energy Efficiency

Against the backdrop of ever-scarcer resources, wise management of raw materials and other materials in industry is increasingly important. Policies and measures for resource-efficient management therefore play an increasing role. Materials are a key cost factor in manufacturing industry.

Considerable advisory and consulting effort has already gone into promoting energy efficiency. Lower Saxony thus promotes material and resource efficiency with consulting services and subsidies for individual companies – primarily SMEs and firms in the crafts and trades sector – under the 2014 to 2020 EU structural funding period. Apart from advising companies and helping them to implement various measures, an ideas competition will be used to improve secondary raw materials platforms that promote materials sharing between individual companies – especially SMEs – and thus foster material and resource efficiency. In addition, research and feasibility studies will be conducted to develop practice-oriented recycling and resource efficiency projects, and to promote the establishment of a teaching factory/centre of expertise to train company employees.

Other funding areas include energy efficiency projects (investment in buildings to reduce energy use) and the establishment of energy efficiency and climate action networks).

Funding has been allocated in the amount of 12 million euros from the EU, with an additional 2.4 million euros from the state of Lower Saxony.

North Rhine-Westphalia: Ministry for Climate Protection, Environment, Agriculture, Conservation and Consumer Protection

Aims

North Rhine-Westphalia (NRW) focuses its economic policy on sustainable growth. While industrial production has been and still is the foundation for prosperity in NRW, its structures must also change with the times. Of particular importance for industrial change is a new approach which focuses on sustainability, climate change mitigation and resource and energy efficiency.

- ◆ To achieve NRW's climate change goals⁵ and to counter rising global demand for resources with limited availability and mitigate the environmental damage caused by resource use, increased resource conservation along with greater resource and energy efficiency are of particular importance. Savings and greater efficiency are also gaining in importance in matters of security of supply, economic viability and social acceptability.
- ◆ Sparing and efficient use of raw materials. Substantial increase in raw material productivity (ratio of GDP to raw material consumption).⁶ In terms of the environment, increased efficiency must go hand in hand with absolute savings. Without this, there is a risk that no real improvement will be achieved when it comes to alleviating environmental pressures.
- ◆ Promoting sustainable management. NRW is to become a leader in innovation for climate and environment-friendly products, services, technology and processes. A substantial increase is to be achieved in the number of people employed in the environment sector in NRW – from currently 320,000 to 420,000 by 2025.

Focus/Action Areas

NRW promotes the protection of natural resources, the environment sector and resource, material and energy efficiency – and not just in businesses.

- ◆ Expansion of (business) consultancy on resource efficiency and energy efficiency
- ◆ Promotion of waste prevention, strengthening a consistent circular economy through better use of raw materials and energy contained in waste
- ◆ Development of the environment sector using approaches to promote innovation, internationalisation, regional expertise profiling, enabling conditions and standards, and networks

- ◆ Networking between stakeholders along the value chain
- ◆ Promotion of investment for resource efficiency
- ◆ Resource efficiency in the food sector
- ◆ Sustainable and resource-sparing consumption
- ◆ Integrating the topic of resource conservation into education
- ◆ Development of targets and indicators for raw materials use and raw material productivity under the NRW Sustainability Strategy

Examples

- ◆ Effizienzagentur NRW (NRW Efficiency Agency) established in 1998 to promote resource efficiency in SMEs and promoting energy efficiency in the framework of dual certification with Energieagentur.NRW (NRW Energy Agency) since 2013
- ◆ Promotion of Ökoprotit since 2000 as a cooperation project between local administrations and industry. 15 years of Ökoprotit in NRW in 2015, with 1,700 companies and organisations participating in 149 projects
- ◆ EnergieUmweltwirtschaft.NRW (EFRE.NRW 2014 – 2020), 40 million euros: funding focus on innovations in raw materials, materials and energy efficiency
- ◆ Ressource.NRW (EFRE.NRW 2014 – 2020), funding focus: resource-efficient production in SMEs; innovative investment (15 million euros) and the promotion of consulting services (three million euros)
- ◆ A study in the form of an e-book on increasing resource efficiency in the food industry: "Steigerung der Ressourceneffizienz in der Ernährungswirtschaft" (EFRE-funded)

5 In North Rhine-Westphalia the Climate Protection Act was adopted with the aim of reducing the overall quantities of greenhouse gases emitted in NRW by at least 25 percent by 2020 and by at least 80 percent by 2050 based on 1990 levels.

6 The target defined by the draft NRW Sustainability Strategy approved by the Cabinet in September 2015. The Wuppertal Institute is currently working on a proposal containing potential targets based on scenario calculations. This will be used to decide on targets and indicators for raw material productivity and resource use.

- ◆ Since 2009, an environmental technology cluster (Cluster Umwelttechnologien.NRW) whose work focuses include material and energy efficiency
- ◆ An Environment Sector Report 2015 for North-Rhine Westphalia (Umweltwirtschaftsbericht NRW 2015), including the sectors materials, material efficiency and resource management, energy efficiency and energy conservation
- ◆ Promotion of start-ups in the climate, environment, energy conservation and resource conservation sectors, with a multi-step business plan competition
- ◆ The Ressourcenschulen (Resource Schools) project run by the consumer protection agency (Verbraucherzentrale NRW) and funded by BMUB
- ◆ ‘MehrWert NRW’ funding project – a regional initiative to promote sustainable consumption through climate-friendly, resource-sparing use of products and services. (EFRE.NRW 2014 – 2020)



www.efanrw.de
www.energieagentur.nrw.de
www.oekoprofit.nrw.de
www.efre.nrw.de
www.umwelt.nrw.de/mediathek/broschueren/detailseite-broschueren/?broschueren_id=4703
www.umweltcluster-nrw.de
www.umweltwirtschaft.nrw.de
www.vz-nrw.de/ressourcenschulen
(only in German)

Rhineland-Palatinate

Through a range of initiatives and projects, the Rhineland-Palatinate state government remains committed to supporting businesses in their efforts to increase resource efficiency. Resource efficiency is seen as including both material and energy efficiency, and as making a significant contribution to climate change mitigation and sustainable development.

Aims

- I. Decoupling economic growth from resource use while maintaining and expanding the large share of manufacturing trade and industry with the existing level of vertical integration
- II. Support the goal under the National Sustainable Development Strategy of doubling raw material productivity in the period 1994 to 2020
- III. Further develop Rhineland-Palatinate as an environment and resource efficiency technology provider
- IV. Secure supplies of raw materials for industry, taking account of the environmental and social aspects of primary and secondary raw materials supply

Focus/Action Areas

The most important areas of action include:

- ◆ Innovation and technology development
- ◆ Support for projects to increase material and energy efficiency in business
- ◆ Circular economy and material stream management
- ◆ Raw materials recovery and recycling in industry

Examples

1. Involvement in the PIUS online portal
2. Effizienznetz Rheinland-Pfalz – EffNet and projects
 - EffCheck – PIUS analyses in Rhineland-Palatinate
 - Project on resource efficiency in the crafts and trades sector
 - Employee engagement project to promote resource efficiency
 - EffNet events (including a resource efficiency breakfast for entrepreneurs, RUF)
 - Sectoral concepts for typical branches of industry in Rhineland-Palatinate
3. A network for municipal material stream management
4. Recycling of construction waste (for example ‘Bündnis Kreislaufwirtschaft auf dem Bau’, RC-Beton: research projects and network creation)

5. IFAG – Informations Forum Abfallwirtschaft und Stoffstrommanagement im Gesundheitswesen (Information Forum Waste Management and Materials Management in the Health Sector)
6. ECOLIANCE – Umwelttechnologienetzwerk Rheinland-Pfalz (an environmental technology network for Rhineland-Palatinate)
7. Intensification of waste transport controls to support environmentally compatible recovery of secondary raw materials



www.pius-info.de
www.effnet.rlp.de
www.ecoliance.rlp.de
(only in German)

Saarland

Aims

- I. More voluntary environmental protection in industry in Saarland and support of resource-efficient production processes and practices
- II. Secure supply of raw materials to Saarland's industry, while taking account of environmental and social aspects
- III. Establish regional, environmentally sound organic waste management and recovery
- IV. Increase energy efficiency, reduce energy use and substitute the use of fossil fuels with renewable energy use

Focus/Action Areas

Key areas of action:

- ◆ Voluntary environmental protection
- ◆ Security of supply of raw materials for industry
- ◆ Circular economy
- ◆ Municipal solid waste
- ◆ Municipal energy efficiency
- ◆ Energy consulting

Examples

- ◆ Saarland Environment Pact (Umweltpakt Saar) – a government-industry alliance for more voluntary environmental protection
- ◆ A responsibility and sustainability campaign (Verantwortung und Nachhaltigkeit. Mach mit!) to sensitise mobile phone users to more sustainable use of mobile phones – as a starting point for change regarding awareness of problems and consumer behaviour in other areas of life
- ◆ Transfer of responsibilities for the recovery and reuse of green biomass from municipal authorities to the regional waste management association (Entsorgungsverband Saar)
- ◆ Funding programme (ZEP Kommunal) for the period 2014 to 2020 (cofinancing from the EFRD) to promote municipal measures for energy efficiency, intelligent energy management and the use of renewable energy in public infrastructure
- ◆ The 'Energieberatung Saar' advisory service helps local citizens, companies and municipal authorities to develop meaningful measures and increase energy efficiency.

Saxony

In 2012, the Saxony state government adopted a Raw Materials Strategy for Saxony ('Rohstoffstrategie für Sachsen: Rohstoffwirtschaft – eine Chance für den Freistaat Sachsen'), with guidelines, targets and raw materials policy measures which serve sustainable raw materials use and increased efficiency in primary and secondary raw materials extraction. The strategy covers a wide range of measures involving fostering knowledge and expertise, international cooperation, research, training of specialists and boosting social awareness of raw materials use.

The state government launched the Saxony Innovation Strategy ('Innovationsstrategie des Freistaates Sachsen') in 2013. With the aim of creating the conditions needed for efficient innovation (promoting research and development to boost the innovative powers of business and of society as a whole), the strategy is designed to spark product and process innovation and drive organisational innovation to achieve environmental efficiency, consistency and sufficiency. Among other things, it

targets the future-focused areas of environment and resources, energy and raw materials, and sets out associated measures for education, research, networking and funding provision.

Expansion of the use of renewable energy sources (wind, sun, bio-energy and geothermal energy) to achieve a gradual reduction in fossil fuel consumption. The Saxony government's targets for renewable energy use are currently being revised and aligned with those of the Federal Government. A wind power potential study is to be prepared in early 2016. The regions are to take greater responsibility in expanding the use of wind power.

Rational energy use: a comprehensive plan drawn up by the Saxony government with a range of action areas and measures supports businesses, municipal authorities and private consumers in improving energy efficiency and energy conservation. Key components of the plan include information, consulting, education and the provision of funding for project implementation. The current funding directives have been published online at www.sab.sachsen.de. Questions concerning efficient energy use can be directed to Saxony's energy agency, SAENA GmbH.

Saxony's Energy and Climate Programme contains a medium-term strategic plan for energy and climate change policy up to 2020/2022. The programme combines climate change policy with energy policy. Strategies to increase efficiency in energy generation and use along with the use of renewable energy sources are set out in detail in a supplementary action plan. The aim is to reduce carbon emissions in trade and industry, retail, services, private households and transport by 25 per cent by 2020 compared with 2009.

Regenerative resources: sustainability as the key principle, with priority placed on material use/cascading use over use for energy supply. The Forest Strategy 2050 ('Waldstrategie') contains a separate strategy for wood production and use.

Saxony Sustainability Strategy ('Sachsen hat Zukunft - Nachhaltigkeitsstrategie für den Freistaat Sachsen'): apart from the many social and environmental issues, core elements of the strategy include resource and energy efficiency. Sustainability in Saxony is seen as a cross-sectoral responsibility whose implementation is managed by the relevant departments.

Saxony Environment Alliance ('Umweltallianz Sachsen'): the aim of the environmental partnership launched in 1998 is to provide incentives for business to implement voluntary environmental protection measures and to reward them for activities that go beyond statutory requirements. A key focal point of the alliance is the provision of support in the introduction and use of environmentally friendly, resource-efficient technologies and management practices. Some 890 companies currently participate in the Umweltallianz Sachsen.

Reducing land take to below two hectares per day for housing development and transport by 2020: Saxony's target is based on the Federal Government target of 30 hectares per day by 2020.



www.smwa.sachsen.de/download/SMWA_BR_Rohstoffstrategie_ES_3VL.pdf

www.innovationsstrategie.sachsen.de/download/Innovationsstrategie_des_Freistaates_Sachsen.pdf

www.saena.de

www.umwelt.sachsen.de/umwelt/klima/30157.htm

www.forsten.sachsen.de/wald/download/Dokument_Waldstrategie_2050.pdf

www.smul.sachsen.de/smul/download/nachhaltigkeitsstrategie_smul.pdf

www.umweltallianz.sachsen.de

(only in German)

Saxony-Anhalt

- ◆ Implementation of the Regional Innovation Strategy RIS ST 2020:
 - Lead markets: energy/machine and plant engineering/resource efficiency and chemicals/bio-economy
 - Promotion of innovative projects for the recycling and resources sector, climate change mitigation, energy efficiency and renewable energy sources
- ◆ Measures to improve resource efficiency conducted under the Umweltallianz
- ◆ Promotion of a cluster management project ('Cluster Kreislauf- und Ressourcenwirtschaft')
- ◆ Energy efficiency policy, projects under the Energy Plan 2030 ('Energiekonzept 2030')

- Lead project: setting savings targets for 2020 and 2030 for Saxony-Anhalt
- Cross-cutting projects:
 - Saxony-Anhalt Energy Agency (LENA)
 - Analysis of Saxony-Anhalt's energy efficiency potential 2015/2016
- Buildings:
 - Interest rate reductions and arrangement of funding under Federal Government programmes relating to energy efficiency (for example 'Sachsen-Anhalt MODERN')
 - Approach to increase and simplify KfW Bank programmes for energy-efficient building modernisation
 - Coordinated enforcement of the Energy Saving Ordinance (EnEV) and Renewable Energy Heat Act (EEWärmeG)
- Transport:
 - Federal research project on green mobility ('Grüne Mobilitätskette')
 - Funding of an e-ticketing pilot project
 - Public Transport Plan Saxony-Anhalt: bikes can be taken on public transport free of charge
 - Intelligent transport systems (Saxony-Anhalt applied transport research initiative (Galileo-Transport) with platforms and framework plan
- Trade and Industry:
 - New EFRD funding directive on energy efficiency in business ('Energieeffizienz in Unternehmen') from the end of 2015 (budget 28.5 million euros, investment measures/ implementation of energy audit recommendations)
 - EFRD funding directive on climate change mitigation (Sachsen-Anhalt KLIMA) – includes innovative efficiency measures
 - Support by LENA for new energy efficiency networks under the National Action Plan on Energy Efficiency (NAPE)
- Public sector:
 - LENA E3K project, including training for energy officers, workshops, exchange, model regions



www.ib-sachsen-anhalt.de
www.umweltallianz.sachsen-anhalt.de
www.cluster-kreislauf-ressourcenwirtschaft.de/Cluster/1343743757
www.lena.sachsen-anhalt.de
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www.galileo.ovgu.de
www.lena.sachsen-anhalt.de/lena/oeffentlicher-sektor
(only in German)

Schleswig-Holstein

The state government of Schleswig-Holstein aims to recruit SMEs in particular to the resource efficiency cause and supports its implementation in businesses by providing information and advice, networking activities and funding. Resource efficiency is seen as material and energy efficiency which, if increased, can contribute significantly to mitigating climate change.

Aims

1. Expanding renewable energy generation and reducing the use of fossil fuels
2. Identify savings potential in private households and businesses, both in terms of energy and resources/materials
3. Innovative measures for increased efficiency, especially in SMEs

Focus/Action Areas

Trained innovation consultants provide businesses with advice on issues such as optimising production processes, research and funding needs, and the adoption of new production processes. The funding programmes operated by the state of Schleswig-Holstein play a key role and open doors for dialogue with companies in the region. Resource-related issues are an important component of the regional innovation strategy. Funding can be provided for specific company projects and to centres of excellence, resulting in diverse co-operation activities and helping to increase awareness of efficiency in regional industry.

Examples and Measures

- ◆ Funding programme for energy and environmental innovation (Energie- und Umweltinnovationen – EUI). The EUI programme primarily supports SMEs in the introduction of innovative, efficient and environment-focused technologies and processes whose use would not be possible without public assistance due to the financial risk involved. To implement the energy transition, the development of intelligent infrastructures will be promoted to achieve optimal integration and use of renewable energy sources. In addition to individual projects, funding is also to be given to joint projects between SMEs and research institutes.
- ◆ BFEI ('Betriebliche Forschung, Entwicklung und Innovation') funding programme to promote corporate research, development and innovation. The aim of the BFEI programme is to support businesses in the development of new ideas, knowledge and technologies and their implementation as marketable products by reducing the risks involved in R&D. Particular emphasis is placed on products and processes which meet the criteria of the Regional Innovation Strategy. Funding is awarded to projects which:
 - focus on first-time use of especially promising technologies and on attainment of technology leadership, or
 - focus on implementing technical solutions in internationally competitive products, processes and services, and capturing market leadership.
- ◆ IA ('Innovationsassistent') funding programme. Small and medium-sized enterprises (SMEs) are given the opportunity to recruit highly-qualified university graduates in fields such as research and development and the application of new technology – among others in the areas of energy, material and resource efficiency – and thus improve their competitive stance.

Further information on the above funding programmes is available on the website of the Schleswig-Holstein Business Innovation and Technology Transfer Corporation.

 www.wtsh.de
(only in German)

Thuringia

Examples:

- ◆ Funding programmes run by the Thuringia Ministry for the Environment, Energy and Nature Conservation (TMUEN):
 - Improving energy efficiency in business: consulting and investment measures to support implementation of the outcome of the consulting service
 - Support for research institutions and associated practitioners in applying for R&D project funding from the Federal Government
 - Promoting acceptance and use of environmental management systems (EMAS, ISO 14001, QUB and ÖKOPROFIT) in government administration and industry

 www.thuringen.de/th8/tmuen/haus/emas
(only in German)

- ◆ Funding programmes run by the Thuringia Ministry for Economic Affairs, Science and Digital Society (TMWWDG):
 - Preference for environmentally sustainable businesses in the award of funding under the joint federal/Länder programme for improving regional economic structures
 - Funding of projects targeting improved resource efficiency or energy conservation in business ('Thüringen Invest')
- ◆ Thüringer Energie- und GreenTech-Agentur (ThEGA)
 - Central expertise, consulting and information centre for the promotion of renewable energy use, the development and implementation of energy conservation measures and rational energy use/energy efficiency for municipal authorities, businesses and private citizens
 - Further development of ThEGA to establish a resource efficiency agency is planned.

- ◆ Thuringia Sustainability Pact (Nachhaltigkeitsabkommen Thüringen (NAT)):
 - Voluntary pact between the state government and industry to shape Thuringia as an industry location while applying the principles of sustainable development. This includes projects in energy efficiency and resource conservation, as well as establishing networks of sustainably managed businesses (exchange of information and experience).
- ◆ Bio-energy Consulting (Bioenergieberatung Thüringen (BIOBETH)):
 - Pre-competitive, neutral initial advice on using bioenergy and improving efficiency in existing bioenergy plants in farming and forestry, municipal administrations and business in rural regions of Thuringia
- ◆ EMAS in TMUEN
 - The public sector as role model: leading by example in the Thuringia state government
- ◆ Scientific Advisory Council on Resources (FbNR) at the Thuringian Ministry for Infrastructure and Agriculture (TMIL)
 - Strategy for the use of regenerative resources in Thuringia ('Konzept zur Förderung der Nutzung nachwachsender Rohstoffe im Freistaat Thüringen') with guidelines on the use of raw materials as resources and for energy – moderated by the Thuringia Centre for Renewable Resources (TZNR) at the Thuringian State Institute for Agriculture (TLL)
- ◆ Thuringia Regional Research and Innovation Strategy (RIS3 Thüringen)
 - Sustainable energy and resource use as an area of specialisation under the 'RIS3 Thüringen' strategy in conjunction with 'Forum Ressourceneffizienz'
- ◆ Bauhaus University, Weimar:
 - FOGEB Research Group on Green Efficient Buildings
- ◆ Ilmenau University of Technology:
 - Thuringia Innovation Centre Mobility (ThIMo)
- Institute for Energy, Drive and Environmental Engineering ('Institut für Energie-, Antriebs- und Umweltsystemtechnik' (IEUA)) and the Energy Engineering Centre ('Zentrum für Energietechnik') at the Ilmenau University of Technology (TU Ilmenau)
- ◆ University of Jena (FSU)
 - Research and transfer projects on resource efficiency, including low-risk, climate compatible and sustainable energy supply, bio-inspired materials and laser-based material processing for use in energy and environmental technology, fluoropolymer coating of textiles and efficient, resource-conserving semi-conductor manufacture using ultrashort pulse lasers
 - At the Jena Centre for Energy and Environmental Chemicals (Zentrum für Energie und Umweltchemie (CEEC)), ceramic and polymer materials are to be developed and prototypes built for energy storage, generation and environmental technologies.
- ◆ Nordhausen University of Applied Sciences
 - Research in green technology
 - Institute for Regenerative Energy Technology (in.RET), Institute for Material Flow, Energy and Land Management (Institut für Umwelt-, Energie- und Recyclingmanagement) (August Kramer Institute, [AKI])
- ◆ Schmalkalden University of Applied Sciences
 - NeMAS – a network for the development, production and manufacture of machines and systems for the use of biomass on special surfaces (ZIM-Netzwerk, FH Schmalkalden) – biomass recovery, use of biomass for energy, residual waste and co-products, use chains
- ◆ Fraunhofer Institute Application Centre System Technology Ilmenau
 - Focus on resource management, including water supply and wastewater treatment, surface water, energy management and energy data management systems, operation of energy transmission and distribution grids, information and communications technology for centralised and decentralised energy supply systems



www.thueringen.de/th8/tmuen/haus/emas
www.thega.de
www.nachhaltigkeitsabkommen.de
www.biobeth.de
www.thueringen.de/th9/tll/pflanzenproduktion/nawaro/tznr/index.aspx
www.thueringen.de/th6/tmwwdg/wirtschaft/ris3/index.aspx
www.cluster-thueringen.de
www.fogeb.de
www.tu-ilmenau.de
www.uni-jena.de
www.hs-nordhausen.de
www.nemas.org
www.iosb.fraunhofer.de/servlet/is/5364
(only in German)

8.3 Municipal activities

From both an environmental and an economic standpoint, unrestricted energy use and consumption of raw materials and their financial impacts call for a change in attitudes along with structural change. This also applies to activities at municipal level.

The member cities and towns of Germany's leading municipal associations – the German Association of Towns and Cities (Deutscher Städtetag), the German Association of Rural Districts (Deutscher Landkreistag) and the German Association of Towns and Municipalities (Deutscher Städte- und Gemeindebund) – are responsible for local community affairs. For many years, the city, district and local authorities have been working towards sustainable development, taking account not just of environmental, but also of social and economic aspects. This approach is reflected in the National German Sustainability Award. In a range of ways, they promote resource efficiency via activities such as local business development, procurement, energy supply and waste management.

As central points of contact and service providers, municipal business development agencies promote small and medium-sized enterprises (SMEs) in particular. Their activities range from consulting and support to implementing model projects to promote

environment-focused production processes. Bringing together representatives from industry, science and research and the public sector to combine their expertise along the value chain, they promote sectoral business development by providing opportunities for the development of resource and energy efficiency innovation, documenting such innovation in the form of high visibility projects, and encouraging replication.

Municipalities and their resident businesses are committed to establishing a resource-sparing basic infrastructure, especially as regards energy and water supply, and wastewater management. For example, they ensure region-wide collection of waste and rain water, treat it to remove pollutants and provide a high-quality, region-wide, integrated waste management system. This helps to increase resource efficiency in production and establish a resource-efficient circular economy. This prioritisation of recycling waste and energy has had the result that, in Germany – and especially at municipal level – more and more sectors are developing into (secondary) raw material and energy producers, thus helping to reduce greenhouse gas emissions.

Via integrated energy and climate change mitigation strategies, in some cases with funding at national and *Länder* level, energy-efficient building modernisation and neighbourhood redevelopment, and comprehensive consulting services, municipalities (either by themselves or in close cooperation with their utility companies) have contributed significantly to increasing energy efficiency for many years. Municipalities and utility companies are also involved in expanding use of renewable energy sources and cogeneration technology, and the optimisation and digitisation of distribution grids. Apart from their environmental focus these activities also take in economic and strategic issues.

With sustainable procurement, municipalities have access to a further tool to achieve the goals of environmental protection and resource conservation which they increasingly use on a voluntary basis. While for many years, environmental criteria have been considered in all procurement activities, attention is now increasingly given to social criteria such as payment of the legally prescribed minimum wage and contractor adherence to ILO standards in contract performance. By asking targeted questions related to these criteria, municipalities have been able to change producers' and service providers' mindsets in several sectors.

8.4 Activities at associations and institutions⁷

- ◆ BBS – German Building Materials Association
- ◆ BDB – Association of German Banks
- ◆ BDG – Association of the German Foundry Industry
- ◆ BDI – Federation of German Industries
- ◆ BGA – Federation of German Wholesale, Foreign Trade and Services
- ◆ Bitkom – Federal Association for Information Technology, Telecommunication and New Media
- ◆ BV Glas – Federal Association of the German Glass Industry
- ◆ BVR – National Association of German Cooperative Banks
- ◆ BV Ziegel – Federal Association of the German Brick and Tile Industry
- ◆ Friends of the Earth Germany
- ◆ DBU – German Federal Environment Foundation
- ◆ DIHK – Association of German Chambers of Commerce and Industry
- ◆ DNR – German League for Nature, Animal and Environment Protection
- ◆ European Six Sigma Club Deutschland e. V. (ESSC-D)
- ◆ FUE – German NGO Forum on Environment and Development
- ◆ Germanwatch e. V.
- ◆ Germany Trade & Invest GmbH
- ◆ HDB – Central Federation of the German Construction Industry
- ◆ HDE – German Retail Federation
- ◆ IG BAU – Trade Union for the Construction, Agricultural and Environmental Industries
- ◆ IG BCE – Industrial Mining, Chemicals and Energy Union
- ◆ Metal Workers’ Trade Union
- ◆ KfW Group
- ◆ German Nature and Biodiversity Conservation Union
- ◆ PlasticsEurope Deutschland e.V.
- ◆ RKW – Efficiency Improvement and Innovation Centre of German Industry
- ◆ SRU – German Advisory Council on the Environment
- ◆ Textil e.V.
- ◆ VCI – German Chemicals Industry Association
- ◆ VDA – German Association of the Automotive Industry
- ◆ VDI – Association of German Engineers
- ◆ VDMA – German Engineering Federation
- ◆ VDZ – German Cement Works Association
- ◆ VKU – German Association of Local Public Utilities
- ◆ vzbv – Federation of German Consumer Organisations
- ◆ WVM – Metal Trade Association
- ◆ WV Stahl – German Steel Federation
- ◆ ZDH – German Confederation of Skilled Crafts
- ◆ ZVEI – German Electronical and Electronic Manufacturers’ Association

⁷ This content is based on input from the respective associations and institutions and does not necessarily reflect the opinion of the German Federal Government.

BBS – German Building Materials Association

Companies in the building materials industry make an active contribution to conserving biodiversity by means of environmentally sound extraction management processes and technology, timely restoration and recultivation of land used for extraction, and close cooperation with conservationists. Targeted management measures take effect early in the operational phase. The building materials industry has affirmed its commitment in a declaration on Resource Use in Germany issued jointly with the nature conservation association Naturschutzbund Deutschland (NABU) and the trade unions for the construction, agricultural and environmental industries (IG BAU) and the mining, chemical and energy industries (IG BCE).

To minimise the environmental impacts that are necessary to meet demand for resources, the building materials industry has always made every effort to use any secondary materials produced. As early as in 1995 the building materials industry established a cooperative working group (Arge Kreislaufwirtschaftsträger Bau) which plays an active role in supporting closed-cycle management in the building sector. This alliance has given the German government a voluntary commitment to ensure the environmentally sound recycling and reuse of mineral building rubble previously deposited as landfill. Monitoring reports presented to the Federal Environment Ministry every two years have documented successes in recycling since 1996. When the voluntary commitment expired after 10 years, the German government and the building industry were able to report a very favourable trend: of the average annual quantity of 220 million tonnes of mineral building rubble, around 90 percent (about 190 million tonnes) stayed within the materials cycle and underwent environmentally sound recycling and reuse. In individual market segments such as road construction rubble the recycling rate was even higher, at nearly 98 percent.

This level of recycling and recovery has become the standard in Germany. The data on the quantities and destinations of mineral building rubble which the building industry continues to publish every two years document the great extent to which mineral building rubble is retained in a closed cycle. The ninth and most recent monitoring report was presented to the Federal

Ministry for the Environment, Nature Conservation, Building and Nuclear Safety in February 2015.



www.baustoffindustrie.de
(only in German)

BDB – Association of German Banks

Banks keep resource efficiency in focus

The business activities of banking customers can have both positive and negative effects on the environment. This is why it is important for banks to promote environmentally sound activities and minimise those which are not. To address this challenge, private-sector banks support their customers by providing financing to enable them to invest in resource-efficient technology. This is done in particular through the provision of investment and development loans. For many small and medium-sized businesses (SMEs), bank loans are a key source of external funding. For large-scale investments, alternative means of financing can be used via the capital market. In some cases, this is also possible for medium-sized enterprises. Private-sector banks give customers access to the capital market. There will continue to be strong demand for debt finance. Banks are conscious of their responsibility in this connection for supporting the transition to a more resource-efficient economy.

BDG – Association of the German Foundry Industry

Foundry technology has a long history of achieving high levels of efficiency in all processes. Casting is by far the most resource-efficient production process thanks to near-net fabrication. Apart from materials efficiency, energy and production efficiency are key success factors for the foundry sector and for cast products compared with products manufactured using other processes.

With regard to the use of metal inputs, some 90 percent of secondary metals are used in cast iron production. In-house regeneration technology enables significant and ongoing reductions in the use of foundry mould sands. More than 80 percent of the sand, which for technological reasons has to be extracted after several processing cycles, is used in landfill and road construction, backfill and cement production.

Recovery and external use of heat generated in the cast-cooling process is currently receiving a lot of attention. Examples for the use of foundry exhaust heat in neighbouring production sites in the food industry illustrate the success achieved by the industry in further improving its energy efficiency. The online platform 'Energieeffizienter Gießereibetrieb 2.0' provides more information:



www.effguss.bdguss.de
(only in German)

Simulation technology – bionics – allows not just the reduction of process-related material loss, but also systematic application of lightweight design principles to produce low-weight, resource-efficient parts. Especially with regard to mass production in the automotive industry and the associated contribution to reducing emissions of harmful greenhouse gases, this aspect of resource efficiency is of huge importance.

BDI – Federation of German Industries

The BDI highlights German industry's indispensable contribution to increasing resource efficiency, where entrepreneurial innovation plays a key role. Two workshops have already been held on this subject in conjunction with the Federal Ministry for Economic Affairs and Energy (BMWi). The first, on resource efficiency as a cornerstone of competitive industry ('Ressourceneffizienz als Eckpfeiler einer wettbewerbsfähigen Industrie'), was held on 9 July 2014 in Berlin. The second focused on whether, despite resource-efficiency measures, industrial raw materials are being depleted ('Endlichkeit trotz Ressourceneffizienz: Gehen uns die wichtigen Industrierohstoffe aus?') and was held a year later on 9 July 2015. The workshops looked at ways to boost industry's innovative power. Further events on the topic are planned.

BGA – Federation of German Wholesale, Foreign Trade and Services

The Federation of German Wholesale, Foreign Trade and Services (BGA) represents the general economic, social and professional interests of 110,000 companies with nearly 1.2 million employees and about 75,000 apprentices. The BGA membership comprises 26 *Länder*-specific and regional associations in the form of employer and business associations, and 43 sectoral associations.

The wholesale trade advocates resource efficiency in many areas, for example by pushing sales of energy-efficient products. A number of initiatives have been launched in the wholesale sector and reusable packaging has also been introduced. Particularly worthy of note in this regard is the deposit consortium in the chemicals industry, which ensures uniform management in the provision and acceptance of returnable chemicals packaging on a deposit basis, and the use of reusable cable drums by electrical wholesalers. Returnable packaging is of huge importance in the wholesale beverages sector, which now runs the country's biggest information campaign ('Mehrweg ist Klimaschutz') to promote the idea of returns and reuse to help mitigate climate change. Ten years ago, the wholesale beverages sector was also one of the initiators of the label for returnable packaging, which is now used by more than 140 manufacturers.

A number of companies in the chemical trade have introduced a chemicals leasing service. Chemicals are supplied to users and are then either treated or disposed of in an environmentally sound way. What is sold is thus a resource-efficient outcome for the customer. In surface cleaning, for example, rather than selling a quantity of chemicals, sales are based on cleaning a certain number of surface units. This involves providing the customer with in-depth advice on optimising cleaning processes while reducing chemicals use. Goods that do not meet specifications or which are contaminated are used as is or for down-grade applications. Before such goods are disposed of, efforts are made to place them in raw materials exchanges to keep them in the materials cycle.

Bitkom – Federal Association for Information Technology, Telecommunication and New Media

The Federal Association for Information Technology, Telecommunications and New Media (BITKOM) represents more than 2,300 companies. Over 1,500 are direct members. Its membership comprises 1,000 SMEs, 300 start-ups and almost all global players on the market – providers of software and IT services, telecommunications and Internet services, manufacturers of hardware and consumer electronics, and companies in the digital media, online services sector and other areas of the digital economy.

For many years, BITKOM has played an active role in improving resource efficiency in the life-cycle of ITC products: from product design to eco-design criteria, to minimising IT resource use and increasing efficiency in the usage phase, right up to correct disposal or recovery and reuse. Over the years, this has given rise to a wide range of initiatives, platforms and projects. Selected examples include:

- ◆ Creating and maintaining a platform for the procurement of resource-efficient ITC in the public sector and publication of guidelines to assist public procurement agents
- ◆ Support for and use of voluntary eco labels such as the Blue Angel, Energy Star and EPEAT
- ◆ Work to promote resource-saving data centre operation, with guidelines on energy efficiency
- ◆ Establishing take-back schemes for electrical and electronic waste
- ◆ Implementation of a pan-European dialogue platform on remarketing of used ITC equipment – Product Reuse European Working Group

 www.bitkom.org/EN
www.itk-beschaffung.de/index-2.html

BV Glas – Federal Association of the German Glass Industry

In 2013 the recycling rate for packaging glass was more than 87 percent, representing an increase compared with previous years. A prerequisite for the use of recycled glass is appropriate quality – it must not contain foreign matter and different coloured glass must be collected separately. To give consumers guidance in this area, the Action Forum ‘Glass Packaging’ has launched an initiative called ‘Not all glass is recyclable glass’. The initiative is designed to inform consumers, providing them with advice on the right way to collect waste glass. Germany’s first ever Glass Recycling Day could well take place in 2016, with the Action Forum approaching municipal administrations, waste consultants and consumer advice centres with the aim of holding associated events at local level. One of the key messages to be communicated to consumers is that by recycling glass they

can actively help to protect the environment. Using recycled glass saves raw materials, energy and reduces CO₂ emissions. For every ten percent of broken glass used, around three percent energy and approximately 3.6 percent CO₂ can be saved. Waste glass is an important resource in the production of new packaging glass: a glass bottle comprises an average 60 percent recycled glass. Green glass bottles can contain as much as 90 percent recycled glass.

In conjunction with the BDE and the bvse, BV Glas has developed and issued a set of standards for the use of recycled glass in the glass container industry (Standardblatt T 120 ‘Qualitätsanforderungen an Glasscherben’). These guidelines set out the criteria for high-quality recycling and promote closed-cycle management of raw materials in the glass container industry.

 www.was-passt-ins-altglas.de
(only in German)

BVR – National Association of German Cooperative Banks

The BVR is the top association of the cooperative banking group FinanzGruppe VR and represents their interests at national and international level. Via the National Resource Efficiency Platform operated by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety, the BVR participates in exchange between policymakers, industry and various social groups on measures to increase resource efficiency.

As reliable finance partners, the cooperative banks offer their SME customers financing solutions for business investment activities to achieve more efficient use of resources and increase energy efficiency. The funding programmes run by the Federal and *Länder* governments, including the guarantee banks, play an important role in the provision of financing. For many years, the cooperative banks have held a large share of the SME-financing market.

BV Ziegel – Federal Association of the German Brick and Tile Industry

Roofing Tile Recycling Plan

Roofing tiles made from sorted tiles recovered from old roofs and from broken tiles from the ceramics industry are in high demand. Broken ceramic tiles are processed in well-monitored specialist facilities to produce grit for sports areas and tennis courts, and to produce growth substrates for the gardening and landscape gardening sector. To create awareness for this demand throughout Germany and to optimise the existing materials cycle, the BV Ziegel has begun to monitor and document the ceramic roofing tile cycle to promote recovery and re-use of high-quality materials. In a first step, companies already operating in the roofing tile sub-cycle were identified which have specialised in using old roofing tiles or in transporting, storing and pre-processing them for later use in production. The network is to be expanded to include finishing companies that process broken tiles to produce substrate for green roofs, gravel turf, garden and landscaping soils, recycled construction materials for paths and grit for sports grounds. Documentation takes in the necessary conditions such as acceptance criteria, purity grade, permissible impurities, etc. The results of the roofing tile recycling research project will be published at the start of 2016.

Friends of the Earth Germany

With some 530,000 supporters, Friends of the Earth Germany (BUND e.V.) is Germany's biggest nature conservation and environmental protection association. It is largely financed from members' contributions and donations.

BUND is part of Friends of the Earth, the world's largest network of independent environmental protection organisations. For many years, it has worked to promote environmental awareness in the use of the planet's resources. While in earlier years, focus was placed on reusing waste and reducing traffic, activities have since been expanded to shine the spotlight on consumer behaviour and lifestyles.

Saving energy and improving energy efficiency are given top priority at BUND. They are a prerequisite in achieving a rapid switch to 100 percent renewable energy use and achieving affordable energy prices.

BUND works to achieve environmental and social sustainable development which meets the needs of current generations without putting those of future generations at risk. This is why BUND believes it necessary to promote the idea of sufficiency in society. Using projects to promote municipal sufficiency policy, such as the blog 'Stadt Land Glück!', BUND supports local administrations on the road to sustainable urban development, reduced land take, decentralised energy supply and energy conservation.

The youth organisation BUNDjugend conducts its own projects to tackle issues involving wasting available resources and changing consumer behaviour, and uses new forms of protest to raise awareness to age-old problems such as negative practices in animal husbandry.



www.bund.net/ressourcen
www.bundjugend.de
(only in German)

DBU – German Federal Environmental Foundation

The German Federal Environmental Foundation (DBU) is responsible for promoting environmental protection projects with special focus on small and medium-sized enterprises (SMEs). Against the backdrop of recognised global environmental limits, both its approaches and the topics it promotes look at the entire value chain with the aim of achieving sustainable industry practices. Key challenges in this regard involve reducing use of energy, natural resources and materials, and minimising emissions of harmful pollutants. Practice-oriented research and development projects in SMEs demonstrate best practices, provide innovative solutions for resource-efficient management in almost all sectors of industry and lead to energy-efficient, resource-sparing products and processes. If successful, the projects can help to reshape and redefine the best available technologies in various industry sectors. Approaches to reduce the use of materials and natural resources are not solely based on more efficient processes, but also on changes in producer and consumer behaviour. Environmental education, information and communication projects aimed at these target groups are designed to promote the necessary paradigm shift.

DIHK – Association of German Chambers of Commerce and Industry

The Chambers of Commerce and Industry (IHK) Recycling Exchange is a platform for secondary raw materials and waste. Companies can use the platform free of charge to search for suppliers and buyers, thus enabling savings in the use of raw materials and disposal costs. In the IHK-UMFIS database of environmental companies, some 10,000 businesses offer their environmental expertise. The EU Eco-Management and Audit Scheme (EMAS), for which the chambers of commerce and industry manage registration, helps companies to continually reduce their resource use.

Operating strategies for improved resource efficiency are given in-depth treatment in seminars and workshops offered by an increasing number of chambers of industry and commerce. These are supported by activities conducted, for example, by the SME Initiative Energy Transition and Climate Action (Mittelstandsinitiative Energiewende und Klimaschutz) as a joint campaign of BMUB, BMWi, DIHK and ZDH (German Confederation of Skilled Crafts). Through dialogue, information and training, the Initiative offers assistance for businesses and establishes contacts at local level. In another joint project, an excellence initiative of climate change mitigation companies – in the form of a cross-sectoral alliance – offers best practice examples for optimising energy use and mitigating climate change.

As part of the German Chambers of Commerce Abroad (AHK) business delegation programme to promote export initiatives for renewable energy sources, energy efficiency and natural resources centres of excellence, Germany's overseas chambers (AHKs) have provided practice-oriented support for German businesses in developing foreign markets and securing supply of natural resources since 2003.



www.ihk-recyclingboerse.de
www.umfis.de
www.emas-register.de
www.mittelstand-energiewende.de
www.klimaschutz-unternehmen.de
(only in German)

DNR – German League for Nature, Animal and Environment Protection

The German League for Nature, Animal and Environment Protection (Deutscher Naturschutzring, DNR) is the umbrella association of German nature conservation, animal and environmental protection organisations and represents almost 100 associations and organisations with a combined membership of 5.2 million. The organisations belonging to the DNR share the common goals of preserving biodiversity, conserving natural resources, mitigating climate change and achieving sustainable, environmentally-compatible industry practices. With a project on Environmental Protection, Resource Conservation and Reforming the Federal Mining Act (Umweltschutz und Ressourcenschutz und Reform des Bundesberggesetz – ending June 2016) and another on Raw Materials Policy 2.0 (Rohstoffpolitik 2.0 – starting July 2016), the DNR places particular focus on legislative and economic instruments for sustainable raw materials and mining policy. The aim of the DNR is to develop models for demand-driven, environmentally compatible extraction of natural resources in Germany and for efficient use of raw materials. The DNR also works to achieve reform of the Federal Mining Act (BBergG), taking up ProgRes Initiative 18. The ultimate aim is to enshrine nature and resource conservation, public participation and legal protection for those affected by mining activities in the Federal Mining Act.



www.dnr.de
www.rohstoffe-zweinull.de
(only in German)

European Six Sigma Club Deutschland e. V. (ESSC-D)

The ESSC-D plays a key role in the development and enhancement of leading methods to secure resource-efficient practices in manufacturing and in the services sector (Six Sigma, Design for Six Sigma and integrating Lean or TRIZ). ESSC-D promotes research and development on methods to reduce errors and increase resource efficiency and resource-efficient use of materials, natural resources and energy in the manufacture and use of products and services. Together with its members, ESSC-D designs applied research and teaching on the use of the Six Sigma method, and assists the transfer of research results to business. It organises and promotes national and international cooperation by

processing and disseminating experience of efficiency improvement with Six Sigma projects and provides participating members with extensive opportunities to share best practices.

Dissemination and sector-specific deepening of knowledge on the connection between resource efficiency and the Six Sigma method is ensured by organising and running regular expert conferences, target group-specific training events, and advisory services for all interested parties.

ESSC-D membership current comprises over 100 individuals and numerous well-known, internationally operating German companies with a combined workforce of more than 300,000 employees, all working to promote resource efficiency.



www.sixsigmaclub.de/en

FUE – German NGO Forum on Environment and Development

The German NGO Forum on Environment and Development (FUE) was established in 1992 following the UN Conference on Environment and Development, and coordinates the activities of German NGOs in international political processes for sustainable development. The FUE maintains contacts with organisations in developing countries and collaborates with international associations to facilitate joint activities.

Working with other NGOs and networks, and particularly with the NGO Working Group on Natural Resources (AK Rohstoffe), the FUE is committed to achieving sustainable, democratic and globally just raw materials policy. The FUE participates in German implementation of the transparency initiative in the raw materials extraction sector (D-EITI), working to promote environmental and development policy needs, and bring D-EITI into both the international and the broader-based national-level raw materials policy debate. In addition to issues involving raw materials and resources, FUE activities also focus on investment and trade policy, agriculture, biodiversity and marine environment policy at national and international level.



www.forumue.de/en

Germanwatch e. V.

Germanwatch is an independent environment and development organisation that works towards sustainable

global development. The organisation is committed to achieving global equity and also to preserving livelihoods. Its work focuses on the politics and economics of the North and their global consequences. Working with members, supporters and other actors in civil society, Germanwatch aims to be a strong advocate of sustainable development. Its funding is broad-based, comprising members' contributions, project funding, donations and funds provided by the Foundation for Sustainability (Stiftung Zukunftsfähigkeit).

As prerequisites for sustainable resource management, Germanwatch cites environmental and social standards for resource extraction, pricing that reflects the truth regarding the environmental impact of the products involved and an absolute reduction in resource use. To reduce resource use, efforts must focus not just on reducing the use of materials in production processes, but on resource efficiency throughout the entire product lifecycle.

Germanwatch strives for progress in addressing such issues in collaboration with other NGOs and constructive stakeholders from consumer protection associations, trade unions and business.

For example, Germanwatch is working on a mix of voluntary and binding measures to promote both sustainability and recycling in the IT sector. Its measures attract government support and sensitise the general public to the issues at hand – especially when it comes to demands for longer lifecycles for IT equipment. In its educational work, Germanwatch is committed to raising awareness to the importance of resource conservation and showing people how they can play their part.



www.germanwatch.org/en/home

Germany Trade & Invest GmbH

Germany Trade & Invest promotes sustainable resource management. Its current activities include:

- ◆ Energy efficiency: ongoing reductions in electricity consumption, for example through the use of cooling mats in data centres and the installation of energy-saving light bulbs and movement sensors in corridors and toilets at its premises in Bonn.
- ◆ Resource efficient equipment: when purchasing printers, importance is placed on energy and resource-saving models. Standard settings are checked for power consumption (for example black

and white printing, and standby after short periods of inactivity). When buying vehicles, fuel consumption is used as the key indicator.

- ◆ Extended lifecycle for hardware: PCs are used for a fixed period of five years and then used for a further two years in home office situations (making for a total lifecycle of seven years).

In addition, measures are adopted to enable medium-term planning to result in increased efficiency in the use of software (process efficiency and consolidation of existing ERP environments).

HDB – Central Federation of the German Construction Industry

German construction companies are committed to sustainable development and efficient resource use. The fact that Germany plays a leading role in resource efficiency and the implementation of important goals in energy and climate change policy is largely thanks to German business.

Resource conservation and climate action are closely related. The German construction industry plays an active role in these fields, both as a source of technological expertise and at the level of strategic policy.

In the field of climate action:

- ◆ The German construction industry supports the transition to renewable energy. The transformation of our energy system involves great constructional challenges, such as modernising existing conventional power stations, building wind farms, boosting storage capacity and establishing a network of ‘electricity highways’. Without these measures, the energy transition cannot be achieved.
- ◆ When it comes to energy efficiency, companies in the German construction industry are technology leaders – both in terms of energy-efficient building modernisation and as regards insulation to prevent energy and heat loss in building technology.

In the field of resource conservation:

- ◆ The German construction industry is one of the sponsors of the initiative for recycling in the construction sector (www.kreislaufwirtschaft-bau.de), which documents the industry’s contribution to

resource conservation and resource efficiency under a voluntary monitoring system. This currently stands at an exemplary 90 percent. The industry also supports the Round Table on Sustainable Building which is hosted by the Federal Ministry of Transport, Building and Urban Development, and actively lends its expertise via the BMUB platform NARESS.



www.kreislaufwirtschaft-bau.de
(only in German)

HDE – German Retail Federation

Against the backdrop of ever-scarcer natural resources and advancing climate change, the German Retail Federation (HDE) works intensively to find ways to protect non-renewable resources. This includes preventing packaging waste, such as by effectively reducing the use of plastic bags and bags made from other materials. In collaboration with BMUB, the HDE has developed an agreement which is designed to make consumers pay for plastic bags and thus achieve a reduction in their use. These measures are supported by wide-ranging awareness-raising activities targeting both customers and employees.

The retail trade is also committed to achieving sustainable consumption, for example by offering a wide range of regional and organically produced products. Using deposit schemes, voluntary return options for customers and the use of secondary rather than primary resources, retailers also make a significant contribution to environmental protection.

Germany’s retail trade supports the expansion of product responsibility to include non-packaging waste made of the same materials as packaging, with the aim of its environmentally efficient collection and reuse on the basis of best available technology.

IG BAU – Trade Union for the Construction, Agricultural and Environmental Industries

For IG BAU, playing an active role in shaping energy and resource efficiency is a central component of sustainable industrial policy.

The efficiency debate in the construction and housing sector, and also in agriculture, has given rise to innovative programmes and sectoral developments.

The expertise and skill of employees and their unions serve as a driver in creating the conditions

needed to achieve the energy transition in industry and business.

Energy-efficient building modernisation has highlighted the win-win situation for all concerned. Energy is saved, the quality of housing and the quality of life for its occupants is improved, while jobs are created and secured.

With the support of the social partners, quality initial and further education and training for employees will become a key component of resource efficiency, making it a best practice model in the years ahead.



www.igbau.de
(only in German)

IG BCE – Industrial Mining, Chemicals and Energy Union

IG BCE (Industriegewerkschaft Bergbau, Chemie, Energie) is convinced that the necessary increases in resource efficiency can only be achieved with the help of employees and co-determination bodies. They must be better integrated into the various business strategies and processes.

In a wide range of events, sectoral dialogues, working groups and one-on-one talks, the IG BCE encourages both codetermination representatives and employees to exercise greater influence on energy and material efficiency processes in their place of work – for example through changes in the raw materials used, product design, optimised production processes and greater use of recycling. The same goal is served by the publication of brochures and the presentation of the Resource Efficiency Award from the IG BCE environment foundation, Stiftung Arbeit und Umwelt.



www.arbeit-umwelt.de
(only in German)

Resource efficiency issues are also addressed under a joint chemicals sustainability initiative (Nachhaltigkeitsinitiative Chemie3) conducted by BAVC, IG BCE and VCI. Significant potential for improvements in efficiency has been exploited in recent years using complex process and shared energy/heating networks. The chemicals industry is launching products, for example in the buildings sector, which help to considerably reduce greenhouse gas emissions. This resource-efficiency potential must also be exploited on the user side.

At congresses and workshops held by the IG BCE Energy Transition Innovation Forum, the topic is presented to a wider audience. For example, best practice projects are being presented that have been initiated by employees and employees' representatives and have been implemented in a social partnership approach.



www.innovationsforum-energiewende.de/information/
(only in German)

The IG BCE will continue to promote the use of sustainable business goals to secure and create jobs in Germany which meet 'good employment' criteria.

Metal Workers' Trade Union

IG Metall promotes sustainable industrial production as a focal area in achieving the transition to environmentally sound industry. Improving resource efficiency is a perfect match for the company-based activities IG Metall conducts as part of its long-standing 'Better Not Cheaper' (Besser statt Billiger) campaign.

The campaign is based on the idea that it is neither possible nor desirable to win the global race to bottom in terms of cost. Only through quality, and through process and product innovation, can employment be safeguarded for the longer term and the principle of good employment take hold.

Employees play key roles in innovation. They can provide impetus for change and it is often works council representatives who call for companies to take the action needed. The issues involved range from new materials, light-weight construction and smart IT to planned obsolescence.

IG Metall activities include:

- ◆ Further education and training of works council representatives as innovation advisors, with resource efficiency as a pillar of practice-oriented project work
- ◆ Energy and resource efficiency guidelines for works council representatives
- ◆ Cradle-to-cradle project and training offerings for engineers in cooperation with consulting institute EPEA



www.aribera.de
www.igmetall.de
(only in German)

KfW Group

KfW Group is a leading global development bank. With decades of experience, KfW works on behalf of the Federal and *Länder* governments to improve economic, social and environmental conditions around the world. In 2014, some 36 percent of its funding went to climate change mitigation and environmental protection.

Under its domestic assistance programmes in Germany, KfW provides low-interest loans and grants to finance measures for improved resource efficiency in residential buildings, businesses and municipal infrastructure. On behalf of BMWi, it also provides assistance for energy saving in residential buildings and in commercial and municipal (non-residential) buildings under a family of programmes entitled “Energy Efficiency – Energy Efficient Construction and Refurbishment”. Under its “Urban Energy-Efficient Rehabilitation” programme operated on behalf of BMUB, KfW assists local authorities throughout the country in the development and implementation of models to save energy in urban neighbourhoods. Commercial businesses wanting to invest in energy efficient production facilities can apply for low-interest loans under the KfW Energy Efficiency Programme – Production Facilities and Processes. Business investment in materials saving, waste avoidance, material recycling and water conservation is funded under the KfW Environmental Protection Programme (ERP).

KfW also offers support in the field of research and development. Under the ERP Innovation Programme, assistance is available for market-oriented research and development work on new products, processes and services that offer greater resource efficiency. Companies looking to implement large-scale R&D of this kind for the first time can apply for assistance in the form of low-interest loans and grants from the Federal Environment Ministry’s environmental innovation programme, which is managed by KfW.



www.kfw.de/kfw.de-2.html

German Nature and Biodiversity Conservation Union

With more than 560,000 members and supporters, Germany’s biggest environmental organisation in terms of membership works to reduce resource use, both in Germany and in the rest of the world. Unless resource consumption is reduced, the high demand for raw materials in industrialised states, global population growth and global economic and consumption growth will further deplete the Earth’s capacities and damage its ecosystems. Increased resource efficiency is thus important, but it is not enough in itself. To ensure that sustainable development also leads to a transformation in the economic behaviour of governments, businesses and private individuals, NABU promotes the resource conservation policy process successfully introduced under the ProgRes initiative. As a civil society organisation, NABU raises awareness to sustainable consumption, represents environmental needs in its lobbying work and brings a vast number of environmental advocates under one roof. Use of secondary raw materials, eco-design, product longevity and lifestyles based on using rather than owning, are the focal points of NABU’s work.



www.en.nabu.de

PlasticsEurope Deutschland e.V.

Plastics are sustainable materials. They are resource-efficient, cost-effective and popular with users and consumers. Transport vehicles are made lighter and more efficient through the use of plastic in their design. Homes insulated with plastics use considerably less energy, helping to reduce emissions of greenhouse gas. Plastic packaging is light and protects products against damage, spoilage and dirt.

Plastics also play an important role in renewable energy use: the rotor blades on wind turbines are made of plastics, and solar cells cannot be produced with them.

Plastics save resources during the usage phase of their lifecycle. This has been confirmed in numerous studies conducted by renowned, independent institutes such as denkstatt/Wien, Fraunhofer IVV/Freising and GVM/Wiesbaden. Apart from the resource conservation potential during the usage phase, focus areas include

innovation, cost-efficiency and consumer benefits arising from specific adapted uses. For this reason, sustainability issues should be central to the ongoing development of the resource efficiency programme.

A sustainable resource efficiency approach allows both quality and the market to decide on recycling and recovery pathways. Plastics producers support eco-efficient – meaning environmentally and economically efficient – waste management processes which enable collection of almost all types of waste, treatment, and reuse in modern, efficient facilities to reap end-of-life benefits from waste, either through material or energy recovery.

 www.plasticseurope.org

RKW – Efficiency Improvement and Innovation Centre of German Industry

RKW aims to improve the competitive stance of small and medium-sized enterprises (SMEs) through the provision of information, advice and further education and training. It operates in conjunction with the RKW network of *Länder*-based organisations in all regions of Germany.

RKW services include:

- ◆ Free consultations on the topics of innovation and resource efficiency
- ◆ Fact sheets and guidelines
- ◆ Best practice
- ◆ Informational events
- ◆ Funded and non-funded resource efficiency consulting
- ◆ Training of resource efficiency consultants
- ◆ Online platforms for energy sector start-ups

 www.rkw.de
(only in German)

SRU – German Advisory Council on the Environment

The German Advisory Council on the Environment (SRU) has long promoted and supported the development of resource efficiency programmes in Germany. One particular area of focus is the development of environmentally sound raw materials management to minimise the environmental impact of raw materials along the entire value chain and usage cycle. In its Environmental Report 2012, the SRU set out a wide range of related proposals. In its Environmental Report 2016, the issue of resource efficiency is taken up again using the example of the debate on further development of the EU circular economy. Both the SRU Chair and its General Secretary have sat on numerous resource policy advisory bodies in recent years, including the Federal Environment Agency's Resource Commission, as scientific advisors of the BMBF programmes r², r³, r⁴, and PolRes and NaRes.

At European level, the SRU has played an active role in establishing an EEAC Circular Economy Working Group, which held its first public workshop in June 2015.

Textil e. V.

- ◆ The member organisations, businesses and textile research institutes in Textil e.V. work in many ways to develop measures for increased resource efficiency. Examples include:
- ◆ Since 2012, the Saxony Textile Research Institute in Chemnitz has worked with partners from industry on the reprocessing of carbon fibres. The resulting nonwoven fabrics can be made into fibre-reinforced plastics, allowing their reuse in machine, facility and vehicle construction.
- ◆ 100 Companies for Resource Efficiency is an initiative launched by Südwesttextil, a member association of Textil e.V. Network, which enables businesses in Baden-Wuerttemberg to present resource efficiency measures which have either already been implemented or are in planning. Material efficiency is given particular focus and the best practice examples are used to foster their replication.

- ◆ Dr. Klaus Opwis and Frank Grüning, two textile research scientists, were awarded the Raw Materials Efficiency Prize (Rohstoffeffizienzpreis) in 2014. They developed a textile which filters valuable resources such as gold, silver, platinum and palladium from industrial waste water. This is a fitting example of how textiles can support resource efficiency in other industry sectors.



www.stfi.de/en/stfi/news.html

www.100betriebe.pure-bw.de
(only in German)

www.suedwesttextil.de
(only in German)

www.dtnw.de/en/home

www.iuta.de/index.php?article_id=632&clang=1

VCI – German Chemicals Industry Association

Through efficient use of resources in production and with innovative, resource-sparing products, the chemicals industry plays an important role in resource efficiency. Chemicals companies continually strive to improve their efficiency in the use of raw materials and energy. One of the ways they do this is to involve employees via employee suggestions schemes and in-house competitions. Promoting resource efficiency is a central component of the sustainability guidelines contained in the joint sustainability initiative Chemie³ operated by VCI, BAVC and IG BCE.

The VCI supports its member companies by providing guidelines on how to increase resource efficiency, including in matters concerning logistics, technical material management and handling of industrial chemicals packaging.

The VCI calls for the creation of chemicals industry clusters to foster use of existing production cluster synergies and enable resource-efficient infrastructures with the lowest-possible energy use.



www.chemiehoch3.de/de/home.html

www.vci.de
(only in German)

VDA – German Association of the Automotive Industry

In economic terms, the automotive industry is Germany's most important sector, with sales of some 370 billion euros and a permanent workforce of 800,000. Vehicles made in Germany enjoy an excellent reputation worldwide.

The German automobile industry is a world leader when it comes to production standards, be it in resource use or environmental protection. It is second to none in feeding water back into the cycle and using water-saving technology. In the last twenty years, Germany's vehicle manufacturers have reduced the amount of water used per vehicle by more than a sixth. One particular site has already achieved the ideal of the wastewater-free facility.

Clean air is a particular issue in the automotive industry. Germany's painting facilities set the standards for competitors worldwide. No country in the world uses less solvent per square metre of paint. Despite a huge increase in production volume, absolute emissions of hydrocarbons have been reduced by two-thirds in the past two and half decades.

The volume of waste has also been significantly reduced since 1990. Today, the waste produced per vehicle fits into a household cleaning bucket.

Use of energy per vehicle in automotive production has also been dramatically reduced since 1990. Energy is a key cost factor in the automotive industry, because it pays the same electricity prices as normal citizens. Numerous state charges and fees make electricity in Germany extremely expensive: it costs at least one third more than in France and more than twice as much as in the US.

The biggest resource efficiency measures have already been implemented. The task now at hand is to secure ongoing improvement. Be that as it may, even with higher prices and the financial pressures they bring, there are limits to what can be achieved.

VDI – Association of German Engineers

With almost 150,000 members, the Association of German Engineers is the largest engineering science association in Germany. As an independent non-profit organisation it is the central point of contact for technical, professional and policy issues, and a recognised voice of the engineering and technology sectors. With more than 12,000 honorary experts, the VDI generates and brings together an unrivalled body of knowledge. The VDI Standards provide an indispensable foundation for practical, scientific and legislative work.

To consolidate VDI's resource efficiency expertise, it has created a cross-sectoral VDI technical committee on resource efficiency. The following VDI standards on resource efficiency are currently being developed by a range of standards committees, with some already published as green or white papers:

- ◆ VDI 4800 Part 1 Resource efficiency – Methodological principles and strategies
- ◆ VDI 4800 Part 2 Resource efficiency – Evaluation of the use of raw materials
- ◆ VDI 4800 Part 3 Resource efficiency – Environmental indicators
- ◆ VDI 4801 Resource Efficiency in Small and Medium-sized Enterprises (SMEs)
- ◆ VDI 4600 Cumulative Energy Demand. Terms, definitions, methods of calculation.
- ◆ VDI 4075 standards series – Cleaner Production (PIUS) Basic Principles and Areas of Application – with sectoral guidelines (VDI 4075 Part 2 to Part 8)

The VDI Centre for Resource Efficiency (VDI ZRE) is a VDI Group company established in 2009. On behalf of BMUB, VDI ZRE develops aids for improving resource efficiency in business. Its primary purpose is to assist SMEs in improving resource efficiency.

 www.vdi.eu
www.resource-germany.com


VDMA – German Engineering Federation

Machine and plant engineering provides the basis for meeting resource efficiency goals. Not only does the engineering sector make efficient technologies available for all manufacturing industry, but as a provider of waste and recycling technology, it also enables re-use and recycling in a wide range of material streams. Over the years, the VDMA has launched many broad-based activities and initiatives to achieve ongoing process optimisation.

The VDMA brings together the engineering sector's sustainability expertise in its "Blue Competence" initiative. Founded in 2011, the initiative currently boasts around 400 member companies. Blue Competence raises awareness of the engineering successes achieved in meeting sustainability goals, creates transparency and provides a network for cross-sectoral exchange. With best practice examples, member companies showcase their sustainable innovations, providing stimulus for other businesses and sectors. Regular workshops and opportunities for exchange assist Blue Competence members in their ongoing quest to improve their processes and facilitate networking beyond sectoral boundaries.

Effizienzfabrik (Efficiency Factory) is a joint initiative of the VDMA and BMBF. In the projects conducted under the Effizienzfabrik roof, research partners from industry and science develop innovative production technologies along the entire value chain. The transfer platform is used to drive technology solutions which enable savings in energy and materials as part of the production process.

By signing the Association Agreement on Energy Efficiency Networks in December 2014, the VDMA committed to promoting energy efficiency in the engineering sector. The aim of the agreement is to establish efficiency networks which can be used both as a platform for exchange and to leverage efficiency potential.

 www.bluecompetence.net/home
www.effizienzfabrik.de/en
www.effizienznetzwerke.org
(only in German)

VDZ – German Cement Works Association

In the interests of sustainable development, the German cement industry is committed to conserving natural resources and to using alternative materials along the cement and concrete value chain. In 2014, around 16 percent of the raw materials used in cement production came from alternative resources.

The use of alternative fuels (approx. 63 percent in 2014) – such as old tyres, waste oil, animal meal and plastics waste – saves an annual 1.9 million tonnes of coal, corresponding to two million tonnes of CO₂.

Companies in the German cement industry are continually searching for ways to improve efficiency in the use of raw materials in their production process. The Wuppertal Institute for Climate, Environment and Energy is currently looking at how the cement industry can contribute more to achieving efficient resource use and to closing cross-sectoral material cycles without risking supply security or harming the sectors' competitive stance.



www.vdz-online.de/en/topics/raw-materials/resource-efficiency

www.zement-verbindet-nachhaltig.de/english-abstract

VKU – German Association of Local Public Utilities

European Week for Waste Reduction and the Let's Clean Up Europe Campaign

The German Association of Local Public Utilities (VKU) promotes waste reduction and resource conservation in its role as the coordinator of the European Week for Waste Reduction in Germany. The initiative raises public awareness for the upper levels of the waste hierarchy, meaning prevention and reuse.

Not only consumers, but also other responsible stakeholders from industry, trade, government administration, education and civil society are integrated into VKU activities to mark the European Week for Waste Reduction. Alternatives to the throw-away society and the importance of product responsibility are highlighted during the annual action week.

The associated Let's Clean Up Europe project is also coordinated by VKU, calling for public clean-up campaigns and local-level activities to keep neighbourhoods clean. The aim is to reduce littering, first by raising citizens' awareness to the litter problem and then by helping to change attitudes and behaviour.

vzbv – Federation of German Consumer Organisations

The Federation of German Consumer Organisations (vzbv) is the strong voice of more than 80 million consumers in Germany. The vzbv represents their interests in dealings with government, industry and local administration, and fights for consumer rights before the courts. As the umbrella association for the 16 *Länder* consumer advice centres and 25 further consumer protection organisations, vzbv consolidates their combined knowledge and expertise to provide robust consumer protection structures in Germany.

The vzbv sees a considerable need for action in raising consumer awareness to resource conservation. Consumers must be given the option to extend the life of the products they buy by having them repaired in order to conserve resources. The vzbv calls for and works to achieve:

- ◆ Effective consumer information and advice
- ◆ Harmonised labelling of resource-efficient products and services, and the introduction of minimum standards
- ◆ Incentives for resource conservation and the withdrawal of incentives for resource waste and misuse
- ◆ Transparency, especially regarding waste management
- ◆ Boosting product responsibility
- ◆ Greater integration of the retail sector
- ◆ Consistent resource policy

The vzbv has developed a fact sheet for batteries used in electrical and electronic devices, takes a proactive approach to resource conservation in its lobbying and press relations work, and participates in legislative initiatives by issuing statements.

In the revision of the EU energy label, the vzbv calls for better understandability, additional rules regarding the transition period and an ambitious schedule.

The vzbv is a founding member of the Round Table on Repairs.



www.en.vzbv.de

www.en.runder-tisch-reparatur.de

WVM – Metal Trade Association

The business initiative “Metals for the Climate” operated by the German Metal Trade Association brings together producers and processors of light metals, non-ferrous metals and rare metals. It currently has 18 members, who provide knowledge and technology-based solutions for climate change mitigation. Energy and resource efficiency in production are key components of industry-led activities in efforts to limit global warming.

Leading businesses in the non-ferrous metals industry laid the foundation for the initiative in 2008. The aim of Metals for the Climate is to draw public attention to the climate action and resource efficiency achievements and contributions of the metal producing and processing industry. Since 1990, companies in the non-ferrous metals sector with facilities in Germany have reduced their specific energy input for every tonne of metal produced by more than 26 percent. This resulted in a similar reduction in emissions of carbon dioxide. Emission cuts of up to 85 percent have been achieved in the case of individual trace gases with significant climate impacts. As well as successes in the field of production-related climate protection, the industry also makes major contributions to climate-friendly energy and resource efficiency through its high recycling rates.

Metals for the Climate operates an ongoing process of dialogue and communication with social actors. It pursues the goals of increasing social acceptance for the industry and raising awareness to related environmental and economic factors.

The Metals for the Climate platform shows how energy and resource efficiency and climate protection are implemented in company operations.



www.metalleproklima.de
(only in German)

WV Stahl – German Steel Federation

Primary steel production is resource intensive and steel products have long been reused at the end of their life. Around the world, steel and iron scrap are the most recycled construction materials, helping to save more than one billion tonnes of primary raw materials each year. Steelworks thus serve as recycling facilities. At the end of their lifecycle, steel products are returned to the global materials cycle without them having to be returned to the place where they were produced. Thanks to the iron and steel scrap pool, in the EU alone an annual 100 million tonnes are returned to the steel cycle without detracting from quality in any way. This multi-recycling process involving the initial use of primary resources and several subsequent recycling cycles enables a multitude of steel products to be produced, as has been confirmed in a lifecycle assessment study conducted by Professor Finkbeiner at TU Berlin. In addition to resource-efficient multi-recycling, targeted production and marketing of by-products along with the circular economy and the highly developed energy management system used in the steel industry contribute to sustainable use of resources. Both the German Steel Federation (WVS) and the Steel Institute (VDEh) support member companies in all of these processes, for example through the establishment of efficiency networks.



www.en.stahl-online.de/index.php/topics/energy-and-environment/

ZDH – German Confederation of Skilled Crafts

The German Confederation of Skilled Crafts (ZDH) represents the interests of more than a million businesses in Germany's crafts and trades sector, with a combined workforce of over five million employees, some 380,000 apprentices and annual sales of 533 billion euros. The sector has a long-standing tradition in resource efficiency, with products custom made to ambitious quality assurance standards. This enables a high degree of longevity and resource conservation. The regional businesses are close to their customers, making for an industry involving short distances. It is also one that harbours great onsite resource efficiency potential. Numerous crafts and trades companies are not, however, sufficiently aware of the benefits of resource efficiency and often underestimate their resource conservation potential. Information deficits need to be rectified. The industry has addressed this issue, for example, with the Resource Scout advisory programme which is specially tailored to the needs of small businesses. These efforts are supplemented by a further education and training programme on energy and resources (Assistent für Energie und Ressourcen im Handwerk). The programme offers apprentices the opportunity to obtain an additional qualification as energy and resources assistants and to assist the promotion of the resource efficiency mindset in training companies. The ZDH also exercises resource efficiency in the course of its own activities. For example, one chamber of crafts and trades has adopted a strategy for sustainable management of raw materials and has published its second sustainability report. The German crafts and trades sector actively promotes environmental protection and nature conservation, and contributes directly to resource efficiency.



ZVEI – German Electrical and Electronic Manufacturers' Association

Resource Efficiency in the Electrical and Electronics Industry

The electrical and electronics industry represented by ZVEI has invested great sums in the research and development of resource-efficient and energy-efficient technologies. The industry is involved in the entire industrial value chain, including the return of electrical and electronic waste and used batteries.

In Germany, efficient machine and facility automation enables energy savings of between 10 and 25 percent. This includes savings achieved in municipal production and waste management companies. Annual savings thus amount to 43 million tonnes of CO₂-equivalents or some seven billion euros in energy costs.

ZVEI is a signatory to and a supporter of the joint Federal Government and industry initiative to establish and operate some 500 new energy efficiency networks by 2020. German industry thus makes an additional contribution to achieving Germany's climate and energy policy goals.

In 2013, German manufacturers of automotive and industrial batteries took back around 150,000 tonnes of lead-based batteries. ZVEI founded the GRS Battery Foundation (Stiftung Gemeinsames Rücknahmesystem Batterien) for the return and recycling of device batteries in 1998. The Foundation collected some 15,000 tonnes of waste batteries in 2014.

For the past ten years or more, manufacturers have taken back electrical and electronic waste. In 2014, more than 600,000 tonnes were recycled and reused in Germany.

The return systems for batteries and for electrical and electronic waste are seen as the most environmentally sound and most cost-effective in Europe.



www.zvei.org/en/Pages/default.asp

www.energieeffizienz-erleben.de
(only in German)

www.grs-batterien.com

www.stiftung-ear.de/en

8.5 Public dialogue and citizens' recommendations on resource efficiency⁸

Background

A public participation concept was developed and implemented to update Germany's Resource Efficiency Programme (ProgRess II). A participative structure was chosen to enable citizens to enter into dialogue, both at specially organised talks and also in online forums.

As part of the public dialogue talks on resource-efficient lifestyles (GesprächStoff: Ressourcenschonend leben), five citizens' workshops were held in mid-2015. The 200 attendees were invited using a random selection process. All other interested individuals were able to participate in an online dialogue from 19 May to 3 July via a dedicated website:



www.gespraechstoff-ressourcen.de
(only in German)

Participants in the public dialogue events took a broad sweep of the topics of resource conservation and resource efficiency. In five pre-defined areas – packaging and waste prevention, transport, tourism and recreation, clothing and textiles, IT and telecommunications, and building and housing, they developed a wide range of suggestions on how natural resources can be conserved.

Apart from the pre-defined topics, many others were touched on in the online dialogue, the most prominent being raising awareness, food and farming, and social issues concerning sustainable consumption, lifestyles and responsibility.

The outcomes of the workshops and the online dialogue were evaluated in detail and documented in a final report. The dialogue ambassadors who represented all five workshops and the online event then used the

findings of the report to draw up a set of citizens' recommendations (Bürgerratschlag) at a workshop held in Berlin on 26 September 2015. To this end, they summarised recommendations and cross-sectoral issues that had come up in talks on the various topics, and then drew up the key issues addressed by the dialogue participants. A total of twelve citizens' recommendations were covering key topics brought up during the dialogue events. The following list does not reflect any particular order of priority and does not give any weighting to the importance of the recommendations made.

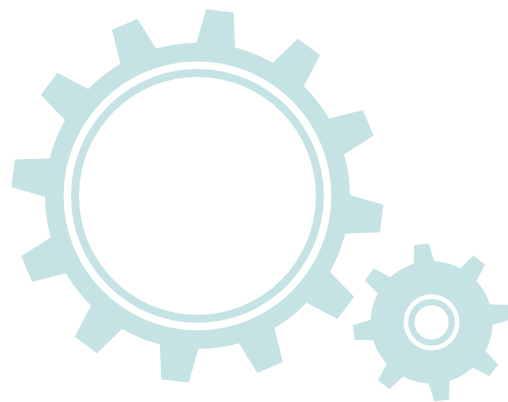
Citizens' Recommendations on Resource Conservation

Recommendation 1: Raising Awareness

Do I really need that? A Federal Government educational and advertising campaign should be launched to make people take a critical look at their behaviour as consumers.

The above initiative will be used to pursue the goal of sensitising consumers and to foster a fundamental shift in attitudes regarding individual consumer behaviour. The unlimited growth and consumer society implied by industry is to be countered by a society that values sustainability by conserving resources. With cross-generation projects, synergies will be created across society as a whole.

Responsibility for the initiative and for promoting relevant projects lies with the Federal Government.



⁸ The public dialogue and citizens' recommendations (Bürgerratschlag) involve input from public talks on resource-efficient lifestyles (Bürgerdialog GesprächStoff: Ressourcenschonend leben) and do not necessarily reflect the views of the Federal Government.

Recommendation 2: Promoting Innovation

Financing is needed for research and innovation in the development of resource-efficient materials and products.

More funding is made available for research projects for the development of resource-efficient material extraction/recovery and product manufacture. Such activities can be incentivised through the award of prizes. In the textile industry, for example, materials should be developed that both provide greater functionality and durability and can also be recycled.

In addition, intelligent, energy-efficient and resource-efficient products should be developed and marketed.

Responsibility for promoting innovation lies both with the Federal Government and with industry.

Recommendation 3: Primary Raw Materials Taxation

To protect environmental resources, a primary raw materials tax is to be introduced at EU level.

Many finite primary raw materials such as coal, natural gas, gold, iron ore and rare earths are extracted around the world. In Germany, these resources are used in a variety of products and also in industry. The cost of using and importing non-renewable resources is to increase through the introduction of a new tax. This provides an incentive to buy recycled products because they are not subject to the tax.

The tax is to be levied by the Ministry of Finance. Agreement should be sought at EU level.

Recommendation 4: Standardise Accessories for Electronic Devices

Connectors on mains adaptors, charger cables, accessories and batteries for electronic devices should be standardised regardless of who produces them.

Consumers can use the same adaptor for all devices no matter what product they select. The device and the

adaptor must be sold separately. Fewer adaptors will be needed as a result. Standardisation is to be prescribed by law at EU level.

Recommendation 5: Labelling to Show Life Expectancy of Technical Products and Length of Guarantees

Technical products should be durable and repairable. Manufacturers of technical products are to be bound by law to state the life expectancy of their products and to provide guarantees. The costs of repairs within the guarantee period must be borne by manufacturers and retailers.

When problems occur with their devices, customers can return them directly to the manufacturer and retailer, who must bear the costs of the necessary repair. The costs of repair and exchange provide businesses with an incentive to develop high-quality products. The costs of disposal for short-lived products are avoided. Customers bear no risk at the time of purchase concerning pre-determined breaking points that are built-in from the outset. More durable products boost consumer trust. Longer product lifecycles allow for repairs, exchange platforms, second hand sales and upcycling.

The desired outcome is to be achieved through legislation. The provision is to be introduced at EU level.

Recommendation 6: Introduce Statutory Labelling

Statutory labelling requirements should be introduced for all products and goods stating the resources used in production and those necessary for disposal.

The aim is to establish a quality classification label to show the degree of sustainability and reusability of resources used. Among other things, labelling should show a product's minimum shelf-life, resource origin, durability and suitability for recycling. The various aspects can be illustrated by means of a bar diagram affixed to the product. Labelling of this kind and the resulting transparency enable consumers to make informed purchasing decisions. This promotes resource-efficient competition between producers.

The Federal Environment Ministry is to initiate appropriate draft legislation.

Recommendation 7: Recycling in the Country of Return

A law on producers taking back the goods they produce and a requirement for those goods to be recycled in the country in which they are returned should be introduced. The necessary recycling processes must be made completely transparent.

The idea is to prevent illegal disposal and to ban relocation of disposal to other countries. This makes Germany a leader in international recycling standards, enabling it to serve as an international role model – where appropriate, through the use of suitable policy instruments – and contribute to the drafting of a globally effective UN resolution.

The Federal Environment Ministry is to initiate appropriate draft legislation.

Recommendation 8: Reduce the Use of Plastic Bags

Legislation must be passed to dramatically cut the use of plastic bags.

Industry is required to substitute non-reusable plastic bags with reusable bags such as cloth bags and shopping baskets. A higher, compulsory price for plastic bags is to be paid by both industry and consumers. Free provision of plastic bags, such as small plastic bags at the check-out, must be prohibited.

The Federal Environment Ministry is to organise an educational campaign to raise awareness regarding the use of plastic bags.

Responsibility for introducing the legislation lies with the Federal Government.

Recommendation 9: Resource-Efficient Packaging

The Federal Government must introduce new rules on packaging.

Industry is required to comply with stricter maximum packaging ratios for packaging and product volumes. Unnecessary packaging, such as double packaging, which is not designed to protect the contents (that is to prevent the transfer of pollutants to foods and

other products) must be banned. Instead of materials which are difficult to recycle, simple basic substances which enable easy, environmentally-sound recycling must be used. Resource-intensive packaging must be questioned as regards the amount of energy used in its production, recycling and reuse, and be replaced by energy-efficient products.

The Federal Government provides the necessary legal framework.

Recommendation 10: Reduce Non-Reusable Products

Legislation must be passed to create an extensive return and reuse system.

The Federal Government is required to expand the existing deposit system for drinks containers and bottles which do not currently carry a deposit. In addition, the deposit for one-way packaging is to be increased to make multi-use packaging more attractive.

Zero-packaging shops are to be subsidised because they protect the environment and prevent waste. Charges levied on traditional one-way products, such as disposable cups, must be charged directly to the customer as a green levy.

Recommendation 11: Promote Use of Public Transport and Car Sharing

More incentive schemes are needed to promote the use of local public transport services and car sharing schemes.

The costs of public transport must be reduced to make it cheaper than private transport and thus promote a transport switch. This applies, for example, for families and groups of travellers (with free transport for children). Also, season tickets should be made more flexible (allowing for transfer to other users and allowing passengers to take bikes on board).

Subsidisation of monthly tickets by companies should be linked to a tax concession.

Another option would be to enter into cooperation agreements with car-sharing companies to encourage people to do without a private car. Car sharing points should be expanded at train stations to allow their use in combination with a ticket for public transport.

The availability of online car-pooling platforms should be stepped up, both for commuters and for longer-distance journeys.

Responsibility for implementing the above schemes lies with local administrations and industry.

Recommendation 12: Increase Share of Regional and Seasonal Products

Legislation must be passed to increase the share of regional and seasonal products in supermarkets and public institutions (using quotas or similar).

More regional produce is to be used in public institutions. More regional products are to be sold in supermarkets. This gives consumers more choice and enables them to buy regional. The higher share of regional products reduces transport journeys. Foods are only on offer if they are available in the region. This reduces imports of strawberries from Spain in December, for example. Expansion to other industry sectors, such as crafts and trades (award of regional contracts) is also possible.

Responsibility for introducing the quota rules lies with the Federal Government.

Recording the Overall Outcome

The citizens' recommendations (Bürgerratschlag) are the main outcome of the public dialogue on resource-efficient lifestyles (GesprächStoff: Ressourcenschonend leben). The individual results and the final report are available online at: www.gespraechstoff-ressourcen.de/ergebnisse. All findings and reports connected with the initiative have been archived by the Federal Environment Ministry and the Federal Environment Agency. They thus remain available online beyond the project lifecycle (Project: "Erstellung eines Beteiligungskonzeptes und Durchführung von Bürgerbeteiligungsmaßnahmen im Rahmen des geplanten Fortschrittberichtes des Nationalen Ressourceneffizienzprogrammes ProgRes II" im Rahmen des Umweltforschungsplans, Förderkennzeichen 3714 93 102 0).

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Public Dialogue Ambassadors

The Public Dialogue and Citizens' Recommendations Report (Bürgerratschlag) was written by the following ambassadors on behalf of all participants in the public dialogue and presented to Federal Environment Minister Barbara Hendricks on 6 November 2015:

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Miriam Fent (Bürgerwerkstatt Hameln/
Onliene-Dialog)
Muriel Hermann (Online-Dialog)
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Ria Krämer (Bürgerwerkstatt Jena)
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8.6 Decision of the German Bundestag

The German Bundestag, at its 183rd sitting of 7 July 2016, passed the following resolution on the German Resource Efficiency Programme II adopted by the Federal Government on 2 March 2016.

German Bundestag
18th electoral term

Printed Paper 18/9094
6 July 2016

Motion for a resolution

The Bundestag is requested to adopt the following resolution:

- a) *In acknowledgement of the notification by the Federal Government in printed paper 18/7777 to pass the following resolution:*

„I. The German Bundestag notes:

Given the finite nature of natural resources, increasingly difficult extraction conditions, trade-distorting resource policies and foreseeable price and distribution conflicts over mineral and energy resources, lowering our consumption of resources and materials is indispensable to protect the environment and the climate. At the same time, the key prerequisite for the economic success of our country is a secure and sustainable supply of raw materials.

The amount of natural resources we use substantially exceeds the earth's ability to replenish these. This means that only a forward-looking policy which conserves resources and uses them more efficiently will ensure generational equity. Lowering the use of materials and the consumption of energy resources that often goes hand in hand with this also make an important contribution to protecting the climate, as processing methods that conserve resources release fewer greenhouse gases.

Reducing the consumption of resources and materials is one of the key challenges of our time and simultaneously harbours major opportunities. For companies, using as little energy as possible and dealing sparingly with resources is an economic necessity. The wide-ranging endeavours by the business community in this vein must continue to be supported in order to create incentives and remove obstacles. This will set the course for ensuring that in the future economic prosperity for all goes hand in hand with social cohesion and the protection of our natural environment.

Improving resource efficiency promotes the competitiveness of the German economy, creates new jobs and secures employment in a lasting way. Many German companies are global leaders in the field of efficiency technologies and are contributing to unlocking more of the potential that exists thanks to technological innovation.

On 29 February 2012, the Federal Cabinet adopted the German Resource Efficiency Programme (ProgRes); the German Bundestag issued an opinion on this on 8 March 2012 (Printed paper 17/8575). In the scope of ProgRes, the Federal Government has decided to report at four-year intervals on the development of

resource efficiency, to evaluate the progress made and to further develop the resource efficiency programme. The first progress report (ProgRes II) is now available.

II. The German Bundestag welcomes that:

1. the Federal Government is continuing to advocate and work towards an increase in resource efficiency in the scope of the German Resource Efficiency Programme II and understands improving resource efficiency as a challenge and at the same time an opportunity for sustainable development which takes into account both economic and ecological and social aspects;
2. ProgRes II is being expanded to include fossil resources used in materials and energy and resource efficiency are increasingly being viewed as two sides of the same coin;
3. with the new indicator “total raw material productivity” in ProgRes II the Federal Government has developed an indicator which can map the development of resource efficiency in Germany more reliably than the raw material productivity indicator from the 2002 Sustainability Strategy, and that it has adopted a target for 2030 which entails an increase in total raw material productivity of 30 percent compared to 2010;
4. resource efficiency plays an important role at European level including in the context of the Circular Economy Package revised by the European Commission and that European initiatives for a more circular economy are to be bolstered;
5. product responsibility is being strengthened and the possibility of intelligently expanding this to include new product groups with untapped recycling potential is being examined. Product responsibility is to be widened so that resource protection, waste avoidance, reusability and recyclability are already given consideration in the development and production phase;
6. with the foundation of the “G7 Alliance on Resource Efficiency” at the G7 Summit in Schloss Elmau in June 2015 resource efficiency was adopted as a permanent feature of the G7’s work and that this was reaffirmed this year under the Japanese presidency;
7. resource efficiency is also enshrined in the broader international context on the basis of the global Sustainable Development Goals (cf. Sustainable Development Goals 8.4, 9.4, 11.b, 12.2);
8. resource efficiency is to be boosted in the bilateral cooperation with developing countries and emerging economies;
9. the Federal Government wishes to work closely with exporting countries and civil society to do justice to its shared responsibility for sustainable local management of resources;
10. the continued expansion of a closer-knit network of business and industry, scientists and political actors is being supported to research technological developments, new processes or materials with a focus on applications and to put these into operational practice more swiftly. This also includes continuing to promote successful advisory and networking work such as the German Materials Efficiency Agency (demea) and the VDI Centre for Resource Efficiency (VDI-ZRE), in close coordination with the expansion of the German Resources Agency (DeRa) at the Federal Institute for Geosciences and Resources (BGR). The continued existence

and development of the Resource Efficiency Competence Centre and the Resource Efficiency Network can make an important contribution to this.

11. resource conservation is to be introduced as a criteria for trade and consumers to improve consumer information on resource-efficient products and enable resource-efficient consumerism.

III. The German Bundestag calls on the Federal Government

1. to develop a comprehensive national strategy to promote research and innovation for new resource technologies. Here, in particular, RD&I programmes (RD&I: Research, Development and Innovation) without any technological bias for small and medium-sized enterprises (SMEs) – which make a considerable contribution to supporting the development of resource-efficient technologies – should be strengthened and accents from earlier programmes, such as the use in materials of CO₂ or innovative production techniques for cement, whose production currently is a major source of CO₂, should be included again;

2. to develop and expand the advice programmes and schemes for companies on how to improve their resource efficiency, in particular those provided by demea (Federal Ministry for Economic Affairs and Energy) and VDI ZRE (Federal Ministry of the Environment) in tandem with the Länder (federal states) and business organisations close to SMEs, in order to promote awareness primarily at SMEs on how to deal more efficiently with resources and to improve the potential for raising performance and competitiveness by dealing more sparingly with abiotic and biotic raw materials;

3. to foster technological innovation for resource efficiency and to ensure that there are no advance decisions favouring a particular type of technology;

4. to systematically interlink the activities on energy and resource efficiency in the future, to develop corresponding communication structures, and to verify to what extent energy efficiency and material efficiency audits can be better attuned to each other and conducted jointly in the future;

5. to improve the methodological basis for assessing the resource consumption of certain product groups across the entire product lifecycle using life cycle assessment;

6. to continue the cooperation with the Länder in the “Alliance for Sustainable Procurement” and in the scope of the alliance to examine to what extent resource efficiency can be bolstered in public procurement;

7. to advocate and work towards the area of resource efficiency being backed up by concrete instruments and deadlines in the Circular Economy Package of the European Commission, which allow Europe to lead the way conceptually and economically;

8. in the implementation of the Ecodesign Directive, in addition to examining energy consumption, to advocate and work towards the consumption of resources being taken into account more in the future, as fundamentally set forth in the work programme since 2012;

9. to advocate and work towards step-by-step expansion of the Ecodesign Directive's scope of application to include other product groups in addition to the ones relevant to energy consumption and to continue to politically support the efforts by the European Commission to include resource efficiency and specifically material efficiency in the Ecodesign Directive;
10. to transpose the provisions of the Ecodesign Directive nationally and in that context to examine to what extent it is possible to give greater consideration to resource protection and waste avoidance in production/product design;
11. to present proposals on expanding product responsibility as an instrument for waste avoidance without delay;
12. to develop concepts for improving waste avoidance, in particular to research through simulations what new opportunities are possible for improving waste avoidance, inter alia systems for consumers to return used appliances;
13. to do more to tackle the illegal export of waste and, like for the provisions applying to electric appliances, to verify which other product groups are particularly affected;
14. to encourage more recycling of household and commercial waste, inter alia by higher and more dynamic recycling quotas;
15. during the German presidency in 2017, to make resource efficiency a permanent part of the G20's work, as successfully done in the G7,
16. to make full use of the impetus on resource efficiency from the United Nation's Sustainable Development Goals (SDG's) in the continuing of the National Sustainability Strategy;
17. to set forth resource efficiency as a focus of investigation for one of the next research reports of the German Sustainability Strategy;
18. to continue to report to the German Bundestag every four years on the development of resource efficiency in Germany.

b) Acknowledgement of the notification by the Federal Government in printed paper 17/8965;

c) To reject the motion in printed paper 18/7047.

Berlin, 6 July 2016

Committee on the Environment, Nature Conservation, Building and Nuclear Safety

Bärbel Höhn

Chairperson

Dr. Thomas Gebhart
Rapporteur

Michael Thews
Rapporteur

Hubertus Zdebel
Rapporteur

Peter Meiwald
Rapporteur



9 Directory



9.1 Glossary

Anthropogenic stock: Resource repositories in the anthroposphere – the part of the environment made or modified by humans and human habitats with human-induced technical and biological processes and human activities such as living, working and food growing.

Biodiversity: Also known as biological diversity, comprising the diversity of ecosystems, the diversity of species, and genetic diversity within species.

Biomass: All organic matter from plants and animals. Biomass used to generate energy is divided into regenerative resources (energy crops such as oilseed rape, maize and cereals) and organic waste. Biomass supplies energy in the form of heat (mostly from wood, including wood pellets) electricity (for example from biogas) or fuels (such as biodiesel).

Cascading use: Waste recycling and recovery in accordance with the type, quality, quantity and content of waste using multiple, consecutive material and energy recovery processes.

Circular economy: Avoidance, reuse and recycling of waste.

Collaborative consumption: Collaborative consumption refers to social practices such as swapping, sharing, passing on and common use.

Decoupling: Removing or reducing a quantitative dependency between causally linked phenomena. The term is often used to refer to a situation where growth in the consumption of natural resources is slower than economic growth. This is known as relative decoupling. Absolute decoupling denotes a situation where resource use does not rise or even falls with increasing economic growth.

DERec (direct effects of recovery): Virtual indicator reflecting the extent to which primary raw materials, semi-finished and finished goods – assuming like production patterns and technologies – would have to be imported or produced domestically if there was no recycling or energy recovery from secondary raw materials. DERec can be linked up with the direct material input (DMI) material stream indicator.

DIERec (direct and indirect effects of recovery): Virtual indicator reflecting the extent to which primary raw materials – assuming like production patterns and technologies – would have to be imported or produced domestically if there was no recycling or energy recovery. An analysis based on DIERec gives a global perspective on resources. All resource flows (except water and air) are taken into account, through to extraction from natural sources. DIERec can be linked up with the raw material input (RMI) material flow indicator.

DMI (direct material input): A material stream indicator: Mass flow of materials directly entering an economy that are processed or consumed within the economy. The standard unit is tonnes per year. DMI is calculated by adding together the mass of resources extracted domestically and the mass of resources and semi-finished and finished goods imported.

Downcycling: Recycling where the resulting secondary raw material is of lower quality than the starting material.

Ecosystem: A system of interacting living organisms together with their physical environment. The boundaries of what can be called an ecosystem vary depending on the focus of study. Thus the extent of an ecosystem may range from very small spatial scales to the entire Earth.

EMAS (Eco-Management and Audit Scheme): Name used as a short form to refer to the European Union Regulation concerning the Community eco-management and audit scheme (EMAS).

Energy productivity: Energy productivity indicator under the Sustainability Strategy, consisting of the ratio of price-adjusted gross domestic product (GDP) to primary energy consumption. The standard unit is euros per petajoule.

Energy resource: Resource that stores energy chemically or physically (for example mechanically or thermally) and can consequently be used to generate energy. Energy resources include fossil fuels, biotic resources capable of being used for energy generation, and nuclear fuels.

Extraction: Removal of material from the environment or its relocation within the environment in consequence of human activity. A distinction is made between used and unused extraction. Extraction is referred to as used extraction if the extracted material is put to economic use, such as in a conversion process. In the case of unused extraction, the material remains in the environment, as with dumped spoil from coal mining.

Flow resources: Flow resources include wind, geothermal, tidal and solar energy and are natural resources. Flow resources cannot run out but other resources are needed for their use. For example, building wind turbines or solar panels requires energy, materials and space.

Fossil fuel: Energy resource of plant or animal origin found in deposits formed over geological periods, and hence a non-renewable resource. Despite its plant or animal origin, a fossil fuel is not a biotic resource. Fossil fuels include coal, lignite, petroleum and natural gas; they do not include nuclear fuels.

ICT: Information and communication technology (ICT) is defined for the purpose of this programme as the hardware and software used for communicating and processing data.

Natural resources: All components of nature. Natural resources comprise biotic and abiotic resources, physical space (such as land), environmental media (water, soil and air), flow resources (such as geothermal, wind, tidal and solar energy) and the diversity of all living organisms.

Primary energy consumption: The quantity of energy available from naturally occurring forms or sources of energy such as coal, gas, oil, the sun, wind, etc. Primary energy is converted in one or more steps to secondary forms of energy such as electricity, heating oil and motor fuel. Domestic primary energy consumption as used for indicators under the National Sustainable Development Strategy consists of primary energy extracted or produced domestically and all imported sources of energy less exports of energy and excluding international marine bunkers. From a consumption perspective, that corresponds to the sum of the energy sources used for energy purposes (final energy consumption and energy industry own use) and for non-energy purposes (such as in chemicals), domestic energy conversion losses, and flaring and transmission losses.

Primary raw material: Raw material obtained by extraction from the natural environment.

Primary raw material, non-renewable: Raw material that is obtained by extraction from the natural environment and does not have the potential to be renewed over time. This mainly relates to mineral and fossil resources. There is no uniform definition as to the length of time over which a resource is considered renewable. The boundary between 'renewable' and 'non-renewable' is generally taken as between 100 and 1,000 years.

Primary raw material, renewable: Raw material that is obtained by extraction from the natural environment and has the potential to be renewed over time. This mainly relates to biotic resources. There is no uniform definition as to the length of time over which a resource is considered renewable. The boundary between 'renewable' and 'non-renewable' is generally taken as between 100 and 1,000 years.

Product life cycle: Consecutive and interconnected stages in a product system, from resource extraction or resource production to recycling, energy recovery or final disposal of the product.

Raw material: Material or mixture of materials in unprocessed or marginally processed form and capable of being used in a production process. A distinction is made between primary and secondary raw materials. It is also common to distinguish between renewable and non-renewable and between biotic and abiotic raw materials.

Raw material consumption (RMC); demand for raw materials for domestic consumption and domestic investment: A material stream indicator: The standard unit is tonnes per year. RMC is calculated as the total mass of primary raw materials extracted domestically plus imported raw materials and imported semi-finished and finished goods (expressed in raw material equivalents) minus exported raw materials and exported semi-finished and finished goods (expressed in raw material equivalents). It thus expresses the mass of raw materials used for domestic investment and consumption by households and the state that are not produced by domestic industry in the form of secondary raw materials (for example by recycling). RMC is thus a consumption and investment-related material stream indicator.

Raw material equivalent (RME): Measure of raw material consumption. Calculated on the basis of the mass of all raw materials used throughout the value chain for the manufacture of the goods under analysis. Unused material extraction such as spoil, tailings and excavated earth that is not put to economic use is not included.

Raw material input productivity (RMIP): Raw material input productivity is defined as price-adjusted gross domestic product (GDP) plus price-adjusted import spending (GDP+M) divided by the mass of domestically used raw material extraction plus the mass of imports expressed as raw material equivalent (RMI). Raw material input productivity relates to abiotic and biotic raw materials. The standard unit is euros per tonne. RMIP is used as a production-related indicator of the resource efficiency of the German economy.

Raw material productivity (RMP): Defined in the National Sustainable Development Strategy as the quotient of price-adjusted gross domestic product (GDP) and abiotic direct material input (abiotic DMI). The standard unit is euros per tonne. Abiotic primary material includes used domestic extraction of abiotic raw materials together with all imported abiotic minerals (raw materials plus semi-finished and finished goods). RMP is used in the German Sustainable Development Strategy as a production-related indicator of the resource efficiency of the German economy.

Raw material, abiotic: A raw material that is not biotic, meaning that it does not originate from living matter (unless it is a fossil fuel). This mainly relates to ores, minerals and earths, and fossil resources.

Raw material, biotic: A raw material originating from living matter (plants and animals) and not a fossil fuel. Often used synonymously with raw material, regenerative.

Recycled material: Products, materials or substances that are the product of recycling. They can either be used for the original purpose or in the place of materials in other applications.

Recycling: Any process of turning waste into products, materials or substances for the original purpose or for other purposes. Recycling includes the recovery of organic material but not energy recovery and the recovery of material destined for use as fuel or for backfilling.

Remanufacturing: Processing a used product for reuse, usually by applying manufacturing operations and usually performed by the original manufacturer. The used product is returned to the quality standard of a new product by dismantling, exhaustive inspection and where necessary repair and/or replacement of components and assemblies.

Resilience: The ability of a social or ecosystem to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity to self-organise and the capacity to adapt to stress and change.

Resource conservation: Long-term environmentally compatible management of natural resources with the objective of conserving them for future generations.

Resource criticality: Measure of the relative scarcity of resources for a system (such as an economy or business enterprise). Used to assess supply risks in connection with the vulnerability of the system to interruptions in resource supply (significance and adaptability). Depending on the assessment method, supply risks include geological, technical, structural, geopolitical, social, economic and environmental criteria.

Resource efficiency: Ratio of quantifiable benefit to the associated resource input. Resource input is defined for the purpose of this programme as the input of natural resources. Improving resource efficiency parallels sufficiency and consistency as a strategy for attaining relative or absolute reductions in resource use.

RMI (raw material input): A material stream indicator: The standard unit is tonnes per year. RMI is calculated as the total mass of primary raw materials extracted domestically plus imported raw materials and imported semi-finished and finished goods (expressed in raw material equivalents).

Secondary raw material: Raw material extracted from waste. Can be used in place of primary raw materials.

Sharing economy: The sharing economy or shared economy refers to systematic lending, swapping and passing on of goods and reciprocal provision of space and land as the basis for new business models by business enterprises, interest groups and private individuals.

Substitute building materials: Substitute building materials are mineral building materials that are made in industrial processes or generated as waste in processing facilities, can be used in engineering structures (such as roads, pathways and rail beds) and are among the 18 materials referred to in the Substitute Building Materials Ordinance (Ersatzbaustoffverordnung). Examples include recycled building materials, various types of ash and slag, rail track ballast, processed dredged material, and excavated material.

Upcycling: Recycling where the resulting secondary raw material is of higher quality than the starting material.

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9.3 List of abbreviations

AbfKlärV	Klärschlammverordnung (Sewage Sludge Ordinance)
AGRAPA	Arbeitsgemeinschaft Graphische Papiere (Graphic Paper Alliance)
AHK	Außenhandelskammer (German Chambers of Commerce Abroad)
AKI	August Kramer Institute
AUF	Angewandte Umweltforschung (applied environmental research funding programme)
BAM	Bundesanstalt für Materialforschung und -prüfung (Federal Institute for Materials Research and Testing)
BAT	Best available technology
BBergG	Bundesberggesetz (Federal Mining Act)
BBodSchV	Bundes-Bodenschutz- und Altlastenverordnung (Federal Soil Protection and Contaminated Sites Ordinance)
BBS	Bundesverband Baustoffe – Steine und Erden e. V. (German Building Materials Association)
BBSR	Bundesinstitut für Bau-, Stadt- und Raumforschung (Federal Institute for Research on Building, Urban Affairs and Spatial Development)
BDB	Bundesverband Deutscher Banken (Association of German Banks)
BDG	Bundesverband der Deutschen Gießerei-Industrie (Association of the German Foundry Industry)
BDI	Bundesverband der Deutschen Industrie e. V. (Federation of German Industries)
BeschA	Beschaffungsamt des Bundesministeriums des Innern (Procurement Office of the Federal Ministry of the Interior)
BFEI	Betriebliche Forschung, Entwicklung und Innovation (Corporate Research, Development and Innovation funding programme)
BGA	Bundesverband Großhandel, Außenhandel, Dienstleistungen (Federation of German Wholesale, Foreign Trade and Services)
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe (Federal Institute for Geosciences and Natural Resources)
BilRess	Netzwerk Bildung für Ressourceneffizienz (Education for Resource Conservation and Resource Efficiency Network)
BlmA	Bundesanstalt für Immobilienaufgaben (Institute for Federal Real Estate)
BIOBETH	Bioenergieberatung Thüringen (Thuringia bio-energy consulting service)

Bitkom	Bundesverband Informationswirtschaft, Telekommunikation und neue Medien e. V. (Federal Association for Information Technology, Telecommunication and New Media)
BMBF	Bundesministerium für Bildung und Forschung (Federal Ministry of Education and Research)
BMEL	Bundesministerium für Ernährung und Landwirtschaft (Federal Ministry of Food and Agriculture)
BMF	Bundesministerium der Finanzen (Federal Ministry of Finance)
BMJV	Bundesministerium der Justiz und für Verbraucherschutz (Federal Ministry of Justice and Consumer Protection)
BMU	Bundesministeriums für Umwelt, Naturschutz und Reaktorsicherheit (Federal Ministry for the Environment, Nature Conservation and Nuclear Safety)
BMUB	Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety)
BMVBS	Bundesministerium für Verkehr, Bau und Stadtentwicklung (Federal Ministry of Transport, Building and Urban Development)
BMWi	Bundesministerium für Wirtschaft und Energie (Federal Ministry for Economic Affairs and Energy)
BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung (Federal Ministry for Economic Cooperation and Development)
BNB	Bewertungssystem Nachhaltiges Bauen (Assessment system for sustainable building)
BV	Bundesverband (federal association)
BV Glas	Bundesverband Glasindustrie e. V. (Federal Association of the German Glass Industry)
BV Ziegel	Bundesverband der Deutschen Ziegelindustrie e. V. (Federal Association of the German Brick and Tile Industry)
BVR	Bundesverband der Deutschen Volksbanken und Raiffeisenbanken e. V. (National Association of German Cooperative Banks)
CEE	Cumulative energy expenditure
CEEC	Centre for Energy and Environmental Chemicals
CFS UN	Committee on World Food Security
CHP	Combined heat and power
CO ₂	Carbon dioxide
COSME	Competitiveness of Enterprises and Small and Medium-sized Enterprises (EU funding programme)
CSR	Corporate social responsibility
CTC	Certified trading chains
DBU	Deutsche Bundesstiftung Umwelt (German Federal Environment Foundation)
DepV	Deponieverordnung (Landfill Ordinance)
DERA	Deutsche Rohstoffagentur (German Mineral Resources Agency)
DERec	Direct effects of recovery
DIERec	Direct and indirect effects of recovery
DIHK	Deutscher Industrie- und Handelskammertag e. V. (Association of German Chambers of Commerce and Industry)

DIN	Deutsches Institut für Normung e. V. (German Institute for Standardization)
DMI	Direct material input
DNR	Deutscher Naturschutzring (German League for Nature, Animal and Environment Protection)
E3K	Projekt „Energie & Kommune: Klimaschutz = Kostensenkung“ (project on local cost savings from energy conservation and climate change mitigation)
ECOLIANCE	Rhineland-Palatinate environmental technologies alliance
EcoMaT	Center for Eco-efficient Materials & Technologies
EEAC	European Environment and Sustainable Development Advisory Councils
EEG	Erneuerbare-Energien-Gesetz (Renewable Energy Sources Act)
EEWärmeG	Erneuerbare-Energien-Wärmegesetz (Renewable Energy Heat Act)
efa NRW	Effizienz-Agentur Nordrhein-Westfalen (North Rhine-Westphalia Efficiency Agency)
EIP AGRI	European Innovation Partnership for Agricultural Productivity and Sustainability
EIP RM	European Innovation Partnership on Raw Materials
EIT	European Institute of Innovation and Technology
EITI	Extractive Industries Transparency Initiative
EKF	Energie- und Klimafonds (Energy and Climate Fund)
ElektroG	Elektro- und Elektronikgerätegesetz (Electrical and Electronic Equipment Act)
ElmoReL 2020	Project on recycling of power electronics from electric vehicles
EMAS	Eco-Management and Audit Scheme
EMPIR	European Metrology Programme for Innovation and Research
EMRP	European Metrology Research Programme
EnEV	Energieeinsparverordnung (Energy Saving Ordinance)
ERDF	European Regional Development Fund
EREP	European Resource Efficiency Platform
ERF	European Resources Forum
ErsatzbaustoffV	Ersatzbaustoffverordnung (Substitute Building Materials Ordinance)
ESD	Education for sustainable development
ESSC-D	European Six Sigma Club Deutschland e. V.
EU	European Union
EUI	Energie- und Umweltinnovationen (energy and environmental information funding programme)
FbNR	Fachbeirat Nachhaltige Rohstoffe (Scientific Advisory Council on Resources)
FINA	Forschungs- und Innovationsagenda (Research and Innovation Agenda)
FOGEB	Forschergruppe Green Efficient Buildings (Research Group on Green Efficient Buildings)
FONA	Forschung für Nachhaltige Entwicklung (Research for Sustainable Development)
FUE	Forum Umwelt und Entwicklung (German NGO Forum on Environment and Development)
G20	Group of the twenty most important industrialised and emerging economies
G7	Group of Seven
GDP	Gross domestic product

GELLED	Project on measures to improve the disposal of gas discharge lamps and other types of lamp containing mercury
GeRI	Globale entwicklungspolitische Rohstoffinitiative (Global Development Policy Raw Materials Initiative)
GERRI	German Resource Research Institute
GewAbfV	Gewerbeabfallverordnung (Commercial Wastes Ordinance)
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German Development Agency)
GrwV	Grundwasserverordnung (Groundwater Ordinance)
HDB	Hauptverband der Deutschen Bauindustrie (Central Federation of the German Construction Industry)
HDE	Handelsverband Deutschland (German Retail Federation)
HIF	Helmholtz Institute Freiberg for Resource Technology
IA	Förderprogramm Innovationsassistent (Innovation Assistant funding programme)
ICGLR	International Conference on the Great Lakes Region
ICT	Information and communication technology
IEAU	Institute for Energy, Drive and Environmental Engineering
IFAG	Informationsforum Abfallwirtschaft und Stoffstrommanagement im Gesundheitswesen (Information Forum on Waste Management and Materials Management in the Health Sector)
IG	Industriegewerkschaft (trade union)
IG BAU	Industriegewerkschaft Bauen-Agrar-Umwelt (Trade Union for the Construction, Agricultural and Environmental Industries)
IG BCE	Industriegewerkschaft Bergbau, Chemie, Energie (Industrial Mining, Chemicals and Energy Union)
IG Metall	Industriegewerkschaft Metall (Metal Workers' Trade Union)
IGF	Intergovernmental Forum on Mining, Minerals, Metals & Sustainable Development
IHK	Industrie- und Handelskammer (Chamber of Commerce and Industry)
ILO	International Labor Organization
IRP	International Resource Panel
ISC	Fraunhofer Institute for Silicate Research
ISO	International Organization for Standardization
ISOE	Institute for Social-Ecological Research
IT	Information technology
IWKS	Fraunhofer-Projektgruppe für Wertstoffkreisläufe und Ressourcenstrategie (Fraunhofer Project Group for Materials Recycling and Resource Strategies)
KfW	Kreditanstalt für Wiederaufbau (KfW Bank)
KIC	Knowledge and innovation community
KNB	Kompetenzstelle für Nachhaltige Beschaffung (Competence Center for Sustainable Procurement)
KRU	Kommission Ressourcenschutz beim Umweltbundesamt (Federal Environment Agency Resources Commission)
KrWG	Kreislaufwirtschaftsgesetz (Circular Economy Act)

KU	Koordinierungsstelle Umweltschutz (Environmental Protection Helpdesk)
LAGRE	Umweltministerkonferenz für Ressourceneffizienz (Cross-Länder working group on resource efficiency)
LCA	Life cycle assessment
LED	Light-emitting diode
LENA	Landesenergieagentur (Saxony-Anhalt Energy Agency)
LOEWE	Landesoffensive zur Entwicklung wissenschaftlich-ökonomischer Exzellenz (State of Hesse programme for scientific and economic excellence)
LUMAS	Maßnahmenprogramm Nachhaltigkeit der Bundesregierung am mehrstufigen Energie- und Umweltmanagement (Federal Government multiphase energy and environmental management programme)
MantelV	Mantelverordnung – Omnibus ordinance stipulating requirements for the introduction or discharge of substances into groundwater and requirements for the use of substitute building material, and revising the Federal Soil Protection and Contaminated Sites Ordinance
MEErP	Methodology for the Ecodesign of Energy-Related Products
MSG	Multi-stakeholder group
NABU	Naturschutzbund Deutschland (Nature and Biodiversity Conservation Union)
NAPE	Nationaler Aktionsplan Energieeffizienz (National Action Plan on Energy Efficiency)
NaRes	Nationale Plattform Ressourceneffizienz (National Resource Efficiency Platform)
NAT	Nachhaltigkeitsabkommen Thüringen (Thuringia Sustainability Pact)
NaWaM	Nachhaltiges Wassermanagement (BMBF Sustainable Water Management [NaWaM] funding priority)
NBS	Nationale Strategie zur biologischen Vielfalt (National Strategy on Biological Diversity)
NeMAS	Netzwerk für Entwicklung, Produktion und Fertigung von Maschinen und Anlagen zur Nutzbar-machung von Biomasse auf Spezialflächen (network for the development, production and manu-facture of machines and systems for the use of biomass on special surfaces)
NeRes	Netzwerk Ressourceneffizienz (Resource Efficiency Network)
NFSB 2030	Nationale Forschungsstrategie Bioökonomie 2030 (National Research Strategy BioEconomy 2030)
NGO	Non-governmental organisation
NPZ	Nationale Plattform Zukunftsstadt (National Platform for the City of the Future)
NRF	Nationales Ressourcenforum (National Resources Forum)
NRW	North Rhine-Westphalia
OECD	Organisation for Economic Co-operation and Development
ORKAM	Project on the separation of power electronics
PC	Personal computer
PFAU	Programm zur Förderung Anwendungsnaher Umwelttechniken (Programme for the Promotion of Application-Oriented Environmental Technologies)
PIUS	Produktionsintegrierter Umweltschutz (production-integrated environmental protection)
ProBas	Prozessorientierte Datenbank für Umweltmanagement (Process-Oriented Data Base for Environ-mental Management Systems)
ProgRes	Deutsches Ressourceneffizienzprogramm (German Resource Efficiency Programme)

PTB	Physikalisch-Technische Bundesanstalt (National Metrology Institute)
QUB	Qualitätsverbund umweltbewusster Betriebe (Quality Alliance for Environmentally Friendly Businesses)
R&D	Research and development
r+impuls	Impulse für industrielle Ressourceneffizienz (impetus for industrial resource efficiency focus area under the FONA programme)
r ²	Rohstoffintensive Produktionsprozesse (resource-intensive production processes focus area under the FONA programme)
r ³	Strategische Metalle und Mineralien (strategic metals and minerals focus area under the FONA programme)
r ⁴	Bereitstellung wirtschaftsstrategischer Rohstoffe (raw materials of strategic economic importance focus area under the FONA programme)
RC	Recycling
RePro	Project on enhancing product responsibility for resource conservation in connection with waste electrical and electronic equipment
ReStra	Project on the recycling of strategic metals
RIS ST	Regional Innovation Strategy
RKW	Rationalisierungs- und Innovationszentrum der deutschen Wirtschaft e. V. (Rationalisation and Innovation Centre for the German Economy)
RMC	Raw material consumption
RMI	Raw material input
RUF	Ressourceneffizienz-Unternehmer-Frühstück (resource efficiency breakfast for entrepreneurs)
RWTH	Rheinisch-Westfälische Technische Hochschule (RWTH Aachen University)
SDG	Sustainable development goals
SME	Small and medium-sized enterprises
SÖF	Sozial-ökologische Forschung (Social-Ecological Research programme)
SRU	Sachverständigenrat für Umweltfragen (German Advisory Council on the Environment)
ThEGA	Thüringer Energie- und GreenTech-Agentur (Thuringia Energy and Green Technology Agency)
ThIMo	Thüringer Innovationszentrum Mobilität (Thuringia Innovation Centre Mobility)
TLL	Thüringer Landesanstalt für Landwirtschaft (Thuringian State Institute for Agriculture)
TMIL	Thüringer Ministerium für Infrastruktur und Landwirtschaft (Thuringian Ministry for Infrastructure and Agriculture)
TMUEN	Thüringer Ministerium für Umwelt, Energie und Naturschutz (Thuringia Ministry for the Environment, Energy and Nature Conservation)
TMWWDG	Thüringer Ministerium für Wirtschaft, Wissenschaft und Digitale Gesellschaft (Thuringia Ministry for Economic Affairs, Science and Digital Society)
TU	Technische Universität (Technical University of applied sciences)
TZNR	Thüringer Zentrum Nachwachsende Rohstoffe (Thuringia Centre for Renewable Resources)
UBA	Umweltbundesamt (Federal Environment Agency)
UFT	Zentrum für Umweltforschung und nachhaltige Technologien (University of Bremen Center for Environmental Research and Sustainable Technology)

UfU	Unabhängiges Institut für Umweltfragen (Independent Institute for Environmental Issues)
UIP	Umweltinnovationsprogramm (Environmental Innovation Programme)
UN	United Nations
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNEP	United Nations Environment Programme
VCI	Verband der Chemischen Industrie e. V. (German Chemical Industry Association)
VDA	Verband der Automobilindustrie (German Association of the Automotive Industry)
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
VDI ZRE	VDI Zentrum Ressourceneffizienz (VDI Centre for Resource Efficiency)
VDMA	Verband Deutscher Maschinen- und Anlagenbau (Mechanical Engineering Industry Association)
VDZ	Verein Deutscher Zementwerke e. V. (German Cement Works Association)
VhU	Vereinigung der hessischen Unternehmerverbände (Federation of Business Associations in Hesse)
VKU	Verband kommunaler Unternehmen (German Association of Local Public Utilities)
vzbv	Verbraucherzentrale Bundesverband e. V. (Federation of German Consumer Organisations)
WEEE	Waste electrical and electronic equipment
WPRPW	OECD Working Party on Resource Productivity and Waste
WRAP UK	Waste and Resources Action Programme
WTSH	Wirtschaftsförderung und Technologietransfer in Schleswig-Holstein (Schleswig-Holstein Business Innovation and Technology Transfer Corporation)
WV	Wirtschaftsvereinigung (industry association/industry federation)
WV Stahl	Wirtschaftsvereinigung Stahl (German Steel Federation)
WVM	Wirtschaftsvereinigung Metalle (German Non Ferrous Metals Association)
ZDH	Zentralverband des Deutschen Handwerks (German Confederation of Skilled Crafts)
ZIM	Zentrales Innovationsprogramm Mittelstand (Central Innovation Programme for SMEs)
ZVEI	Zentralverband Elektrotechnik- und Elektronikindustrie e. V. (German Electrical and Electronic Manufacturers' Association)

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