# Resource efficiency and circular economy in Europe – even more from less

## An overview of policies, approaches and targets of Germany in 2018

July 2019

ETC/WMGE consortium partners: Flemish Institute for Technological Research (VITO), CENIA, Collaborating Centre on Sustainable Consumption and Production (CSCP), Research Institute on Sustainable Economic Growth of National Research Council (IRCrES), The Public Waste Agency of Flanders (OVAM), Sustainability, Environmental Economics and Dynamic Studies (SEEDS), VTT Technical Research Centre of Finland, Banson Communications Ireland (BCI), The Wuppertal Institute for Climate, Environment, Energy (WI), Slovak Environment Agency (SEA)

**European Environment Agency**
**European Topic Centre on Waste and Materials in a Green Economy**

European Topic Centre on Waste and Materials
in a Green Economy
Boeretang 200
BE-2400 Mol
Tel.: +14 33 59 83
Web: wmge.eionet.europa.eu
Email: etcwmge@vito.be

## Contents

## Acknowledgements

This country profile is based on information reported by the Eionet network and, in particular, the National Reference Centres on Resource Efficiency and Circular Economy. The information is current as of March 2019, when members of Eionet verified the content of this profile.

This country profile was prepared as part of the 2019 EEA review of material resource efficiency, circular economy and raw material supply policies, which aimed to collect, analyse, and disseminate information about experience with the development and implementation of these policies in EEA member and cooperating countries.

At the time of writing, a summary report is being finalised. The report reflects on trends, similarities and differences in policy responses, showcases selected policy initiatives from member countries and identifies possible considerations for the development of future policies.

These country profiles were compiled and finalised by members from the European Topic Centre on Waste and Materials in a Green Economy, namely Bart Ullstein, Bettina Bahn-Walkowiak, Jeroen Gillabel, Margareta Wahlström, Jutta-Laine Ylijoki, Dirk Nelen, Theo Geerken, Veronique Van Hoof and Evelien Dils. The responsible EEA project managers for the work were Pawel Kazmierczyk and Daniel Montalvo.

## Germany, facts and figures

*Note: data in this section was sourced from Eurostat databases (April 2019), except where noted otherwise*

**GDP:** EUR 3,277.3 billion (20.6 % of total EU28 in 2017)

**Per capita GDP:** 39,600 Euro (purchasing power standard) (132 % of EU28 average per capita figure in 2017)

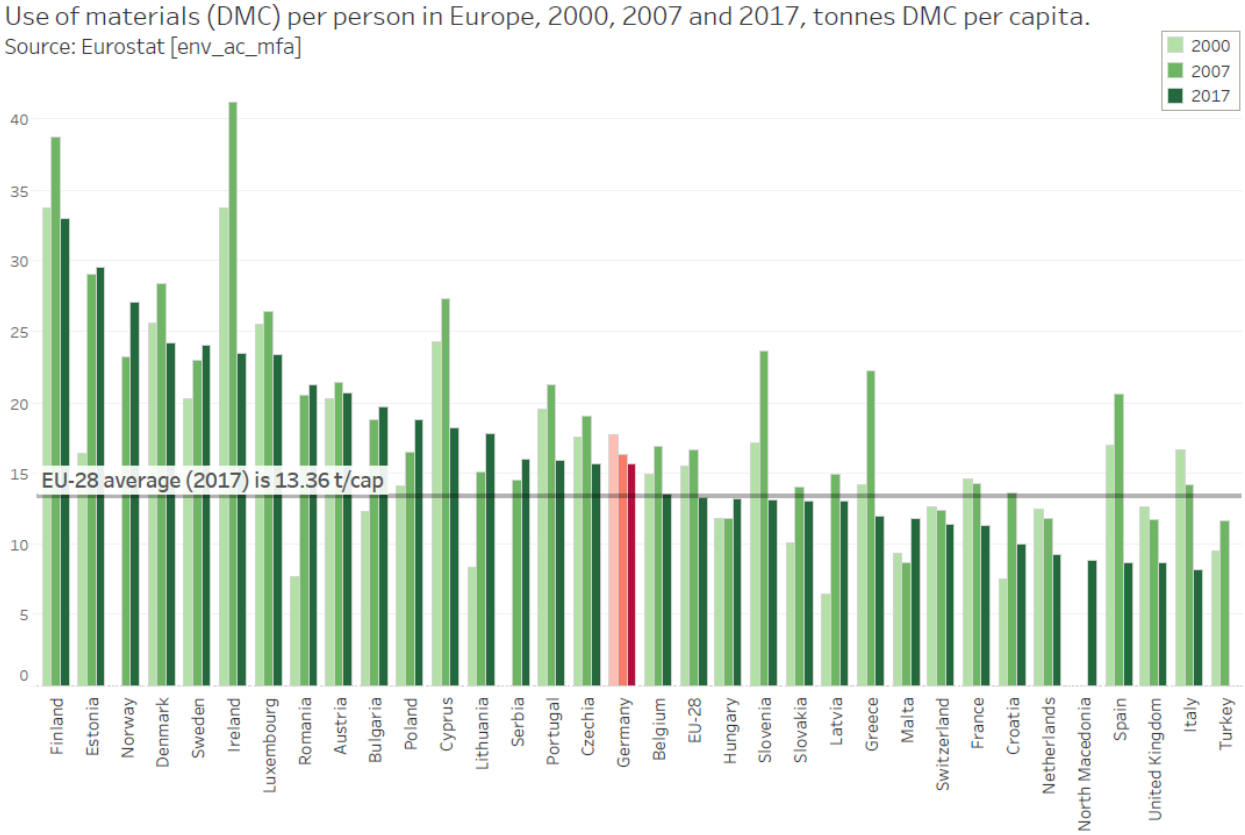
**Use of materials (domestic material consumption (DMC))**
1,293.4 million tonnes DMC (18.9 % of EU28 total in 2017)
15.6 tonnes DMC/capita (117.1 % of EU28 average per capita in 2017)

**Structure of the economy:**
agriculture: 0.9 %
industry: 31.0 %
services: 68.1 %

**Surface area:** 357.3 thousand square kilometres ($km^2$) (8 % of total EU28)

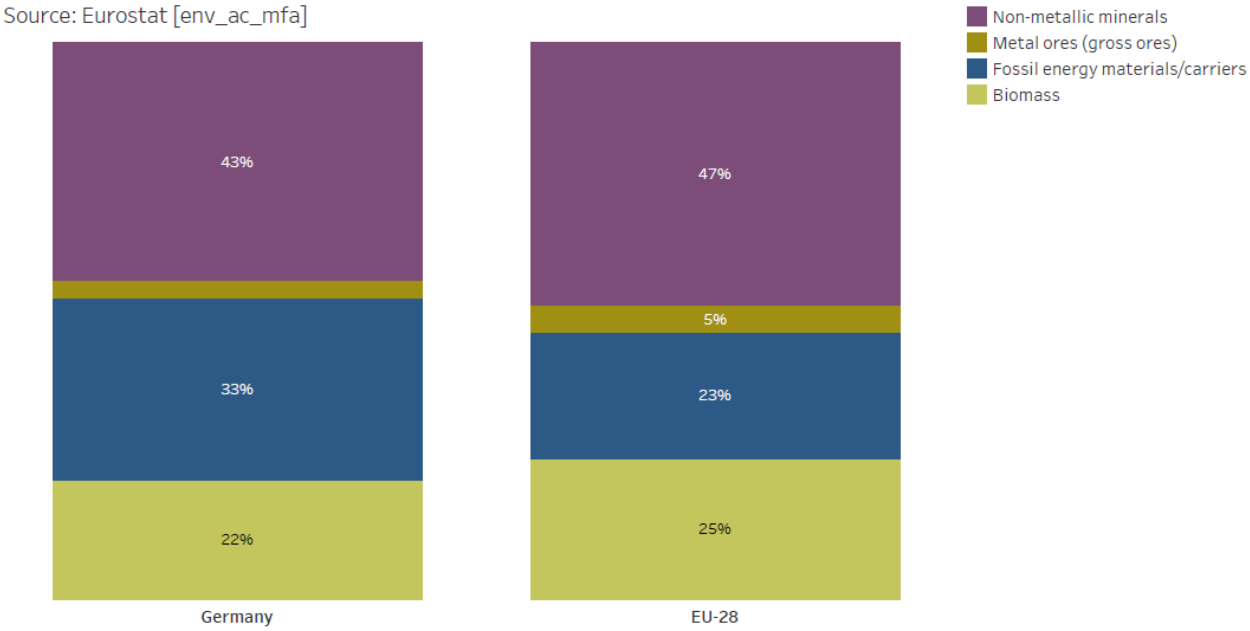
**Population:** 82.5 million (16.1 % of EU28 total in 2017)

Use of materials (DMC) per person in Europe, 2000, 2007 and 2017, tonnes DMC per capita.
Source: Eurostat [env_ac_mfa]



**Germany & EU-28.** Domestic Material Consumption by material category, 2017.

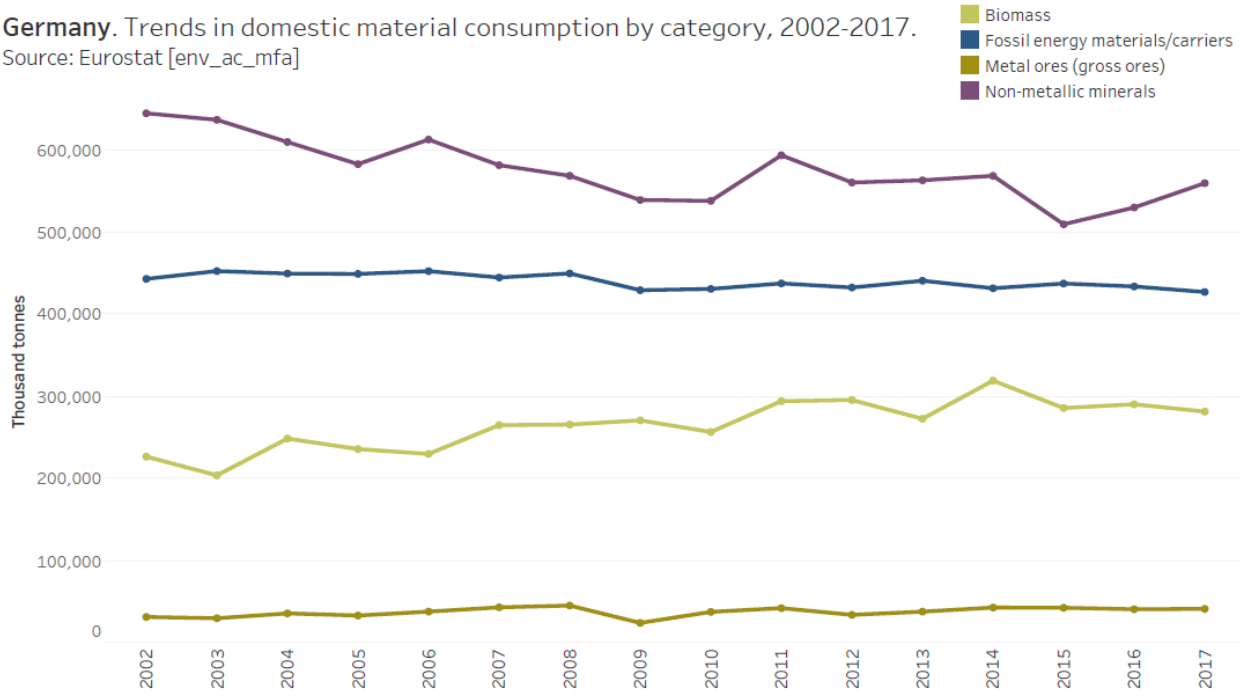
Source: Eurostat [env_ac_mfa]




Note: The domestic material consumption categories 'other products' and 'waste for final treatment and disposal' are excluded from the figure.

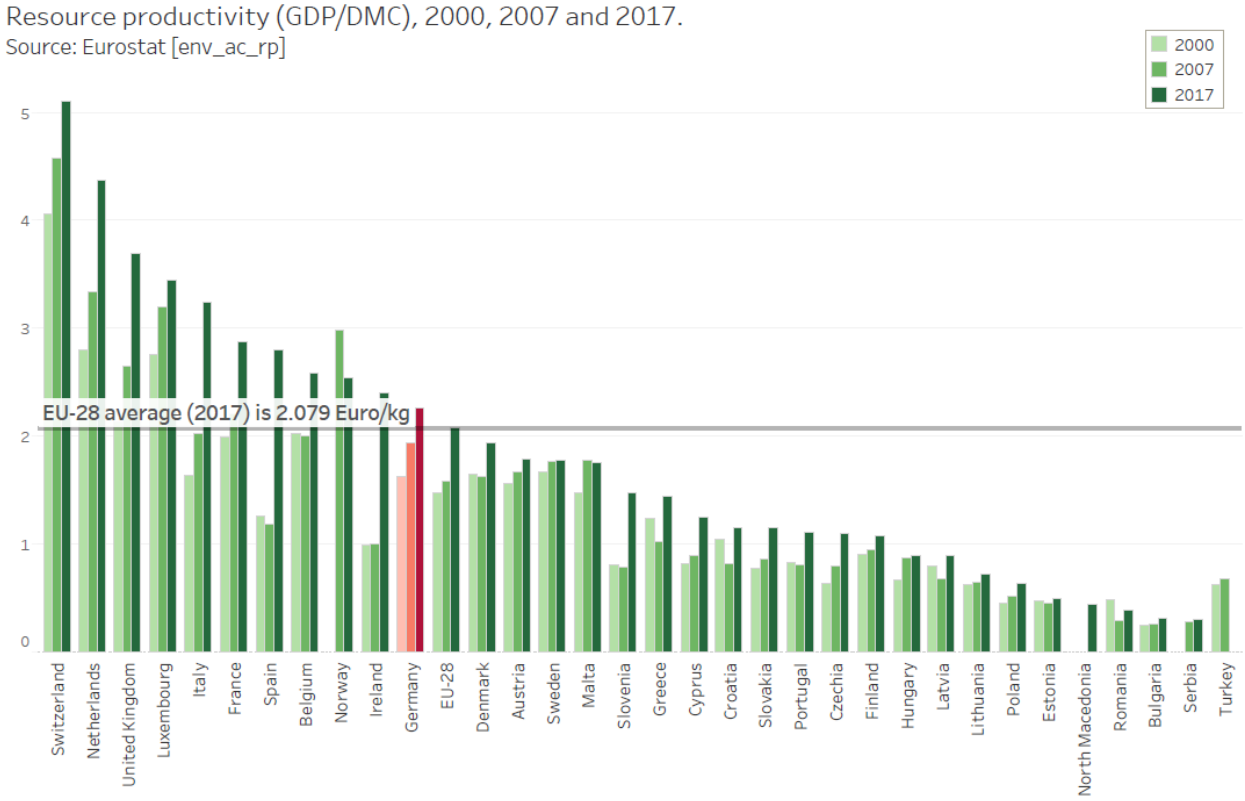
**Germany**. Trends in domestic material consumption by category, 2002-2017.

Source: Eurostat [env_ac_mfa]



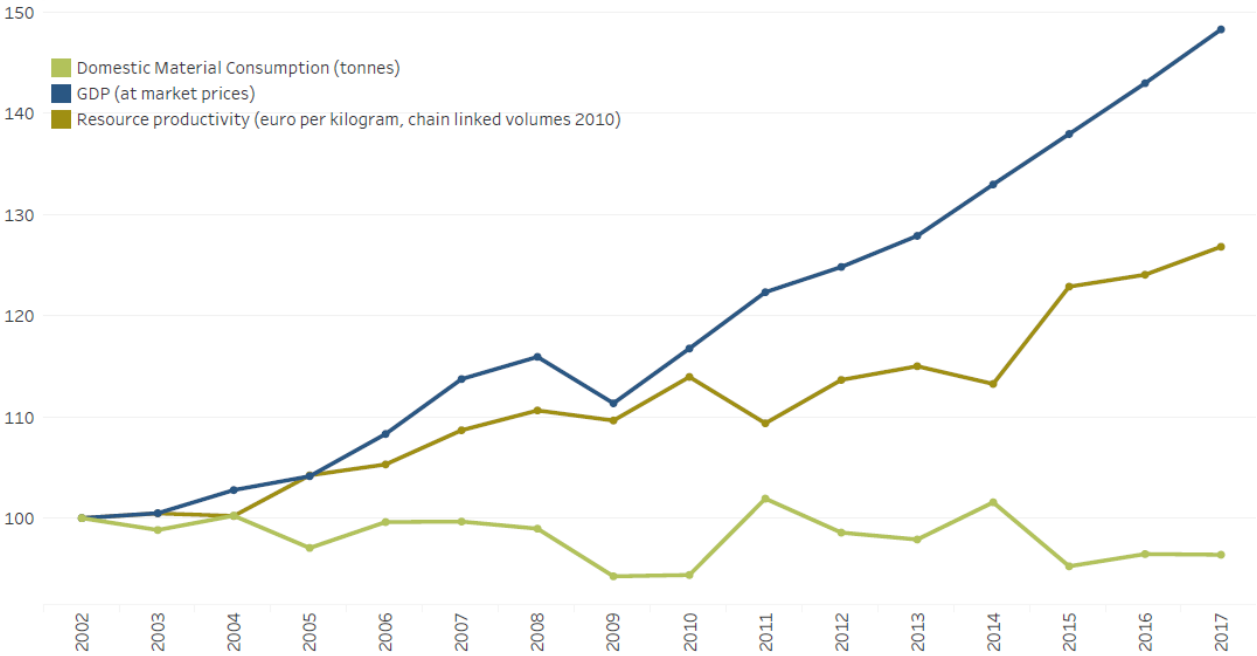

Note: The domestic material consumption categories 'other products' and 'waste for final treatment and disposal' are excluded from the figure.

Resource productivity (GDP/DMC), 2000, 2007 and 2017.
Source: Eurostat [env_ac_rp]

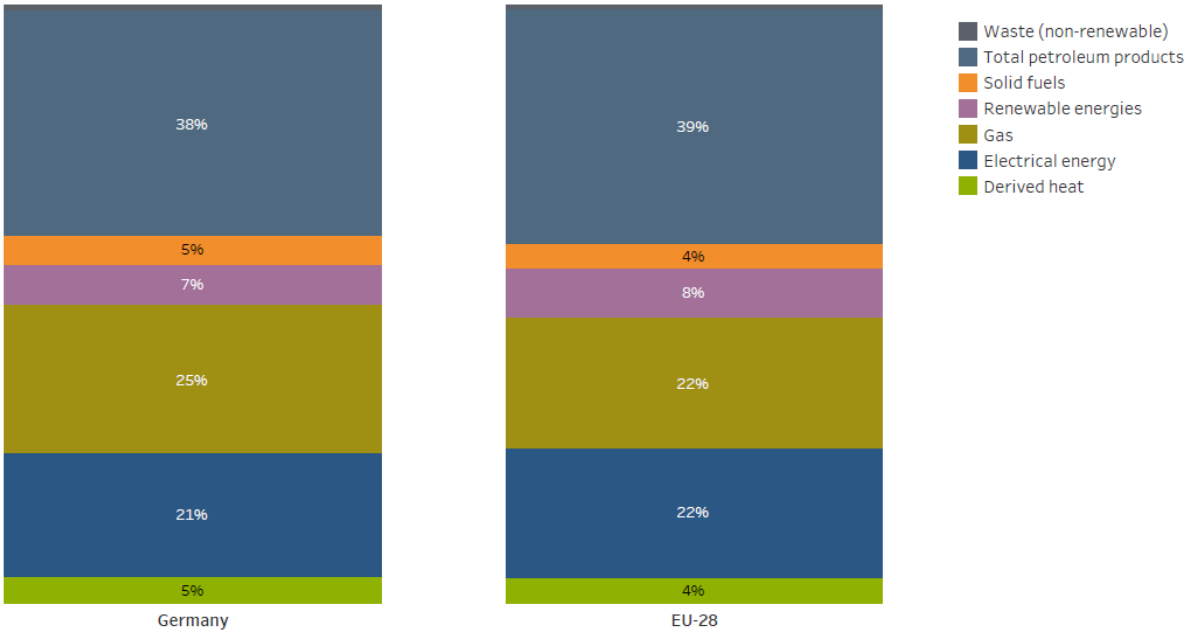



Note: GDP expressed in chain linked volumes 2010.

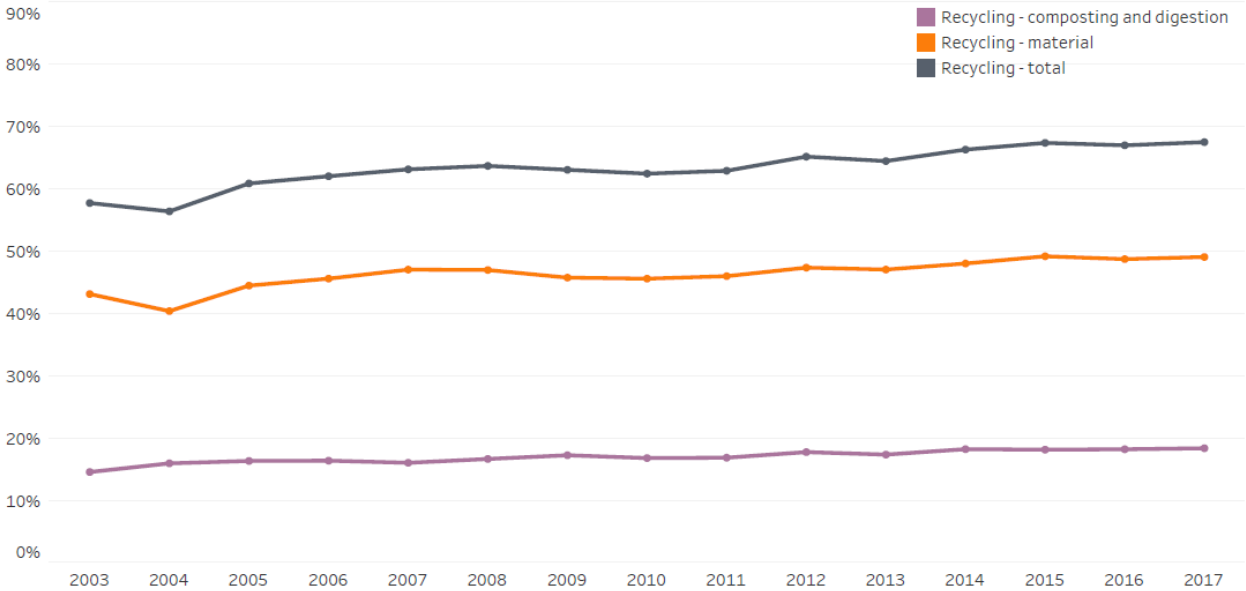
**Germany**. GDP, DMC and resource productivity trends, 2002-2017, index 2002=100.
Source: Eurostat [env_ac_mfa], [env_ac_rp] & [nama_10_gdp]



**Germany & EU-28**. Primary energy consumption by energy product, 2016.
Source: Eurostat [nrg_100a]




**Germany**. Recycling of municipal waste, 2003-2017, as share of total waste treatment.
Source: Eurostat [env_wasmun]




Note: The amount of municipal waste treatment is reported for the treatment operations incineration (with and without energy recovery), recycling, composting and landfilling.

## Policy framework

### Driving forces for material resource efficiency and circular economy

Natural resources, especially raw materials, are key to production and are therefore fundamental to our prosperity. The steadily increasing use of raw materials worldwide, the assumption that rapid economic growth in newly industrialising countries is leading to further and rising demand for raw materials, and the currently high variation in per person consumption of raw materials globally make it clear that sustainable resource use is a major challenge from an economic, ecological and social perspective.

The Federal government embraces its responsibility in this regard. As early as 2002, it defined the sustainable use of natural resources as a cornerstone of its National Sustainable Development Strategy. Based on a range of targets including doubling Germany's raw material productivity by 2020 relative to 1994, the Strategy sets the main approach of German resource efficiency policy: it should deliver benefits in all three dimensions of sustainability and where possible should mean no loss of prosperity.

German resource policy addresses the following economic and ecological challenges:

- volatile and in some cases rapidly rising raw material costs;
- some market concentration for certain raw materials in conjunction with high import dependency, especially for metals;
- the ecological and social impacts of raw materials extraction;
- the environmental impacts of resource use along the whole value chain.

Resource policy is based on securing raw material supply and increasing resource efficiency, and is intended to reduce pressure on the environment and boost the competitiveness and growth of the German economy while creating new and securing existing jobs. The German Resource Efficiency Programme (ProgRess) of 2012 and the first progress report in 2016 (ProgRess II) were directed at achieving these objectives. The main strategy addressing concerns on securing raw material supply and making the German economy more independent of raw material imports is the National Raw Material Strategy of 2010.

In addition, a major factor in Germany's resource policy is the understanding that resource efficiency is a strategic topic for innovation, growth and improving the competitiveness of the German economy. In this respect, the German government stimulates innovation in clean technology, in particular material- and energy-efficient products and production processes, through several funding programmes, for example the Environmental Innovation Programme. In addition, with its Green Tech – Made in Germany campaign, the government fosters the export of energy- and resource-saving environmental technologies.

### Dedicated national strategies or roadmaps for material resource efficiency and a circular economy

In February 2012, the Federal government adopted the German Resource Efficiency Programme (ProgRess) and committed itself to reporting every four years on the development of resource efficiency in Germany, assessing progress and updating its programme.

In March 2016 the German cabinet adopted the first update, ProgRess II. Following the fundamental objectives of decoupling economic growth from resource use, minimising associated environmental pressures as much as possible and improving the sustainability and competitiveness of German industry, the German Resource Efficiency Programme intends to make the extraction and use of natural resources more sustainable. ProgRess and ProgRess II are based on four guiding principles[1]:

- combining ecological necessities with economic opportunities, innovation focus, and social responsibility;

[1] www.bmu.de/WS1742-1 (English) and www.bmu.de/PU149-1 (English)

- 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;
- and securing sustainable resource use for the long term by guiding society towards quality growth.

ProgRess and ProgRess II focus on the material use of abiotic and biotic resources. The use of fossil and biotic resources for energy generation is addressed in a range of other strategies and measures in connection with Germany's energy transition. In addition, natural resources such as water, air, land, soil and ecosystem services and biotic resources such as food and feed are already incorporated in various programmes, processes or legislation, so are excluded from the scope of ProgRess II.

ProgRess looked at resource efficiency gains 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 and recognise and resolve goal conflicts at an early stage.

ProgRess II continues to focus on market incentives, information, consultation, education, research and innovation and on strengthening voluntary measures and initiatives to increase resource efficiency along the entire value chain. In addition, it makes use of overarching instruments. Ten action areas are considered in this context:

- securing the sustainable supply of raw materials;
- increasing resource efficiency in production;
- making production and consumption more resource efficient;
- developing a resource-efficient circular economy;
- sustainable building and sustainable urban development;
- resource-efficient information and communication technology;
- cross-cutting instruments;
- exploiting synergies with other policy areas and resolving goal conflicts;
- supporting resource efficiency policy at local and regional levels;
- strengthening resource policy at international and European Union (EU) level.

Exemplary measures are further expanding efficiency consulting services for small and medium-sized enterprises (SMEs), the continuation of resource efficiency networks, supporting material-efficient production processes and resource-efficient product design, increased consideration of resource aspects in standardisation processes, placing greater focus on resource-efficient products and services in public sector procurement, building up a circular economy and greater integration of resource efficiency into international and European processes and institutions.

Germany has no dedicated circular economy strategy or programme. Under its waste policy, however, the government is explicitly pursuing the goal of the development of waste and closed-cycle management into a sustainable and resource-efficient management of material flows over the coming years. In this context, the Closed Cycle Management Act of 1996, renewed in 2012, is the main legislation strengthening waste prevention, recycling and closing the loop. Additionally, the German Resource Efficiency programme is already addressing the whole value chain from raw material supply to waste management with a dedicated focus on closing material flows and making waste management more sustainable and resource efficient[2].

[2] https://www.bmu.de/en/topics/water-waste-soil/waste-management/ (English) and https://www.bmu.de/en/topics/water-waste-soil/waste-management/waste-policy/cycle-management/ (English)

## Overview of dedicated national or sectoral strategies for raw materials

In 2010, the German government adopted the National Raw Material Strategy, which mainly focuses on securing the availability of mineral raw materials for the national economy in a sustainable way, at home and abroad, and to make Germany less dependent of raw material imports[3].

The strategy should develop the necessary framework for a sustainable and international competitive raw material supply and provide several measures to improve access to raw materials. For example, bilateral raw material partnerships or credit guarantees can offer new sources of supply by supporting cooperation between companies from both countries in the field of development, extraction, processing and use of mineral raw materials, with the aim of a secure and sustainable supply and use of raw materials as well as technology and innovation transfer. Currently Germany has bilateral raw material partnerships with Kazakhstan[4], Mongolia[5] and Peru[6].

However, the main focus of the strategy is the support and funding of research on raw materials, material and resource efficiency and recycling to reduce dependency on raw material imports, mostly metals, together with the build-up of an information structure to provide detailed information to industry and support knowledge exchange.

For example, the foundation of the German Mineral Resources Agency (DERA)[7], in autumn 2010, as an arm of the Federal Institute for Geosciences and Natural Resources (BGR) in Hanover, is a direct implementation of the strategy. 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. In addition, since 2011, DERA conducts the competition for the German Raw Material Efficiency Award[8], funded by the Federal Ministry for Economic Affairs and Energy, which recognises outstanding innovative accomplishments on the part of businesses and research institutes in achieving raw material efficiency.

## Policies which include elements of material resource efficiency

With the new Sustainable Development Strategy adopted in 2016, the German government transferred the UN Agenda 2030 into the national context. By doing so, resource efficiency, circular economy and sustainable production and consumption are key issues in several contexts of the Strategy, especially in implementing Sustainable Development Goal (SDG) 8: Decent Work and Economic Growth and SDG 12: Responsible Consumption and Production (see also the Resource efficiency, circular economy and the 2030 Sustainable Development Goals section).

With its Integrated Environmental Programme 2030, Shaping Ecological Transformation[9], published in 2016, the Federal Environment Ministry is tackling major challenges and drawing attention to the wide range of medium-term environmental policy measures to shape a path towards a social-ecological market

[3] http://www.rohstoffwissen.org/fileadmin/downloads/160720.rohstoffstrategie-der-bundesregierung.pdf (German)
[4] https://www.bmwi.de/Redaktion/DE/Downloads/A/abkommen-zwischenbrd-und-kasachstan-partnerschaft-rohstoff-industrie-und-technologiebereich.html (German)
[5] https://www.bmwi.de/Redaktion/DE/Downloads/A/abkommen-zwischen-brd-und-mongolei-zusammenarbeit-rohstoff-industrie-technologie.html (German)
[6] https://www.bmwi.de/Redaktion/DE/Downloads/A/abkommen-zwischen-brd-und-peru-partnerschaft-rohstoff-industrie-und-technologiebereich.html (German)
[7] https://www.deutsche-rohstoffagentur.de/DERA/DE/Home/dra_node.html (German)
[8] https://www.deutscher-rohstoffeffizienz-preis.de/DREP/DE/Home/rep_node.html (German)
[9] https://www.bmu.de/en/publication/shaping-ecological-transformation-integrated-environmental-programme-2030/ (English)

economy and a sustainable society within planetary boundaries. The design of a sustainable consumption and production system is one of five key areas identified and underpinned with several measures on resource efficiency for a 'resource turnaround'.

The Waste Prevention Programme[10], adopted in 2013, slots into the framework of the German Raw Material Strategy, ProgRess and Circular Economy Policy and pursues compatible objectives. It is designed to sever the link between economic growth and the impacts on humankind and the environment associated with waste generation. Its principal objective is to decouple economic growth from the adverse impacts on human health and the environment caused by the production of waste. With secondary objectives and measures, including encouraging consumption patterns that favour low-waste, low-emission products, clean product design, reuse of products or extended lifespan of products, it goes hand in hand with the German Resource Efficiency Programme and fosters the circular economy policy in Germany.

The National Programme for Sustainable Consumption[11], adopted in February 2016, complements ProgRess and the Waste Prevention Programme, focusing mainly on wider capacity building and improving enabling factors for sustainable consumption practices and sustainable lifestyles, including the promotion of green markets and product/service innovation. The Programme lays out how the German government plans to systematically strengthen and expand sustainable consumption in various areas at the national level, and addresses the six areas of consumption with the greatest potential for reducing pressures: mobility, food, housing and households, office and work, clothing, and tourism and leisure. Education, consumer information, eco-design, public procurement, social innovation and research are cross-cutting areas that are also being addressed. The Programme is also a platform to facilitate the involvement of all relevant groups of society.

The National Biomass Action Plan (2009)[12] and the Action Plan for the Industrial Use of Biomass (2009)[13] aim to increase the use of biomass for energy production and by industry as a significant contribution to reducing the use of fossil raw materials and to combat climate change. The efficient use of biomass is one of the main goals of both action plans and increased resource efficiency is addressed in several spheres of activity. These Action Plans are supplemented by the Policy Strategy on Bioeconomy.

The transformation to a knowledge-based bioeconomy is seen as a way forward to make Germany more independent of fossil and mineral raw materials, to secure the supply of raw materials for German industry and to increase the efficient use of biomass. Therefore the National Policy Strategy on Bioeconomy, published in July 2013[14], defines priorities on the way towards a knowledge-based bioeconomy and plots the needed action. This covers cross-cutting issues such as building a coherent policy framework for a sustainable bioeconomy and information and dialogue with society as well as thematic areas of action including sustainable production and the provision of biotic resources, and strengthening research on innovative processes and production systems. The Policy Strategy is directly linked to the National Raw Material Strategy, ProgRess and the Sustainable Development Strategy. It is accompanied by the National Research Strategy for Bioeconomy 2030 – Our Path towards a Bio-based Economy, adopted in November 2010[15]. The overarching aim of the research strategy is to promote the sustainable use of biological

[10] https://www.bmu.de/en/publication/waste-prevention-programme-of-the-german-government-with-the-involvement-of-the-federal-laender/ (English)
[11] https://www.bundesregierung.de/breg-de/service/publikationen/national-programme-on-sustainable-consumption-855388 (English)
[12] https://www.bmel.de/SharedDocs/Downloads/EN/Publications/BiomassActionPlan.pdf?__blob=publicationFile (English)
[13] https://www.bmel.de/SharedDocs/Downloads/Broschueren/AktionsplanNaWaRo.pdf?__blob=publicationFile (German)
[14] https://www.bmel.de/SharedDocs/Downloads/EN/Publications/NatPolicyStrategyBioeconomy.pdf?__blob=publicationFile (English)
[15] https://www.bmbf.de/pub/Nationale_Forschungsstrategie_Biooekonomie_2030.pdf (German)

resources through bio-innovation and its application in various industrial sectors to improve material efficiency, climate protection and the use of materials from renewable sources.

The Forest Strategy 2020[16], launched in 2012, focuses on the sustainable forest management and efficient use of wood in German forest-based industry. It is reinforced by the Charter for Wood 2.0[17], published in 2017, which promotes and supports the increased use of wood to foster climate protection and the sustainable and efficient use of natural resources.

Resource efficiency is also a key element in German research and innovation policy. Research into intelligent and wise use of resources is a focal point of the third Framework Research Programme for Sustainable Development (FONA$^3$[18]), with its three flagship initiatives – Green Economy, the City of the Future and Energy Transition in Germany. A research and development (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 refining and rare earths ($r^4$ – Research to Supply Raw Materials of Strategic Economic Importance[19]). Recycling and substitution, and urban mining to obtain raw materials are part of the $r^3$ – Strategic Metals and Minerals funding programme[20]. In achieving an organic-based, low-resource economy, the National Research Strategy BioEconomy 2030 focuses on biotic resources and sustainable bioeconomic 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 resource management, bilateral projects are being promoted, in particular with Viet Nam, Russia, Argentina and Brazil. These are supported by research on the bioeconomy and social change.

### Institutional setup and stakeholder engagement

Promoting resource efficiency is an overall policy objective of the Federal government, but also of the Federal States (Bundesländer), with many cross-cutting links to various policy fields. Resource efficiency policies are therefore formulated and introduced by various Federal Ministries, covering different issues and aspects of the resource efficiency agenda, including, as examples:

- the Federal Ministry of Economy and Energy (BMWi), responsible for raw material policy and support of SMEs;
- the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), responsible for ProgRess and closed-cycle management;
- the Federal Ministry of Education and Research (BMBF), responsible for research and innovation;
- the Federal Ministry of Food and Agriculture (BMEL), responsible for sustainable biomass production, biomass use and bio-economy;
- the Federal Ministry of Economic Development and Cooperation (BMZ), responsible for promoting resource efficiency and sustainable raw material extraction in development co-operation.

The states play a key role in achieving efficient use of natural resources. They have already developed a wide range of activities implemented in conjunction with other actors such as industry, science and research, and civil society. State measures supplement and support Federal government activities whose true potential can only be achieved in this way.

[16] https://www.bmel.de/SharedDocs/Downloads/EN/Publications/ForestStrategy2020.pdf?__blob=publicationFile (English)

[17] https://www.bmel.de/SharedDocs/Downloads/EN/Publications/CharterWood2.0.pdf?__blob=publicationFile (English)

[18] https://www.fona.de/en/index.php (English)

[19] https://www.r4-innovation.de/ (German)

[20] http://www.r3-innovation.de/ (German)

Given the wide range of measures at both national and state level, there is an increasing need for a coordinated approach. To this end, the German Environment Ministers Conference has set up LAGRE, a cross-state 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 input from the states, provides feedback to the Federal government regarding the Programme's implementation and informs the government regarding states' 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 state level. This will also highlight the specific action needed to implement the visions and goals of ProgRess II. The activities at Federal and state level should ideally be integrative and mutually enhancing.

The German Mineral Resources Agency (DERA)[21], 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. In addition, since 2011, DERA conducts the competition for the German Raw Material Efficiency Award[22], funded by the Federal Ministry for Economic Affairs and Energy, which recognises outstanding innovative accomplishments on the part of businesses and research institutes in achieving raw material efficiency.

*Stakeholder involvement*

The Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) supports and implements several networks to foster resource efficiency through knowledge sharing. The Ministry initiated the National Resource Efficiency Platform (NaRess) as well as the Resource Efficiency Network (NeRess) and the network Education for sustainable resource use and resource efficiency (BilRess)[23] (see also section 'Examples of good practice and innovative approaches').

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 forward 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.

*Public consultation*

A public participation concept was developed and implemented to update ProgRess. 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 through a random selection process. All other interested individuals were able to participate in an online dialogue through a dedicated website[24].

[21] https://www.deutsche-rohstoffagentur.de/DERA/DE/Home/dra_node.html (German)

[22] https://www.deutscher-rohstoffeffizienz-preis.de/DREP/DE/Home/rep_node.html (German)

[23] https://www.bilress.de/ (German)

[24] https://www.gespraechstoff-ressourcen.de/ (German)

Participants in the public dialogue 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; information technology (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 12 citizens' recommendations covered key topics brought up during the dialogue events.

*Periodic international science-policy conferences*

Regular conferences bringing together policy-makers, scientists and key industrial players can foster an effective international knowledge exchange on resource efficiency policies. Germany, represented by the Federal Environment Agency, is organising the bi-annual European Resources Forum, bringing together several stakeholders to advance knowledge exchange on resource efficiency in Europe. Further, the Federal Environment Agency is supporting the World Resource Forum[25], which aims to promote the exchange experience globally[26].

In addition, the Federal government is promoting the international establishment of resource efficiency to strengthen resource policy at international level. For example, during the German presidency of the G7 and G20 groups of countries[27], resource efficiency was put on the agenda, leading to the foundation of the G7 Alliance for Resource Efficiency[28].

### Approaches to resource efficiency and circular economy policy evaluation

In ProgRess the German government committed itself to reporting every four years on the development of resource efficiency in Germany, to assessing progress and updating its programme. So, the regular update of the German resource efficiency programme is ex-post evaluation in the form of a broad monitoring report on progress towards the objective and targets set in the Programme. The main focus of evaluation is the effectiveness of ProgRess implementation, mainly indicator based. But measures are also evaluated for coherence and relevance.

In light of the planned update of the ProgRess in 2020, the Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMUB) has commissioned the Wuppertal Institute for Climate, Environment and Energy to evaluate the implementation mechanisms, activities, influence and effects of the Programme in the area of resource efficiency. The aim is to identify the strengths and weaknesses of the Programme and to identify options for the institutional and strategic development of the Programme and its processes.

[25] www.wrforum.org (English)
[26] https://www.umweltbundesamt.de/en/node/26203 (English)
[27] https://www.bmu.de/en/topics/economy-products-resources-tourism/resource-efficiency/resource-efficiency-in-the-g20/ (English)
[28] https://www.bmu.de/en/topics/economy-products-resources-tourism/resource-efficiency/resource-efficiency-in-the-g-7/ (English)

Beside the direct evaluation in the regular updates of ProgRess, further regularly reported indicators are used to evaluate the resource policy indirectly, for example concerning environmental impacts. *The Use of Natural Resources – Report for Germany 2016*[29] is one of such indirect evaluation reports.

## Monitoring and targets

### Targets for resource efficiency and circular economy

The German Resource Efficiency Programme sets two main economy-wide targets for resource efficiency:

- raw material productivity; and
- total raw material productivity.

The target on doubling abiotic raw material productivity (GDP/direct material input ($DMI_{abiotic}$)) from 1994 to 2020 is still in place. Since the launch of ProgRess II, it is supplemented by the indicator and associated target on total raw material productivity ((GDP+ monetary value of imports)/raw material input (RMI)). The identified trend during 2000–2010 of an average increase of 1.5 per cent per year for total raw material productivity should be sustained to 2030. This target is also set in the updated 2016 Sustainable Development Strategy. The new indicator is calculated by the Federal Statistical Office and reported on a regular basis.

Apart from these two main indicators, ProgRess II also includes a series of circular economy targets including:

- a significant increase in the recycling rate of plastic waste by 2020, currently 46 per cent of plastic waste is recycled;
- a significant increase in the percentage of recycled aggregate used as concrete aggregate relative to the total volume of mineral recycled construction materials by 2030;
- a significant increase in the percentage of recycled material in the manufacture of gypsum board by 2030;
- a permanent increase in the recycling rate of municipal solid waste to more than 65 per cent by 2020;
- a 50 per cent increase in the quantity of separately collected organic waste and high-quality recycling/recovery of such waste by 2020 relative to 2010.

The updated Sustainable Development Strategy defines further targets related to resource efficiency in a broader sense, including:

- the market share of goods certified by independently verified sustainability labelling schemes should increase to 34 per cent by 2030;
- the development of additional land for settlement and transport purposes is to be limited to below 30 hectares per day by 2030.

### Indicators to monitor progress towards a resource-efficient circular economy

The main indicators used to monitor progress are currently GDP/$DMI_{abiotic}$ and (GDP+ monetary value of imports)/RMI. Total raw material productivity is seen as an extension and enhancement of raw material productivity as it includes both biotic and abiotic materials. In addition, and more important, imported goods are included not only in terms of their actual weight, but including the weight of all raw materials used during their production (material footprint). This guarantees that increases in productivity will not be falsely registered because of shifting resource intensive processes abroad. To have a consistent indicator, the monetary value of imported goods is added to the GDP.

[29] https://www.umweltbundesamt.de/en/publikationen/the-use-of-natural-resources (English)

These two indicators will be reported regularly – total material productivity at least every two years – as they are also indicators in the 2016 German Sustainable Development Strategy.

In addition, various indicators are currently under development or are reported outside the official statistics. For example, the indicators direct effects of recovery (DERec) and direct and indirect effects of recovery (DIERec) developed on behalf of Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) 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 would have to be produced not only domestically, but also globally.

Resource use in Germany is the title of a German Environment Agency (UBA) research project that analyses developments in German raw material consumption and other indicators. The project examines the manifold interlinkages between resource extraction, resource consumption and economic development. The first project report was published in November 2016 under the title *The Use of Natural Resources – Report for Germany 2016*[30]. The report focuses on renewable and non-renewable raw materials, and its themes range from raw material extraction and trade to the use of raw materials in the German economic system and material consumption. Other resources, such as water, land or flow resources, are included in a separate report. In order to provide a comprehensive picture, the report is not limited to a national perspective but includes an in-depth account of international aspects, covering issues such as supply security and indirect raw material use.

### Resource efficiency, circular economy and the 2030 Sustainable Development Goals

The 2016 revision of the government-wide German National Sustainable Development Strategy, adopted in January 2017, sets out implementation measures for the 17 Sustainable Development Goals (SDGs), including SDGs 8 and 12. For example, with view to sub-target 8.4, the Federal government aims both to reduce absolute resource and energy consumption along the entire value chain and to decouple it from economic development and to continuously increase efficiency. The Federal government is also examining how new progress measures for sustainable development can supplement GDP.

In addition, the Integrated Environmental Programme 2030 can be seen as a direct response to the policy-making challenge of Agenda 2030. As described under section 'Seeking synergies with other policy areas', resource policy is a key element of the Programme[31].

## Examples of innovative approaches and good practice

### Examples of good practice and innovative approaches

**National Programme for Sustainable Consumption[32]**

The German government adopted the National Programme for Sustainable Consumption on 24 February 2016. The Programme was drawn up by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety and was presented together with the Federal Ministry of Justice and Consumer Protection and the Federal Ministry of Food and Agriculture. The Programme, which lays out how the government plans to systematically strengthen and expand sustainable consumption in various areas at

[30] https://www.umweltbundesamt.de/en/publikationen/the-use-of-natural-resources (English)

[31] https://www.bundesregierung.de/breg-en/issues/sustainability/global-goals-for-sustainable-development-355956 (English)

[32] https://www.bundesregierung.de/breg-de/service/publikationen/national-programme-on-sustainable-consumption-855388 (English)

the national level, is an important step towards implementing the 2030 Agenda for Sustainable Development. It aims to turn sustainable consumption from a niche into a mainstream concept and increase consumer awareness of consumption patterns, while at the same time ensuring that all groups of the population have access to sustainable consumption opportunities.

The Programme addresses the six areas of consumption with the greatest potential for reducing pressures: mobility, food, housing and households, office and work, clothing, and tourism and leisure. Education, consumer information, ecodesign, public procurement, social innovation and research are cross-cutting areas that are also being addressed. More than 170 measures are described to support sustainable consumption, including:

- further developing and strengthening credible and ambitious labels and standards;
- research on the impacts of consumption and consumer behaviour;
- exploring the idea of a 'second price tag', which would depict the social and environmental impact of a product;
- developing new tools for socially responsible and equitable public procurement;
- systematically recording, using and helping to better harness the potential of social innovation to promote sustainable consumption;
- establishing a sustainable diet as a health-promoting factor;
- promoting teleworking and mobile working;
- promoting new forms of living arrangements in the community;
- supporting interventions to encourage economical heating behaviour;
- raising consumer awareness of sustainable information and communications technology (ICT) and expanding the range of sustainable ICT products;
- systematic implementation of the Programme of Sustainability Measures developed and adopted by the State Secretaries' Committee on Sustainable Development.

In addition, the Programme is a platform to facilitate the involvement of all relevant groups of society.

The National Programme for Sustainable Consumption complements other important policy programmes of the Federal government such as ProgRess or the National Waste Prevention Programme, focusing mainly on wider capacity building and improving enabling factors for sustainable consumption practices and lifestyles, including the promotion of green markets and product/service innovation.

Implementation of the Programme's measures is coordinated through an Inter-ministerial working group, while a newly established Competence Centre for Sustainable Consumption[33] at the German Environment Agency supports joint implementation, information and dialogue and cooperation with stakeholder groups and the public.

**Advisory services and networks to support resource efficiency and raw material supply**

The Federal government has funded several agencies and built up various networks to foster resource efficiency and support German industry in securing its raw material supply.

In 2009, the Federal Environment Ministry and the Association of German Engineers jointly founded the **Centre for Resource Efficiency (VDI ZRE)**[34]. The aim of the Centre is to promote integrated use of technologies to protect the environment, natural resources and the climate. Mostly through awareness raising, case studies and best-practice databases, the Centre aims to reduce resource consumption in German industry. The VDI ZRE is closely connected with the VDI Association of German Engineers. With more than 150,000 members, the largest association of engineers in Germany pools experts for interdisciplinary dialogue and propagates knowledge of current developments in science and research, economy, society and policy.

[33] https://www.k-n-k.de/Kompetenzzentrum (German)

[34] http://www.resource-germany.com/ (English)

**The German Raw Materials Agency (DERA)**[35] is the competence centre for the raw materials industry and the central information and consulting platform for mineral and energy raw materials for the German economy. DERA continuously analyses and evaluates international markets for mineral raw materials and fossil energy raw materials. With various trend-setting studies and pilot projects, the Agency identifies price and supply risks as well as new raw materials and efficiency potentials for mineral raw materials. For example, DERA offers a free-of-charge raw materials information system, ROSYS[36]. With the help of interactive maps and diagrams, current developments on commodity markets can be tracked, analysed and evaluated[37]. ROSYS contains data on around 80 raw materials. Furthermore, DERA publishes information on raw materials with potential price and supply risks for the German economy on a regular basis.

The **Competence Centre for Sustainable Procurement**[38] at the Procurement Office of the Federal Ministry of the Interior (KNB) supports public-sector clients in considering sustainability criteria for procurement projects. Based on the work of an expert group on resource efficiency, the Centre published updated reference guidelines to better implement resource efficiency standards within the public construction and building sector in 2016[39]. The reference guidelines with minimum standards refer to the following areas:

- exploitation and refurbishment of used mineral-based construction materials;
- use of cement with recycled content in buildings;
- road construction without binding agents;
- earthwork construction;
- high-rated reuse of pavement materials (asphalt) in road construction and other mobility infrastructure;
- tendering of tree substrate.

For the German government, environmental technology and resource efficiency act as catalysts for the modernisation and competitiveness of the economy. A large number of SMEs are among the ranks of Germany's green-tech players. The importance of environmental technology and resource efficiency to Germany's economy is reflected not only in rapid growth in market volumes and growing demand for exports, but also in the industry's increasing contribution to economic output. In 2013, green tech accounted for 13 per cent of Germany's GDP – up two percentage points since 2011.

As a result, the government set up the **Green Tech – Made in Germany campaign**[40], in which resource efficiency is one of six lead markets. With the GreenTech Atlas, the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety published a showcase for Germany's innovative green-tech firms. It features an extensive, detailed database based on the UMFIS database maintained by the Association of German Chambers of Commerce and Industry (DIHK), enhanced by surveys and content systematisation. Portfolio details, business data and reference projects for 2,100 companies lend shape and substance to the green-tech industry and confirm the powerful role played by medium-sized companies in this sector.

The Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety supports and implements several networks to foster resource efficiency through knowledge sharing. In September 2013,

[35] https://www.deutsche-rohstoffagentur.de/DERA/DE/Home/dra_node.html (German)
[36] https://rosys.dera.bgr.de/ (German)
[37] https://www.deutsche-rohstoffagentur.de/DERA/DE/Rohstoffinformationen/Monitoring/monitoring_node.html (German)
[38] http://www.nachhaltige-beschaffung.info/DE/Home/home_node.html (German)
[39] http://www.nachhaltige-beschaffung.info/DE/DokumentAnzeigen/dokument-anzeigen.html?idDocument=1075&view=knbdownload (German)
[40] http://www.greentech-made-in-germany.de/en/ (English)

it set up a **National Resource Efficiency Platform** (NaRess)[41] for coordination with industry associations. Membership of the platform was extended in 2015 to include environmental and consumer protection organisations and trade unions. While NaRess is implemented and chaired by the Environment Ministry, the Resource Efficiency Network (NeRess), established in 2007, is chaired by the VDI ZRE. The network links up and provides information to a wide variety of different players. Network members include industry associations, special-interest associations, chambers of commerce, research institutions, and federal and state bodies.

Based on a research project, the **network Education for sustainable resource use and resource efficiency (BilRess)**[42] was established in 2016. It brings together several actors within and outside of the education system to anchor the topic in several education areas including schools, professional training, higher education and technical qualifications. Since the end of 2017 BilRess has been recognised by the UNESCO Education for Sustainable Development in Germany programme.

The **German Mining Network**[43], funded and supported by the Ministry for Economic Affairs and Energy (BMWi), is a platform for German companies and institutions dealing with mineral resources nationally and internationally. It is coordinated by the Association of German Chambers of Industry and Commerce (DIHK) and consists of six international Competence Centres for Mining and Mineral Resources co-located with the respective bilateral German Chambers of Commerce Abroad (AHKs) in Australia, Brazil, Canada, Chile, Peru and several countries in South Africa, the German Mineral Resources Agency (DERA) in the Federal Institute for Geosciences and Natural Resources (BGR), and Germany Trade and Invest (GTAI). The Network aims to support the sustainable long-term resource supply security for German companies and boost German exports internationally.

In addition to the federal level, several Federal States funded their own consultancy agencies to support their industries to implement measures for increasing energy and resource efficiency. For example, with the Effizienz-Agentur NRW (EFA) [44], North Rhine-Westphalia provides industrial companies and tradespeople with concrete support in identifying and implementing efficiency potential. In Bavaria, the Resource Efficiency Centre supports knowledge transfer from science to economy[45].

### Seeking synergies with other policy areas

Although most of the already mentioned strategies and programmes – such as the Policy Strategy on Bioeconomy, the Charter for Wood and the programmes on innovation policy – explicitly are the nexus between resource efficiency, climate change and economic competitiveness as a major objective, they do not implement substantive policy integration across different domains.

ProgRess II[46] explicitly follows an integrated perspective on energy and material flows, as measures to improve resource efficiency in material use can also have an impact on energy consumption and vice versa. The Federal government will take these various relationships into account during the implementation of ProgRess II. An objective of the programme is the better integration of efforts for energy and material efficiency so that they mutually support each other.

[41] https://www.bmu.de/themen/wirtschaft-produkte-ressourcen-tourismus/ressourceneffizienz/naress-nationale-plattform-ressourceneffizienz/ (German)
[42] https://www.bilress.de/ (German)
[43] http://www.germanmining.net/ (English)
[44] https://www.ressourceneffizienz.de/ressourceneffizienz/startpage-en.html (English)
[45] https://www.stmuv.bayern.de/themen/ressourcenschutz/ressourceneffizienz/rez.htm (German)
[46] https://www.bmu.de/fileadmin/Daten_BMU/Pools/Broschueren/german_resource_efficiency_programme_ii_bf.pdf (English)

With the Integrated Environmental Programme 2030, Shaping Ecological Transformation[47], the Federal Environment Ministry is tackling major challenges and drawing attention to the wide range of environmental policy designs in the medium-term perspective by laying the path towards a social-ecological market economy and a sustainable society within planetary boundaries. The Programme continues a long line of programmatic steps taken by Germany: from the precautionary approach as the guiding principle for environmental policy (enshrined in the government's first Environmental Programme in 1971) to the vision of sustainable development (in the German Environment Ministry's 1998 draft Environmental Programme) and now the new guiding theme of transformative environmental policy. This guiding theme states that environmental policy must address processes of societal change and promote sustainable lifestyles and new approaches to our economic practices and ways of working. It aims to facilitate the transition to a sustainable society and economy – and to expand the range of environmental policy tools available for this purpose. The main objectives are described as follows:

- an energy transition (Energiewende) that ensures an almost emission-free energy supply in all sectors, that pursues a roadmap for phasing out fossil fuels developed in dialogue with all parties involved, and which adheres to clear criteria for environmentally sound and socially equitable implementation;
- a transport system that facilitates environmentally sound mobility and urban quality of life, which supports the energy transition and minimises noise and air pollution;
- an agricultural sector that conserves biodiversity, protects the climate, puts an end to intensive livestock farming and reduces its emissions and residues to a tolerable level;
- a form of resource use and consumption that respects ecological limits in Germany and worldwide;
- to drive forward the transformation towards sustainability in economy and society even more vigorously, including at the international level.

To achieve these objectives five priority areas for action were identified:

- environment- and climate-friendly economic practices, energy and resource transition;
- sustainable agriculture, intact nature;
- sustainable mobility, liveable cities;
- healthy living conditions;
- the international dimension of environmental policy.

Both the main objectives and the identified priority areas for action highlight the need for an integrated policy approach, seeking synergies and avoiding trade-offs between various environmental (and other) policies, including sustainable resource use and resource efficiency policy.

Several Federal States address material resource efficiency in their innovation strategies: Saxony's looks at resource efficiency in the thematic areas of the environmental impact of resource use and securing raw material supply; Saxony-Anhalt looks at resource efficiency in the context of future markets; and North Rhine-Westphalia includes resource efficiency in the area of climate protection.

One of the guiding principles of ProgRess is 'seeing global responsibility as a key guide of national resource policy'. Therefore, several measures of the programme are directly linked to improving either the resource efficiency of imported products or the ecological and social conditions of raw material extraction and use abroad. Furthermore, one of the two main indicators, total material productivity and its respective target, takes into account the materials needed to produce imported products.

The new indicator (GDP+ monetary value of imports)/RMI, implemented by ProgRess II, also reflects the global responsibility of Germany's resource policy. As the indicator includes imports not only by weight of

[47] https://www.bmu.de/en/publication/shaping-ecological-transformation-integrated-environmental-programme-2030/ (English)

imported goods, but includes the associated total primary raw material input, it prevents productivity gains being falsely registered because of shifting resource-intensive processes abroad.

The German Recycling Technologies and Waste Management Partnership (RETech) grew from the Federal Environment Ministry's 2007 Export Initiative on Recycling and Efficiency Technologies and was established in late 2011. RETech focuses on support for the international application of sustainable environmental technologies developed by German companies. RETech serves as a contact point for all public and private organisations and institutions in Germany and abroad that are interested in German recycling and efficiency technologies. It also provides a platform for businesses, institutions and consultants considering international activities.

### Resource efficiency and circular economy policy initiatives from subnational to local level

To support increasing resource efficiency and as a sub-national implementation of ProgRess, Baden-Württemberg developed its own resource efficiency strategy, published in March 2016, and its Ministry of the Environment, Climate Protection and the Energy Sector launched the Stakeholder Platform Resource Efficiency Baden-Württemberg, which is still active. All relevant stakeholders have the opportunity to discuss their views on the need to improve resource efficiency and develop recommendations for implementation of the Resource Efficiency Strategy.

The objectives of the Baden-Württemberg's strategies are[48]:

- the decoupling of economic growth from resource use while maintaining and further developing most of the manufacturing sector as well as retaining the economic structure of Baden-Württemberg;
- supporting the objective of the National Sustainability Strategy and its target to double raw material productivity over the period 1994–2020;
- making Baden-Württemberg the leading market player and leading supplier of resource efficiency technologies;
- ensuring a secure supply of raw materials to the economy through more efficient extraction of primary raw materials and increasing the proportion of secondary raw materials.

In order to achieve these objectives, the Baden-Württemberg's strategy has proposed 31 measures, ranging from application-oriented research projects through information and support to companies to regulatory measures in the field of waste movement[49].

To support knowledge exchange within the State, Baden-Württemberg established the Baden-Württemberg Alliance for Resource Efficiency and incorporated the 100 Companies for Resource Efficiency initiative[50], with its best-practices examples for corporate resource efficiency, as a joint industry and government initiative. In addition, an annual congress on resource efficiency and circular economy was established to provide a broad platform for the exchange of experience and information[51].

The Rohstoffwende Bayern is the resource strategy of the Bavarian State Ministry for the Environment and Consumer Protection. Its aim is to:

- establish Bavaria as a model for the symbiosis of ecology and economy;

[48] https://um.baden-wuerttemberg.de/fileadmin/redaktion/m-um/intern/Dateien/Dokumente/6_Wirtschaft/Ressourceneffizienz_und_Umwelttechnik/160301_Landesstrategie_Ressourceneffizienz.pdf (German)

[49] https://compa.pure-bw.de/en/search/key/444 (English)

[50] https://pure-bw.de/de/100betriebe/overview (German)

[51] https://www.ressourceneffizienzkongress.de/ (German)

- decouple raw material consumption from economic growth and reduce the overall consumption of natural resources;
- continuously increase overall raw material productivity – i.e. raw material productivity expanded by the use of biotic primary materials, as well as the consideration of price-adjusted expenditure on imports – by 2030, in line with the National Sustainability Strategy.

An important strategic approach is the efficient use of materials, as well as to recover valuable substances from objects and products, such as mobile phones or cars, after they have been used as a source of secondary raw materials to return to the material and production cycle. The central building blocks for a successful turnaround in raw materials in Bavaria are:

i) increase in resource efficiency;
ii) further expansion of a sustainable environmental service branch;
iii) substitution of critical raw materials and environmentally harmful substances; and
iv) promoting a conscious and sustainable use of available resources.

The Circular- and Resource-Economy Cluster[52] has been working since 2012 as a cross-border platform of medium-sized companies in Saxony-Anhalt, Saxony and Thuringia. The aim is to organise cooperation on resource management between these companies and associations, educational and research institutions, as well as other service providers, politics and administration. The Cluster is coordinated by ISW Gesellschaft für wissenschaftliche Beratung und Dienstleistung GmbH and the Mitteldeutscher Abfallwirtschaftsverband e.V. (Central German Waste Management Association) from funds from the joint Federal Government/State (Länder) Scheme for the Improvement of Regional Economic Structures (GRW).

A key objective of the work of the Cluster is to actively bring together companies, universities and research institutes to generate new innovative project ideas, and to identify and develop projects that can be implemented within the framework of the promotion of innovation by the Federal Government, the State/s and the EU. The Cluster brings together partners from companies, engineering firms and research and development institutions. In the individual fields of competence, such projects should have a lasting effect on the development of regional value chains.

Currently defined fields of action are[53]:

- coordination of cross-border cooperation with a focus on implementation of the environmental alliance Saxony-Anhalt;
- identification and implementation of innovative projects in industry, among others for allocation of the Future Waste Management Industry Fund;
- construction of the circular economy and resource park Halle/Saalekreis;
- establishment of a network to represent the competencies of the waste management industry in Saxony-Anhalt;
- cluster development as a contribution to cooperation between the regional metropolis of Halle and the surrounding region in the context of the development of regional cooperation models for pooling strengths in the area of business promotion;
- building an internationally active training network, the Virtual Academy of Circular Economy and Resource Management;
- European cooperation with other resource management clusters to strengthen international networking among companies in the industry as an instrument for increasing the competitiveness of companies in Saxony-Anhalt.

[52] http://www.cluster-kreislauf-ressourcenwirtschaft.de/Home (German)

[53] http://www.cluster-kreislauf-ressourcenwirtschaft.de/Cluster/1343744324/content_120199/20150126_Bausteine_Virtuelle_Akademie_Kreislauf-_und_Ressourcenwirtschaft.pptx (German)

A comprehensive overview of existing initiatives at the Federal State level is given in the Appendix of ProgRess II.

## Other resources

**Examples of policies which go beyond "material resources"**

Currently the main focus of German resource policy is on material resources; other natural resources are covered by separate policies and legislation.

## The way forward

**Reflections on future directions of policies on resource efficiency and circular economy**

The main challenge for resource policy can be seen in the necessity to speed up the reduction in raw material consumption, both nationally and globally, to stop the overexploitation of natural resources and its accompanied environmental and social impacts. This is becoming more challenging as we need a transformation in our energy system away from fossil energy carriers to stop climate change. This transformation may need a high amount of raw materials, making it clear that implementation of increased resource efficiency is absolutely necessary as described by the International Resource Panel.

A major challenge for the implementation of resource policy is, therefore, to be coherent with other policies, mostly environmental ones. Here, the development of an integrated policy approach seeking synergies and avoiding trade-offs right at the beginning will be necessary.

In addition, it is necessary to involve all relevant stakeholders, including civil society, in policy development, as an effective resource policy will address and influence all areas of everyday life.

And last but not least, well-defined goals, principles and targets are necessary for the development and discussion of concrete policy measures, especially with stakeholders and within the policy debate.

European Topic Centre on Waste and Materials
in a Green Economy
Boeretang 200
BE-2400 Mol
Tel.: +14 33 59 83
Web: wmge.eionet.europa.eu
Email: etcwmge@vito.be

The European Topic Centre on Waste and Materials in a Green Economy (ETC/WMGE) is a consortium of European institutes under contract of the European Environment Agency.

**European Environment Agency**
**European Topic Centre on Waste and Materials in a Green Economy**