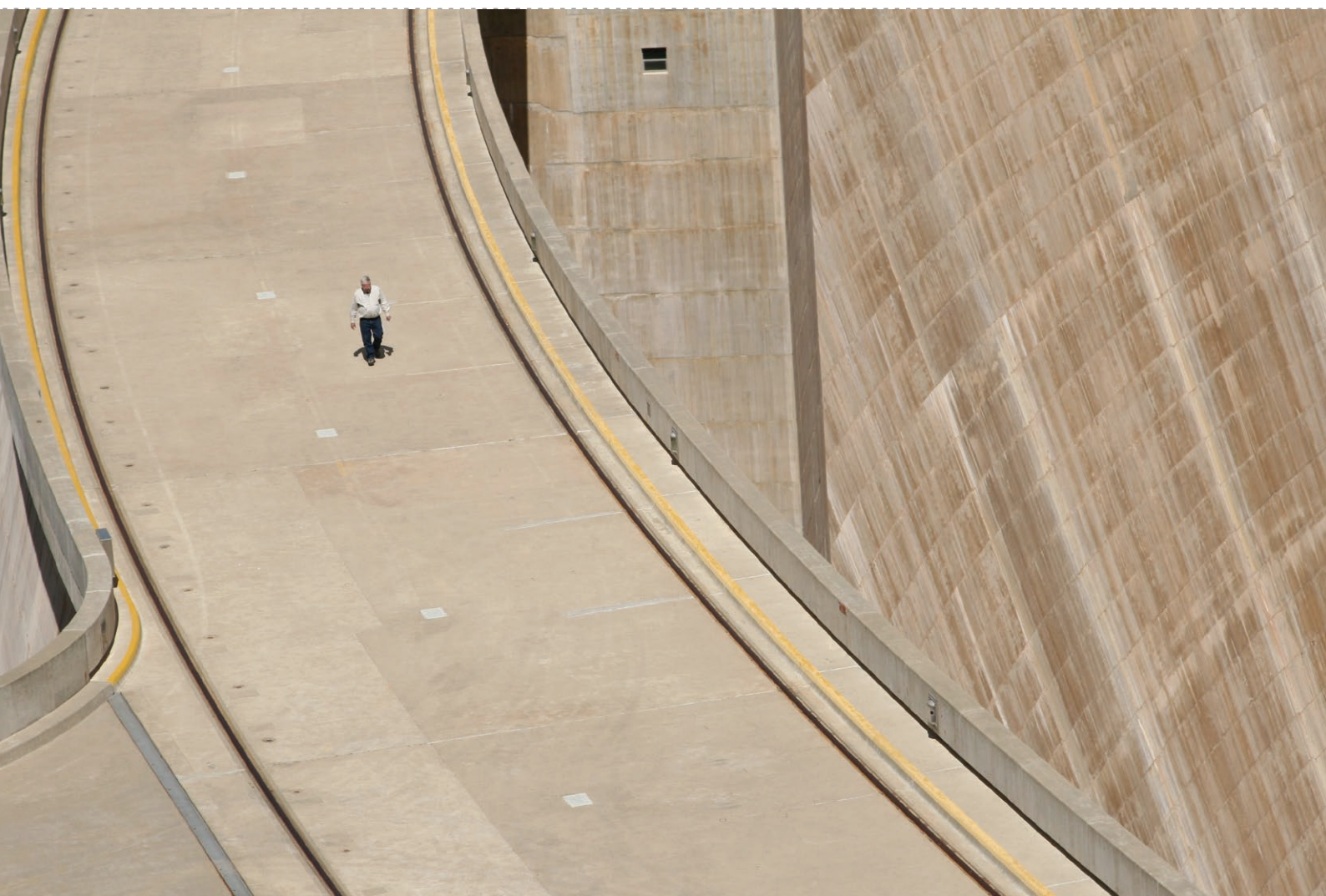


More from less — material resource efficiency in Europe

2015 overview of policies, instruments and targets in 32 countries

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Selected examples of material resource efficiency policies, instruments or targets presented in the country profiles



Albania

- National Energy Efficiency Action Plan, 2011–2018
- Law on Integrated Waste Management



Belgium

- Plan C, Transition Network for Sustainable Materials Management (Flanders)
- Marshall Plan 4.0-circular economy (Wallonia)



Croatia

- Act on Sustainable Waste Management (2013)
- Act on Mining (2013)



Denmark

- Circular economy policy toolkit
- Indicators of resource efficiency at the sector level



Finland

- National Material Efficiency Programme (2014)
- By 2017, all new public buildings should be near-zero-energy



France

- Law on Consumption (2014), addressing lifespan of products
- National Council for Ecological Transition



Hungary

- National Environmental Technology Innovation Strategy
- Set of 2020 targets for resource management and efficiency



Austria

- Resource Efficiency Action Plan (2012)
- Food is Precious initiative



Bulgaria

- National Development Programme Bulgaria 2020
- Operational Programme on Innovation and Competitiveness 2014–2020



Czech Republic

- Secondary Raw Materials Policy (2014) and Action Plan
- Vision 2024 and a 'decatalogue' for a circular economy



Estonia

- Estonia 2020 National Reform Programme
- Good Practice of Involvement



former Yugoslav Republic of Macedonia, the

- Strategy for Sustainable Development (2010)
- Ecolabel scheme for tourism facilities



Germany

- ProgRes Resource Efficiency Programme
- Closed Cycle Management Act



Iceland

- The Icelandic Recycling Fund
- Waste Prevention Policy



Further information about material resource efficiency policies, including the 32 detailed country profiles, are available on the EEA website: <http://www.eea.europa.eu/resource-efficiency>



Foreword

Over the past decade, the sustainable use of natural resources has received increasing attention in European Union (EU) policy as a smart way to address environmental, climate, economic efficiency and security of supply objectives. It is a central element in the 2050 vision for Europe, as laid down in the 7th Environment Action Programme 'Living well within the limits of our planet' (2013).

The EU Roadmap to a Resource Efficient Europe (2011) outlined the policy targets and actions to 'produce more value with less input, use resources in a sustainable way and manage them more efficiently throughout their life cycle'. A key challenge in this respect is to decouple environmental pressures and impacts from economic development.

In support of this policy process, and on the basis of a detailed survey, the European Environment Agency published an overview of resource efficiency policies and instruments in its network of member and cooperating countries, known as Eionet ⁽¹⁾ (EEA, 2011). The variety of approaches and experiences pointed at the value of information exchange between policy stakeholders, and has resulted in a series of webinars and workshops to enhance understanding.

Since 2011, EU policies have evolved. With the recently published Circular Economy Package (EC, 2015), efforts on resource efficiency have gained additional traction. The increased focus on closing material loops and waste reduction reflects the notion that incremental resource efficiency gains in a linear economic model may not be sufficient to reach the 2050 vision.

More fundamental changes of our production and consumption systems are called for, with a focus on

increased recycling, eco-design, reuse, repair and use of renewables in systems such as food, energy and mobility that most contribute to environmental pressures and impacts.

The current EEA report, produced together with Eionet countries and the European Topic Centre on Waste and Materials in a Green Economy (ETC/WMGE), is in many ways an update of the 2011 review. It describes the current state of play in the countries, extending the information on national resource efficiency policies with information on specific initiatives to close material loops in a circular economy.

It is reassuring to see that the economic and environmental co-benefits of increased resource efficiency and closing material loops are explicitly recognised in national approaches. The resource use agenda is thus evolving from a largely environmental concern towards an integrated, sustainable economic development model.

Yet, one important finding is that the circular economy for most countries still means merely better waste management. Furthermore, climate change and resource efficiency policies appear largely disconnected in practice, while integration with a bio-economy strategy also requires further efforts.

Keeping the balance between environmental, economic and social objectives is essential, as it is not about generating more jobs and wealth through using more natural resources, rather doing so in a sustainable manner. EEA is firmly committed to supporting this balance in coming years through its contributions to the knowledge base.

⁽¹⁾ European Environmental Information and Observation network (Eionet).

Summary of findings

Introduction

In 2011, the European Environment Agency (EEA) carried out a detailed survey to collect, analyse and disseminate information about national experiences in developing and implementing resource efficiency policies. The purpose was two-fold: to help expand the knowledge base on resource efficiency, an emerging priority on the EU policy agenda; and to facilitate the sharing of experience and good practice. The resulting report and 31 individual country profiles provided an overview of resource efficiency policies and instruments in the member and cooperating countries of the European Environment Information and Observation Network (Eionet).

Four years on, additional policies have emerged on resource efficiency, the circular economy and closing material loops. Responding to this, the EEA, together with Eionet and the European Topic Centre on Waste and Materials in a Green Economy (ETC/WMGE), set out in 2015 to review national approaches to material resource efficiency and explore similarities and differences in policies, strategies, indicators and targets, policy drivers and institutional set-up. In contrast to the work in 2011, the current analysis addresses material resources (Box S.1) rather than the more broadly defined natural resources.

Purpose and scope

Following on from its 2011 report, *Resource efficiency in Europe*, the EEA set out to review policies and approaches to material resource efficiency and closing material loops in its member and cooperating countries. The main objective is to encourage countries to share experience in the development of material resource efficiency policies.

The work also contributes to broadening the knowledge base underpinning resource efficiency and the circular economy, and increases understanding of policy approaches. The approach and scope were developed in close consultation with Eionet so as to reflect countries' priorities and needs.

Box S.1 The scope of 'material resources'

Following consultation with Eionet, the main focus of this report is policies and initiatives on material resources. The scope includes material flows entering or leaving an economy (biomass, non-metallic minerals, metal ores and fossil energy materials) as well as secondary (waste-derived) raw materials. Also within the scope are the transformations that materials undergo throughout their full life cycle, and initiatives to close material loops in the context of a circular economy.

This analytical report was prepared by the EEA and ETC/WMGE. It presents an overview of findings from the analysis of information provided by countries, reviewing national approaches to material resource efficiency and exploring similarities and differences in policy responses. The analysis is illustrated with short examples of countries' policy initiatives, which are described in more detail in the 32 country profiles published alongside this report. These are self-assessments prepared with assistance from the EEA and ETC/WMGE. The documents — the exclusive source of information on national policies used in this report (Box S.2) — describe the current status of material resource efficiency policies in each country, including the approach to the circular economy and closing material loops.

Beyond the analysis, this report offers a number of considerations for future policies on material resource efficiency and the circular economy.

Box S.2 Sources of information

A standard set of questions was used to elicit information for the country profiles. The analysis in this report is based solely on the information provided by participating EEA member countries through the Eionet National Reference Centres on Resource Efficient Economy (NRCs) and the National Focal Points (NFPs). No claim is made that this report covers all possible facets of material resource efficiency, as countries may have related policies, instruments or targets that remain unreported.

Material resource efficiency in the countries

Key trends in material use and resource productivity in the European Union

- From 2000 to 2014, resource use in the EU-28 fell both in absolute terms (down by 12 %) and per person (from 15.5 to 13.1 tonnes per person). Resource productivity — measured by relating gross domestic product (GDP) to domestic material consumption (DMC) — increased by 34 % between 2000 and 2014. Thus, absolute decoupling of economic growth from resource use has taken place.
- Most of the improvements in resource productivity occurred between 2007 and 2014. This largely reflects the sharp decline in construction activity as a result of the economic crisis that started in 2007/2008, which led to huge falls in material use, but had rather less impact on GDP.
- While recent trends in material use and resource productivity have been positive, the key challenge is to ensure that recent gains are sustained, and that the pattern does not revert to economic growth accompanied by increasing resource use.

National strategies and plans

- Only three countries — Austria, Finland and Germany — have dedicated national strategies for material resource efficiency. Two further countries have dedicated strategies at a regional (subnational) level — in Flanders (Belgium), and Scotland (United Kingdom).
- Most countries incorporate material use and resource efficiency in a wide variety of other strategies and policies, including those on waste and energy, industrial development and reform programmes, or in national environmental or sustainable development strategies.
- In most countries, key concepts remain undefined, with countries commonly using fairly vague, catch-all notions of 'resource efficiency', 'natural resources' and 'raw materials'. The intuitive shorthand of 'doing more with less' seems sufficient for policy needs.
- Most countries (28) presented waste management and recycling initiatives as the core of their national approach to material resource efficiency. Waste prevention plans and initiatives on the use of secondary raw materials also featured prominently.

- Almost all countries (29) reported various initiatives related to energy use, energy efficiency and the use of renewables as part of national policies on material resource efficiency. In most countries, however, energy policy is a separate long-standing policy field.

Drivers of material resource efficiency

- The factors and concerns reported by countries as driving their work on material resource efficiency policies roughly fall into three groups: economic interests, environmental concerns and regulatory requirements.
- Although most countries reported a combination of all three categories, economic considerations seem the most important, with economic drivers outnumbering those related to environmental concerns in most countries. This seems to indicate that material use and resource efficiency are now core economic and strategic issues, and that the logic of doing more with less has been widely embraced.
- The most recurrent drivers were the desire to increase competitiveness and to secure the supply of raw materials and energy as well as to reduce dependence on imports on the one hand (economic interests), and the need to reduce pressures on the environment on the other (environmental concerns).
- Other frequently mentioned incentives were the need to improve production efficiency and the performance of the energy sector, the creation of new green-sector jobs or job creation in general, and the need to improve waste management and the use of secondary raw materials.
- Only nine countries specifically pointed to the need to reduce greenhouse gas emissions as a driver of material resource efficiency.

Priority resources and sectors

- A majority of countries (26) identified a number of waste streams and secondary materials as the most common group of priority materials. Key waste streams are plastic and packaging (17), construction and demolition waste (16), and food waste (15). Energy carriers, including renewables, were mentioned by 18 countries as priority resources. Both energy and waste were also top priorities in the 2011 EEA review.

- Several countries are preparing national raw material strategies. Some, including the Netherlands and Switzerland, have already investigated which materials are critical for their economies and competitiveness, while others, including France, Poland and Turkey, are in the process of identifying them.
- Manufacturing was singled out most frequently as the key economic sector for material resource efficiency, followed by agriculture and forestry, construction, and waste management. The service sector was mentioned very infrequently.
- Food and beverages, and housing were the two consumption categories most often identified as a priority.
- Several countries called for a more systemic approach to material resource efficiency, including improving the understanding of material systems and developing better ways of addressing the end-user phase of consumption.
- According to country responses, economic and financial instruments are the most widely used policy instruments for material resource efficiency.
- Examples of good practice reported by countries are dominated by waste prevention and/or recycling measures.

Closing material loops in a circular economy

- Only ten respondents identified the concept of a circular economy and closing material loops as a driver of material resource efficiency, and even fewer — Flanders (Belgium), Germany and the Netherlands — reported having a dedicated strategy for closing material loops. Work on the topic is also taking place at a regional level, as demonstrated by the case of Flanders.
- Several countries, however, acknowledged the need to move away from the current linear economic model, and stated that the circular economy and closing material loops are already policy priorities.
- Complying with existing waste legislation and targets appears to be the most important driver of initiatives to close material loops. This is a clear illustration of how initiatives at the EU level stimulate national action.
- The majority of reported policy initiatives related to the circular economy focus on waste management,

a downstream policy option, rather than on prevention or reuse. Two countries, however, explicitly commented that a circular economy implies going beyond merely raising recycling rates and increasing the use of secondary raw materials.

Targets

- Nine countries have adopted targets for national material resource efficiency: Austria, Estonia, France, Germany, Hungary, Latvia, Poland, Portugal and Slovenia. In most cases, these targets are based on gross domestic product relative to domestic material consumption (GDP/DMC), the EU's lead resource productivity indicator. The EU itself does not have a target for material resource efficiency, and the formulation of appropriate objectives and targets is clearly a challenge, at both the EU and national levels.
- The two areas for which targets are common are waste and energy. This is clearly driven by EU regulations, though some countries have adopted targets that are more ambitious than those required by current EU legislation. Some non-EU participating countries also reported having targets for waste and energy in line with EU directives.
- No countries reported having targets for reducing the use of primary materials (metals, minerals or biomass), or for specific materials, including those on the EU list of critical raw materials. Targets for reducing energy use and improving energy efficiency are fairly common. Very few targets have been adopted at the level of individual economic sectors.
- An increasing number of material resource efficiency initiatives, accompanied by targets, are being introduced in the public sector and by local governments within their areas of competence. Examples include reducing energy consumption in public administration, reducing the use of paper, and increasing the use of sustainable transport.

Indicators

- The indicators most commonly reported as being used to monitor material resource efficiency are Eurostat-produced ones based on material flow accounting (MFA). Countries also tend to use indicators on waste generation and management as a measure of material resource efficiency. Very few countries have developed their own indicators on material resource efficiency and closing material loops.

- The EU Resource Efficiency Scoreboard was frequently mentioned as a common source of indicators. This suggests that the model bringing together a number of relevant indicators in one place has been well received.
 - There is a shortage of indicators to inform material resource efficiency policies that go beyond energy and waste. Indicators such as DMC, used by most countries, are sufficient to monitor macroeconomic trends, but it was noted by some countries that they are too aggregated to steer material resource efficiency policies. There are some examples of sector-oriented indicators, typically measuring the ratio between a particular environmental parameter and the gross added value of a given sector.
 - Eight countries reported considering indicators that take account of resources embedded in international trade, for example raw material consumption (RMC).
 - Belgium, France, Germany, the Netherlands, Switzerland and the United Kingdom mentioned preparatory initiatives to develop metrics and indicators for the circular economy.
 - Indicators on material use and/or resource efficiency that are currently available or in use do not seem well suited to measuring the environmental effects of material use or the decoupling of resource use from economic growth and its impacts.
- Institutional set-up***
- Almost all countries reported having an institutional structure to develop material resource efficiency policies. The most frequently occurring model is a shared ministerial responsibility, typically involving ministries of the environment, economy, energy and agriculture.
 - The prominent role of ministries reflects the fact that policies on material resources are developed at a national level.
 - The development and implementation of material resource efficiency policies are usually supported by one or more specialised agencies. Some countries reported having set up institutions to assist business and industry in the implementation of material resource efficiency.
 - Institutional set-up ranges from fairly centralised to more decentralised. This is especially true of those countries with devolved responsibilities for environmental matters, in which regions play a strong role. Twenty countries reported having four or more ministries or agencies with responsibility for material resource efficiency.
 - Stakeholder processes to tackle the topic of material resource efficiency are common, but are organised very differently across countries. Several new and original multi-stakeholder approaches have emerged in recent years, including partnerships along value chains, voluntary agreements, or coalitions of stakeholders working on common solutions.

Considerations for policy

This section offers considerations for the development of future policies on material resource efficiency and the circular economy, drawn from an analysis of the information provided by countries.

Key concepts

- Key concepts — including resource efficiency and the scope of material resources — are not clearly defined in either national policies or at the EU level. Such a vague scope makes it difficult to carry out an insightful assessment of progress towards resource efficiency objectives.
- Several countries recommend clarification of the definitions and scope of material resources and resource efficiency so as to develop more coherent policy responses.

Opportunities for synergy

- Material resource efficiency and waste management are viewed as very closely related issues. This indicates an opportunity to address both themes together, through, for example, the circular economy, the recovery of secondary materials, or industrial symbiosis.
- Energy and resource efficiency are still largely disconnected from a programmatic point of view. This might warrant more attention in future, as there are many potential synergies between the two, in line with the Seventh Environment Action Programme (7EAP) objective to 'turn the Union into a resource-efficient ... low-carbon economy'.
- Concerns about the impact of resource use on health and well-being — another strategic objective of the 7EAP — play only a marginal role in driving countries' work on material resource efficiency policies. The potential for material resource efficiency to benefit human health and well-being may warrant further analysis and illustration in practice.
- Reducing dependence on imports and securing stable access to resources were shown to be some of the most important concerns, but only a handful of countries specifically referred to the EU list of critical raw materials. This may signal a need to intensify communication concerning EU initiatives on raw materials.

- Some countries emphasised the potential contribution of material resource efficiency initiatives to economic competitiveness and (green) job creation. This dimension may deserve stronger emphasis in future policies on material resource efficiency in light of growth and jobs being high on the EU policy agenda.

- The prevention of food waste, identified by about half the countries as a priority, is an interesting example of how improvements in material resource efficiency can also result in a reduction in greenhouse gas emissions — with related climate benefits. It may be worth identifying and highlighting other cases with synergistic co-benefits.
- Manufacturing was identified as a priority sector for material resource efficiency by two thirds of countries. It might, however, be useful to further emphasise material efficiency within ecodesign policies. The Ecodesign Directive provides a policy framework that could be adapted to aid the transition towards a material resource-efficient economy.

- Few countries (3) identified the service sector, which accounts for two thirds of most European economies, as a priority, indicating that the potential role of services in improving material resource efficiency could be explored further.

Circular economy

- The majority of reported initiatives on the circular economy are targeted at waste and secondary raw materials and at the abiotic part of the economy. Only two countries explicitly commented that the circular economy requires going beyond increasing recycling rates and a higher use of secondary raw materials. It might therefore be worth reflecting on how policies on the transition to a circular economy could encourage initiatives beyond waste and recycling.
- Approaches to closing material loops in a circular economy are still developing, and the topic is interpreted differently by different stakeholders and countries. It would be useful to disseminate information on successful initiatives in which the circular economy helps achieve other key policy objectives, such as those related to the climate, competitiveness or employment agendas.
- For the majority of countries, compliance with existing legislation is the main driver of any action

taken at the national level. Targets seem particularly effective in energising policy development and guiding policy implementation.

- Regional (subnational) initiatives can take advantage of physical proximity, reduced distances and a strong incentive on the part of local stakeholders. When expanding the knowledge base for the circular economy, it is worth keeping an eye on emerging regional and local initiatives.

Targets and indicators

- The resource productivity indicator, GDP/DMC, and a suite of MFA indicators are regularly updated by Eurostat. Recent progress in analytical methods, such as decomposition and input/output analysis, allows for more advanced, disaggregated uses of MFA-based indicators to help steer policy, for example within economic sectors and for specific materials.
- A few countries are currently working on material- or sector-specific indicators. One direction, drawing on Swiss and Danish examples, might be to focus attention on resource efficiency in individual economic sectors or industries.
- Measuring the degree of circularity is quite challenging within the established statistical system in Europe. Some countries, including Belgium, Germany and the Netherlands, are already carrying out experimental work on the development of indicators that specifically target a transition to a circular economy. This may help to address the challenges of measuring circularity and system change.

Institutional arrangements and support

- Many and varied institutional arrangements are in place to develop and implement policies for material resource efficiency, reflecting national conditions and requirements. In most cases, however, several ministries are involved, with overlapping responsibilities and competencies. Further streamlining of institutional arrangements in which several ministries are involved could ensure the more effective use of capacities and help improve policy coherence.

- The drivers of material resource efficiency have expanded from environmental concerns to include economic interests, so engagement could be strengthened between policymakers from different policy fields, as well as with implementing parties.
- Practically all countries see the benefit of exchanging information and good practice on material resource efficiency. They identified a wide variety of institutions that could support such exchanges, with the European Commission and the EEA mentioned most often. Workshops and conferences were listed as the preferred format, followed by webinars and internet-based information platforms.

In conclusion...

The overall picture that emerges from this survey is that the economic benefits of improved efficiency and circularity of resource use are increasingly being recognised and acted upon. At the same time, continued attention is needed to secure related environmental and social co-benefits.

Despite a growing number of national strategies, the wide scope and conceptual complexity of the issue leaves much room for improvement in policy initiatives and their implementation. Further integration of policies regarding energy, material resources and waste would appear to be particularly beneficial.

There is scope for an increased focus on upstream measures to close material loops (such as ecodesign, business models, consumer behaviour and corresponding incentives) to complement the well-established downstream measures for waste management and prevention laid down in the EU environmental *acquis*.

Concrete targets have been adopted and corresponding monitoring mechanisms are in development in many countries, but major gaps still exist regarding compatible waste and material flow statistics and accounts, sectoral performance indicators, enablers of progress, and environmental and socio-economic co-benefits.

The need for capacity building is widely recognised, with the exchange of national experiences and propagation of effective practices seen as central to the harmonisation of key concepts and methods, as well as to increased policy coherence and impact.

Background and scope of work

Introduction

Throughout the last decade, the sustainable use of natural resources and the refocusing of waste management towards prevention and recycling have steadily moved up the EU environmental policy agenda. They have also gained prominence on the economic agenda under the heading of resource efficiency.

The European Commission's 'Flagship initiative for a resource-efficient Europe' (2011) and its Communication on a 'Roadmap to a Resource Efficient Europe' (2011) focus on a wide range of resources. These include raw materials such as fuels, minerals and metals, as well as food, soil, water, air, biomass, biodiversity and ecosystems. This broad definition of resources includes renewable and non-renewable resources as well as ecosystem functions and services. The ultimate policy goal is to 'produce more value with less input, use resources in a sustainable way and manage them more efficiently throughout their life cycle'.



In 2011, to help expand the knowledge base in this new field, the European Environment Agency (EEA) conducted a detailed survey among its member countries to collect, analyse and disseminate information about national experiences in developing and implementing resource efficiency policies, and to

facilitate the sharing of experience and good practice. The resulting report and 31 individual country profiles provided an overview of resource efficiency policies and instruments in member and cooperating countries of the European Environment Information and Observation Network.

Five years on, resource efficiency policies have evolved, with additional policies emerging on the circular economy and closing material loops.

Responding to this, in 2015 the EEA, together with Eionet and the European Topic Centre on Waste and Materials in a Green Economy (ETC/WMGE), set out to review national approaches to material resource efficiency and explore similarities and differences in policies, strategies, indicators and targets, policy drivers and institutional set-up. Although loosely following the format and approach used in 2011, the analysis presented in this report focuses on material resources; this narrowed-down focus is explained in the next section.

This report is published as a key output envisaged in the EEA's Multi Annual Work Programme 2014–2018 (SA1.9): Catalogue of material resource efficiency policies, objectives and targets. It is the product of close collaboration between Eionet, the ETC/WMGE and the EEA. Thirty-two countries provided detailed information (Map B.1). The list of participating countries is available in Annex 1.

The purpose of this initiative

The main objective is to stimulate the sharing of experience and the exchange of lessons learned concerning the material resource efficiency policies of EEA member and cooperating countries.

The work also contributes to broadening the knowledge base underpinning resource efficiency and the circular economy, and increases understanding of the policy approaches taken by the different countries.

Where appropriate and relevant, comparisons are made between 2011 and the current situation. However, this report is not intended to assess progress achieved in the intervening five years, nor to evaluate the success of specific policies in place.

The scope

In close consultation with Eionet in early 2015, the approach and scope of this work were designed to reflect countries' priorities and needs.

Map B.1 The 32 countries that provided detailed information on their material resource efficiency policies

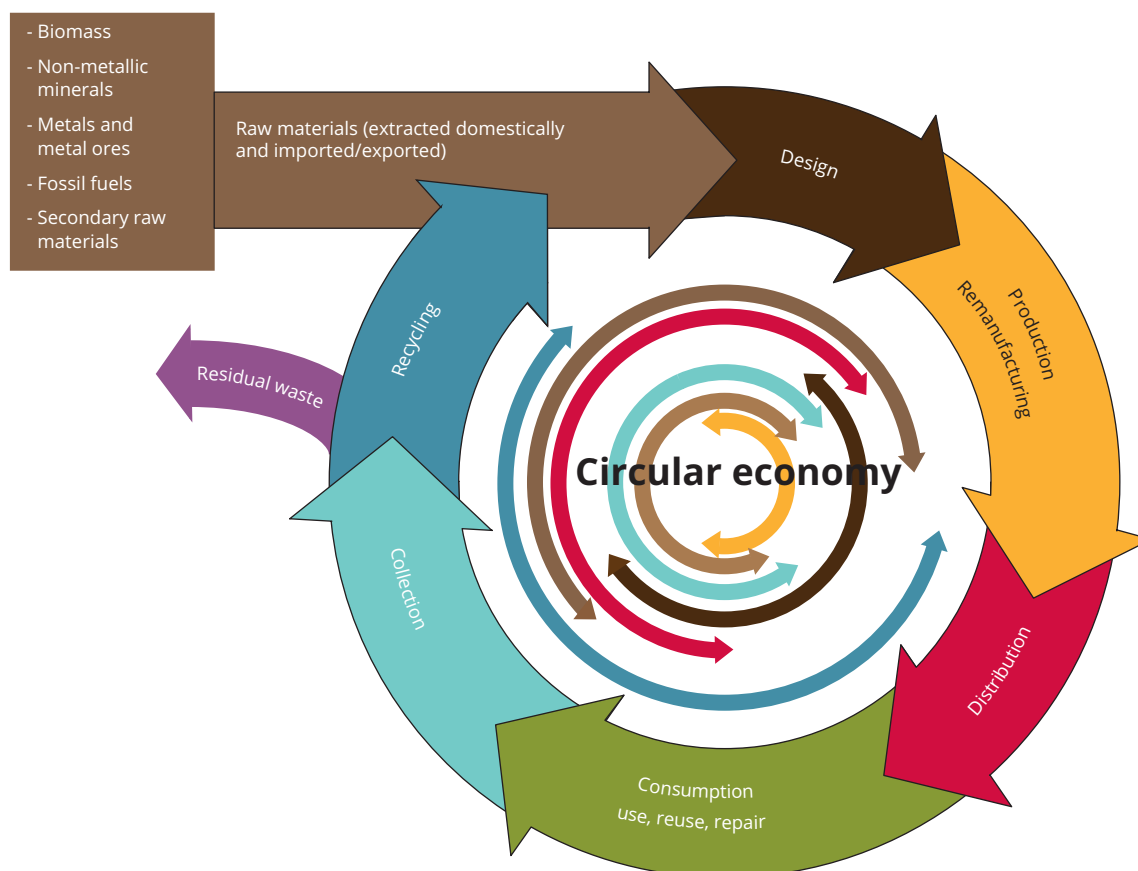


Note: *: Kosovo under United Nations Security Council Resolution 1244/99;
FYR Macedonia: the former Yugoslav Republic of Macedonia.

During the consultation, the majority of countries expressed a preference for the main focus of the work to be on material resources. This encompasses the areas covered by the lead indicator on resource productivity — the ratio of gross domestic product to domestic material consumption (GDP/DMC) — and delineated in the circular economy approach (Figure B.1). Thus, the scope includes material flows entering or leaving the economy, as measured by the material flow accounting framework: biomass, non-metallic minerals, metal ores and fossil energy materials, and secondary raw or waste-derived materials. Also within the scope are the transformations that materials undergo throughout

the full life cycle of extraction, production, end-user consumption and disposal, as well as initiatives to close material loops in a circular economy.

Some countries expressed an interest in presenting information on resource efficiency in the broader meaning of the term, encompassed in the Europe 2020 Flagship initiative and the 2011 Roadmap to a Resource Efficient Europe. The areas of interest most often mentioned in this context were water, land and soil, marine resources and biodiversity. To accommodate this, an optional question was included that went beyond the scope of material resources.

Figure B.1 Scope of material resources used in this report

Source: Adapted from the 2014 Circular Economy Package.

The process for collecting country information

The analysis in this report is based on information provided on a voluntary basis by the 32 participating countries.

A standardised set of questions was used to elicit information. The questions are presented in Annex 2, and cover national strategies or action plans for (material) resource efficiency, priority material resources and sectors, targets and indicators, policy instruments, institutional set-up and other topics of interest.

In light of ongoing European Commission work on a circular economy strategy, one question was dedicated specifically to countries' approaches to closing material loops in a circular economy.

Countries were also invited to share their reflections on national trends in the use of material resources and on challenges and obstacles to the further development of

material resource efficiency, as well as to present views on the way material resource efficiency should develop in the future.

The collection of country information took place between February and July 2015. Between October and December 2015, countries were invited to review draft country profiles, revise or update them if they found it necessary, and approve them for publication by the EEA. For the majority of countries, the reported information is current as of December 2015, with exceptions indicated in the country profiles.

Most countries nominated National Reference Centres on Resource Efficient Economy to take the lead, with a few preferring National Focal Points to be in charge. It was up to each country to decide how best to organise internal coordination. Countries were encouraged to consult broadly with various ministries when compiling information on material resource efficiency policies.

In an effort to ensure comprehensive information with a similar level of depth across countries, each country's

initial submission was reviewed by three experts from the project team.

In the case of countries in which resource efficiency strategies or action plans are developed at the regional rather than national level, answers have been collated in one national country profile.

The outcome

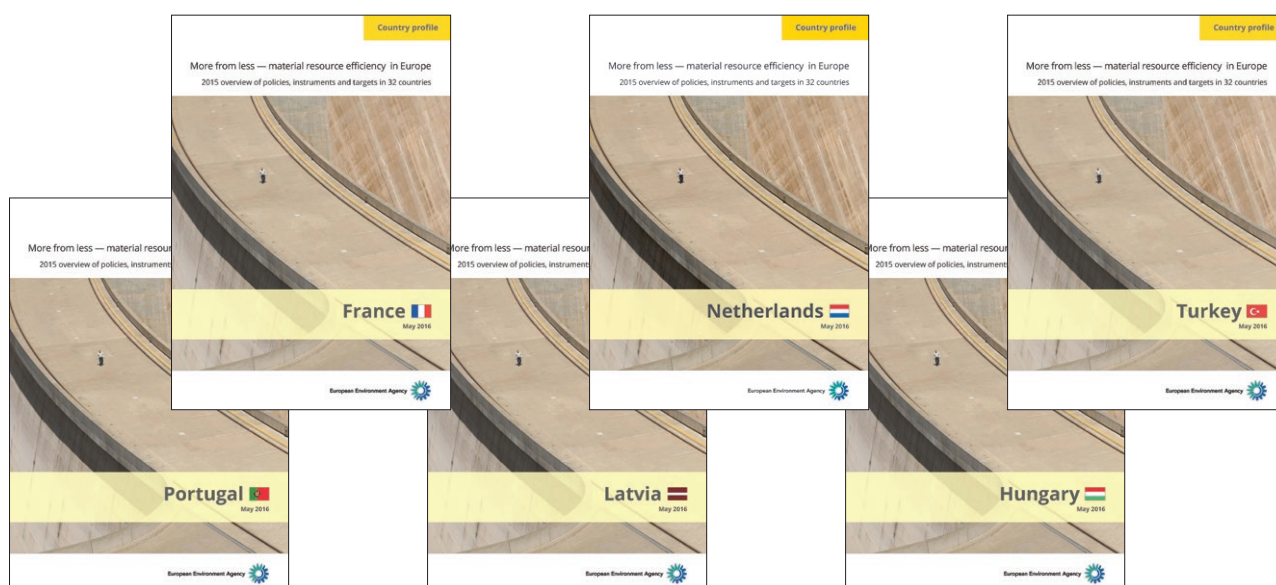
The 2015 survey work resulted in publication of a set of 32 country profiles and this analytical report in June 2016.

- **Country profiles** are self-assessments prepared by the countries with assistance from the EEA and ETC/WMGE. These documents describe the current (generally, as of end of 2015) status of material resource efficiency policies in each country, including their approach to the circular economy and closing material loops.
- **This analytical report** was prepared by the EEA and ETC/WMGE. It presents an overview of findings from the analysis of information provided by the countries. It reviews national approaches to material resource efficiency and explores similarities and differences in policy responses. It concludes with EEA thoughts on future policies concerning material resource efficiency and the

Important note

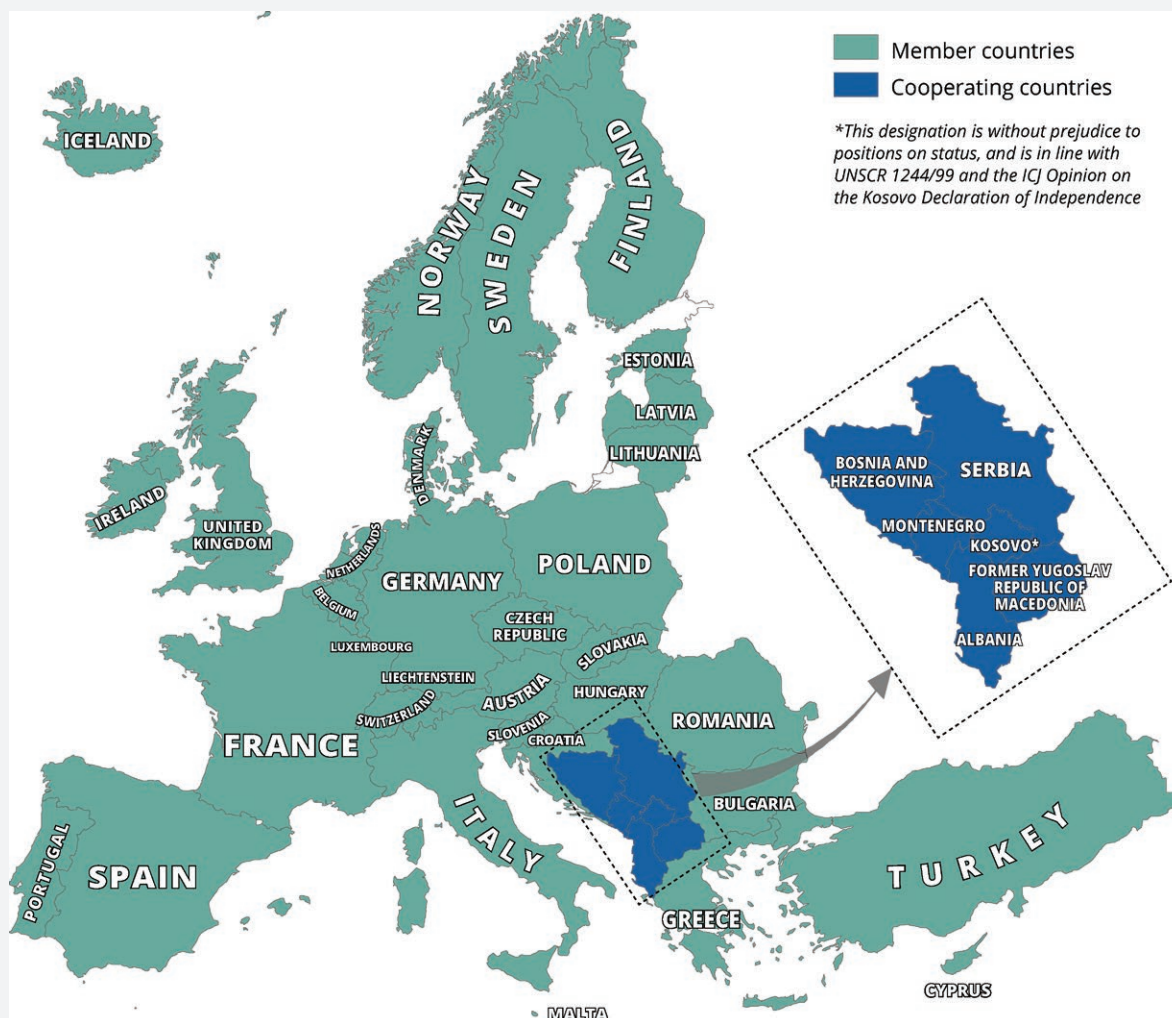
The analysis in this report is based solely on the information provided in the country profiles by EEA member countries through the National Reference Centres on Resource Efficient Economy and the National Focal Points. Substantial efforts were made to ensure that the responses from the countries were as complete and comprehensive as possible, including providing detailed guidance to each of the questions. Countries were encouraged to seek input from other national institutions that are relevant to material resource efficiency. A thorough review of initial responses was carried out by the project team, which made suggestions for possible additional topics for consideration. Bilateral discussions were held with countries where necessary to clarify any open issues. However, it was ultimately left to the countries to determine the scope of their responses and level of detail. Thus, no claim is made that this report covers all possible facets of material resource efficiency, as countries may have policies, instruments or targets related to resource efficiency that remain unreported.

circular economy, which could be taken into account when developing policies at the EU and country levels. The analysis in this report is illustrated with short examples of countries' policy initiatives, which are described in more detail in the country profile documents.



About Eionet

The EEA has 33 member and six cooperating countries. The 33 member countries include the 28 EU Member States together with Iceland, Liechtenstein, Norway, Switzerland and Turkey. Cooperating countries from the West Balkans are Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Montenegro, Serbia, and Kosovo under United Nations Security Council Resolution 1244/99.



The European Environment Information and Observation Network (Eionet) is a partnership network of the EEA and the 39 countries. The EEA is responsible for developing the network and coordinating its activities, working closely with National Focal Points (NFPs), typically national environment agencies or environment ministries, which are responsible for coordinating national networks involving many institutions.

The NFPs are responsible for coordinating networks of National Reference Centres on Resource Efficient Economy (NRCs), bringing together around 1 000 experts from more than 350 national institutions and other bodies dealing with environmental information.

The key participants in the work on this report were the NFPs and NRCs.

More information is available at <http://www.eea.europa.eu/about-us/countries-and-eionet>.

PART I MATERIAL RESOURCE EFFICIENCY IN THE EUROPEAN UNION



1 Material resource efficiency policies in the European Union

This chapter provides an overview of EU policies related to material use and resource efficiency. It is not intended to be a comprehensive analysis of the existing regulatory framework — the main goal is to set the context for country responses to questions on their material resource efficiency policies, which clearly mirror the many and varied directions of EU policies.

The chapter first identifies selected EU policy initiatives related to material resource efficiency, and discusses the several parallel directions of such policies to have emerged in recent years. It then presents a variety

of policy objectives for material use and resource efficiency, followed by priority materials, sectors and consumption categories. Finally, indicators and targets for resource efficiency are discussed.

1.1 Introduction

The EU is estimated to have adopted more than 200 pieces of environmental legislation since the 1970s. Table 1.1 presents examples of specific policy initiatives, grouped by theme in a loosely chronological order.

Table 1.1 Examples of EU policies related to material use and resource efficiency

Theme	Examples
Energy	• Energy 2020: A strategy for competitive, secure and sustainable energy • A policy framework for climate and energy for 2020–2030 • Energy Roadmap 2050 • European Energy Security Strategy
Waste and recycling	• Waste Framework Directive • Landfill Directive • Packaging and Packaging Waste Directive • Thematic Strategy on the prevention and recycling of waste
Sustainable management of natural resources	• Sixth Environment Action Programme (6EAP) • Thematic Strategy on the sustainable use of natural resources • EU Forest Strategy
Sustainable consumption and production, and business-oriented initiatives	• Sustainable Consumption and Production and Sustainable Industrial Policy (SCP/SIP) Action Plan • Eco-innovation Action Plan • Industrial Policy for the Globalisation Era and Innovation Union • Single Market for Green Products • The Green Action Plan for Small and Medium Enterprises (SMEs)
Raw materials	• Raw Materials Initiative • Strategy on commodity markets and raw materials • European Innovation Partnership on Raw Materials • EU list of critical raw materials
Resource efficiency	• Europe 2020 strategy for smart, sustainable and inclusive growth • Flagship initiative for a resource-efficient Europe • Roadmap to a Resource Efficient Europe • Seventh Environment Action Programme (7EAP)
Circular economy	• Towards a circular economy: A zero waste programme for Europe (2014) • Flanking communications on sustainable buildings, green employment, SMEs • Closing the loop: An EU action plan for the Circular Economy (2015)

Box 1.1 The scope of materials, resources and resource efficiency in EU policies

There is no uniform definition or even implicit understanding of key terms such as **materials**, **raw materials** or **resources** in EU policy documents that deal with resource efficiency and raw materials.

- 'Materials' sometimes refers to primary or raw materials, understood as virgin materials extracted from the natural environment. This normally includes biomass, metal ores, non-metallic minerals and fossil energy carriers. On other occasions, it also includes secondary raw materials such as recycled steel, plastics and concrete. Furthermore, some policies are directed at specific materials, such as in the case of the EU list of critical raw materials.
- The 2005 EU Thematic Strategy on the sustainable use of natural resources defines 'natural resources' rather broadly and includes raw materials such as minerals, biomass and biological resources; environmental media such as air, water and soil; flow resources such as wind, geothermal, tidal and solar energy; and space (land area).
- The 2011 Flagship initiative for a resource-efficient Europe has an even broader scope, setting out to support '... policy agendas for climate change, energy, transport, industry, raw materials, agriculture, fisheries, biodiversity and regional development'.
- The 2011 Roadmap to a Resource Efficient Europe offers a slightly different scope, in which 'all resources are sustainably managed, from raw materials to energy, water, air, land and soil. Climate change milestones have been reached, while biodiversity and the ecosystem services it underpins have been protected, valued and substantially restored'. The Roadmap addresses the following specific resources: ecosystem services, biodiversity, minerals and metals, water, air, land and soils, and marine resources.
- Energy is frequently singled out from other resources because the topic is subject to its own regulatory framework, while climate is sometimes considered as part of resources, as stated, for example, in the Roadmap to a Resource Efficient Europe: 'climate is a key resource: specific challenges of progressing to a low-carbon economy are addressed in detail in the Commission's Roadmap for moving to a competitive low-carbon economy and the forthcoming Energy Roadmap 2050'.
- The European Commission's December 2015 Circular Economy Package — Closing the loop: An EU action plan for the Circular Economy — does not explicitly discuss the scope of materials or resources, but outlines targeted action in areas such as 'chemicals, plastics, food waste, construction, critical raw materials, industrial and mining waste, consumption and public procurement'. Fertilisers and water reuse will be addressed as the next step.

The term 'resource efficiency' denotes the political goal of 'allowing the economy to create more with less, delivering greater value with less input, using resources in a sustainable way and minimising their impacts on the environment'. The December 2015 EU Action Plan aims to support a circular economy in which 'the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste is minimised'.

1.2 Early EU policies on resource efficiency, decoupling and sustainable management of resources

This section reviews early initiatives related to material use and resource efficiency, which aimed to set strategic direction for the sustainable use of natural resources in the EU. They include the 2001 EU Strategy for Sustainable Development, the 6th Environment Action Programme (6EAP) and two key thematic strategies from 2005. More recent policies are discussed in the subsequent section.

The European model of prosperity has traditionally been based on a high level of resource consumption,

including energy and materials. The continuous increase in the use of these — a long-term trend that was only interrupted by the global recession that started in 2007/2008 — has been recognised as a policy concern for well over a decade.

While resource efficiency was explicitly put on the EU policy agenda in 2011 with adoption of the Flagship initiative for a resource-efficient Europe under the Europe 2020 strategy, as well as in the Roadmap to a Resource Efficient Europe of the same year, a variety of related concepts had already made their way into environmental and economic policies. They included, among other things, 'the decoupling of economic growth from environmental pressures', 'the decoupling of economic growth from materials and

energy consumption', and 'the sustainable use and management of natural resources'.

The **EU Strategy for Sustainable Development** (2001) emphasised the strategic objective of breaking the link between economic growth, the use of resources and the generation of waste. Among operational objectives and targets in the area of conservation and management of natural resources, the following were identified in the Strategy's 2006 revision:

- '... improving resource efficiency to reduce the overall use of non-renewable natural resources and the related environmental impacts of raw materials use, thereby using renewable natural resources at a rate that does not exceed their regeneration capacity';
- '... gaining and maintaining a competitive advantage by improving resource efficiency, inter alia through the promotion of eco-efficient innovation ...';
- '... avoiding the generation of waste and enhancing efficient use of natural resources by applying the concept of life-cycle thinking and promoting reuse and recycling'.

The 2001 **Sixth Environment Action Programme** (6EAP) called for 'breaking the linkages between economic growth and resource use', and identified 'sustainable use of natural resources and management of waste' as one of the four priority areas. The specific objectives for this area were:

- '... to ensure that the consumption of renewable and non-renewable resources does not exceed the carrying capacity of the environment';
- 'to achieve a decoupling of resource use from economic growth, through significantly improved resource efficiency, dematerialisation of the economy and waste prevention'.

Reviewed in 2007, the 6EAP set out to achieve '... better resource efficiency and improved resource and waste management, to help bring about more sustainable patterns of production and consumption, thereby decoupling the use of resources and the generation of waste from the rate of economic growth ...'. It acknowledged that the EU's '... social and economic development must take place within the carrying capacity of ecosystems. The amount of waste continues to grow and the inability to break the link between economic growth and the environmental impacts of resource use, consumption and waste remains an essential concern'.

The 6EAP's aim '... to decouple economic growth from environmental degradation' constitutes the foundation for:

- 'making the EU the most resource-efficient economy in the world';
- 'achieving a significant overall reduction in the volumes of waste generated (...);
- '(achieving) a significant reduction in the quantity of waste going to disposal and the volumes of hazardous waste produced (...);
- 'encouraging re-use, and for wastes that are still generated, the level of their hazardousness should be reduced and they should present as little risk as possible; preference should be given to recovery and especially to recycling (...)'.

While the Strategy for Sustainable Development and 6EAP set out strategic directions, they did not, however, result in a systemic approach to resource policies, and individual policy domains tended to develop their own approach to using materials and managing natural resources.

A systematic attempt to address the use of materials and management of natural resources emerged in 2005, when two EU Thematic Strategies were adopted.

- The **Thematic Strategy on the sustainable use of natural resources** (COM(2005) 670) reiterated the objective of decoupling resource use — and its negative impacts — from a growing economy. The Strategy pointed out that, 'whether the resources are used to make products or as sinks that absorb emissions (soil, air and water), they are crucial to the functioning of the economy and to our quality of life'. This Thematic Strategy provided impetus for the development of dedicated indicators, the establishment of a data centre at Eurostat and EU support for the United Nations Environment Programme's (UNEP) International Resource Panel.
- The **Thematic Strategy on the prevention and recycling of waste** (COM(2005) 666) linked waste policy with wider policy on resources, highlighting the importance of reducing the environmental impacts of resource use and moving Europe towards becoming a recycling society by developing end-of-waste criteria for specific waste streams, and turning waste prevention policies into action.

In the Thematic Strategy on the sustainable use of natural resources, raw materials are considered as just one of many natural resources, while in the

Thematic Strategy on the prevention and recycling of waste, waste prevention is seen as a tool for improving material resource efficiency.

1.3 Recent policy initiatives

In recent years, in addition to environmental concerns, a number of economic factors have gained importance in shaping policies related to material resource efficiency. They include security of supply, concerns over the volatility of raw material prices, the competitiveness of EU industry, and the potential for job creation and economic growth.

As a result, EU policies that touch on resource efficiency, natural resources and raw materials have developed in several different directions. They are discussed below in four different clusters:

- creating a strategic framework for improving resource efficiency;
- integration of material resource efficiency into other thematic policies, in particular waste and energy;
- strengthening support for monitoring material use and resource productivity;
- addressing specific materials and securing access to raw materials.

Creating a strategic framework for improving resource efficiency

In 2010, the EU adopted **Europe 2020**, a European strategy to achieve sustainable and inclusive growth. The **Flagship initiative for a resource-efficient Europe**, included among the seven priority initiatives of Europe 2020, defined the political goal of 'allowing the

economy to create more with less, delivering greater value with less input, using resources in a sustainable way and minimising their impacts on the environment'. The Flagship initiative set out to create a framework for policies to support the shift towards a resource-efficient and low-carbon economy that will help to:

- boost economic performance while reducing resource use;
- identify and create new opportunities for economic growth and greater innovation, and boost the EU's competitiveness;
- ensure security of supply of essential resources;
- limit the environmental impacts of resource use and fight against climate change.

The European Commission's September 2011 Communication, **Roadmap to a Resource Efficient Europe**, provides more operational directions by setting out the following vision: '... by 2050 the EU's economy has grown in a way that respects resource constraints and planetary boundaries, thus contributing to global economic transformation. Our economy is competitive, inclusive and provides a high standard of living with much lower environmental impacts. All resources are sustainably managed, from raw materials to energy, water, air, land and soil. Climate change milestones have been reached, while biodiversity and the ecosystem services it underpins have been protected, valued and substantially restored'. In addition, the EU economy is '...to create more with less, delivering greater value with less input, using resources in a sustainable way and minimising their impacts on the environment'.

One of the priority objectives of the November 2013 **Seventh Environment Action Programme (7EAP)** is 'to turn the Union into a resource-efficient, green and

Box 1.2 Policy initiatives for a strategic framework

Examples of policy initiatives aiming to create a strategic framework for improving resource efficiency include:

- Flagship initiative for a resource-efficient Europe, under the Europe 2020 strategy (COM(2011) 21);
- Roadmap to a Resource Efficient Europe (COM(2011) 571 final);
- EU 7EAP (1386/2013/EU);
- Sustainable Consumption and Production (SCP) and Sustainable Industrial Policy (SIP) Action Plan (COM(2008) 397 final);
- Closing the loop: An EU action plan for the Circular Economy (COM(2015) 614 final).

competitive low-carbon economy'. Among other things, the 7EAP refers to 'reduced overall resource use' and the intention to 'strive towards an absolute decoupling of economic growth and environmental degradation'. In the long-term vision of the 7EAP, material resource efficiency is implicitly present: 'in 2050, we live well, within the planet's ecological limits. Our prosperity and healthy environment stem from an innovative, circular economy where nothing is wasted and where natural resources are managed sustainably, and biodiversity is protected, valued and restored in ways that enhance our society's resilience. Our low-carbon growth has long been decoupled from resource use, setting the pace for a safe and sustainable global society'.

Closing the loop: An EU action plan for a Circular Economy is the follow-up to the Communication Towards a circular economy: a zero waste programme for Europe (COM(2014) 398). The 2015 Circular Economy Package consists of an Action Plan with a list of follow-up initiatives and corresponding timelines, and four new legislative proposals on waste. The key objective is a 'transition to a more circular economy, where the value of products, materials and resources is maintained in the economy for as long as possible, and the generation of waste minimised'. This is seen as an essential contribution to the EU's efforts to develop a sustainable, low-carbon, resource-efficient and competitive economy. It is also in line with key EU priorities, including jobs and growth, the investment agenda, climate and energy, the social agenda and industrial innovation, and with global efforts on sustainable development.

The Circular Economy Action Plan addresses five main areas:

- production (including product design and production processes);
- consumption (including labelling, reuse, repair, planned obsolescence and public procurement);
- waste management (including extended producer responsibility, recycling and harmonisation of methodologies);
- supporting markets for secondary raw materials, including quality standards for secondary raw materials, and addressing water reuse and fertilisers;
- horizontal measures including innovation, investment and monitoring.

The circular economy is expected to 'boost the EU's competitiveness by protecting businesses against

scarcity of resources and volatile prices, helping to create new business opportunities and innovative, more efficient ways of producing and consuming. It will create local jobs at all skills levels and opportunities for social integration and cohesion. At the same time, it will save energy and help avoid the irreversible damages caused by using up resources at a rate that exceeds the Earth's capacity to renew them in terms of climate and biodiversity, air, soil and water pollution. (...) Action on the circular economy therefore ties in closely with key EU priorities, including jobs and growth, the investment agenda, climate and energy, the social agenda and industrial innovation, and with global efforts on sustainable development'.

It is worth noting that while the term 'circular economy' has only recently appeared formally on the EU policy agenda, the logic of a transition from the current linear economy to a circular one is embedded in several earlier EU documents on resource efficiency or waste policy, including:

- the waste hierarchy in the Waste Framework Directive (2008/98/EC);
- the Communication on resource efficiency opportunities in the building sector (COM(2014) 445);
- the Consultative Communication on the Sustainable Use of Phosphorus (COM(2013) 517 final);
- the Directive on Packaging and Packaging Waste (94/62/EC);
- the Raw Materials Initiative (COM(2008) 699);
- the Communication on raw materials — Tackling the challenges in commodity markets and on raw materials (COM(2011) 25 final).

Integration of material resource efficiency into other thematic policies

In several EU policy documents, using waste as a resource is presented as a strategy linking material resource efficiency with waste policy in order to combine environmental benefits (for example by avoiding final disposal of waste) with economic gains (by avoiding the purchase of virgin materials and reducing disposal costs).

Waste prevention and management have a central role in enhancing resource efficiency and creating a circular economy that enables society to maximise the economic return on scarce resources. Europe can gain many social and economic benefits from treating waste

Box 1.3 Initiatives for integrating material resource efficiency into other thematic policies

Examples of initiatives that integrate material resource efficiency into other thematic policies include:

- waste policy and legislation, including the Waste Framework Directive (2008/98/EC) (obligations for and review of national waste prevention plans in the Waste Framework Directive);
- extension of the methodology for material criteria for the Ecodesign Directive for energy-related products (2009/125/EC);
- the Energy Efficiency Directive (2012/27/EU);
- research topics such as 'Using waste as a resource' and 'Waste: a resource to recycle, reuse and recover raw materials' under the Seventh Framework Programme (FP7) and Horizon 2020, the EU's research and innovation funding programmes for 2007–2013 and 2014–2020;
- the EU Lead Markets Initiative (COM(2007) 860 final).

as a resource. In addition to reducing environmental pressure, better waste management can secure vital resources, create jobs and boost competitiveness.

The EU has adopted multiple waste policies and targets that are closely related to material use and resource efficiency. Some examples of instruments include:

- legislation on specific waste streams, such as packaging, vehicles and electrical and electronic equipment;
- legislation and guidance on waste treatment options, such as landfill, waste treatment industries and waste incineration;
- legislation on the environmental performance of products, such as through ecodesign;
- framework legislation such as the Waste Framework Directive.

The **Waste Framework Directive** introduced a requirement for EU Member States to develop waste prevention programmes concentrating on key environmental impacts and taking the whole life cycle of products and materials into account. It presented the overarching logic guiding EU policy on waste — the **waste hierarchy**, which prioritises waste prevention, followed by reuse, recycling, other recovery, and finally disposal, with landfill as the least desirable option.

The 2011 Roadmap to a Resource Efficient Europe and the 7EAP signalled a new level of ambition in applying the logic of the waste hierarchy, including additional goals on waste prevention and using waste as a resource. In addition, where the Waste Framework Directive had formulated the aim of the EU becoming

a recycling society, the Roadmap called for the virtual elimination of landfill and for limiting energy recovery by incineration to non-recyclable waste.

The close relationship between waste management and improving resource efficiency is well recognised, including its economic significance. Recycling is one of six lead markets addressed by the EU's **Lead Markets Initiative**, which was created to support innovation in the EU and bring new products and services to market. The Initiative sets out a number of measures to boost recycling, including ensuring the quality of recycled products and reducing the environmental impacts of recycling processes.

Energy use and efficiency and the combustion of fossil fuels are traditionally considered to be a separate policy area from material use and resource efficiency. Almost a quarter of total EU material use, however, is made up of fossil energy carriers and this is perhaps why there is an explicit link in the 7EAP between resource efficiency and the low-carbon economy.

In the 20-20-20 objectives of 2009, the EU set out its aims of, by 2020, cutting greenhouse gas emissions by 20 % compared to 1990 levels, increasing the share of renewable energy to 20 % of energy consumed, and achieving a 20 % cut in primary energy use compared with projected levels.

More recently, the EU adopted two new energy targets: increasing renewables to a minimum of 27 % of EU energy use and improving energy efficiency by a minimum of 27 % by 2030. European Union leaders have endorsed the long-term objective of reducing Europe's greenhouse gas emissions by 80–95 % by 2050 compared to 1990 levels.

Examples of approaches to make energy production and consumption more sustainable include the Energy Performance of Buildings Directive, the Energy Labelling Directive and the Ecodesign Directive. The **EU Ecodesign Directive** (2009/125/EC) sets a framework for specifying ecodesign principles and requirements for energy-related products, including design principles related to resource use and waste — although so far the focus of implementation is clearly on the energy aspects. The EU Ecolabel is another instrument that guides design towards better resource efficiency.

Strengthening support for monitoring material use and resource productivity

The 2002 **Regulation on waste statistics**, amended in 2010, aims to improve and harmonise the collection of data on waste generation and treatment, and in particular on waste recovery, incineration with energy recovery, other incineration, disposal on land and land treatment, by waste category.

The 2011 **Regulation on European environmental economic accounts** defined the data to be collected to compile economy-wide material flow accounts. This approach to accounting covers all solid, gaseous and liquid materials, except flows of air and water, measured in mass units per year. Similar to the system of national accounts, it serves two major purposes. Detailed data on material flows provide a rich empirical database for numerous analytical studies. They are also used to compile different economy-wide material flow indicators for national economies and the EU as a whole.

The Communication **Closing the loop: An EU action plan for the Circular Economy** announced the

development of a **monitoring framework for the circular economy**. This will draw on existing Eurostat indicators, the Resource Efficiency Scoreboard, and the upcoming Raw Materials Scoreboard. It will also include 'new indicators on food waste and indicators based on existing Eurostat and other official data in areas such as security of supply for key raw materials, repair and reuse, waste generation, waste management, trade in secondary raw materials in the EU and with non-EU countries, and the use of recycled materials in products'.

Addressing specific materials and securing access to raw materials

In light of rising commodity prices, increased global competition for access to resources and periodic problems with securing stable access to selected raw materials, the efficient use of raw materials has taken on strategic economic importance. In 2008, responding to concerns about resource scarcity and long-term stable access to resources, the European Commission presented the **Raw Materials Initiative — meeting our critical needs for growth and jobs in Europe**.

The European Commission pointed out that '... while the rising costs of energy and the high dependence of the EU on energy imports is already high on the political agenda, comparable challenges regarding certain non-energy raw materials have not yet received full attention'.

Recognising that 'the critical dependence of the EU on certain raw materials underlines that a shift towards a more resource efficient economy and sustainable development is becoming even more pressing', the Initiative supported reducing the EU's consumption of primary raw materials by increasing resource efficiency, improving eco-efficiency, a wider use of recycled materials, the prevention of leakage of valuable

Box 1.4 Initiatives for monitoring material use and resource productivity

Examples of initiatives that support the monitoring of material use and resource productivity include:

- Regulation No 849/2010 on waste statistics;
- economy-wide material flow accounting (EW-MFA) as one of three modules in the Regulation on European environmental economic accounts (EU 691/2011), which entered into force with the 2013 data collection;
- development of a monitoring framework for the circular economy, a measure planned for 2017 (COM(2015) 614 final).

Box 1.5 Initiatives on specific materials and access to raw materials

Examples of initiatives addressing specific materials and securing access to raw materials include:

- EU Raw Materials Initiative (COM(2008) 699 final);
- European Innovation Partnership on Raw Materials (2012);
- EU list of critical raw materials (2011, 2014);
- Bioeconomy Strategy (2012).

resources through the export of end-of-life products, and an increased use of renewable materials.

The Raw Materials Initiative called for the development of a list of critical raw materials that warrant special attention. The first list was published in 2011 in the **Communication on raw materials — Tackling the challenges in commodity markets and on raw materials**.

The **EU list of critical raw materials** is to be reviewed and updated at least every three years. The most recent version, published in 2014, includes antimony, beryllium, borates, chromium, cobalt, coking coal, fluorspar, gallium, germanium, indium, magnesite, magnesium, natural graphite, niobium, phosphate rock and platinum group metals, heavy rare earths, light rare earths, silicon metal and tungsten.

The **Communication on raw materials**, which also addresses commodities such as energy and agricultural/food products with similar challenges of import dependency, explores security of supply, increasing demand for materials, decreasing supply, increasing prices of raw materials and increasing scarcity of resources. The strategy is based on the following pillars:

- ensuring access to raw materials from international markets under the same conditions as other industrial competitors;
- setting the right conditions in the EU to foster the sustainable supply of raw materials from European sources;
- boosting overall resource efficiency and promoting recycling to reduce the EU's consumption of primary raw materials and decrease its relative import dependence.

The **Bioeconomy Strategy** (2012) encompasses the production of renewable biological resources and the conversion of these resources and their waste streams into value-added products such as food, feed, bio-based products and bioenergy. With respect to policy objectives, material resource efficiency shares many similarities with the EU Bioeconomy Strategy, the objectives of which include:

- ensuring food security;
- managing natural resources sustainably;
- reducing dependence on non-renewable resources;
- mitigating and adapting to climate change;

- creating jobs and maintaining European competitiveness.

The 2014 Circular Economy Package (COM(2014) 398) mentioned **phosphorus** as a specific material needing a policy framework. Phosphorus, as a fertiliser, is considered a vital resource for food production, but with significant security-of-supply risks, waste and losses at every stage of its life cycle. Phosphate rock is now included on the 2014 EU list of critical raw materials.

The European Commission considers the **European Innovation Partnership on Raw Materials** as a 'new approach to innovation' with the aim of securing the sustainable supply of raw materials. A **Strategic Implementation Plan**, adopted in 2013, includes 95 measures to be taken by various stakeholders. As part of the monitoring and evaluation effort built into the Innovation Partnership, the European Commission is currently preparing a **Raw Materials Scoreboard** that is due to be adopted in 2016.

1.4 Priority material resources, sectors and consumption categories

As shown in Box 1.1, the scope of material resource efficiency is still rather broadly defined in EU policies, and in most cases priority resources are not explicitly identified. The few exceptions include fossil fuels, strategic materials on the EU's list of critical raw materials and certain waste streams, as well as the five priorities identified in the 2015 Circular Economy Action Plan. Chosen because of the implications for value chains, their environmental footprint, or dependency on materials imported from outside Europe, the five priorities include:

- plastics;
- food waste;
- critical raw materials;
- construction and demolition waste;
- biomass and bio-based products.

The Action Plan envisages that additional legislative proposals will also be developed for fertilisers and water reuse.

One way of identifying **priority resources** indirectly is to examine the framework of indicators proposed in the 2011 Roadmap to a Resource Efficient Europe. It includes resource productivity as the lead indicator,

complemented by four dashboard indicators covering **materials**, **land**, **water** and **carbon** (greenhouse gas emissions). Furthermore, the Roadmap includes dedicated chapters on ecosystem services, biodiversity, minerals and metals, water, air, land and soils, and marine resources. Finally, the sections on food, buildings, mobility, waste, and sustainable consumption and production are another indication of priority themes.

A few **sectors** and **consumption categories** regularly come up as priorities in recent EU policy documents. These include:

- food sector/food and drink;
- building and construction sector/housing;
- transport sector/mobility;
- energy (production and storage);
- waste management/use of secondary raw materials.

A wide variety of material resources can be linked with these sectors and consumption categories. In the food sector, for example, relevant material resources can range from nutrients to packaging materials. For the building and construction sector, the focus is clearly on construction minerals and a few metals, such as steel, but more recently it is increasingly on the recycling of construction and demolition waste. For transport the approach is equally varied, ranging from the efficient use of materials for transport infrastructure, through critical materials needed for car batteries and the reuse and recycling of end-of-life vehicles, to the efficient use of fossil fuels.

1.5 Targets for material resource efficiency in the European Union

Adopting specific targets for resource productivity and material use has proved to be very challenging.

The 2011 Roadmap to a Resource Efficient Europe made a proposal 'to discuss and agree on indicators and targets by the end of 2013'. Three levels of indicators were initially envisaged (Annex 6).

In the 7EAP, adopted late in 2013, it was agreed that the EU 'should establish indicators and set targets for resource efficiency, and assess whether it would be appropriate to include a lead indicator and target in the European Semester'. The 7EAP stated that '... targets for reducing the overall life-cycle

environmental impact of consumption will be set, in particular in the food, housing and mobility sectors'. Indicators and targets for land, water, material and carbon footprints as well as their role within the European Semester should also be considered in this regard.

The June 2014 Circular Economy Package suggested a long-term aspirational target, proposed by the European Resource Efficiency Platform, to increase resource productivity in the EU by 30 % by 2030. It was also pointed out that policymakers need to be 'aware of the overall picture of resource pressures on the environment', and 'other indicators, in particular for water use and finite land resources, need to be taken into account'.

No decision was taken at the October 2014 Environment Council to adopt any targets for resource efficiency, beyond merely stating that 'an aspirational target at EU level on resource efficiency could bring all the circular economy elements together and increase efforts towards reaching environmental, social and economic objectives at the same time'. The Council encouraged further consideration of the topic, and concluded that 'an aggregate indicator for resource efficiency will need to be complemented by macro indicators on materials, water, land and carbon and accompanied by a set of thematic indicators'.

As reflected in the December 2015 Circular Economy Package, the European Commission does not envisage work on a target for resource productivity, either for the EU as a bloc or for Member States individually. It may, however, be worth noting that nine EU Member States have adopted their own targets for improving resource productivity (Chapter 9).

Various EU policy documents specify targets somewhat related to material resource efficiency, typically in areas such as energy consumption and efficiency, greenhouse gas emissions and waste. These include targets on greenhouse gas emissions, renewables and energy efficiency under the Europe 2020 strategy, which mirror the 20-20-20 objectives, and the 2015 Circular Economy Package with its revised legislative waste proposals envisioning the following as targets:

- a common EU target for recycling 65 % of municipal waste by 2030;
- a common EU target for recycling 75 % of packaging waste by 2030;
- a binding target to reduce landfill to a maximum of 10 % of all waste by 2030;

- a ban on depositing separately collected waste in landfill;
- a target to halve per person food waste at the retail and consumer levels as part of the United Nations 2030 Sustainable Development Goals.

The Circular Economy Action Plan envisages that these targets 'should lead Member States gradually to converge on best practice levels and encourage the requisite investment in waste management'.

For some resources, only aspirational or qualitative goals are included, often without a timeline. Examples in the Roadmap to a Resource Efficient Europe include a 20 % reduction in the food chain's resource inputs, and ensuring that annual water abstraction is below 20 % of the available renewable resource.

A number of targets for waste can be found in waste-related policies:

- increase to a minimum of 70 % by weight, by 2020, non-hazardous construction and demolition waste for reuse, recycling and other material recovery (Directive 2008/98/EC);
- reuse and recycling of paper, metal, plastic and glass to be at least 50 % by weight by 2020 (Directive 2008/98/EC);
- waste electrical and electronic equipment (WEEE) (Directive 2012/19/EU): from 2019, the minimum collection rate to be achieved annually shall be 65 % of the average weight of electrical and electronic equipment placed on the market in the three preceding years in the Member State concerned, or alternatively 85 % of WEEE generated within the territory of that Member State.

There are further examples of existing targets in the area of waste.

- The Packaging and Packaging Waste Directive (2015/720) was amended in 2015 with regard to reducing the consumption of lightweight plastic carrier bags. By the end of 2019, annual consumption of lightweight plastic carrier bags in all Member States should not exceed 90 per person, and 40 by the end of 2025.
- Under the End of Life Vehicles Directive (2000/53/EC), Member States should have taken the necessary measures to ensure that the following targets were achieved: no later than 1 January 2015, for all end-of-life vehicles, the reuse and recovery be a minimum of 95 % by an average weight per

vehicle and year. Within the same time limit, reuse and recycling should have been increased to a minimum of 85 % by an average weight per vehicle and year.

- Under the Battery Directive (2006/66/EC), Member States shall achieve a 45 % minimum collection rate by 26 September 2016.

1.6 Indicators to monitor the use of materials and resource efficiency

A set of indicators to monitor the use of resources and resource productivity is brought together in the **Resource Efficiency Scoreboard** (Annex 6). This tool/user interface is a compilation of key indicators produced by several European institutions and includes data for the EU as a whole and for individual Member States. Maintained by Eurostat, it contains those indicators that are currently available and will be expanded and modified as new ones emerge. It was designed to cover as many as possible of the themes and subthemes identified in the 2011 Roadmap to a Resource Efficient Europe.

The Scoreboard is a three-tier system consisting of the lead resource productivity indicator, a dashboard of indicators for four key areas, and a set of theme-specific indicators.

- The lead indicator on resource productivity — the ratio of gross domestic product (GDP) to domestic material consumption (DMC) expressed as EUR per tonne — was adopted to measure the principal objective of the Roadmap to improve economic performance while reducing pressure on natural resources. While no single indicator can fully achieve this goal, this provides a headline metric that monitors trends in material resource efficiency.
- The dashboard indicators complement the lead indicator and focus on four key areas: water, land, materials and carbon. They are intended to measure environmental impacts and natural capital or ecosystems, as well as seeking to take into account the global aspects of EU consumption.
- The thematic indicators — as the scope of 'natural resources' is quite broad — are theme-specific, showing trends in a range of key areas and monitoring progress towards existing targets in other sectors. The thematic indicators are grouped into subsections, along the following lines:
 - turning waste into resource;
 - supporting research and innovation;

- getting the prices right;
- biodiversity;
- safeguarding clean air;
- land and soils;
- addressing food;
- improving buildings;
- ensuring efficient mobility.

Within the Scoreboard, GDP/DMC is used as the lead indicator to measure resource productivity, and DMC per person is used as a dashboard indicator for consumption of materials. In the 2014 Circular Economy Package, the alternative indicator of GDP relative to raw material consumption (RMC) — which takes into account all the materials extracted to produce a specific raw material — was identified as a candidate to replace the current lead resource productivity indicator. Eurostat, however, currently compiles RMC figures only for the EU as a whole. Individual Member States are encouraged to produce their own, but in the meantime will continue to use GDP/DMC to measure resource productivity.

At the thematic level, the Scoreboard indicators related to material resource efficiency include:

- generation of waste excluding major mineral resources (kg/person);
- landfill rate of wastes excluding major mineral resources (%);
- recycling rate of municipal solid waste (%);
- recycling of WEEE (%).

Within the framework of policies on raw materials, the European Commission is currently finalising work on the **Raw Materials Scoreboard**. When adopted — expected in mid-2016 — it will provide a picture of raw material use at the EU level, including indicators on the extraction and consumption of raw materials, imports and exports of primary and secondary raw materials, and recycling's contribution to meeting material demand.

In a somewhat related initiative, the European Commission is developing the Joint Research Centre's **Raw Materials Information System**. The System serves as a structured repository of knowledge on non-energy, non-agricultural raw materials from primary and secondary sources. Its overarching goal is to help strengthen the competitiveness and visibility of the EU raw materials sector while promoting green and sustainable growth. The System aims to support a number of Commission initiatives, including:

- the Raw Materials Initiative — through methodological advancements in the area of analysis of raw material criticality and updates to the EU list of critical raw materials;
- the European Innovation Partnership's Strategic Implementation Plan — by collecting the data and information required to develop the indicators included in the forthcoming Raw Materials Scoreboard;
- the Circular Economy Action Plan — by providing information on material stocks and flows in the EU economy and globally for both primary and secondary raw materials.

2 Trends in the use of material resources and resource productivity in Europe, 2000–2014

This chapter provides an overview of trends in the use of material resources and resource productivity in European countries and the EU-28 as a whole, using Eurostat data compiled according to material flow accounting (MFA) methodology. Information on the MFA framework is provided in Annex 5.

Country-specific data and graphs on the use of material resources and resource productivity are presented in individual country profiles.

2.1 Overall use of material resources in the EU-28

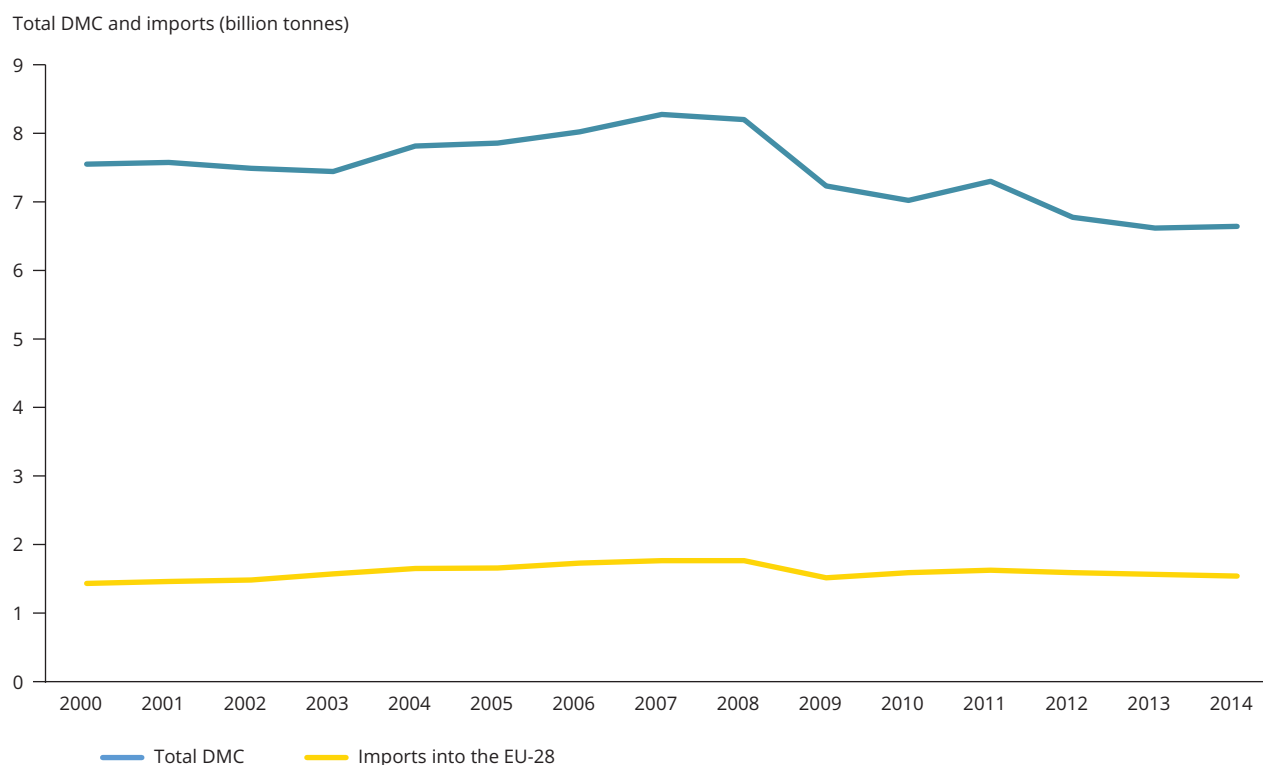
The total use of resources (domestic material consumption, DMC) in the EU-28 declined from

7.55 billion tonnes in 2000 to 6.64 billion tonnes in 2014, a fall of 12 %. Over the same period, physical imports from outside the EU-28 increased by about 8 % (Figure 2.1).

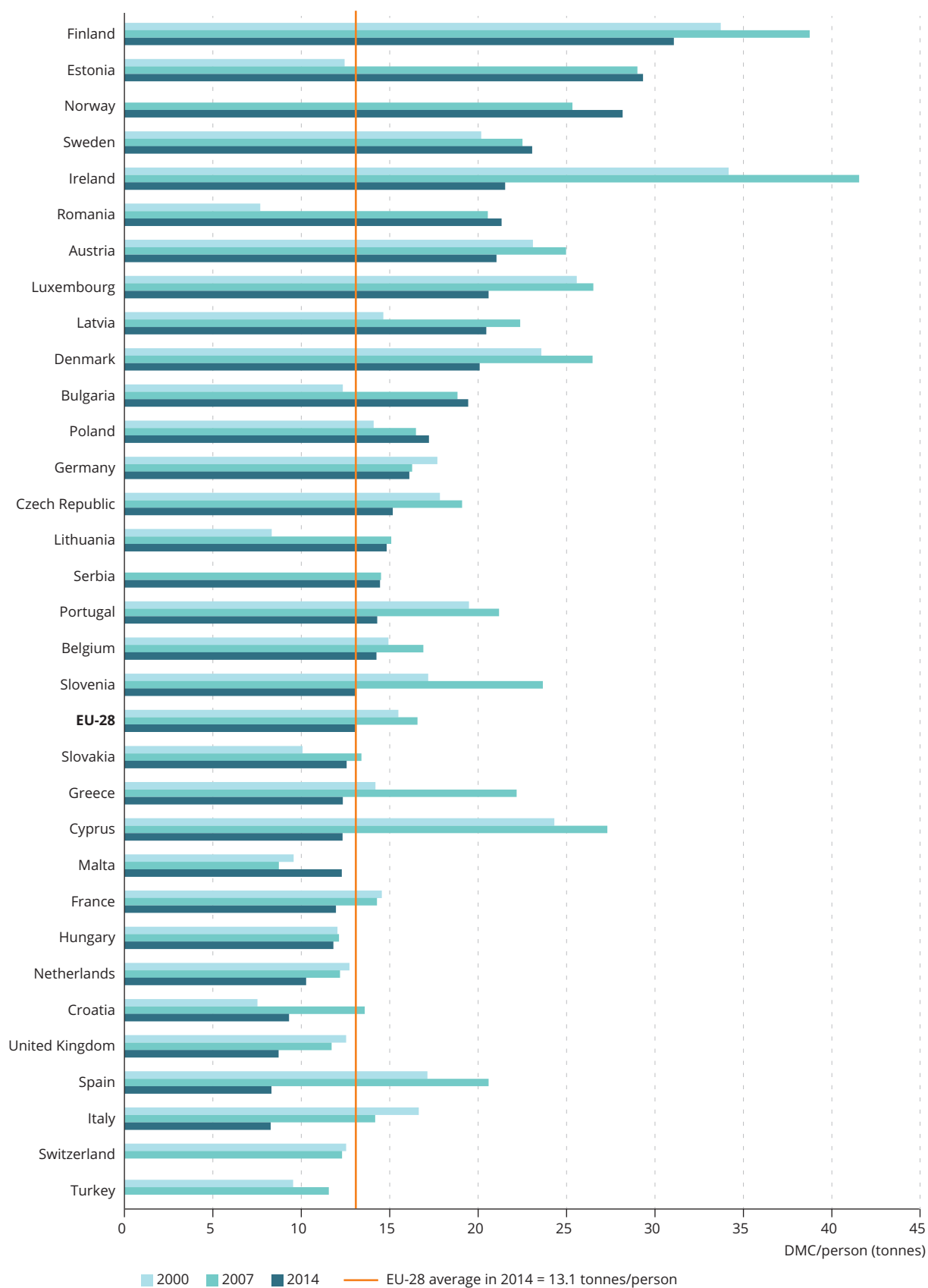
Per person DMC in the EU-28 dropped by almost 16 % between 2000 and 2014. It initially rose from 15.5 tonnes in 2002 to a peak of 16.6 tonnes in 2007, but then fell back to 13.1 tonnes in 2014. However, the levels of material consumption and trends in individual countries were quite variable, as shown in Figure 2.2.

Comparing the figures for 2000 and 2014 only tells part of the story, however, as all long-term trends were disrupted by the global economic crisis that started in 2007/2008. It is therefore important to

Figure 2.1 EU-28 total domestic material consumption (DMC) and physical imports, 2000–2014



Source: Eurostat 2016, datasets for MFA [env_ac_mfa]; resource productivity [env_ac_rp]; and GDP and main components (output, expenditure and income) [nama_10_gdp], downloaded 10 April 2016.

Figure 2.2 Domestic material consumption (DMC) per person, 2000, 2007 and 2014

Source: Eurostat 2016, datasets for MFA [env_ac_mfa]; resource productivity [env_ac_rp]; and GDP and main components (output, expenditure and income) [nama_10_gdp], downloaded 10 April 2016.

examine trends before and after the onset of the crisis and the ensuing global recession.

In the period 2000–2007, the total DMC of the EU-28 increased by 10 %, while imports grew by 23 %. Economic growth and rising resource use went hand in hand, in line with the historic long-term trend.

It was only after 2007 — and the onset of the global recession — that a significant decline occurred in both total DMC (– 20 % between 2007 and 2014) and imports (– 13 %).

The impact of the economic crisis was even more dramatic with respect to resource productivity, as discussed in the final section of this chapter.

2.2 Resource use by type of material

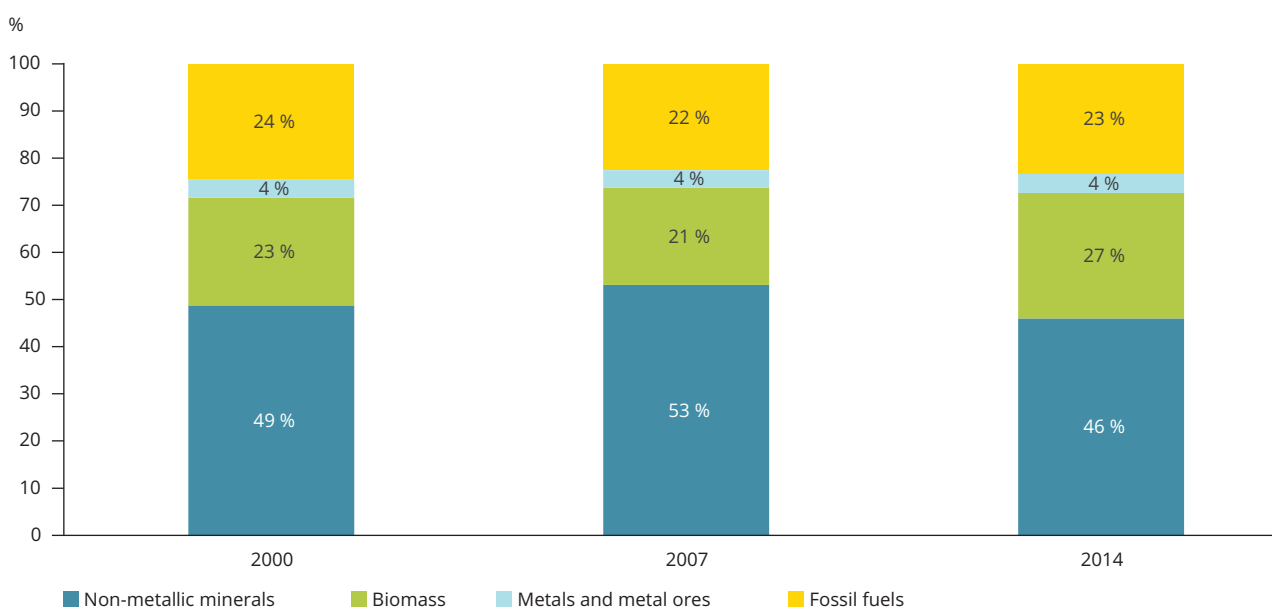
Although the shares of the four main components of total DMC fluctuated between 2000 and 2014, the overall picture remains consistent (Figure 2.3). By far the largest category is non-metallic minerals — mostly materials used in construction — with a share in total DMC of between 46 % and 53 %. The share of biomass ranged between 20 % and 27 %, and for fossil fuels between 22 % and 26 %. The smallest group is metals and metal ores, which accounted for 3–4 % of total EU-28 DMC.

Individual materials with a significant share in total DMC in the EU-28 are:

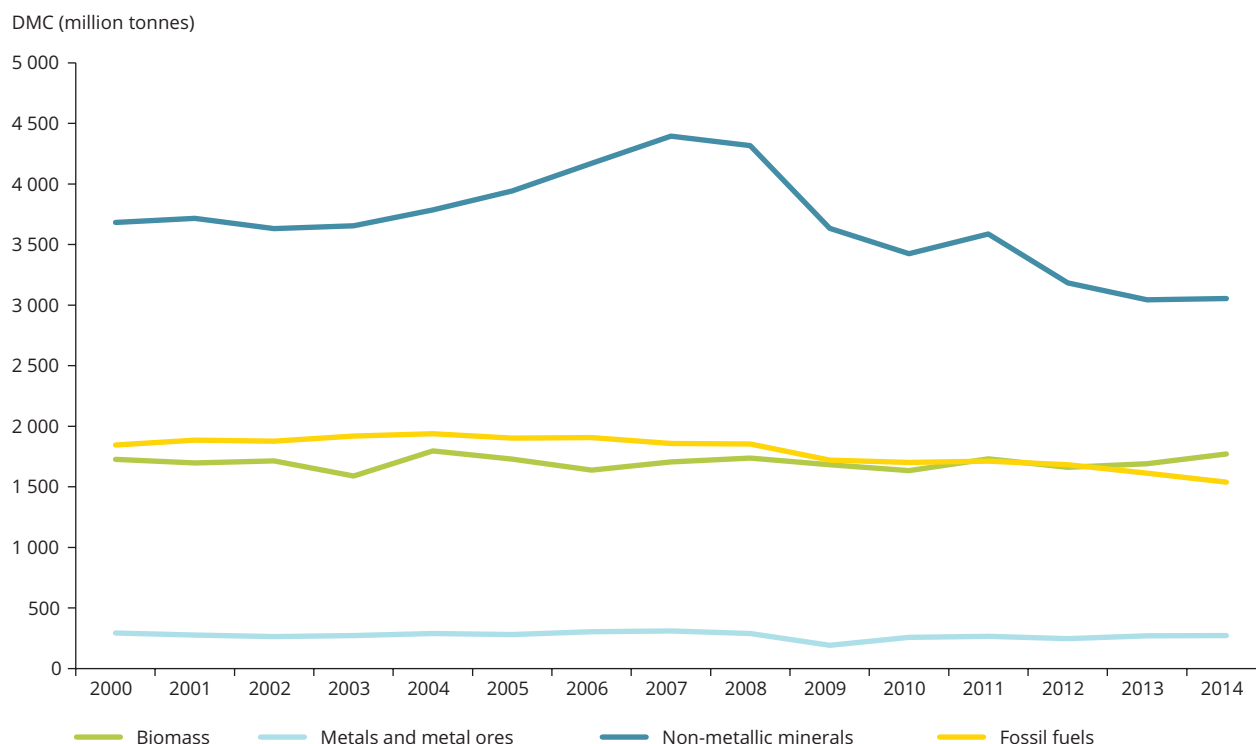
- sand and gravel, 31–34 %;
- liquid and gas energy carriers, 13–14 %;
- coal/solid energy carriers, 10–11 %;
- fodder crops and grazed biomass, 9–11 %;
- non-fodder crops, 8–10 %;
- limestone and gypsum, 7 %;
- marble, granite and sandstone, 4–5 %;
- wood, 4 %.

As shown in Figure 2.4, the overall trend in total DMC in the EU-28 is almost entirely determined by non-metallic minerals, mainly used for construction. This is not only because non-metallic minerals constitute the largest single category in DMC, but also one that is most susceptible to change in the overall economic situation. The sharp drop in the use of non-metallic minerals was mostly caused by the decline of the construction sector from 2007 onwards, which in some countries was quite dramatic (Figure 2.5).

Figure 2.3 EU-28 domestic material consumption (DMC) by share of components, 2000, 2007 and 2014



Source: Eurostat 2016, datasets for MFA [env_ac_mfa]; resource productivity [env_ac_rp]; and GDP and main components (output, expenditure and income) [nama_10_gdp], downloaded 10 April 2016.

Figure 2.4 EU-28 domestic material consumption (DMC) by type of material, 2000–2014

Source: Eurostat 2016, datasets for MFA [env_ac_mfa]; resource productivity [env_ac_rp]; and GDP and main components (output, expenditure and income) [nama_10_gdp], downloaded 10 April 2016.

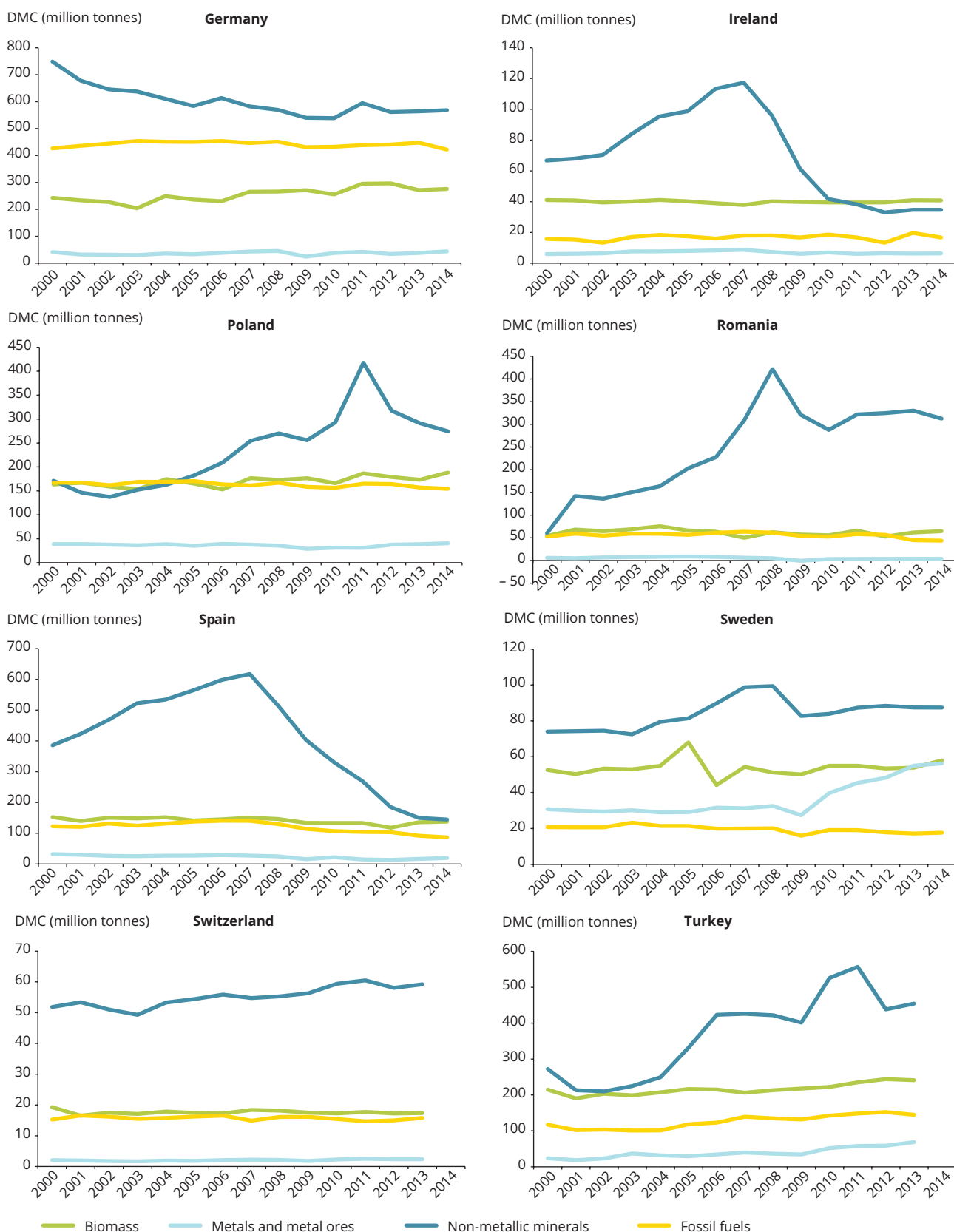
Between 2000 and 2007, the consumption of non-metallic minerals in the EU-28 grew by 19 % compared to an overall increase in DMC of 10 %. Between 2007 and 2014, however, the use of non-metallic minerals declined by 31 % and total DMC went down by 20 %.

Similarly, the use of metal and metal ores grew by 6 % during 2000–2007 but then declined by 13 % in 2007–2014 (although by 2013 it was back to 2003 levels).

A different — and noteworthy — trend occurred in the EU-28's use of fossil fuels, which declined by 17 % between 2000 and 2014. Beginning in 2004, the rate of decrease was initially fairly gradual, only accelerating after 2008. Here, it appears that three forces were in play:

- a decrease in overall economic activity from 2008 onwards, resulting in lower consumption of energy;
- a long-term trend in the EU of increasing the use of energy from renewable sources;
- the improving overall energy efficiency of the economies.

All in all, however, one should keep in mind that aggregating figures for a big group of countries will inevitably miss the large variety of trends in individual countries, as demonstrated by selected examples in Figure 2.5. However, more detailed analysis at the country level is outside the scope of this report.

Figure 2.5 Domestic material consumption (DMC) by type of material in selected European countries, 2000–2014

Source: Eurostat 2016, datasets for MFA [env_ac_mfa], resource productivity [env_ac_rp], and GDP and main components (output, expenditure and income) [nama_10_gdp], downloaded 10 April 2016.

2.3 Imports of resources into the EU-28 and growing reliance on imported fossil fuels and metals

Figure 2.6 presents the share of imported materials in the overall direct material input (DMI) of the EU-28. Direct material input — which is the sum of imported and domestically extracted resources required by the economy — is better suited to measure reliance on imports than DMC. Further details on these indicators are provided in Annex 5.

Overall, imports account for about a fifth of the resources used in the EU-28, and their share in DMI has grown steadily, from 18 % in 2000 to 21 % in 2014. The share of imports of non-metallic minerals remains rather insignificant, at about 2 % of their total use. The situation is similar for biomass, where imports account for about 9 % of the total. In both cases this is understandable given the good availability of biomass and non-metallic minerals within Europe, as well as the high cost of transporting bulk materials from outside the region.

Highly significant for a number of policies — from resource efficiency and energy policies to security of supply — are trends in the import of fossil fuels and metals and metal ores.

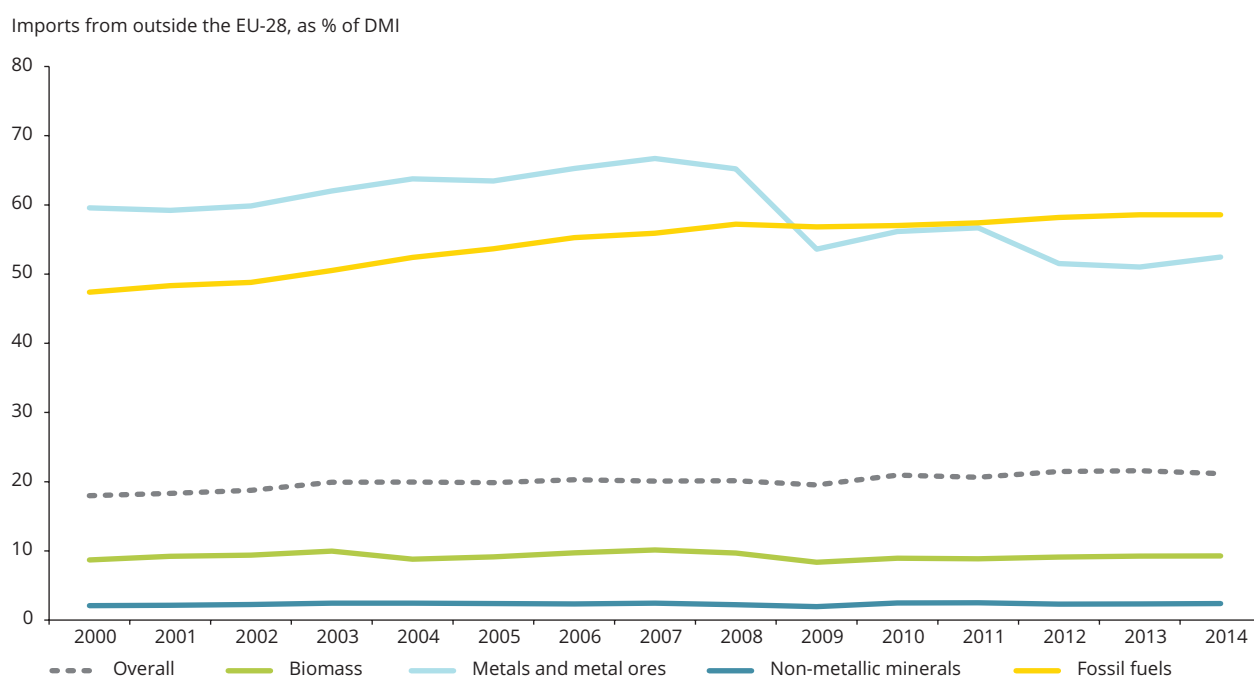
The share of imported fossil fuels grew from 47 % in 2000 to 59 % in 2014. Even though the DMI of fossil fuels in absolute terms went down by 12 % during the period (and the DMC of fossil fuels decreased even more, by 17 %), the amount of imported fossil fuels grew by 9 %. This indicates that the EU is continuously becoming more dependent on imported fossil fuels.

In the case of metals, dependence on imports grew steadily during 2000–2007, from 60 % to 67 %, then declined to 52 % in 2014. The high dependence on imports of metals, combined with the fact that the production of several hi-tech metals is concentrated in one or two countries, generated concerns about the security and stability of access to resources and resulted in European Commission policy work on raw materials, including elaboration of the EU list of critical raw materials. Several countries also compile their own lists of critical materials (Boxes 6.1 and 6.3)

2.4 Resource productivity in the EU-28

Resource productivity in the EU-28 — as measured by the lead indicator relating gross domestic product (GDP) to DMC — increased by 34 % between 2000 and 2014 (Figure 2.7). In this period, GDP grew by 18 % while DMC declined by 12 %. Thus, the EU-28 is clearly

Figure 2.6 EU-28 reliance on imports of materials from outside the European Union, 2000–2014



Source: Eurostat 2016, datasets for MFA [env_ac_mfa]; resource productivity [env_ac_rp]; and GDP and main components (output, expenditure and income) [nama_10_gdp], downloaded 10 April 2016.

doing more with less, and has achieved something that appeared unthinkable a mere decade ago — an absolute decoupling of economic growth from resource use.

For a more nuanced analysis, however, it is important to take a closer look at the trends before and after the economic crisis of 2007/2008 (marked by the grey bar in Figure 2.7).

Between 2000 and 2007, total DMC for the EU-28 increased by 10 %, in association with a 7 % growth in resource productivity. In this period the use of resources and economic growth went hand in hand, corresponding to the long-term structural trend.

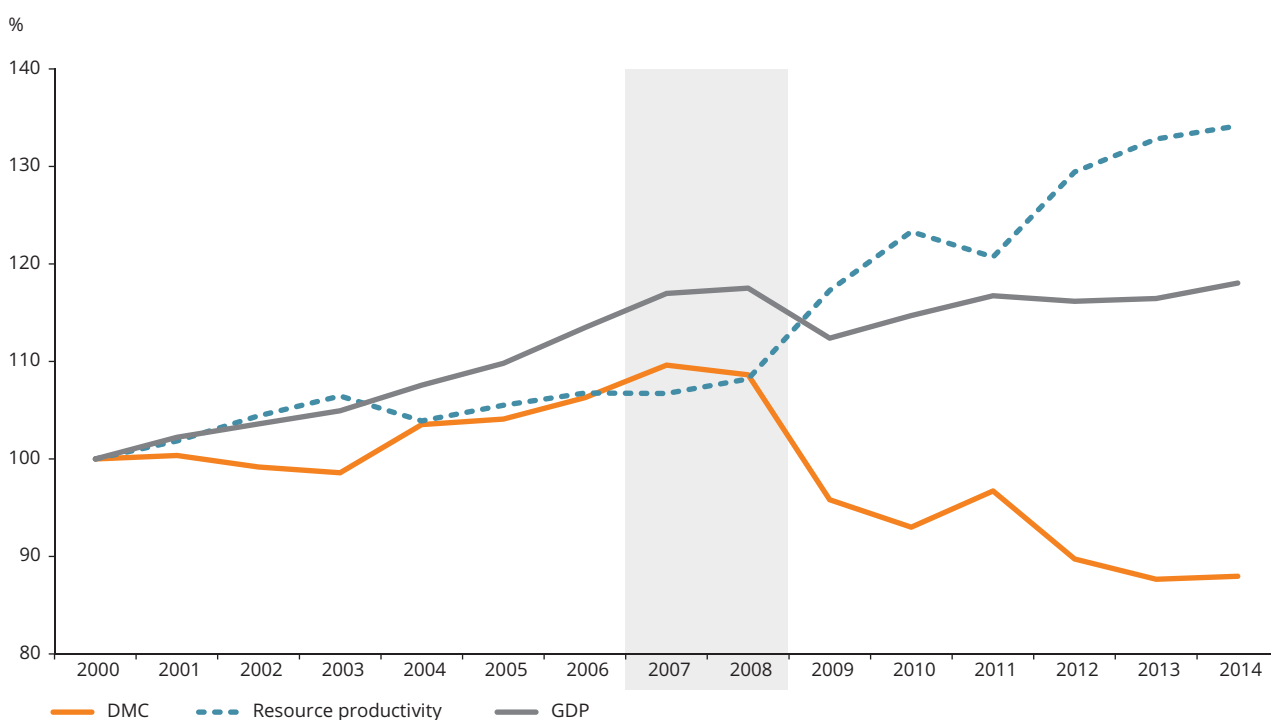
After 2008, the use of materials declined rapidly, with a 20 % decrease in total DMC between 2007 and 2014. As discussed earlier, this was mostly due to the sharp decline in the construction sector, which accounts for the lion's share of total material use but contributes, in relative terms, much less to the EU economy.

There was a sharp fall in GDP in 2009, but it has gradually recovered since; by 2013 it had returned to the same level as in 2007.

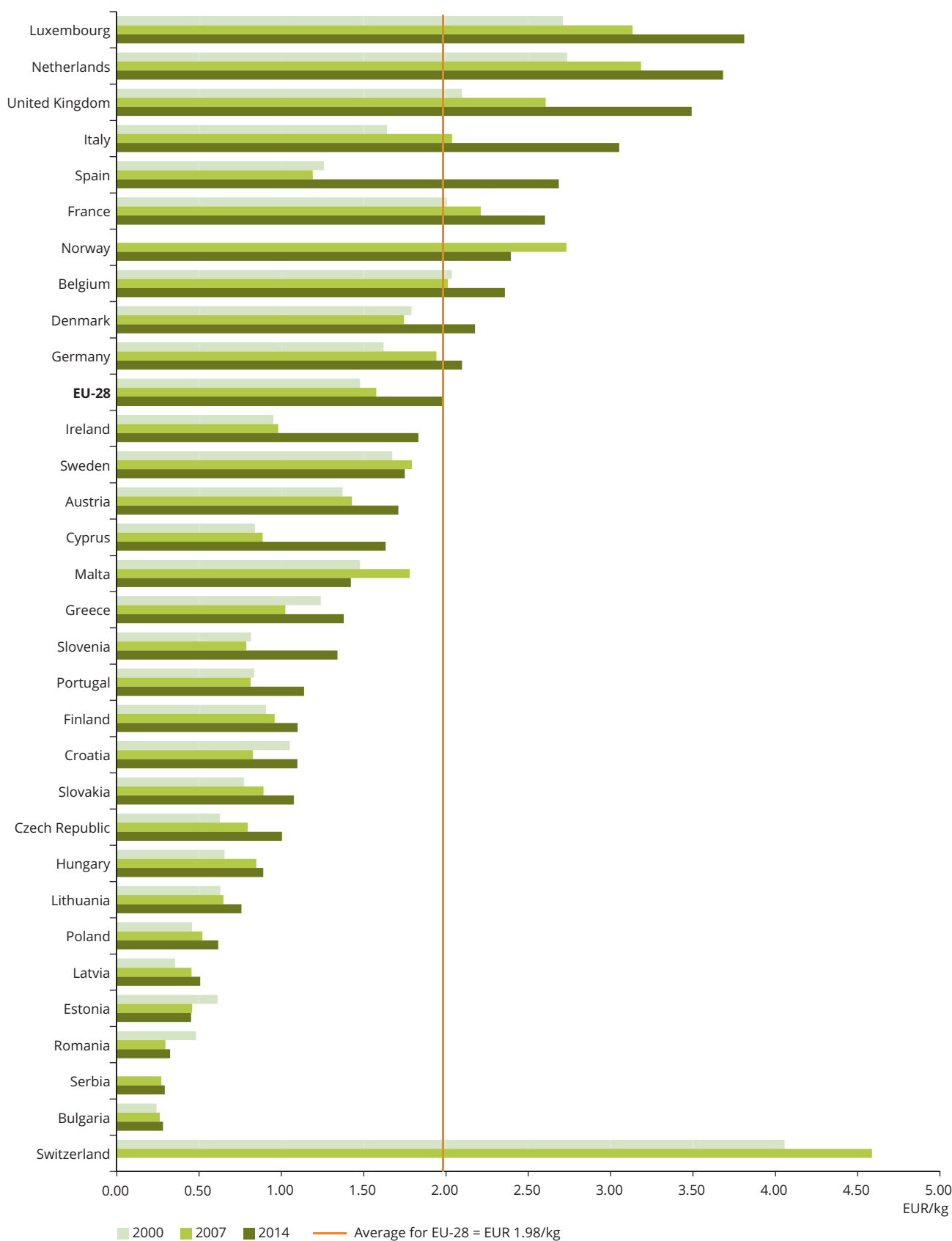
The result is that resource productivity — which is the **ratio** of GDP to DMC — went up by about a quarter in the seven years from 2007 to 2014. While this improvement is both welcome and impressive, at this stage it would not appear justified to attribute it entirely to the success of environmental policies. Other economic or technical factors may have played a role, including the changing structure of the economies, the way the economic crisis affected individual countries, globalisation and increasing reliance on imports, and even the nature of the indicator itself. It remains to be seen whether this positive trend will continue in the long term. Furthermore, both levels of resource productivity and trends over time varied from country to country (Figure 2.8).

The most fundamental challenge is whether EU and national policy responses will manage to build on — and strengthen — the favourable trend apparent in recent years. Failing that, the EU and national economies are likely to return to the traditional pattern of economic growth accompanied by increasing resource use.

Figure 2.7 EU-28 gross domestic product (GDP), domestic material consumption (DMC) and resource productivity, 2000–2014 (index 2002 = 100 %)



Source: Eurostat 2016, datasets on MFA [env_ac_mfa]; resource productivity [env_ac_rp]; and GDP and main components (output, expenditure and income) [nama_10_gdp], downloaded 10 April 2016.

Figure 2.8 Resource productivity 2000, 2007 and 2014


Source: Eurostat 2016, datasets on MFA [env_ac_mfa]; resource productivity [env_ac_rp]; and GDP and main components (output, expenditure and income) [nama_10_gdp], downloaded 10 April 2016.

Box 2.1 Material consumption indicators and measuring the material footprint of the European Union

Eurostat regularly publishes a set of indicators based on economy-wide material flow accounts (EW-MFA) for all individual EU Member States and a number of other countries (Chapter 10). One of the most frequently used is DMC, typically expressed in absolute values (million tonnes), on a per person basis, or as GDP/DMC (the so-called lead resource productivity indicator).

In an effort to better capture the global material footprints of the EU, Eurostat has initiated work on the raw material consumption (RMC) indicator. The main difference between DMC and RMC is how imports and exports are calculated. Domestic material consumption only takes account of the actual weight of the traded goods when they cross country borders, which excludes any materials extracted to produce them.

To adjust for this, in RMC the weight of processed goods traded internationally is converted into the corresponding raw material extraction that they cause. Such results are better suited to compare material use across countries than DMC, but also have a higher statistical uncertainty, and therefore are not part of official statistics.

At the time of writing, Eurostat provides RMC data for the EU-27 as a bloc for the period 2000–2013. Countries are encouraged to compile national RMC accounts on a voluntary basis, and several have done some pilot work (Chapter 10). Eurostat has published a raw material equivalents (RME) tool to enable national statistical institutes to take this work forward.

In the future, when estimates are of sufficient quality and available for all Member States, GDP/RMC may replace GDP/DMC to monitor resource productivity in the context of the Europe 2020 strategy.

For further information: http://ec.europa.eu/eurostat/statistics-explained/index.php/Material_flow_accounts_-_flows_in_raw_material_equivalents.

PART II MATERIAL RESOURCE EFFICIENCY POLICIES AT THE COUNTRY LEVEL



3 National strategies or action plans for material resource efficiency and policy objectives

This chapter provides an overview of country responses to three separate questions.

- Does your country have a dedicated national resource efficiency strategy or action plan? (Question 1)
- What other national policies and strategies address material resource efficiency among various other topics? (Question 3)
- What general policy objectives for material resource efficiency are set in the above policies? (Question 4)

Annex 7 presents an overview of responses. Full details are available in individual country profiles.

3.1 Dedicated national resource efficiency strategies or action plans

Three countries — Austria, Finland and Germany — reported having a dedicated national strategy for material resource efficiency or a material resource efficiency action plan.

The **Austrian Resource Efficiency Action Plan** (REAP) was adopted in 2012 and includes a target to decouple resource consumption from economic growth and to increase resource efficiency by at least 50 % by 2020 (Box 3.1). The 2014 **Finnish National Material Efficiency Programme — Sustainable Growth through Material Efficiency** aims simultaneously to achieve economic growth, the rational use of natural resources, and disengagement from harmful environmental effects (Box 3.2). The 2012 **German Resource Efficiency Programme** (ProgRes) (update expected in 2016) sets out to ensure the more sustainable extraction and use of natural resources and a reduction in associated environmental pollution (Box 3.3).

There are two further material resource efficiency strategies, but adopted at the regional (subnational) level: the **Flemish Sustainable Materials Management Programme** (2011) and **Zero Waste — Safeguarding Scotland's Resources** (2013). Both go beyond recycling and reuse; in the case of Flanders (Belgium), with a focus on closing material loops and a set of measures for achieving a circular economy, and in the case of Scotland (United Kingdom), by including materials, energy and water.

Box 3.1 Resource Efficiency Action Plan, Austria

The Resource Efficiency Action Plan (REAP) was published in 2012 by the Federal Ministry of Agriculture, Forestry, Environment and Water Management (BMLFUW) as Austria's response to the EU Roadmap to a Resource Efficient Europe.

REAP covers natural resources, raw materials and energy usage (materials and energy carriers) as well as water, air and land. It outlines measures to reduce resource consumption in Austria and to further improve resource efficiency through measures in a number of areas, including resource-efficient production, public procurement, the circular flow economy and awareness raising.

The overarching goal is to reduce national resource consumption considerably, to decouple it from economic growth, and to increase resource efficiency by at least 50 % by 2020 relative to 2008, and four- to ten-fold by 2050.

Building on this, the RESET2020 — Resources.Efficiency.Technologies initiative was developed by the BMLFUW in 2015, aiming to implement resource efficiency in the areas of environmental technology, sustainable production and sustainable consumption. Areas with particular potential to increase resource efficiency were also identified.

For further information: <http://www.bmlfuw.gv.at/en/fields/environment/Sustainabledeve/Resouefficactionplan.html>.

Box 3.2 National Material Efficiency Programme, Finland

Finland's 2014 National Material Efficiency Programme aims to improve material efficiency through the economical use of resources, efficient management of by-products, a reduction in the volume of waste, and recycling of materials at different phases of the life cycle.

The programme proposes eight measures for the advancement of material efficiency, and includes objectives to create preconditions for ecologically sustainable growth and employment; promote competitiveness and balanced operational preconditions for business; utilise non-renewable natural resources in a sustainable manner; and promote the production of high added-value products based on strong knowledge and skills.

The overarching goal of the programme is sustainable growth through material efficiency, aiming simultaneously at economic growth, the sensible use of natural resources and disengagement from harmful environmental effects.

For further information: https://www.tem.fi/files/38764/TEMjul_8_2014_web_27022014.pdf.

These five dedicated strategies cover different mixes of materials and resources, but all aim to reduce the environmental impact of material resource use and propose a considerable number of measures to achieve this objective.

The Austrian REAP approach and its implementing initiative RESET2020 are noteworthy because of the scope of their activities, as well as the fact that Austria is currently one of the few European countries to adopt quantitative targets for improving material resource efficiency (Chapter 9).

Finland's National Material Efficiency Programme is flanked by a number of projects on topics such

as bioeconomy, sustainable mining and clean technologies. Programmes targeting consumption habits, greening of public procurement, and material efficiency in construction are under way.

Germany's ProgRess (2012) focuses on abiotic non-energy resources, as well as the use of biotic resources. Other natural resources — such as water, air, land, soil, biodiversity and ecosystems — are covered by other strategies, processes or legislation, and are not addressed by ProgRess in detail. The updated version of ProgRess, due for publication in 2016, will extend the scope by including abiotic (fossil fuel) and biotic (biofuel) energy resources.

Box 3.3 Resource Efficiency Programme, Germany

Adopted in 2012, the German Resource Efficiency Programme (ProgRess) has four guiding principles:

- joining ecological necessities with economic opportunities, supporting innovation and social responsibility;
- viewing global responsibility as a key focus of German national resource policy;
- gradually making economic and production practices in Germany less dependent on primary resources, and developing and expanding closed-cycle management;
- securing sustainable resource use in the long term by guiding society towards quality growth.

ProgRess covers the entire value chain. It is about securing a sustainable supply of raw materials, raising resource efficiency in production, making consumption more resource efficient, enhancing resource-efficient closed-cycle management and using overarching instruments. A total of 20 strategic approaches are identified together with implementing measures. ProgRess attaches particular importance to market incentives, information, expert advice, education, research and innovation, and to strengthening voluntary measures and initiatives taken by industry and society.

Since movement towards resource efficiency objectives will be reported every four years, the programme marks the beginning of a long-term process in policymaking, science and society.

For further information: http://www.bmub.bund.de/fileadmin/Daten_BMU/Pool/Broschueren/progress_broschuere_de_bf.pdf.

3.2 National policies and strategies addressing material resource efficiency under other topics

Only three countries have a targeted strategy for material resource efficiency at the national level and two at the regional level. However, there has been dynamic growth in the work on policy frameworks and a huge increase in programmes that have material resource efficiency as an essential component since the adoption of the 2011 EU Roadmap to a Resource Efficient Europe. At the same time, interpretations of key terms, concepts and scope (Chapter 4) continue to differ, with some countries raising concern that this may actually hamper effective policy implementation.

All 32 participating countries reported a wide spectrum of national policies or strategies that address material resource efficiency through other topics and under a range of headings.

A mosaic of diverse approaches — in total 240 examples were reported — can be roughly grouped into the following categories:

- national plans and programmes concerning **waste management and recycling**, for example the Czech Republic's Secondary Raw Materials Policy (2014), Denmark's resource strategy Denmark Without Waste, and the Dutch circular economy programme From Waste to Resource (2014);
- national strategies and action plans addressing **energy and energy efficiency**, including the French Energy Transition For Green Growth Act (2015) (Box 3.4), and Poland's National Energy Efficiency Action Plan;
- general national **sustainable development and environmental strategies** addressing material resource efficiency, such as Hungary's National Framework Strategy on Sustainable Development (2012–2024), Ireland's Our Sustainable Future, Latvia's Sustainable Development Strategy (2010), and the Swedish Generational Goal and Environmental Quality Objectives;
- national plans and programmes for **waste prevention** or the **prevention of specific wastes**, including the national waste prevention programme Towards a Resource Efficient Ireland (2014), the Italian National Plan to Prevent Food Waste, and Towards Zero Waste in Wales (United Kingdom);
- strategies for **innovation and industrial development**, including Hungary's National Environmental Technology Plan (2011–2020), and Turkey's 10th Development Plan (2013) with its Priority Transformation Programmes;
- strategies for a **green economy**, including Promoting the Green Economy in Iceland, the Green Growth Policy in the Netherlands (2013), the Green Growth Commitment in Portugal (2015), and the Green Economy Action Plan in Switzerland (2013);
- strategies to **reduce import dependency and secure raw materials**, including the Czech Republic's Action Plan for Self-Sufficiency in Raw Materials, and Turkey's Programme for Reducing Import Dependency;
- thematic strategies or plans **addressing specific resources or sectors**, such as Liechtenstein's Action Plan on the use of recycled material for public buildings (2010), or the Lithuanian National Forestry Sector Development Programme for 2012–2020;
- programmes for **agricultural and rural development**, such as the Estonian Rural Development Plan for 2014–2020, Latvia's Rural Development Programme 2014–2020, or the Polish Strategy for Sustainable Development of Rural Areas, Agriculture and Fishing.

Box 3.4 Energy Transition for Green Growth Act (2015), France

The Energy Transition for Green Growth Act, adopted in 2015, sets a target of achieving a 30 % increase in material productivity between 2010 and 2030. It also calls for the development of a national circular economy strategy including a plan for natural resources. The circular economy strategy will be an opportunity to better take into account the resource efficiency potential of a shift to a circular economy. The Act also foresees measures related to waste prevention, recycling and recovery of waste, and a dedicated national strategy on biomass resources.

For further information: http://www.developpement-durable.gouv.fr/IMG/pdf/14123-8-GB_loi-TE-mode-emploi_DEF_light.pdf.

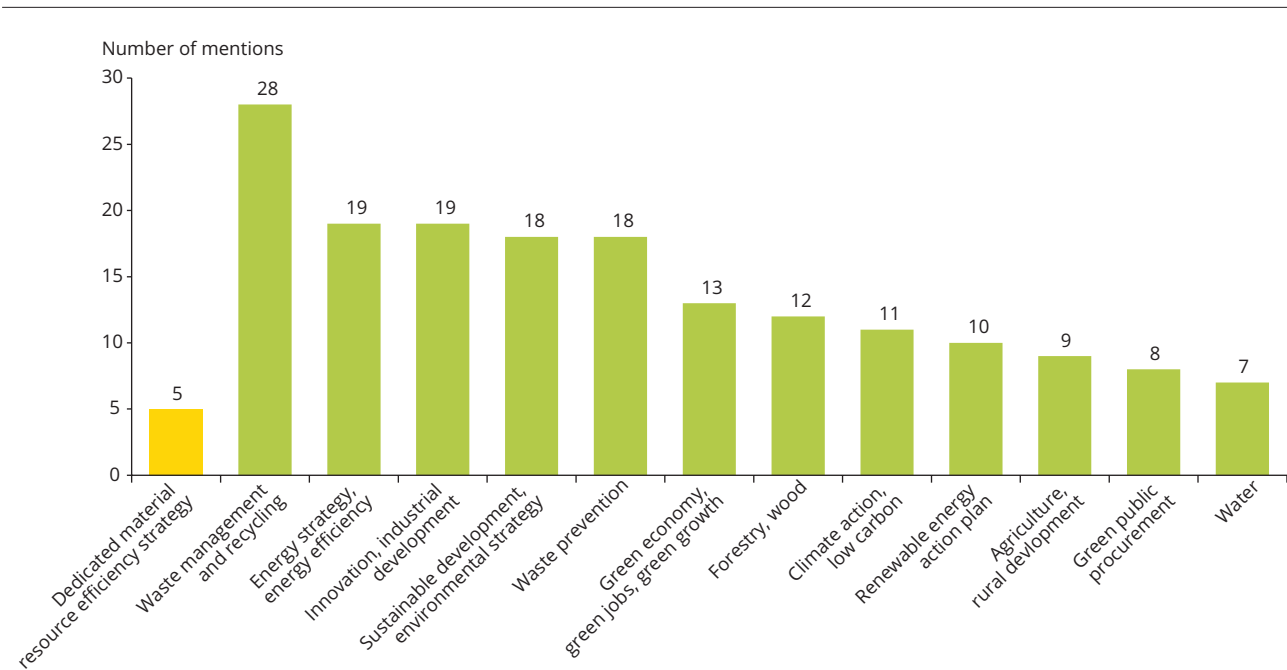
Figure 3.1 presents the most frequent examples (seven or more) of policies and strategies reported by countries that include references to material resource efficiency.

The largest number of policy initiatives (28) focused on **waste management and recycling**, but **waste prevention** programmes also featured prominently (18). Specific policies in this group ranged from national waste prevention programmes to initiatives to reduce waste generation, improve management by reducing waste sent to landfill and increasing recycling, and greater use of secondary

materials. The use of secondary resources — one of the measures for closing material loops — was explicitly brought forward as a programme by two countries (Czech Republic, Box 3.5, and Ireland) but was mentioned several times as a sub-goal within waste management plans.

Almost all countries (29) mentioned one or more programmes, strategies or plans addressing **energy**. This broad group of policies included **energy use, energy efficiency** and the use of **renewable energies**, and was largely driven by EU legislation on energy efficiency.

Figure 3.1 Overview of policies and strategies addressing material resource efficiency among various topics (*) (seven or more mentions)



Note: (*) Based on the available information a distinction was made between more general energy strategies and more specific energy efficiency strategies, although both address energy. Waste was handled in the same manner (waste management and recycling versus waste prevention).

Box 3.5 Action Plan for Self-Sufficiency in Raw Materials, the Czech Republic

The Strategic Framework for the Effective Use of Secondary Raw Materials was ratified by the government in 2015. The accompanying Action Plan identifies 20 specific tasks for achieving the strategic goal of replacing virgin raw materials (energy and non-energy raw materials) with secondary raw materials.

Implementation of the Action Plan, as well as tasks contained in other strategic documents dealing with raw materials, energy and the environment, will initiate progressive application of the principles of the circular economy in the Czech Republic, which will result in increased resource efficiency and a greater use of secondary resources.

For further information: <http://www.mpo.cz/dokument6621.html>.

Box 3.6 Denmark Without Waste, Denmark

Denmark Without Waste I — Recycle More, Incinerate Less (November 2013) focuses on higher levels of recycling and more efficient use of raw materials. The goal is that in 2022 Denmark will recycle more than twice as much household waste as it did in 2011.

For further information: http://eng.mst.dk/media/mst/Attachments/Ressourcestrategi_UK_web.pdf.

Denmark Without Waste II — Strategy for Waste Prevention (April 2015) contains 72 initiatives aimed at getting companies and consumers to prevent the generation of waste.

For further information: http://mst.dk/media/131357/danmark_uden_affald_ii_web_29042015.pdf.

Eighteen countries (including Ireland, Box 3.7) reported having a national strategy or action plan for **sustainable development** or an **environmental protection strategy** that directly includes elements of material resource efficiency as a general objective or a policy measure.

Further large groups of policies that include aspects of material resource efficiency are those related to a **green economy** (13 mentions), such as Austria's Masterplan Green Jobs and Switzerland's Green Economy Action Plan; and to **innovation and industrial development** (19 mentions), including Smart Specialisation in the Czech Republic, Bio-Economy in Germany, the National Environmental Technology Innovation Strategy in Hungary, Ecodesign for Energy-Related Products in Portugal, and the Green Investment Bank in the United Kingdom.

Six countries reported programmes for **reducing import dependency**, mainly referring to fossil fuels and critical minerals. Specific **raw materials policies**

were reported by seven respondents — Austria, Flanders (Belgium), the Czech Republic, Finland, Germany, the Netherlands and Slovakia — mainly focusing on extraction and mining. Five respondents — Finland, Hungary, Kosovo (under UNSCR 1244/99), Norway and Sweden — reported a **mineral resources strategy**.

National action plans or national strategies for **construction materials** were reported by two countries — Estonia and Liechtenstein.

Flanders (Belgium) presented a regional policy plan that aims to expand the approach from focusing on the collection of construction and demolition waste to a life-cycle perspective on building and building materials, encompassing mining, production, design, construction, use and maintenance, end of life, and waste collection and management.

A total of 62 thematic strategies for specific resources or sectors were reported. Among these, the most

Box 3.7 Our Sustainable Future, Ireland

Our Sustainable Future is a joined-up approach to policymaking on sustainable development, with 70 measures targeted at improving quality of life for current and future generations. Launched in 2012, the framework describes measures, responsibilities and timelines in areas such as economic resilience, natural resources, agriculture, climate change and transport. The measures of greatest relevance to resource efficiency are grouped under the sustainable consumption and production challenge.

A new Waste Management Policy aims to adhere to the waste hierarchy and move Ireland away from an overdependence on landfill, with a range of alternative measures having a role to play.

In line with development of the Roadmap to a Resource Efficient Europe under Europe 2020, the government will work to ensure the effective implementation of this initiative in Ireland. The relevant agencies, including the Industrial Development Agency, Enterprise Ireland, the Sustainable Energy Authority and the Environmental Protection Agency, will continue to work to offer an integrated suite of resource efficiency programmes for business.

For further information: <http://www.environ.ie/en/Environment/SustainableDevelopment/PublicationsDocuments/FileDownload,30452,en.pdf>.

common concerned **forestry and wood** (12) and **climate action** (11), followed by agriculture and rural development (9), water (7), biodiversity (5), buildings (5), food (5), mobility (3), tourism (2), the marine environment (2), and land and soil (1). Most of these align with the resources and sectors mentioned in the Roadmap to a Resource Efficient Europe, which might have been used by respondents as a starting point for listing the different national strategies.

There were only a few examples of national policies on the sustainable use of natural resources that follow the approach in the European Commission's 2005 Thematic Strategy on the sustainable use of natural resources. In Serbia, the 2012 National Strategy for Use of Natural Resources and Goods covers 'renewables as well as non-renewable geological, hydrological and biological resources and natural goods'. The objectives of Serbia's Strategy include increasing the efficiency of resource use while reducing environmental impacts relative to economic output.

Green public procurement (GPP) was mentioned by eight countries. Although GPP does not focus on one specific topic, some countries consider it an important instrument for improving material resource efficiency, as reflected, for example, in Denmark's National Strategy for Intelligent Public Procurement, and Green Tenders in Ireland.

Within the scope of their strategies on material resource efficiency, four countries reported instruments to support businesses and small and medium enterprises (SMEs) that plan to incorporate circular economy and material efficiency approaches into their manufacturing processes, for example Innovate UK, the Fund for Green Business in Denmark, Reffnet in Switzerland, and the Reference Centre on Circular Economy in Wallonia (Belgium). Most frequently, however, the circular economy was mentioned as a principle or goal within many different strategies.

Some countries, including Germany, Italy and Spain, reported having regional and local resource efficiency strategies implemented as a complement to economy-wide or national strategies for material resource efficiency or, as in the case of Belgium and the United Kingdom, as a regional response to national strategies that address other topics.

3.3 General policy objectives for material resource efficiency

In contrast to targets, which are measurable, concrete and have a deadline (Chapter 9), general policy objectives are a statement of intent and an indication

of goals to be achieved with respect to material use and resource efficiency.

This section reviews responses to the question about general policy objectives for material resource efficiency — be it in dedicated or in broader strategies.

Countries reported more than 380 examples of general and specific policy objectives directed at all kinds of natural resources, sectors and topics. Detailed information is available in individual country profiles. Table 3.1 presents examples of the policy objectives most frequently reported.

Concerning **waste** and waste-related policies, which make up by far the largest category, the most often mentioned objectives were increased recycling and recovery rates (24), waste prevention (17), promotion of reuse and secondary resources (17), more efficient waste management (16), efficient construction and buildings (11), reduction of environmental impacts associated with waste (9), application of the waste hierarchy (8), and reduction of food losses and food waste (8).

The most frequently reported **objectives related to material use** were the sustainable use of natural resources (14), increased (material) resource efficiency (13), reduction of environmental impacts associated with material use (10), reduction of mineral use (7), and decoupling of economic growth from environmental pressure or waste generation (6).

The specific goal of **reducing current levels of material use** was mentioned by only six respondents — Austria, Flanders (Belgium), Hungary, Iceland, Ireland and Poland.

The main policy objectives in the field of **energy** are to increase the share of renewable energy (14) and improve the energy efficiency of the economy or certain sectors (12).

Concerning the **conservation of natural resources**, frequently reported policy goals addressed the protection of biodiversity (14), more sustainable forest management (12), reduction of water losses and better water efficiency (10), and more sustainable management of land and soil (7).

Regarding **economic objectives**, the most frequently mentioned policy objectives were innovation for resource-efficient production and clean technology (13), green or sustainable economic growth (12), security of energy and supply of raw materials (10), market introduction of innovative, resource-efficient technologies and services and ecodesign (9), and the increase or maintenance of competitiveness (8).

Table 3.1 The most frequently reported (seven or more entries) policy objectives for material resource efficiency, grouped by theme

Waste and recycling (144 in total)	• Increase recycling rates and recovery (24) • Waste prevention (17) • Promotion of reuse and secondary resources (17) • More efficient waste management (16) • Efficient construction and alternative building materials (11) • Reduce environmental impacts of waste (9) • Apply waste hierarchy (8) • Reduce food losses and waste (8)
Material resource use objectives (64 in total)	• Sustainable use of natural resources (14) • Increase (material) resource efficiency (13) • Reduce environmental impacts associated with material use (10) • Reduce use of minerals (7)
Managing energy more efficiently and increased share of renewables (54 in total)	• Increase share of renewables/energy transition (14) • Improve energy efficiency in (certain) sectors (12) • Reduce greenhouse gas emissions (8)
Economic considerations — competitiveness and security of supply (54 in total)	• Green/sustainable economic growth (13) • Innovation/resource-efficient production/clean technology (12) • Secure supply of energy and raw materials (10) • Market introduction of innovative, resource-efficient technologies and services/ecodesign (9) • Increased competitiveness (8)
Conservation of natural resources (47 in total)	• Protect biodiversity (14) • More sustainable forest management (12) • Reduce waste of water/increase water-use efficiency (10) • More sustainable utilisation of land and soil (7)
Societal interests — education and consumption patterns (20 in total)	• Improve education/knowledge (7) • Decrease unsustainable consumption patterns (7)

Note: This table lists only those policy objectives that were mentioned by at least seven countries. However, these account for almost 80 % of the total reported and as such are considered representative of the most common priorities.

Box 3.8 Generational Goal, Sweden

Sweden does not aspire to adopt a dedicated resource efficiency strategy, but instead has a broader strategy that is intended to address several issues. Material resource efficiency is included in the so-called Generational Goal: the overall aim of environmental policy is to hand over a society to the next generation in which the major environmental problems have been solved without increasing environmental pressure outside Sweden's borders.

Along with the Generational Goal, there are 16 Swedish Environmental Quality Objectives, which provide directions on what should be achieved, how and at what pace. The Objectives cover several issues related to resource efficiency, although not always with quantitative targets.

For further information, see country profile.

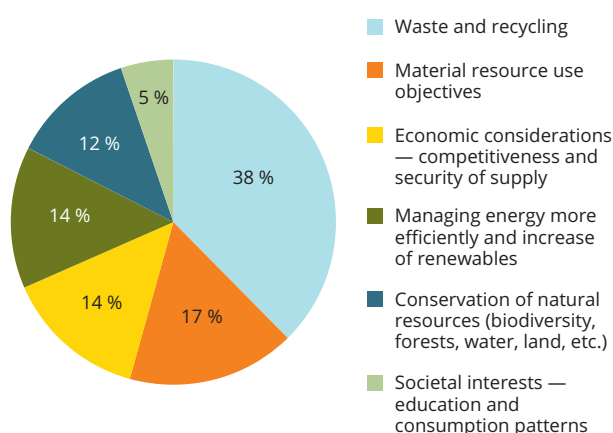
Overall, the responses show that individual countries have a wide array of needs and interests that call for continued economic growth, creation of jobs and improvement in competitiveness while reducing environmental pressures from the use of material resources and the consumption of energy.

It should be kept in mind that due to overlaps in scope, many goals cannot be easily separated from one another. Therefore, as a complement to the frequently mentioned policy goals listed in Table 3.1, Figure 3.2 presents the relative share of topics or categories of all the reported general policy objectives (totalling more than 380).

Such clustering shows that more than a third (38 %) of general policy objectives refer to waste management, including recycling, recovery and a circular economy approach (as in the Netherlands, for example, Box 3.9). This is in line with the list of priority resources discussed in Chapter 6, as well as with the apparent predominance of waste management initiatives for closing material loops in a circular economy (Chapter 7).

A further 17 % of the reported objectives can be regarded as specific to material resource use, while 14 % address economic considerations, and another 14 % refer to managing energy more efficiently and increasing the share of renewables in overall energy consumption.

Figure 3.2 Reported general policy objectives, clustered by main topic (*)



Note: (*) Details are available in Table 3.1.

Of reported policy objectives, 12 % focused on the conservation of natural resources such as biodiversity, forests, water, land, and marine resources, which are largely outside the scope of material resources.

Societal interests were emphasised by 5 % of the reported policy objectives. The former Yugoslav Republic of Macedonia was an interesting case in highlighting resource efficiency among mechanisms to ensure an integrated approach to economic, social and environmental concerns (Box 3.10).

Box 3.9 Preparing the ground for the circular economy, the Netherlands

The Dutch Ministry of Economic Affairs developed the National Policy for Green Growth in 2013. This is built on four pillars: smart use of market incentives; an incentivising framework with legislation that promotes dynamism; innovation; and the government as a network partner.

Specific challenges and opportunities are identified in eight domains, two of which are relevant to resource efficiency: the bio-based economy and using waste as a resource. The shift from waste to resource will contribute to a more circular economy. Several measures were formulated for the waste-as-a-resource theme:

- a pilot project for the introduction of a circular economy in a promising sector in order to gain experience with the transition process;
- a survey of the opportunities for and obstacles to a circular economy in the Netherlands (by mid-2013);
- a strategy for motivating consumers to help use resources efficiently;
- focusing the implementation of waste policy on targets for green growth and, specifically, on reducing the consumption of raw materials.

The Dutch approach to material resource efficiency focuses on the transition to a circular economy. This is described as 'an economic system based on the reuse of products and materials and the conservation of natural resources, coupled with the aim of creating value in every link of the system. In a circular economy, cycles are closed and chains designed to be as efficient as possible. Waste and emissions no longer exist, transference to humans and the environment is prevented, and the depletion of resources or the Earth system is no longer an issue'.

For further information, see country profile.

Box 3.10 Management of natural resources, the former Yugoslav Republic of Macedonia

General policy objectives are directed towards the management and protection of natural resources in the broad meaning, including biodiversity, air, water, soil, forest and land cover. Examples of specific objectives include the reduction of water pollution, air pollution and waste generation, as well as reuse and an increase in the amount of waste recycled. Other objectives relate to the protection of natural resources used in agricultural production, including soil and water, the increase of forest cover, and the rehabilitation of abandoned agricultural sites across the country.

For further information, see country profile.

Considerations for policy

- Only three countries — Austria, Finland and Germany — have dedicated national strategies for material resource efficiency. Two additional countries have dedicated regional strategies — Belgium (Flanders) and the United Kingdom (Scotland). Most countries incorporate material use and resource efficiency in a wide variety of other strategies and policies, including on waste and energy, industrial development and reform programmes, or in national environmental strategies.
- Since 2011, the number of programmes and policy initiatives incorporating material resource efficiency as an essential component has increased. This can be at least in part attributed to the adoption of the EU Flagship initiative for a resource-efficient Europe and the Roadmap to a Resource Efficient Europe.
- Material resource efficiency and waste management are viewed as very closely related issues. This indicates an opportunity to address both themes together, through, for example, the circular economy, recovery of secondary materials or industrial symbiosis initiatives.
- Energy and resource efficiency are still largely disconnected from a programmatic point of view. This might deserve more attention in future, as there are many potential synergies between the two in line with the Seventh Environment Action Programme (7EAP) objective to 'turn the Union into a resource-efficient ... low-carbon economy'.
- Some countries emphasised the potential contribution of material resource efficiency initiatives to addressing security-of-supply issues on the one hand, and economic competitiveness and (green) job creation on the other. This dimension may deserve stronger emphasis in future policies on material resource efficiency in light of growth and jobs being high on the policy agenda.
- In most countries, key concepts remain undefined, with countries commonly using fairly vague, catch-all notions of 'resource efficiency', 'natural resources' and 'raw materials'. The intuitive shorthand of 'doing more with less' seems sufficient for policy needs.

4 Scope of material resource efficiency

4.1 Introduction

This chapter complements the analysis in Chapter 3 by looking at whether and how countries define material resource use and resource efficiency.

The EEA analysis of country policies on resource efficiency carried out in 2011 showed that there was neither a clear definition nor a common understanding of key terminology. Terms such as resource efficiency, decoupling, or sustainable use of resources often seemed to be used as synonyms. Very few countries formally defined 'resources' in their policies, and some used the narrower 'raw materials' when addressing resource efficiency.

In order to examine how countries define resource efficiency in 2015, they were asked a multi-faceted question.

- Are the term 'resource efficiency' and the scope (which resources are addressed) explicitly defined? If yes, how? Are raw materials/material resource efficiency defined differently/separately, to distinguish them from the broad scope of resource efficiency? If yes, how? (Question 2)

Scope of material resource efficiency — undefined ... ?

The responses provided by the countries indicate that key terms and concepts continue to defy definition. Nineteen countries reported that neither the terms

nor the scope of 'resources', 'materials' or 'resource efficiency' are explicitly defined in their policies relating to material resource efficiency.

As of December 2015, three countries — Austria, Finland and Germany — adopted dedicated national material resource efficiency/raw materials strategies (Chapter 3). In addition, two dedicated action plans for material resource efficiency were adopted at the subnational level — the 2012 Flanders Materials Programme (Belgium), and the 2013 Safeguarding Scotland's Resources (United Kingdom).

These five strategies took very different approaches when defining the scope of material resources.

- **Austria's** strategy addressed raw materials, but also energy, air, water and land.
- **Flanders (Belgium)** specified substances that have been extracted, obtained, cultivated, processed, produced, distributed, put into use, discarded or reprocessed, or any objects that were produced, distributed, put into use, discarded or reused, including the waste originating from them.
- **Finland's** strategy was concerned with natural resources used in production, and waste and secondary raw materials.
- **Germany** addressed abiotic, non-energy resources, supplemented by the material use of biotic resources.

Box 4.1 The scope of material resource efficiency used in this report — and water as a special case

As explained in the 'Background' chapter, the main focus of this report is on material resources. Thus the scope includes biomass, non-metallic minerals, metal ores and fossil energy materials, as well as secondary raw and waste-derived materials. Also within the scope of this report are the transformations that these material resources undergo throughout their full life cycle — extraction, their use in production, end-user consumption and disposal — and closing material loops in a circular economy.

Water is not included within the scope, partly to ensure consistency with indicators under the Eurostat material flow accounting (MFA) framework, and also because water is subject to its own regulatory framework. It is worth noting, however, that ten countries reported water as one of their core areas for resource efficiency. Efficiency of water use was almost always mentioned in the context of optimising its use in production or adequate water supply as an essential public service.

- **Scotland (United Kingdom)** focused on energy, water and materials.

As shown in Chapter 3, a large majority of countries do not have a dedicated resource efficiency strategy, and address the topic as part of other policies instead. There, the most common approach was to leave the scope undefined, or to make general references to EU resource efficiency policies, which tend to apply the broad notion of natural resources (Chapter 1). Furthermore, very few countries reported distinguishing the broad notion of natural resources from the more narrowly defined material resources.

It is noteworthy that for many countries the topics of energy efficiency and the reduction in energy demand tend to be considered to lie outside the scope of material resource efficiency (Box 4.2).

Belgium, the Netherlands and Scotland (United Kingdom) mentioned the circular economy when addressing the scope of material resource efficiency. In the Netherlands, the entire approach to material resource efficiency is anchored in the concept of the circular economy (Box 3.9).

... and unmeasurable?

A few countries reflected on the metrics they use for material resource efficiency.

The Austrian Resource Efficiency Action Plan (REAP) defines resource efficiency as the ratio between monetary output and the input of natural resource materials, energy, water, air and land. Gross domestic product (GDP) relative to domestic material consumption (DMC) is used as the indicator for the adopted targets. Regular reporting on material resource use is made possible through the annual collection of relevant data within Austria. This allows for continually maintaining a clear picture of the

material dimensions of the Austrian economy and provides an important basis for REAP and RESET2020 (Box 3.1).

Switzerland does not formally define material resource efficiency. Environmental resource efficiency is, however, understood as 'environmental impact compared to the economic performance of the Swiss economy', and it is operationalised as domestic final demand in monetary terms divided by consumption-based environmental impacts. While production-based environmental impacts are usually compared to GDP, the economic factor directly comparable to environmental pollution from the consumption perspective is domestic final demand. It is the sum of the consumption expenditure of private households, state final demand and macroeconomic investments.

Denmark has experimented with operationalising resource efficiency at the sector level, producing indicators that take into account added value (Chapter 10).

Other countries reported using a rather indirect, catch-all understanding of material resource efficiency, as illustrated by selected examples presented in Box 4.3.

All in all, only a few distinct national approaches emerge concerning the scope and definition of material resource efficiency. The most common approach is to leave the scope of key terms undefined.

When responding to the question on indicators used to measure resource efficiency (Chapter 10), 17 countries mentioned the lead resource productivity indicator of GDP/DMC. Furthermore, nine countries adopted national targets for resource productivity based on the lead indicator (Chapter 9). This shows that most countries follow the direction of policies adopted at the EU level, without necessarily seeing the need to adapt the scope or indicators to the national situation.

Box 4.2 Energy efficiency policies versus material resource efficiency

Energy use- and efficiency-related initiatives were mentioned as part of the material resource efficiency agenda by 12 countries. This is not fully consistent with the relatively high number of countries reporting on energy in the context of priority resources or targets. At the same time, however, it seems to confirm that most countries consider energy efficiency (and related topics such as reducing energy consumption or increasing the use of renewables) as subject to a separate policy framework, outside the scope of material resource efficiency. It is worth keeping in mind that even those countries that did not report energy-related policies as part of material resource efficiency will nonetheless have adopted one or more such policies.

Box 4.3 Examples of indirect definitions of material resource efficiency

Estonia: 'achieving sustainable economic growth which means continuous development of a more resource-efficient, nature-conserving and competitive economy'.

Finland: resource efficiency in production means 'the sparing use of natural resources, the effective management of side flows and wastes, a reduction in the volume of waste and the recycling of materials in different phases of a product's life cycle'.

Germany: 'doing more with less raw materials'.

Ireland: 'living better while using less' and 'preventing unnecessary and inefficient consumption of water, energy and resources; recovery of residual resources from waste streams; and clever reuse of end-of-life goods'.

Netherlands: the focus of resource efficiency policies is on transition to a circular economy as 'an economic system based on the reuse of products and materials and the conservation of natural resources, coupled with the aim of creating value in every link of the system'.

Portugal: 'optimised resource management aimed at increasing productivity and maximising its use (reuse, recycling, energy efficiency) while reducing carbon intensity'.

Serbia: 'maximum efficiency in the use of resources and the decrease in losses in all phases of the life cycle of resources'.

Spain: 'reduced and efficient use of raw materials and energy, doing more with less raw materials, and renewable energy alternatives'.

England (United Kingdom): 'using the Earth's limited resources in a sustainable manner while minimising negative impacts on the environment'.

Scotland (United Kingdom): 'using the least amount of resources (energy, water and materials) to maximum effect — cutting overheads and improving productivity by creating more with less'.

For further information, see country profiles.

Considerations for policy

- Key concepts, including resource efficiency and the scope of material resources, continue to remain vague or poorly defined, both in national policies and at the EU level. This may not be a problem since countries are invited and encouraged — rather than required — to develop resource efficiency strategies. With such a vague scope, however, it is difficult to carry out an insightful assessment of progress towards resource efficiency objectives.
- While the integration and exploitation of synergies are essential, the concepts of circular economy and resource efficiency have a different history and different indicators. The shortcomings in available metrics highlight the need for further development of indicators for material resource efficiency and closing material loops. One option, drawing on the Swiss and Danish examples, could be to focus attention on resource efficiency in individual economic sectors or specific industries, where measurements and indicators can provide guidance and a meaningful impulse for policy development.
- Energy efficiency, including reduction in energy demand, is generally subject to its own policy framework, and is often considered to be outside the scope of material resource efficiency. However, it may be worth strengthening the synergies between the two, reflecting the Seventh Environment Action Programme (7EAP) objective to 'turn the Union into a resource-efficient, green and competitive low-carbon economy'.
- Countries fairly frequently presented national waste prevention plans (required by the Waste Framework Directive) and waste recycling policies as a national material resource efficiency strategy. It is worth keeping in mind that the transition to a circular economy and the closing of loops will need to go beyond the management of waste, requiring significantly extended value chains and life cycles.
- Limited attention was paid in country responses to the EU list of critical raw materials, even though securing access to resources has been an area of growing concern in recent years. While this may be due to survey respondents not being involved in the work on raw materials initiatives, it also indicates opportunities for stronger outreach regarding the increasing number of initiatives concerned with supply.

5 The driving forces of material resource efficiency

5.1 Introduction

Countries were invited to identify the major factors and concerns that drive their work on material resource efficiency policies.

- What are the major factors and concerns that drive material resource efficiency policies in your country? (Question 5)

Every single one of the 32 participating countries responded, although the level of detail varied significantly, ranging from listing one or two generic drivers, such as 'protecting the environment' or 'economic development', to a detailed analysis of local conditions followed by a discussion on how material resource efficiency policies can help address problems.

All in all, countries reported a total of 214 policy drivers. Similarly to the results of the 2011 review, *Resource efficiency in Europe*, factors frequently reported to drive material resource efficiency policy can be roughly grouped into:

- those related to economic interests, such as increasing competitiveness, securing access to raw materials and energy and improving production efficiency;
- those related to environmental concerns, such as reducing pressures on the environment, preventing environmental degradation or reducing greenhouse gas emissions;
- regulatory requirements, such as national or EU regulations, compliance with international targets and commitments or transposition of EU *acquis*;
- other drivers.

However, in contrast to the situation in 2011, when environmental and economic considerations were quite evenly balanced, in 2015 economic considerations became the most important factor (51 % of all the drivers mentioned, reported by 30 countries). This was followed by environmental concerns (28 % of drivers, reported by 28 countries), various other drivers (11 % of the total, reported by 16 countries), and last but not least, regulatory requirements (10 % of drivers, reported by 14 countries) (Figure 5.1).

Table 5.1 presents a summary of the most frequently mentioned drivers and responses; further details are available in individual country profiles.

Most countries reported a combination of three or four categories, though some mentioned more (Boxes 5.1–5.6).

Figure 5.1 Reported drivers by category

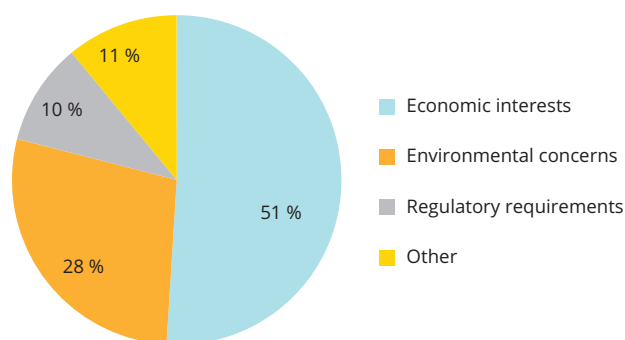


Table 5.1 Summary of drivers reported by countries (mentioned by four or more countries)

Economic interests	110 mentions, reported by 30 countries
Increase competitiveness	20
Secure supply of raw materials and energy	17
Reduce dependence on imported resources	14
Job creation and employment	12
Increase use of secondary raw materials and closing material loops	10
Create new market opportunities/green jobs	10
Improve performance of the energy sector	7
Improve production efficiency	6
Provide impulse to economic growth	6
Reduce exposure to volatile prices	4
Concerns about scarcity of resources	4
Environmental concerns	60 mentions, reported by 28 countries
Reduce pressure on the environment (including pollution and degradation of the environment)	21
Better waste management	12
Reduce greenhouse gas emissions	9
Sustainable use and management of resources	9
Reduce use of resources	5
Protect human health	4
Regulatory requirements	21 mentions, reported by 14 countries
Compliance with EU legislation/targets	10
Compliance with national legislation/targets	7
Compliance with international commitments	4
Other drivers	23 mentions, reported by 16 countries
Reduce social impacts/address social concerns	6
Sustainable consumption and production, and helping consumers make better choices	4

Box 5.1 Policy drivers, the Czech Republic

The Czech Republic identified a comprehensive set of policy drivers of material resource efficiency, including:

- the need to secure raw materials;
- promoting the competitiveness of the Czech economy;
- ensuring access to critical raw materials;
- creating new jobs and addressing social issues;
- protecting the environment and human health;
- increasing the use of waste as a source of raw materials;
- compliance with EU and national legislation.

For further information, see country profile.

5.2 Economic interests

The predominance of economic factors seems to indicate that countries consider material use and resource efficiency to be a core economic and strategic issue, and that the logic of doing more with less has now been widely embraced. This is a good sign with respect to the second priority objective of the Seventh Environment Action Programme (7EAP) to 'turn the Union into a resource-efficient, green and competitive low-carbon economy'.

The need to increase competitiveness was the single most recurrent driver for those countries declaring an economic interest in resource efficiency, either with the goal of maintaining a prominent position among competitors, or with the ambition to catch up with the performance of other countries.

Another notable policy driver reported by countries was to secure their supply of raw materials and energy, and to reduce dependence on imported resources. While the majority of countries generically mentioned concerns about access to raw materials, some, including Denmark and Turkey, were more specific, mentioning fuels or water.

Several countries referred to the creation of new jobs in green sectors, or job creation in general, as one of the drivers of their material resource efficiency policies. Some — including Belgium, France, Germany, Latvia (Box 5.2), the Netherlands (Box 5.3) and Portugal — identified material resource efficiency as a strategy for providing a new impulse to economic growth.

Taken together, the two somewhat related objectives of raising production efficiency and improving the

performance of the energy sector were also a very frequently mentioned driver of material resource efficiency policies.

Somewhat surprising was the fact that only a few countries mentioned the need to reduce exposure to volatile prices (4) and concerns about scarcity of resources (4). However, it seems that for many countries these two categories were often implicitly acknowledged when mentioning concerns about security of supply.

Only Denmark provided answers that reflect company perspectives, stating that material resource efficiency in the latter sector is 'foremost driven by cost saving'.

5.3 Environmental concerns

The predominance of economic interests notwithstanding, environmental concerns, too, are a strong driver of the development of material resource efficiency policies. In fact, the goal of alleviating pressure on the environment and reducing environmental pollution and degradation was the single most frequently mentioned driver of all.

Twelve countries identified the need to improve waste management — primarily an environmental concern — as a driver of material resource efficiency. Interestingly, another ten countries pointed out the need to increase the use of secondary raw materials and to close material loops, which is the economic dimension of improved waste management.

Nine countries specifically referred to the need to reduce greenhouse gas emissions as a driving force of

Box 5.2 Driving forces for material resource efficiency, Latvia

Latvia listed five essential driving forces for material resource efficiency policies.

- EU requirements and international obligations are the most powerful driver. The requirements of the EU directives, especially in the fields of waste, energy and climate change, help countries to set quantitative targets and rigid time frames in national policies, and legislative norms to reach them.
- Energy independency and security is another powerful factor due to the Latvian geopolitical situation and energy supply pattern.
- Competitiveness (and market forces) is a driving force for the efficient use of resources, particularly in the energy and transport sectors (railway and transport of goods).
- Environmental sustainability in general is an important factor as it implies a sustainable use of domestic natural resources, the use of renewable energy sources, and sustainable production and consumption.
- Economic development and the need for materials and energy resources, especially for agriculture and for energy- or material- intensive industries.

For further information, see country profile.

resource efficiency. Mitigation of climate change was sometimes mentioned together with reducing the use (and import) of energy and improving competitiveness (Box 5.4). In addition, nine countries reported ensuring the sustainable use and management of resources as a driver, with a further four aiming to actually reduce the use of resources.

Only a few countries, for example Germany, Hungary, the Netherlands (Box 5.3) and Portugal, identified a comparable number of environmental concerns and economic interests as drivers of their material resource efficiency. In most countries, economic drivers outnumbered those related to environmental concerns, although some, including Lithuania and Sweden, stated that environmental concerns were the predominant driver.

All in all, it appears that preservation of the environment and the efficient use of materials are increasingly seen as constituting an approach that simultaneously safeguards environmental and economic interests. According to country responses, scarcity of resources, security of supply and exposure to high resource costs are problems that can be tackled by rationalising the use of material resources, which — in turn — will protect the environment.

Only four countries — Belgium, the Czech Republic, Hungary and Poland (Box 5.5) — reported concerns about human health as a policy driver for material use and resource efficiency. This is perhaps surprising when the third strategic objective of the 7EAP is to 'safeguard the Union's citizens from environment-related pressures and risks to health and well-being'.

Box 5.3 Driving forces for material resource efficiency, the Netherlands

A number of major factors drive resource efficiency in the Netherlands:

- the securing of raw materials, dealing with geopolitical threats and the efficient use of raw materials;
- economic growth through cost savings and the creation and exploitation of economic opportunities;
- a reduction in environmental impact through more efficient and effective use of raw materials, less waste, less landfill and incineration, and lower emissions;
- employment growth;
- sustainable use and restoring natural capital.

For further information, see country profile.

Box 5.4 Policy drivers, Ireland

A broad spectrum of policy drivers in Ireland includes the following:

- competitiveness, a key driver with a clear focus on policies for reducing the costs of energy, materials, water and waste management;
- national economic and social development ambitions, which are based around a recognition that scarcity of fossil fuels, the impact of climate change and the need to fundamentally change the way we use the Earth's finite resources will be key drivers of how we evolve as an economy and as a society;
- strategic goals and regulatory requirements, mostly originating from the EU, which have been an influential foundation for resource efficiency approaches — for example the Europe 2020 strategy or, looking further back, the waste hierarchy;
- national energy policy, which has been driven by three primary objectives: security of supply, environmental protection and cost competitiveness (Ireland imports 90 % of its energy, so greater energy independence through increased use of renewable energy alternatives is important to ensure security of supply);
- sustainable availability of raw materials, which is a significant factor for continued prosperity in a highly open economy with a growing manufacturing sector.

For further information, see country profile.

Box 5.5 Policy drivers, Poland

Among the most important factors are:

- concerns about security of supply of raw materials;
- striving for increased competitiveness of the economy;
- health issues and the standard of living, including a better state of the environment.

For further information, see country profile.

5.4 Regulatory requirements

Compared with the first two categories, compliance with regulatory requirements (accounting for 10 % of all reported drivers) seems to play a rather limited role in stimulating the development of resource efficiency policies. Nonetheless, two particularly important regulatory factors reported by countries were compliance with national regulations and requirements set by the EU.

Seven respondents mentioned complying with national objectives or targets as the dominant driver within this category. A broad range of strategies reaching to 2020 or 2030 were cited, mostly addressing energy, as was the case with Estonia and Turkey, and sustainable development, as with Wallonia (Belgium) and Croatia.

Intriguingly, only eight EU Member States — Croatia, the Czech Republic, Ireland, Italy, Latvia, Lithuania, Portugal and Slovakia — identified compliance with EU requirements as a driver for national policies on

material resource efficiency. This may reflect the fact that the current regulatory framework for material resource efficiency is still limited, with few hard targets. At the same time, the significance to countries of energy and waste policies shows that EU policies can — and indeed do — provide a powerful impetus where the regulatory regime is strong and/or includes targets.

Compliance with the EU environmental *acquis* was mentioned by two candidate countries — the former Yugoslav Republic of Macedonia and Serbia. The former Yugoslav Republic of Macedonia also reported that material resource efficiency is an integrated approach for addressing economic, social and environmental concerns.

It is noteworthy that practically all countries seem to approach material resource efficiency as a domestic issue of relevance within national borders. Only Germany explicitly identified global responsibility as one of the key guidelines for its national resource policy (Box 5.6).

Box 5.6 Guiding principles, Germany

Four guiding principles were adopted during development of the German Resource Efficiency Programme (ProGress). They included:

- combining environmental necessities with economic opportunities, innovation and social responsibility;
- recognising the country's global responsibility in its national resource policy;
- making economic and production practices less dependent on primary resources and strengthening closed-cycle management;
- securing long-term sustainable resource use and quality growth.

For further information, see country profile.

5.5 Other drivers

Finally, 16 countries reported a total of 23 additional drivers. In contrast to the three categories discussed above, however, this was a very disparate group, comprising drivers typically mentioned by just one or two countries.

One driver in this category that received several mentions was the need to reduce social impacts and to address social concerns (Czech Republic, the former

Yugoslav Republic of Macedonia, Germany, Hungary, Ireland and Poland). Finland, the former Yugoslav Republic of Macedonia, Latvia and Turkey mentioned sustainable consumption and production as a driver, and the need to help consumers make better choices. Finally, three countries — Austria, Bulgaria and the former Yugoslav Republic of Macedonia — commented that their economies offered good potential for improving resource efficiency.

Other drivers were mentioned by single countries.

Considerations for policy

- Although many national policy initiatives result from EU legislation, only eight EU Member States explicitly pointed to compliance with EU requirements as a policy driver. It is not clear why this is the case. One reason could be that material resource efficiency is now perceived as a strategic economic issue of national concern that countries are addressing in their own interests, so they see less need for guidance from the EU. Another reason could be the limited EU regulatory regime for material resource efficiency.
- Reducing dependence on imports and securing stable access to resources were shown to be some of the most important concerns, but few countries specifically referred to the EU list of critical raw materials. This may signal a need to intensify communication efforts on EU raw materials initiatives.
- At present, only about a third of responding countries identified the concept of a circular economy and closing material loops as a policy driver for material resource efficiency. This may change in the near future as a result of the new EU Communication on Circular Economy published in December 2015.
- Concerns about health and well-being, one of the strategic objectives of the Seventh Environment Action Programme (7EAP), play only a marginal role in driving work on material resource efficiency policies. While resource efficiency today is primarily seen as an economic issue with a strong environmental component, its potential to benefit health and well-being is also worth emphasising and illustrating in practice.
- Continued effort is needed to demonstrate the benefits of material resource efficiency as a synergistic approach to reduce environmental pressures, address economic challenges and tackle climate change at the same time. Perhaps the last of these three elements — which was explicitly acknowledged by only nine countries — requires greater attention.
- Surprisingly, very little was mentioned about the link between resource efficiency and innovation, education and social considerations. This is perhaps something to reflect on in light of the Europe 2020 objective to achieve smart and inclusive growth.
- Only two countries commented on the business and industry perspective. This was not unexpected given that the respondents mostly come from environmental administration. However, it also shows that there is space for awareness raising to position material resource efficiency as a means of improving competitiveness and production efficiency, or as a way of creating niche market opportunities.
- Pressure from the public, business or the media does not appear to play a prominent role as a driver. This indicates the need for continued work to increase awareness of the importance of material resource efficiency and the opportunities it brings.

6 Priority material resources, industries and consumption categories

Three different dimensions of country priorities in material resource efficiency were explored:

- individual types/categories of priority material resources (Question 6);
- priority industries/economic sectors (Question 8);
- priority consumption categories for material resource efficiency policies (Question 9).

Almost all countries (31, or 97 % of respondents) reported having identified priority materials, industries/economic sectors or consumption categories. This was done either within a dedicated material resource efficiency strategy or plan, or as part of energy efficiency or waste management plans, or in broad-spectrum national resource-related or environmental strategies.

Figure 6.1 summarises the material resources that countries reported as a priority, grouped into related categories.

The largest group (112 reports by 27 countries) comprises a range of waste and secondary materials.

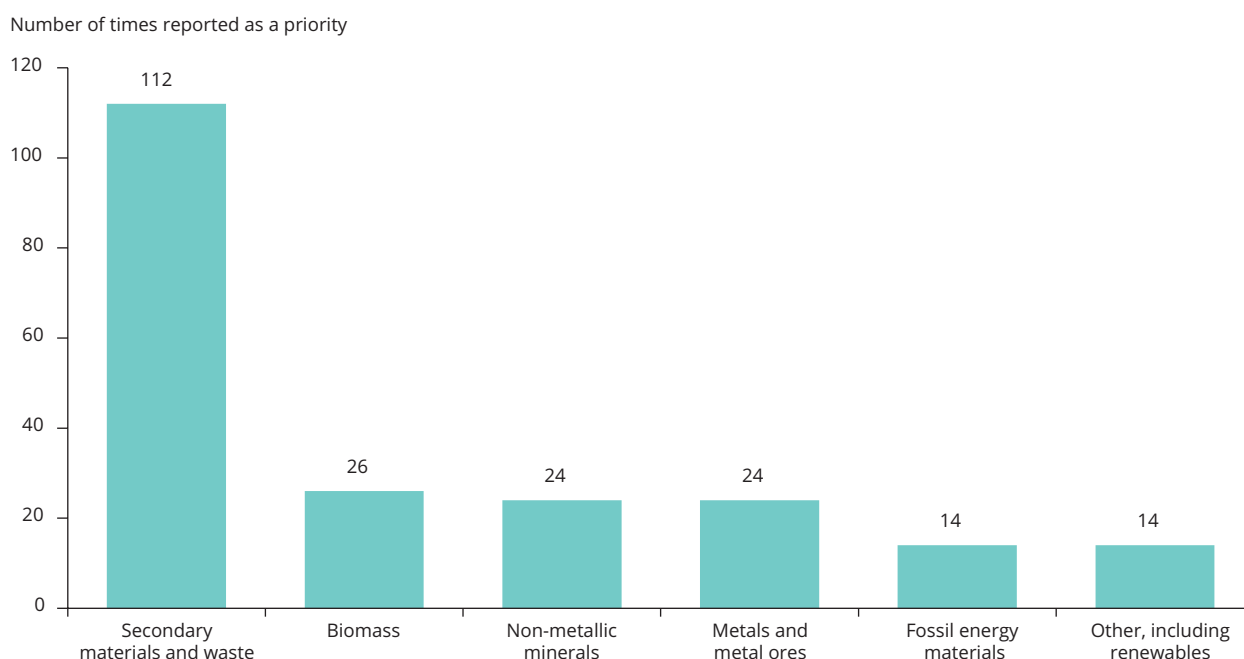
This was followed by different types of biomass, which was noted 26 times by 18 countries. Wood was the most common material in this category (mentioned 15 times), primarily as timber and only in a few cases as a renewable energy carrier.

In the non-metallic minerals group (24 reports by 19 countries), construction minerals were most commonly mentioned (by 10 countries).

Metals and metal ores were mentioned as priority materials by 18 countries (24 reports).

Relatively few countries reported fossil fuels as a priority (14 mentions by 11 countries) and renewables (12 mentions in the category 'other' by 12 countries). This is probably because in a majority of countries energy is considered a separate policy field.

Figure 6.1 Priority materials by broad category and number of times reported as a priority



Country replies are discussed in more detail below. However, it may first be worth reflecting on the criteria behind the selection of priority materials.

Most countries did not address this specifically in their responses. However, looking at the most frequently reported materials — plastics and packaging,

construction and demolition waste, wood and timber, food waste and biowaste, renewables, and batteries and waste electrical and electronic equipment (WEEE) — it is clear that most of them are closely linked to recent EU policy priorities. However, quite a few countries applied their own indigenous criteria, some of which are presented in Box 6.1.

Box 6.1 Some reported criteria for selecting priority materials and/or industries

Austria: critical materials used in industry (mainly the high-value metals industry, car industry, renewable energy industry and electronics industry).

Belgium, Federal level: the importance of markets/sectors in terms of the percentage of gross domestic product (GDP) they represent, the potential for improvement in terms of resource use within these sectors, the potential for environmental benefits, the Belgian position with regard to direct competitors, and possibilities for action.

Wallonia (Belgium): the potential for economic recovery of stocks and local flows of secondary materials that are presently poorly exploited, or are exported when they could be reused in Wallonia.

Czech Republic: the importance of the commodity for Czech industry (as input for production), the mass production of secondary raw materials, and the commodity's potential for use in the Czech Republic and its significance.

Denmark: a mixture of economic, environmental and social priorities.

Estonia: the main raw materials that bring social and economic benefits.

France: among other criteria for inclusion, the use of priority metals in green technologies needed to support the low-carbon ecological transition.

Germany: raw materials declared as critical on the basis of country concentration, company concentration and country risk.

Latvia: waste categories identified as essential sources of secondary raw materials on the basis of their recyclability, the availability (and affordability) of technologies, infrastructure capacity for collecting and separating waste, and the economic feasibility of such operations. Concerning priority sectors, the general approach is to address resource efficiency from the perspective of competitiveness and the availability of resources.

Lithuania: the priority waste streams that have the largest negative impact on the environment and public health, and create large quantities of waste compared to other streams.

Netherlands: the vulnerability of the economy to supply risks weighed against the economic importance of the selected materials. In addition, selection criteria for a specific material, product or sector are based on a mix of factors including waste volume and weight, environmental impact, economic impact, political impact and the willingness of relevant stakeholders to cooperate. A value-chain selection method (for ten key value chains) has been developed on the basis of economic or environmental impact and value preservation or transition potential.

Norway: the reasons for choosing edible food waste as a priority material are linked to the negative environmental effects of the production, transport and storage of food and from the waste treatment of discarded food. In addition, by reducing edible food waste, global food resources are conserved.

Poland: critical raw materials understood as important for the growth of Polish industry and simultaneously as problematic due to possible supply risks.

Switzerland: key sectors identified through life-cycle analysis.

Turkey: to secure the supply of raw materials that are essential and critical to the Turkish economy (...) and to reduce import dependency. Regarding sectors, those with low levels of efficiency, high levels of resource consumption and high levels of import dependency are identified as priority.

United Kingdom: metals and minerals that have been identified as critical by many UK businesses.

Secondary materials and waste

The majority of reporting countries consider waste or secondary materials a priority; 81 % of them (26 countries) identified a number of specific types of waste in their replies on priority materials. Key waste streams are plastic and packaging (17 countries), construction and demolition waste (16), and batteries and WEEE (11). Food waste was listed by 15 countries as a priority material, which, if combined with an additional 11 mentions of biowaste, would make the largest single category in this group.

The prioritisation of waste or secondary materials seems to be largely driven by EU legislation, which sets limits for the share of waste going to landfill and for preventing and reducing the environmental impacts of waste, particularly packaging. Due to a growing number of policy initiatives at the EU and national levels, waste is also increasingly perceived as a potential resource for industry — for example in the manufacturing, construction and energy sectors.

Accounting for about a third of all waste generated in Europe, and increasingly subject to EU policy initiatives, construction and demolition waste was reported as a priority stream by half the countries. Its role in countries' waste prevention programmes was mentioned by, among others, Austria, Belgium, Denmark, Italy and Sweden.

Food waste, which was identified as a priority material by 15 countries, was also frequently mentioned as a priority

concern in waste prevention or other programmes, including in Flanders (Belgium), France, Ireland and Sweden (for more details on food waste initiatives, see Box 8.6). The reasons for focusing on food waste seem to be EU waste policies and the EU Roadmap to a Resource Efficient Europe on the one hand, and the significant potential for reducing greenhouse gas emissions from waste management operations on the other.

Non-metallic minerals and metals and metal ores

Countries emphasised the efficient use of minerals — and within this category construction materials in particular — in part because of the resulting economic benefits, although the reduction of environmental impacts was also considered. In most countries, non-metallic minerals make up half of total material consumption.

Twelve countries reported having dedicated plans or strategies related to the sustainable supply and use of minerals and/or metals. The key drivers appear to be economic ones — managing national resources and securing supplies for the economy.

Some countries, including France, the Netherlands, Poland (Box 6.3) and Turkey, are in the process of compiling lists of materials that they identify as critical to their own economies. These lists are being developed independently of the EU list of critical raw materials, although the latter seems to be taken as a useful starting point.

Box 6.2 Specific product groups targeted by a recycling fund, Iceland

Iceland's authorities have set the goal of systematically reducing waste generation and channelling waste into reuse and recovery; the Act on Recycling Fees was passed to this end. The Icelandic Recycling Fund was charged with creating favourable economic conditions for the reuse and recovery of waste, lowering the volume of waste going to final disposal and ensuring the proper disposal of hazardous substances.

The fund builds on the principle of extended producer responsibility and applies economic incentives to establish practical arrangements for waste processing, charging producers and importers a fee for the following: motor vehicle waste, paper packaging, plastic packaging, tyres, bale plastic, hazardous waste and electronics. The fund contracts out waste processing services and uses the recycling fee to cover the cost.

For further information, see country profile.

Box 6.3 Identifying nationally critical materials, Poland

Poland is preparing an Action Plan on Security of Non-energy Raw Materials. An important part of it will be the identification of critical raw materials — those which are vital for the growth of Polish industry and simultaneously problematic due to possible supply risks. The analysis will therefore take into account the development prospects of Polish industry (based, among other things, on National Intelligent Specialisations). It can thus be expected that the Polish list of critical raw materials may not be consistent with the EU critical materials list. The Action Plan, including the national list of critical raw materials, is expected to be finalised in 2016.

For further information, see country profile.

Energy carriers

Although in most countries energy policy is considered to be a separate policy field, 18 countries mentioned energy carriers as priority materials, including 14 reports on fossil energy carriers and 12 on renewables. The prioritisation of fossil fuels and the use of biomass as a renewable source of energy are mostly driven by countries' energy efficiency plans and, more generally, by climate change policies. Other factors include efforts towards sustainable management of national resources, and ensuring the country's energy security, as is the case for Estonia, Poland and Slovakia (Box 6.4).

Biomass and renewables

Concerning biomass-based renewables, emphasis is increasingly on the use of biowaste and agricultural by-products as energy sources, while the use of wood is moving towards material utilisation first — for example in construction and furniture making — and as an energy

source second. However, the focus changes from one country to another. Poland, for example, emphasised the use of wood as a material (timber) rather than a fuel. In Wallonia (Belgium), the January 2012 economic policy of the wood sector emphasises the use of quality indigenous wood. Bulgaria reported developing a national scheme for the sustainable production and consumption of wood biomass for energy purposes. Latvia also reported biomass as playing a significant role in the country's energy mix.

Other priority resources

Although technically outside the scope of material resources for this review (see 'Background' chapter), water was mentioned by eight countries as a national priority resource. Concerns about aquatic resources included the prevention of shortages on the one hand and maintaining environmentally acceptable water quality on the other. Belgium also mentioned water's industrial use as a principal national asset.

Box 6.4 Priorities in raw materials policy, Slovakia

Slovakia's Raw Materials Policy aims to ensure the sustainable use of minerals and domestic raw material resources. Four strategic raw material categories were identified as a priority for the national economy.

Crude oil and natural gas: domestic geological reserves are negligible relative to total consumption. Emphasis is placed on balancing imports with the construction of the necessary reserve storage capacities for oil and petroleum products and the development of underground natural gas reservoirs.

Coal: efficient use of domestic brown coal and lignite is considered crucial for securing electricity supply.

Metals: geological reserves are limited; raw materials for industry's needs are provided by imports.

Industrial minerals mined in Slovakia: magnesite, cement materials, rock salt, high-purity limestone, bentonite, zeolite, ceramic clays, gypsum, anhydrite and talc are crucial for the development of domestic industrial infrastructure and for export.

For further information, see country profile.

Linking materials to local conditions

It is worth noting that the prioritisation of materials or sectors varies widely between countries, driven by local needs and conditions and the availability and use of materials. However, material resource efficiency policies seem to play a relatively minor role compared to that played by EU waste legislation and countries' energy efficiency and renewable energy policies. Specific plans and strategies for securing access to material resources were reported by 12 countries (including the United Kingdom, Box 6.5), whereas energy- or waste-related plans and regulations were mentioned by 22.

Overall, countries reported a wide variety of priority material resources, indicating that the majority adopt a

broad understanding of the term 'resources', extending well beyond raw materials.

6.1 Priority industries and economic sectors

The question on priority material resources (Question 6) was complemented by the question on which individual industries and/or economic sectors have been identified as a priority for material resource efficiency (Question 8).

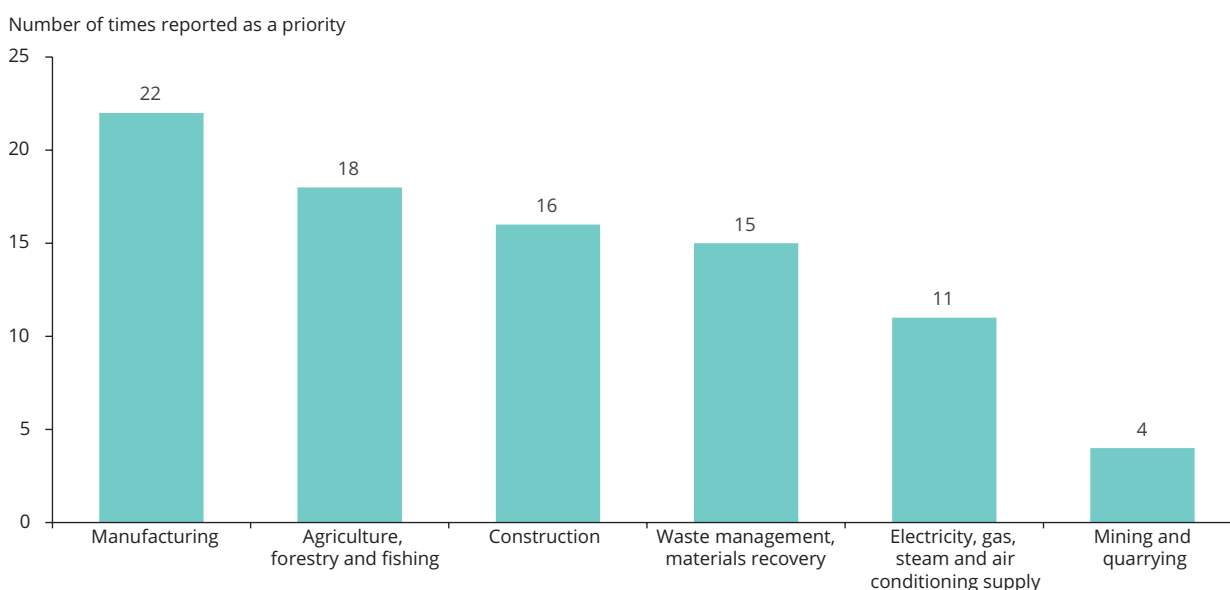
Almost every country (31 countries or 97 % of respondents) reported on industries identified as a priority for material resource efficiency. Figure 6.2 presents a summary of the main priority industries and economic sectors.

Box 6.5 Resource Security Action Plan, the United Kingdom

The United Kingdom's Resource Security Action Plan (2012) was developed in response to private-sector concerns about the availability of some raw materials. The Plan lays out how the government recognises these issues, providing a framework for business action to address resource risks, and sets out high-level measures to build on the partnership that is developing between government and businesses to address resource concerns. The scope of the Action Plan covers a broad range of renewable and non-renewable resources not covered by government policies on energy and food. Considerable focus is currently on metals and minerals that have been identified as critical by several UK businesses. Acknowledging that supplies of most resources are not expected to run out, the focus is on resource security rather than scarcity.

For further information, see country profile.

Figure 6.2 Priority industries and economic sectors (reported by four or more countries), grouped by NACE (*) classification



Note: (*) Nomenclature générale des Activités économiques dans les Communautés Européennes, i.e. the statistical classification of economic activities in the European Community.

Manufacturing industry was mentioned most frequently (22 replies). Raw material-intensive manufacturing encompasses various production sectors, including the chemicals industry — a priority for Belgium, Germany, Finland and Slovenia, amongst others — and appliances — a priority, for example, in the Czech Republic and Slovakia.

Other frequently mentioned sectors were agriculture, forestry and fishing (18 replies), followed by construction (16 replies), and waste management and material recovery (15 replies).

The service sector — currently accounting for some 70–75 % of GDP in most European economies —

is potentially significant with respect to material use and the resource efficiency of the economy. Considering this, it is somewhat surprising that only a very few countries mentioned service-oriented sectors among their priorities — including the former Yugoslav Republic of Macedonia (Box 6.7) and Spain (Box 6.8).

This may perhaps be explained by the fact that services tend to be more labour intensive and generally use smaller quantities of materials than industry (with the notable exception of transport). However, in light of the large share of services in the economy, it remains an important area for material use and resource efficiency policies.

Box 6.6 Waste prevention and the manufacturing industry, Denmark

The Denmark Without Waste II — Strategy for Waste Prevention pays specific attention to increased resource efficiency through the prevention and recycling of construction and demolition waste, food, electronics, textiles and packaging. Denmark has analysed material use and related costs in its key industrial sectors. Manufacturing has the highest share of materials in production costs, and material resource efficiency in production is therefore of considerable importance for Danish competitiveness. In manufacturing, the sectors with the highest relative production costs for the use of materials are food and beverages (58 %), machinery (10 %) and the manufacture of metals (7 %).

For further information, see country profile.

Box 6.7 Eco-labels in the tourism industry, the former Yugoslav Republic of Macedonia

The tourism industry was identified in the former Yugoslav Republic of Macedonia as one of its priority sectors for resource efficiency. Dedicated legislation was introduced on eco-labels for tourist facilities. It defines limits for energy and water consumption, as well as addressing waste management in tourist facilities (with respect to classification, selection and transport of waste). Furthermore, support is provided for the use of renewable sources of energy and the promotion of environmental education. The Ministry for Environment and Physical Planning is responsible for overseeing eco-tourism labelling.

For further information, see country profile.

Box 6.8 The service sector as a priority, Spain

Among the reported priority economic sectors for material resource efficiency in Spain is the service sector, including tourism. One efficiency measure is a voluntary agreement that aims to achieve 100 % separate collection of used kitchen oil from the country's 360 000 hotels and restaurants, and to use it for energy recovery in biofuel plants.

For further information, see country profile.

6.2 Priority consumption categories

The consumption patterns of private households and public purchasers are an important factor driving material use and resource efficiency. Steering demand towards more resource-efficient goods and services can have a strong impact on overall material use and efficiency. Figure 6.3 presents the foremost national priority consumption categories reported by countries (Question 9).

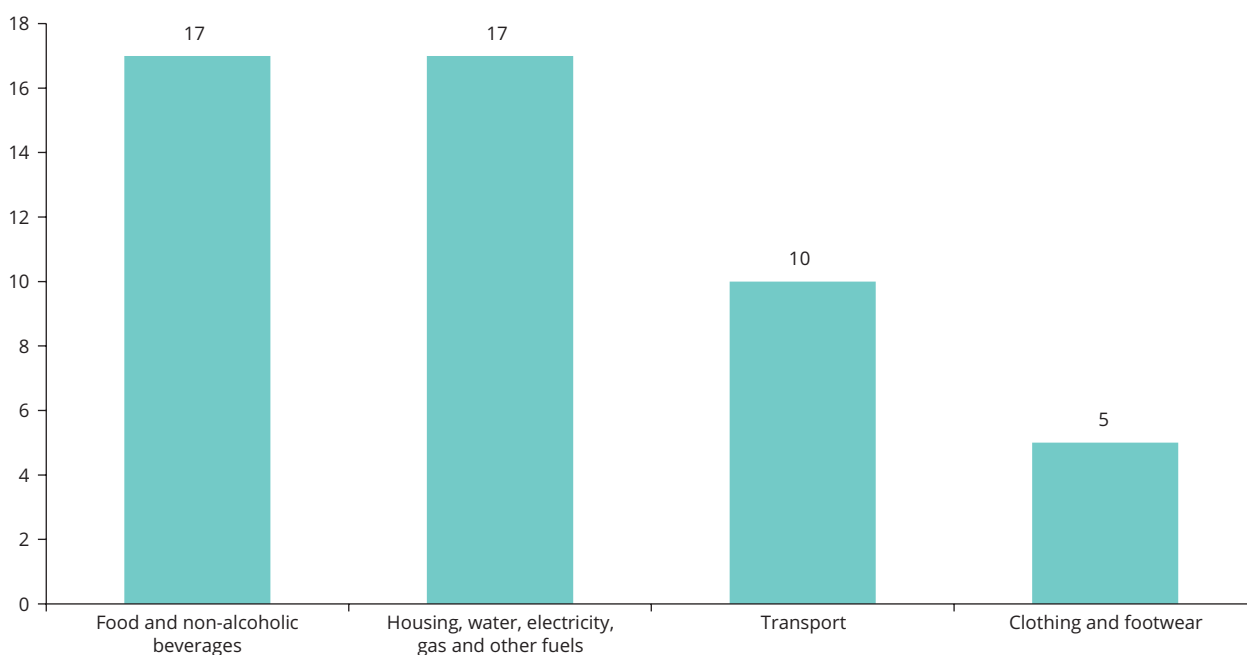
Three quarters of the responding countries (25 of 32) identified specific categories of consumption as priorities for material resource efficiency policies. The two most often reported were the food and beverages

category and the housing, water, electricity and fuels category, both of which were reported by 17 countries. The food and beverage category was often presented as part of national strategies and plans concerning mitigation of food waste, whereas the category covering housing, water, electricity and fuels seems to have been largely related to energy efficiency policies. Ten countries pointed to the transport sector, either referring to mobility in general, or to an increased use of biofuels.

Finally, eight countries identified government spending (4) and public procurement (4) as priority consumption categories, although with no further specified focus of action.

Figure 6.3 Most frequently reported priority consumption categories (reported by four or more countries)

Number of times reported as a priority



Box 6.9 Using life-cycle analysis to identify priorities for resource efficiency, Switzerland

Switzerland has selected its priority sectors based on a life-cycle analysis that also took into account the economic importance of different materials. The analysis included three different perspectives: Swiss final demand, the Swiss economy, and evaluation of materials and goods from an environmental point of view. Although conclusions varied widely depending on the perspective, the most important consumption categories were food, housing and mobility. The potential reduction of environmental impacts in these categories was estimated at 30–45 %. Another area with high environmental relevance is the primary sector, followed by the chemical industry, energy supply and construction industries. Evaluations of the materials and goods categories indicated high resource requirements for metals and electricity production. The analysis also concluded that many of the impacts associated with resource requirements in all areas of action arise outside Switzerland. Therefore, measures to increase resource efficiency in Switzerland's final demand and economy may also have positive effects outside the country.

For further information, see country profile.

Considerations for policy

- Similarly to the results in the 2011 *Resource efficiency in Europe* report, there was a range of waste streams among the most commonly reported priority materials, with plastic and packaging, construction and demolition waste, and food and biowaste topping the list.
- European waste legislation — including landfill bans, extended producer responsibility and the Waste Framework Directive — seems to be the main driver, but a growing role is played by non-legislative drivers relating to the circular economy's key principle of turning waste into a resource. The focus on waste-derived materials is increasingly the result of a combination of economic, environmental and social priorities.
- Awareness of material scarcity has clearly increased compared to responses in 2011. This can be seen in new initiatives and measures related to securing access to raw materials for economically important sectors. A number of countries are preparing national raw material strategies based on economic considerations, and several countries seem to have been inspired to look into their own needs by the EU list of critical raw materials. Several countries, including the Netherlands and Switzerland, have already investigated which materials are critical to their economy and competitiveness, while others, such as France, Poland and Turkey, are in the process of identifying them.
- The fact that relatively few countries point to the service sector as a priority indicates that the potential role of services to improve material resource efficiency could be explored further.
- The manufacturing industry has been identified as a priority sector for material resource efficiency by a majority of countries. It might be useful to further emphasise issues of material efficiency within ecodesign policy. The Ecodesign Directive provides a policy framework that could be further adapted to aid the transition towards a material resource-efficient economy.
- Food waste, identified by about half the reporting countries as a priority, is interesting in that it combines material resource efficiency with climate benefits. Reductions in greenhouse gas emissions occur not only during the consumption and production phases, but to a significant degree during waste management. It may be worth identifying and highlighting other such cases of synergistic co-benefits.

7 Closing material loops in a circular economy

With the circular economy receiving increased policy attention in recent years (Box 7.1), the 2015 work on material resource efficiency included a question to examine how the concept has been adopted at the national level and to identify approaches towards closing material loops.

- What is the policy approach towards closing material loops in the economy/circular economy? (Question 7)

Countries reported a wide variety of policy approaches to closing material loops, of which the majority are dedicated to waste management (53 %) and waste prevention (17 %). More than 200 initiatives were reported, grouped into 41 different categories. This large range reflects the complexity of the theme and demonstrates that there is no one-size-fits-all solution.

Most of the countries reported focusing on closing material loops, especially waste management/recycling and waste prevention (Figure 7.1). Fewer countries looked at the circular economy as a broader concept, and very few reported already having a policy document specifically on the circular economy and closing material loops. Furthermore, it is worth noting that not all aspects of the circular economy were covered to the same degree in the different country responses.

7.1 National strategies on a circular economy

Only a handful of countries reported having adopted or being close to adopting a dedicated strategy or action plan on the transition to a circular economy. These include Germany with its 1996 Closed Cycle Management Act (updated in 2012); Belgium with the 2012 Flemish region's Sustainable Materials Management Programme, including an Action Plan; and the Netherlands with the 2014 From Waste to Resource programme. The government of the Netherlands intends to develop a government-wide programme on the circular economy in 2016 (Box 7.2). A few other respondents, including Scotland (United Kingdom) and Switzerland, reported plans to adopt a dedicated strategy in the near future.

In Germany, the 1996 Closed Cycle Management Act focused on producer responsibility, while the renewed 2012 Act aims to improve the contribution of waste management to environmental and climate protection as well as to increase resource efficiency through strengthening waste prevention and recycling.

Although they do not yet have a dedicated national (or regional) strategy, several countries stated that a circular economy or closing material loops is a

Box 7.1 The European Union and the circular economy

In December 2014, the European Commission decided to withdraw its legislative proposal on waste, which had been published together with the July 2014 Communication, Towards a circular economy: A zero waste programme for Europe. At the same time, the Commission pledged to present a new package by the end of 2015 which would cover the full economic cycle, not just waste reduction targets, drawing on the expertise of all the Commission's services.

On 2 December 2015, the Commission adopted a new Circular Economy Package. It includes Closing the loop: An EU action plan for the Circular Economy, encompassing a broad set of measures to maintain the value of products, materials and resources for as long as possible while minimising the generation of waste. The aim of the package is to give clear signals to economic actors and society at large concerning the way forward.

The action plan highlights several broad areas including waste management, production, consumption, markets for secondary raw materials, and water reuse. It outlines specific measures in five priority areas: plastics, food waste, critical raw materials, construction and demolition, and biomass and bio-based products.

political priority. Examples of countries expressing strong support for the circular economy include the Czech Republic, Denmark, France, Ireland, Portugal and the United Kingdom. A frequent scenario was to acknowledge the importance of the paradigm shift from the linear economic model — make, use, dispose — to one in which resources are kept in circulation for as long as possible.

This is reinforced by references in policy documents to the need for 'transition to a green and circular economy', 'support to a circular and resource-efficient economy', 'progressive implementation of the principles of circular economy', or 'enabling a shift towards a more circular economy'.

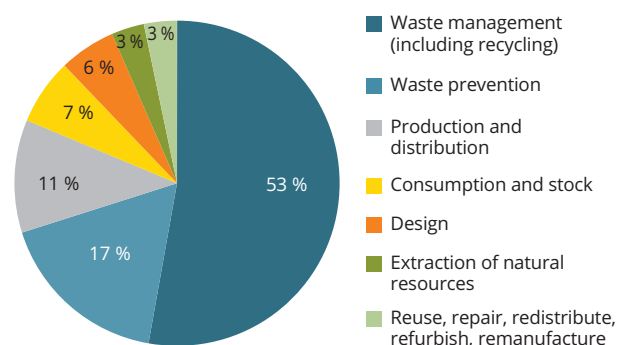
Another frequent response from countries was that they already incorporate the principles of a circular economy in various environmental strategies, and in a few cases in economic development strategies. It is interesting to note that more than two thirds of reported circular economy initiatives were related to waste, which is consistent with waste-derived materials being one of the most frequently mentioned priority resources (Chapter 6).

7.2 The policy approach to closing material loops, by stage of life cycle

The examples that countries provided were classified according to the different stages of the material life cycle to which they relate.

An overview of countries' responses following classification according to the stage of material life cycle is given in Figure 7.1, while Table 7.1 presents selected examples of country initiatives.

Figure 7.1 Distribution of responses on policy approaches to closing material loops in the economy/circular economy across different life-cycle stages



The majority of responses addressed the **waste-related aspects** of closing material loops. In fact, the terms 'waste recycling' and 'the use of secondary resources' were often used synonymously with 'circular economy' and 'closing material loops'. Within **waste management**, which represented 53 % of responses, **recycling** is by far the main focus of policy interventions concerning material loops. Specific initiatives include achieving high recycling rates, transformation of waste into secondary raw materials and separate collection of different types of waste. The promotion of recycling was in some cases accompanied by support for activities lower in the waste hierarchy, such as recovery of energy from waste incineration and bans on landfill.

Complying with existing waste legislation — and with related quantitative targets — was reported as the most frequent driver of initiatives for closing material loops. For several respondents it was in fact the only one reported.

Box 7.2 From Waste to Resource, the Netherlands

The circular economy programme From Waste to Resource, published in 2014, adopts three key objectives: keeping Dutch natural capital vibrant, improving the security of supply, and reinforcing the earning power of the Dutch economy.

The programme identifies a wide range of measures to enable the transition from a linear to a circular economy, covering all steps in the product chain. This includes keeping the waste leaving the chain to an absolute minimum in the very near future through sustainable sourcing, circular design and production, sustainable consumer behaviour, waste prevention and better recycling of what waste there is.

In 2016, the government of the Netherlands aims to adopt a government-wide programme on the circular economy. This will be developed with close cooperation between at least four ministries: Infrastructure and the Environment; Economic Affairs; Foreign Affairs; and Interior and Kingdom Relations.

For further information, see country profile.

Table 7.1 Examples of initiatives reported by countries, by stage of material life cycle

Extraction of raw materials	• Reduce the use of primary raw materials (Iceland) • Reduce the impact of material extraction (United Kingdom)
Design	• Integrate environmental aspects into product design (France) • Extend the lifespan of products (Ireland)
Production and distribution	• Extended producer responsibility, for example for waste electrical and electronic equipment, packaging and end-of-life vehicles (Portugal) • Industrial symbiosis and new business models (Sweden)
Consumption and use	• Pay-as-you-throw schemes (Belgium) • Changing consumption patterns (Italy)
Reuse, repair, redistribute, refurbish, remanufacture	• REPANET and REVITAL initiatives (Austria) • The Scottish Institute for Remanufacture (Scotland, the United Kingdom)
Waste prevention	• Secondary Raw Materials Policy (Czech Republic) • Strategies for prevention of waste (Denmark)
Waste management (including recycling)	• Separate collection of metal and biowaste to improve recycling rates (Croatia) • Seven goals for the National Waste Management Plan and Waste Prevention Programme (Finland) • Tailor norms or certifications to the circular economy (Netherlands) • Transform waste into resources (Poland)

Waste prevention was the second most frequent policy approach, representing 17 % of responses. Many countries reported a focus on waste prevention as essential for closing material loops, both reducing the supply risk of (virgin) raw materials and reducing the amount of waste to be disposed of.

Austria is implementing a pilot project to identify the most important critical materials for the Austrian economy and the degree to which a circular economy could help address problems. Slovakia mentioned the provision of information on waste prevention technologies with the goal of enabling industry to use the best available technologies and to implement voluntary agreements as part of their waste prevention approach. In the United Kingdom, Scotland adopted a food waste reduction target in October 2015.

Six countries reported an emphasis on **reuse, repair, refurbishment and remanufacturing**. An interesting way to encourage these strategies is by promoting or establishing specific centres and networks, as Austria and Slovakia have done. Some countries, including Ireland and the United Kingdom (Box 7.3), actually emphasised that repair and reuse are preferential as the 'tightest' of resource loops, followed by remanufacturing and recycling.

Not many initiatives were reported as focusing on changing consumer behaviour, such as pay-as-you-throw schemes, shared-use initiatives, collaborative consumption or educational campaigns. The few policy initiatives that were reported in the area

of **consumption and use** show that raising awareness seems to be the most common approach.

In Flanders (Belgium), pay-as-you-throw schemes are used for several waste streams to make consumers aware of their waste generation and the corresponding loss of materials.

Activities related to the **design of products and production** were mentioned by only a few countries. However, for those that implement activities related to design and production, such as ecodesign, lifetime extension or extended producer responsibility schemes, these initiatives are considered an efficient way of closing material loops and saving resources. In addition, they enable better and cleaner recycling at the end of a product's useful life.

An interesting illustration of a design-related approach is the extension of the lifespan of products to discourage planned obsolescence, as reported by France (Box 8.2), Ireland and Italy.

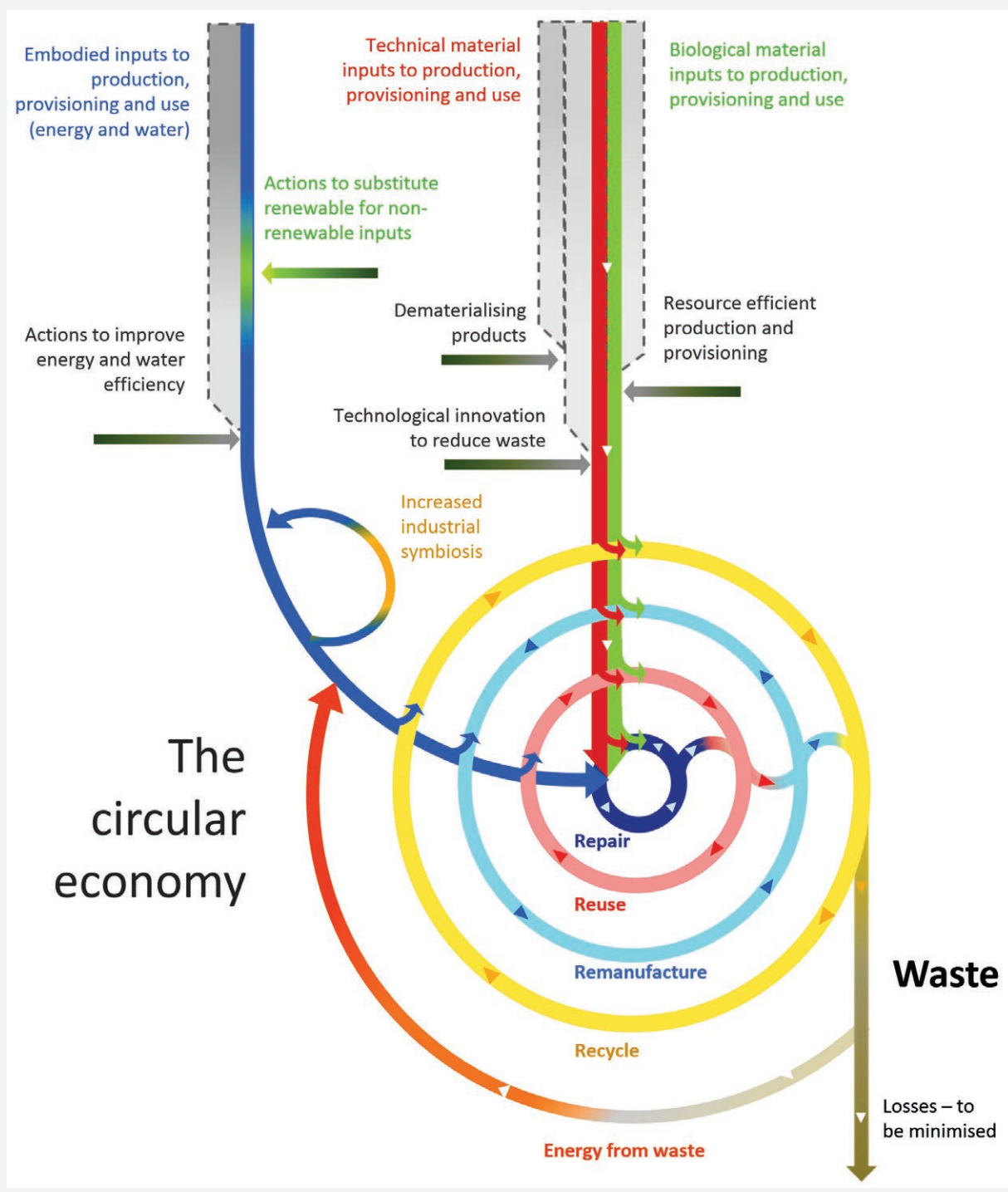
In Sweden, the creation of clean material cycles is one of the key elements of the transition to a green and circular economy. One of the country's specific objectives is to restrict and phase out substances of very high concern, as these would otherwise become dispersed. Building blocks for this approach include improved information about recyclability, information on the content of substances of high concern and further restriction in existing product legislation on substances of very high concern.

Box 7.3 Preferential loops for the circular economy, the United Kingdom

Increasingly mainstreamed in the UK economy, the circular economy model recognises the importance of improving resource productivity, with resources kept in circulation and valued to their full extent. A circular economy is defined as '... moving away from our current linear economy — make, use, dispose — towards one where our products, and the materials they contain, are valued differently; creating a more robust economy in the process'.

This concept sets out preferential loops where repair and reuse is the 'tightest' of resource loops, followed by remanufacturing and recycling (Figure 7.2).

Figure 7.2 The circular economy



Box 7.4 A circular economy in the construction sector, Flanders (Belgium)

Flanders is approaching activities in the construction sector with the principles of sustainable materials management and the circular economy in mind. This means that policies should expand from primarily focusing on the demolition and waste management phase — and within that, separate collection of construction and demolition waste — to encompass building in a sustainable way, looking at the whole life cycle of building materials. This covers the mining and extraction stage, design, construction, use and maintenance, the end-of-life phase and separate collection and waste management.

For further information: www.ovam.be/materiaalbewust-bouwen-kringlopen.

Another approach is to focus activities on a specific sector, such as the construction sector in Austria, Flanders (Belgium) (Box 7.4), or France.

7.3 Other policy initiatives for a circular economy and closing material loops

Several types of initiatives were reported that could not be allocated to just one of the specific stages of the material life cycle. These more generic initiatives refer to:

- economic and financial instruments, such as taxes and levies as well as grants in the United Kingdom;
- research and evidence programmes to identify opportunities and potential for action in Slovenia and Scotland (United Kingdom) (Box 7.5);
- collaborative work and partnerships, such as voluntary agreements or sharing initiatives;
- awareness raising, such as training programmes for employees;
- business-orientated initiatives, such as funds for green business development in Denmark, promotion of industrial symbiosis in Denmark, Ireland, Slovenia, Sweden and Turkey (Box 7.6), support programmes for small and medium enterprises (SMEs) in Denmark and Turkey, and changing the linear business model in Estonia, Poland and the United Kingdom;
- green public procurement in Denmark, Italy, the Czech Republic and Slovakia (Box 7.7);
- targeting of critical or priority materials or products in Austria, the Czech Republic, Estonia, France, Slovakia, Sweden and the United Kingdom;
- technical support and guidance on the circular economy and closing material loops in Wallonia (Belgium) and Denmark;
- education and awareness raising for a circular economy in the Czech Republic and Spain (Box 7.8).

Initiatives on **industrial symbiosis** were reported by several countries — Denmark, Ireland, Slovenia,

Box 7.5 Developing a new circular economy strategy, Scotland (United Kingdom)

The Scottish government has undertaken various initiatives to facilitate the move towards a more circular economy. A new strategy is expected to be launched in 2016 (consultation closed in October 2015). Some key early activities include:

- a circular economy evidence programme to identify opportunities and potential for action;
- establishing the Scottish Institute for Remanufacture, one of only four worldwide, to bring together business and academia to nurture this important sector;
- establishing the Scottish Materials Brokerage Service to deliver contracts of sufficient scale and duration to stimulate domestic reprocessing;
- developing a food waste reduction target for Scotland, as announced in October 2015.

For further information, see country profile.

Sweden, Turkey and the United Kingdom. Such initiatives are generally considered a promising approach for increasing both competitiveness and resource efficiency by establishing commercial partnerships between companies that can make use of each other's waste or surplus resources.

In the case of Ireland, potential exchanges are identified through networking events, an online exchange facility and direct contact with the technical advisors of SMILE, a free industrial symbiosis service. In addition, three regional waste management plans in Ireland include provisions to support repair and reuse activities and networks to extend the lifespan of items.

Several countries reported supporting the circular economy through **green public procurement**. Initiatives ranged from including the circular economy and closing material loops in procurement criteria, through setting up competent bodies to certify recycled

content, to developing guides for life-cycle costing (Box 7.7).

Targeting material resource efficiency measures on **critical or priority materials or products** was reported by several countries, including Austria, the Czech Republic, Estonia, France, Slovakia, Sweden and the United Kingdom. Such an approach aims to focus efforts and identify win-win situations, which may vary across countries. The reported selection criteria or procedures for identifying priority materials and products ranged from very methodical to fairly ad hoc.

Relatively few countries reported initiatives providing **technical support and guidance** on a circular economy and closing material loops. In 2013, Wallonia (Belgium) opened a Reference Centre on Circular Economy. Denmark has developed a circular economy policy toolkit.

Box 7.6 Circular economy and industrial symbiosis, Turkey

In Turkey, resource efficiency, closing material loops and promotion of a circular economy are linked with waste policies through recycling and industrial symbiosis. The recent By-Law on Waste Management introduced such concepts as reuse of waste, by-products and extended producer responsibility. Recycling, reuse and recovery of waste aim to reduce the use of natural resources and decrease import dependency on raw materials. Recycling of scrap metal (iron and steel) and special waste groups (oils, tyres, accumulators and packaging) are specifically highlighted by the National Recycling Strategy and Action Plan. Industrial symbiosis has been promoted in the September 2015 Small and Medium Enterprises Strategy and Action Plan 2015–2018 and National Recycling Strategy and Action Plan 2014–2017. Both include provisions to ensure that, where possible, the waste or by-products of an industrial facility or company become the raw materials of another, with a particular focus on material and energy exchange.

For further information, see country profile.

Box 7.7 The circular economy and green public procurement

In Denmark, a Forum for Sustainable Procurement was established in 2010 as a knowledge hub and networking organisation for greening procurement. In 2015, one of the topics for which the Forum developed actions and communications was the circular economy.

The Danish Environmental Protection Agency (EPA) and the Capital Region are engaged in a Horizon 2020 project on greening public procurement, with the Danish EPA responsible for developing a tool on the circular economy in a public procurement context. Among other things, the Danish EPA has developed tools for total cost of ownership — including maintenance, water and waste costs — in five product areas: office equipment, toilets, lighting, self-service machines, and fridges and freezers.

Italy aims to stimulate recycling via green public procurement with agreements and incentives to support the purchase of products made from post-consumer materials. Authorised bodies will be used for certification of recycled content.

A number of other countries, including the Czech Republic and Slovakia, reported considering the circular economy in public procurement, usually following EU guidance on green public procurement.

For further information, see country profiles.

A few countries emphasised the importance of **education and awareness raising**. Spain's New Plan on Waste (PEMAR) promotes closed-cycle management, the circular economy and a more sustainable and resource-efficient management of material flows. It attaches particular importance to improving awareness and information, education and training. The Secondary Raw Materials Policy of the Czech Republic is another noteworthy initiative. It outlines a coherent strategy for the next 20 years, setting out strategic goals for the extraction, processing and use of secondary raw materials from both domestic and foreign sources. In addition, there are various flanking activities to support implementation of the circular economy in the Czech Republic (Box 7.8).

Several countries pointed out the importance of **indicators** — or rather, the lack of them — for monitoring the circular economy and material flows. As part of the work resulting from the German Resource Efficiency Programme (ProgRes), several indicators to measure improvements in resource

efficiency are currently in development. These include indicators illustrating the share of the circular economy and recycling in resource efficiency, indicators describing the sustainability of mining activities, and indicators on urban mining (reclaiming compounds and elements from products, buildings and waste which would otherwise be sent to landfill). Belgium planned to launch a study in 2015 to evaluate the economic potential of the circular economy and to propose targets and indicators related to federal competencies (mainly product policy). Some advanced research on closing material loops is already under way in Flanders (Belgium) (Box 7.9).

It is worth noting a number of **initiatives taking place at the regional (subnational) level** (Boxes 7.9 and 7.10). In most cases, this is due to the respective country's federal structure (Belgium, Germany) or devolved management (United Kingdom). The development of policies at such a level carries the advantage of resident ownership, focus on local priorities and interests, and physical proximity.

Box 7.8 A 'decatalogue' for a circular economy, the Czech Republic

A Vision 2024 initiative was set up by non-profit organisations, universities and private businesses to support the development of a circular economy in the Czech Republic. Participants in the Vision 2024 platform developed a 'decatalogue' for a circular economy, which identifies key assumptions for the implementation of a circular economy in the Czech Republic. Principles include support for the recycled materials market; requalification programmes for the unemployed; educational programmes for grammar schools, high schools, universities and training institutions; and a number of targets for material recovery.

For further information, see country profile.

Box 7.9 Modelling closed material loops, Flanders (Belgium)

The Public Waste Agency of Flanders (OVAM) developed a model that gives an insight into how material stocks are depleted and identifies which are the issues to tackle first in moving to a sustainable use of materials.

The model estimates material stocks in the Flemish economy, calculates scenarios for the release of materials at the end of their life, and identifies the main pathways of material loss. It maps material leakage in the Flemish economy, identifies the applications that are responsible and the reasons behind this leakage, and allows for comparing this information with primary material stock worldwide.

Tested on aluminium, the model uses variable parameters including lifespan, collection and recycling rates and export, which enable assessment of the influence of a specific policy focus — such as increased collection rates — on material stock and leakage flows. In further development, the model will be extended and refined for other materials. The model is intended to support the development of indicators for material sustainability in the Flemish economy and society.

For further information, see country profile.

Box 7.10 The circular economy at the subnational level, Belgium and Germany

A number of policy initiatives on the circular economy are taking place at the regional (subnational) level.

In Belgium, the **Flemish Materials Programme** and its executive plan on municipal waste deal with challenges concerning materials and moving towards a circular economy. **Wallonia's Marshall Plan 4.0** intends to focus the priorities of the economic restructuring programme around the digital and circular economies. The Marshall Plan 4.0 is dedicated to the circular economy as part of the Competitiveness Cluster Policy, with a specific focus on SMEs and in collaboration with relevant actors. These focus on the joint use of material flows and energy. In 2013, a **Reference Centre on Circular Economy was set up in Wallonia** to assist SME involvement. The Centre acts as a contact point to connect the different stakeholders, gives advice and shares good practice. The Centre also manages a circular economy fund for Walloon SMEs.

One of the outcomes of the workshop Stakeholder Platform Resource Efficiency Baden-Württemberg, Germany, was the founding of the **Alliance for Resource Efficiency Baden-Württemberg**. The initiative aims to demonstrate potential savings of resources and energy by highlighting good practices from 100 SMEs in Baden-Württemberg (100 Enterprises for Resource Efficiency). Other planned outcomes include support for knowledge transfer by building-up regional networks and regularly hosting a Congress on Resource Efficiency and Circular Economy.

For further information, see country profiles.

Considerations for policy

- The approach to closing material loops and a circular economy is still developing, but the topic is clearly interpreted in different ways by different stakeholders and countries. There are always going to be national variations in the optimal scope of action and policy mix.
- Very few countries reported having a dedicated national strategy for addressing the circular economy and closing material loops. However, many acknowledged the need to move away from the linear model, stating that the transition to a circular economy is a political priority and that they already have initiatives addressing various elements of the circular economy as described by the European Commission. The December 2015 Communication on circular economy, Closing the loop: An EU action plan for the Circular Economy, is likely to give further impetus to such initiatives.
- The majority of reported policy initiatives on closing material loops focus on waste management/recycling and waste prevention. Countries are also making the shift from landfill and incineration to recycling and recovery. This is to a large degree driven by a number of waste-related targets in European legislation, illustrating how EU policy intervention, including setting targets, results in a strong policy response at the country level. In fact, for the majority of respondents, compliance with existing legislation is the main driver of any action taken at the country level. It is worth keeping this in mind when developing a European framework for a circular economy.
- Two countries explicitly commented that the circular economy needs to go beyond increasing recycling rates and a higher use of secondary raw materials.
- Regional (subnational) initiatives such as those in Belgium or Germany have an advantage of physical proximity/small distances and a strong drive among local stakeholders. However, they frequently remain below the radar of international policy forums. When expanding the knowledge base for the circular economy, it is worth keeping an eye on successful initiatives at the regional and local levels.
- One of the challenges for both material resource efficiency and the circular economy is to develop adequate indicators to monitor trends and measure progress, and to set targets where appropriate. Measuring the degree of circularity is quite challenging within the European statistical system, but it would be useful to monitor the progress of ongoing efforts in this field, for example in Belgium and Germany.
- Initiatives on closing material loops are frequently driven by economic and security-of-supply factors. There are some examples of financial support/seed financing for new business models in a circular economy, including the Green Business Fund in Denmark and Innovate UK, to help initiate implementation at the company level.
- To ensure a broad adoption of the circular economy, it is worth demonstrating successful initiatives in which the circular economy goes hand-in-hand in a mutually reinforcing way with other key policy objectives, such as the reduction of greenhouse gas emissions — for example by preventing food waste or making use of scrap metal — or the competitiveness and employment agenda.
- Given the broad scope and variety of interpretations of the circular economy and material resource efficiency, one appropriate action might be to support the exchange of experience and information between countries on good practices in the development and implementation of circular economy policies and initiatives.

8 Policy instruments and examples of good practice

8.1 Introduction

A comprehensive and methodical review of policy instruments used by countries to improve material resource efficiency is outside the scope of this report. Instead, countries were asked which policy instruments they considered most important in this field, and were invited to provide examples of good practice.

This chapter provides an overview of country responses to the following question.

- Which policy instruments are considered most important in your country — and why — to improve material resource efficiency? (Question 12)

Responding to the question on which policy instruments are most important for material resource efficiency, countries reported 166 examples, among which economic and financial instruments (72 reports) were mentioned most often. Regulatory (45) and information-based instruments (29) followed in second and third place. Voluntary agreements were the least mentioned group of instruments (15 reports) (Figure 8.1).

It is worth noting that green public procurement (GPP) was mentioned by countries under different categories of instrument. Some, such as Liechtenstein, regard it

as a regulatory instrument, while the Czech Republic and the former Yugoslav Republic of Macedonia see it as an economic instrument for material resource efficiency. Denmark and the United Kingdom reported it as an information-based instrument, and Germany as a voluntary one. It appears that, depending on how public procurement is used or enforced, it can fall under different types of instrument, so it is listed under 'other instruments' in this chapter.

8.2 Economic and financial instruments

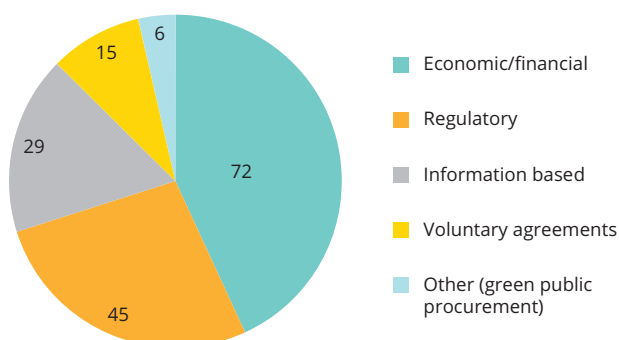
Economic and financial instruments, sometimes also referred to as market-based instruments, typically include taxes and fees, eco-charges, grants, and various investment or financial support programmes.

Of the 166 reports on policy instruments, almost half were economic or financial (72). There was much variety among them, from tax rebates to awards and grants for research and development — various forms of grants and awards were reported by 10 out of the total of 32 participating countries. A significant number of policy instruments also focused on financial support for improving material resource efficiency in industry.

Tax instruments seem to be widely used — ranging from taxes on extraction to taxes and fees on generating hazardous waste. Some taxes or levies targeted a specific type of waste, of which plastic carrier bags (Box 8.1) have received much attention in recent years thanks to the successful use of levies in many countries.

On a macroeconomic scale, Portugal is targeting material resource efficiency within its Green Fiscal Reform, which was introduced in 2015. The Reform aims to promote the efficient use of resources, reduce energy dependency, support sustainable production and consumption, encourage entrepreneurship and job creation, and diversify sources of public revenue, all the while maintaining fiscal neutrality and economic competitiveness. The introduction of a charge on lightweight plastic bags and a landfill tax are also part of the Reform.

Figure 8.1 The most important policy instruments for material resource efficiency, by number of mentions in country responses



Box 8.1 Levies on plastic carrier bags

In line with the EU's waste policy objectives, a number of countries — including Denmark, Kosovo (under UNSCR 1244/99), Ireland, Portugal and Northern Ireland (United Kingdom) — have introduced a levy on single-use plastic carrier bags, which has led to a remarkable decline in their use. The fee varies from 7 cents in the United Kingdom to 22 cents in Ireland, resulting in a reported reduction of between 35 % and 96 %. The funds raised are directed to a variety of causes, including specifically to environmental projects.

Sweden highlighted support for research on material resource efficiency and the circular economy. Examples include a four-year research programme under Mistra (the Swedish Foundation for Strategic Environmental Research), and a Vinnova (Swedish innovation agency) programme that aims to increase economic and environmental sustainability in resource and waste management.

Other frequently mentioned regulations focused on producer responsibility (Flanders (Belgium), Bulgaria, the Czech Republic, Latvia, the Netherlands, Poland and Portugal); energy efficiency and sustainable energy (Albania, Croatia, Finland, the former Yugoslav Republic of Macedonia, Poland and Spain); and environmental legislation in general (Wallonia (Belgium), Italy, Kosovo under UNSCR 1244/99, Serbia and Spain).

8.3 Regulatory instruments

Regulatory instruments typically include laws or decrees on a variety of themes related to materials, including bans on the use of certain substances, and design and performance or quality standards. In total, 45 regulatory instruments were reported by 26 countries. Most frequently (16), they focused on waste management, sometimes in a specific sector — such as energy or construction. Bulgaria, for example, adopted a specific ordinance on the management of construction waste and the use of recycled building materials. Most countries reported regulatory instruments for waste management in general.

Some countries highlighted recently adopted innovative approaches to regulatory policy instruments. For example, France's law on consumption (2014) includes several articles related to the lifespan of products (Box 8.2). Another example is the Materials Recovery Facility Regulations (2014) in the United Kingdom, which aim to improve the quality of recycled materials.

The issue of how to ensure a coherent regulatory framework has been under increasing discussion in recent years. This has been the case in Germany where, in the context of the Resource Efficiency Programme (ProgRes), a debate was initiated on a more coherent regulatory framework for resource conservation and resource efficiency. This resulted in a study on the

Box 8.2 The Act on Consumption and preventing planned product obsolescence, France

France emphasised that recycling is only one of the steps in a circular economy — a longer product lifespan can substantially improve material efficiency.

The Act on Consumption, adopted by France in March 2014, aims to address product durability and prevent planned obsolescence. Although its primary objective is to increase consumer protection, the law includes several articles related to the lifespan of consumer goods.

To combat planned obsolescence, sanctions have been considerably strengthened in the case of deliberate deception on quality. In addition, the introduction of a class action procedure in French law will allow consumers to bring a collective lawsuit.

The duration of legal product guarantees has been extended from six months to two years. The seller must also inform the consumer how long spare parts will remain available for the product in question.

Additional provisions to combat planned obsolescence are outlined in the National Low-Carbon Strategy.

The law on consumption of March 2014 (in French): <http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000028738036&categorieLien=id>.

The decree of 9 December 2014 related to the availability of spare parts (in French): <http://www.legifrance.gouv.fr/affichTexte.do?cidTexte=JORFTEXT000029881868&categorieLien=id>.

development of a regulatory framework concept for resource conservation at the federal level. Another example is the Netherlands with its 'better regulation' approach, under which the Ministry of Economic Affairs initiated a task force to look at the barriers and problems companies experience with legislation or rules that may influence opportunities for moving to a circular economy. It helps companies to overcome obstacles, explains the rules or, if possible, changes the rules.

8.4 Information-based instruments

Information-based instruments typically include communication and information campaigns, technical support schemes and eco-audits, training and education, or various eco-labels and awards to raise public awareness and increase the visibility of an issue.

Within this category, 29 information-based instruments were reported by 18 countries. Information-based instruments for eco-labelling (5 reports) and for increasing awareness of the circular economy paradigm, especially for small and medium enterprises

(SMEs) and for material resource efficiency (4 reports each), were most commonly reported.

In Flanders (Belgium), there are several information-based instruments that aim to stimulate and help companies to become more aware of their use of materials, and to demonstrate to companies how they can become more sustainable and efficient. Estonia supports activities for raising awareness in companies, training resource specialists or auditors for resource-efficient solutions. Some countries target support for SMEs (Box 8.3).

Several countries, including Belgium, Bulgaria, the Czech Republic, Estonia, France and Germany, reported supporting specialised mechanisms such as industrial symbiosis (Box 7.6 and Box 8.4) or developing tools to help companies become more aware of their use of materials and identify options for becoming more resource efficient.

Another frequently targeted policy area is energy efficiency. Poland, for example, reported various information and education campaigns promoting efficient energy use.

Box 8.3 Support for small and medium enterprises

In most countries, SMEs are the backbone of economic and industrial activity and therefore play a substantial role in determining a nation's material efficiency. A number of countries reported using information-based instruments to reduce raw material use and waste generation in SMEs. Examples include web-based toolkits in Belgium; financial support schemes for audits and/or investments in Estonia, Finland, Germany, Poland, Slovakia and the United Kingdom; and pilot and demonstration projects reported by Bulgaria and Denmark.

Box 8.4 Supporting industrial symbiosis

Several countries have programmes in place to support the creation of local industrial symbiosis initiatives. The **Finnish Industrial Symbiosis System**, based on active facilitation, aims to promote in particular those symbioses which would not be implemented without external support. Rolled out regionally, the activities include business activation and commitment, exchange of resource information and networking, as well as support during implementation. Launched in 2013, the programme now includes 350 companies. Industrial symbiosis is also promoted in **Bulgaria's Operational Programme on Innovation and Competitiveness 2014–2020**, which will provide financial support for demonstration initiatives on increasing resource efficiency in enterprises. The programme targets SMEs in the manufacturing sector.

Green industrial symbiosis is an initiative of the **Danish Fund for Green Business Development**. The scheme encourages Danish companies to explore the benefits of symbiotic partnerships by helping them to recognise the value of their by-products and assisting them in making connections across traditional value chains.

Industrial symbiosis in Turkey has been promoted by the **Small and Medium Enterprises Strategy and Action Plan** (2015–2018) and the **National Recycling Strategy and Action Plan** (2014–2017). They aim to ensure that the wastes or by-products of an industrial facility or company become the raw materials of another, with a particular focus on material and energy exchange. In addition, the **Productivity Strategy and Action Plan** (2015–2018) promotes the implementation and dissemination of industrial symbiosis studies.

8.5 Voluntary agreements

Voluntary agreements typically include agreements between governments and other stakeholders, though they can also include multi-party contracts or various forms of joint implementation. The use of voluntary instruments depends to a large degree on historical tradition, as presented by the Netherlands: 'in general, the Netherlands traditionally prefers to work with stakeholders on a voluntary cooperative basis before entering into regulation. However, a range of regulatory instruments is also available ...'.

Compared to other types of policy instruments, this was a much less used approach, although it seems to have been on the increase in recent years. In total, voluntary instruments were reported by 11 countries: Austria, Belgium, Croatia, Estonia, France, Germany, Ireland, the Netherlands, Poland, Spain and the United Kingdom.

Examples include agreements between industries, or between the government and other stakeholders such as non-governmental organisations (NGOs), industries and knowledge organisations. Germany, for example, instituted a voluntary agreement called the Alliance for Sustainable Procurement to foster innovation through public procurement. An initial group of six federal ministries decided to promote more innovation-friendly

procurement systems in government ministries, agencies or research institutes.

Box 8.5 presents an example of a consensus-based decision-making approach applied to the material resource efficiency context in the Netherlands.

8.6 Mixes of policy instruments

Responding to the question about the most important policy instruments for material resource efficiency, 15 out of 32 countries indicated a preference for using a mix of instruments to address an issue of concern instead of just one. A combination of regulatory, economic/financial and information-based instruments was the most commonly reported approach (7 reports), followed by a combination of economic/financial and regulatory instruments.

In its country profile, Austria outlined the guiding principles for using a mix of policy instruments: '... strong regulatory instruments such as bans should mainly be applied when protection against hazardous substances is needed. In other cases, a combination of a carrot (financial, economic and market-based instruments as well as voluntary agreements) and a stick (regulations for limiting the effect of market participants who do not play by voluntary rules and

Box 8.5 Green Deals, the Netherlands

The Green Deals programme launched in the Netherlands in 2011 provides non-financial government support for environmentally friendly initiatives. It is an accessible way for companies, other stakeholder organisations, local and regional government and interest groups to work with central government on green growth and social issues. The aim is to remove barriers in order to help sustainable initiatives get off the ground and to accelerate this process where possible. Central government plays a key role in this area.

The Green Deal approach is one element in a standard range of policy instruments. It is used to supplement existing instruments, such as legislation and regulation, market and financial incentives, and measures to stimulate innovation.

A Green Deal is a mutual agreement or covenant under private law between a coalition of companies, civil-society organisations and local and regional government. The deal defines the innovative initiative and the related actions as clearly as possible (in quantitative aims or output, if appropriate) and it defines the input by the participants involved as clearly as possible.

The Green Deal Board is responsible for monitoring and evaluating the progress and results of the Green Deals in place and for stimulating new initiatives. The nine members currently making up the Board meet once every three months. These nine members come from business/industry, NGOs and government organisations. Five observers from different ministries represent the government to which the Green Deal Board reports.

Green Deals cover nine themes: energy, the bio-based economy, mobility, water, food, biodiversity, resources, construction, and climate. Nearly 200 Green Deals have been concluded so far, many of which relate to resource efficiency.

For further information: <http://www.greendeals.nl/english>.

for making inefficient behaviour expensive) approach is preferred. Information and motivation/awareness raising are necessary under all circumstances'.

Examples of using a mix of policy instruments to address the problem of food waste are shown in Box 8.6.

Finally, several countries explicitly mentioned policies and instruments aiming to promote material resource efficiency and achieve energy efficiency or climate objectives at the same time. Examples include Croatia, Estonia, Finland, Ireland, Latvia, Poland and Serbia.

Box 8.6 No more food waste?

Many countries are using a broad mix of policy instruments to prevent food waste. Reported initiatives target different parts of the production and consumption chain.

The **Austrian initiative, Food is Precious**, targets the whole life cycle of food through a broad stakeholder engagement. This includes better adaptation of supply to demand, optimised logistics and better use of unsold food. Recipes for the use of left-over food have been collected. As part of the programme, studies were conducted on the amount of food waste in municipal waste, on making better use of food at events, on the prevention of food waste in restaurants, and on the potential to prevent food waste in the agricultural phase. Other initiatives include the preparation of educational material for primary and secondary schools and information campaigns for pupils, as well as awareness raising among consumers and co-workers in the food processing industry and services. Awards for projects on best practice are given annually.

In **Finland**, several pilot projects were implemented under the Programme to Promote Sustainable Consumption and Production. The **Ilmastolounas (Climate Lunch)** project provided guidelines for a 'climate lunch', which is served in public canteens, while the **Save the Food** project undertook a pilot scheme to establish the feasibility of sharing left-over food and groceries between the inhabitants of a housing cooperative.

Ireland's Stop Food Waste is an awareness and enabling initiative aimed at householders and individuals — and more recently very small businesses such as cafés, pubs serving food and small local supermarkets. It is an easy-to-follow stepwise programme that guides people through the food cycle to identify areas where changes in behaviour can lead to reductions in food waste. In addition, a food waste prevention guide for the hospitality/catering sector — *Less Food Waste More Profit* — is being widely disseminated, arising from the Green Hospitality Awards programme.

In **Poland**, the **ForWaRD** project involves the Polish Federation of Food Banks saving food and helping needy people — the Federation operates 32 food banks throughout the country. In 2011–2012 they carried out a mass-media **awareness campaign, Don't Waste Food, Think Green**.

Portugal's awareness campaign project Menu Dose Certa in Oporto focused both on changing consumption behaviour and on economic, environmental and associated health issues. The first pilot in 2008 targeted the catering and restaurant services. One component of the project proposed that restaurants prepare a balanced menu with correct amounts of food and nutritional value that would minimise food waste and have economic advantages. Resulting in a waste reduction of up to 77 %, the approach was further replicated in restaurants and school canteens. Good-practice lessons from the project were disseminated among the population to help guide meal preparation at home.

The World Bank financed a research and development project on **Resource Efficiency Projects in the Food Processing Industry in Serbia**. The purpose of the project was to identify the major areas of inefficient use of energy, raw materials, water, packaging and chemicals and to identify major areas of waste generation and others with the potential to improve material and energy efficiency. Low-cost measures and cost-effective investment projects for improvements were then identified.

In Sweden, food waste was determined as one of the priorities of the Environmental Quality Objectives system. A **campaign about reduction of food waste in Sweden** is jointly managed by the Swedish National Food Agency, Environmental Protection Agency and Board of Agriculture.

In the **United Kingdom**, the **Hospitality and Food Service Agreement** was launched in 2012. It is a voluntary agreement between the United Kingdom and devolved administrations and the hospitality and food service sector, which includes restaurants, hotels, caterers and pubs. The purpose is to support the sector in preventing food waste and to increase recycling. It has a waste prevention target for signatories to reduce food and packaging waste by 5 % by the end of 2015, against a 2012 baseline.

Food Waste Regulations (2015) in **Northern Ireland** (United Kingdom) provide for the separate collection and subsequent treatment of food waste for both households and businesses. The landfill of separately collected food waste is prohibited as of 1 April 2015. In October 2015, **Scotland** (United Kingdom) announced the intention to establish a **national food waste reduction target**. This will be announced in early 2016 and will be one of the first in the world.

8.7 Examples of good practice

In addition to the question on the most important policy instruments discussed above (Question 12), countries were invited to present examples of national material resource efficiency initiatives/policy instruments that

they consider good-practice showcases (Question 13). Overall, more than 90 examples were reported, and are listed in Annex 4, while details are available in the individual country profiles. Some of the good-practice showcases are presented throughout this report in the country text boxes.

Considerations for policy

- Economic/financial instruments were most frequently reported as the most important policy instruments for material resource efficiency, followed by regulatory instruments.
- More than a third of all reported policy instruments relate to waste management and waste prevention. The link between waste management and resource efficiency can be further strengthened in future policies for a circular economy.
- Many policy instruments and tools address various material resources — such as fuels or construction materials — and different stages of the value chain. Practical experience and research increasingly show that a broad range of approaches is needed to make a successful transition to a resource-efficient society.
- The use of voluntary instruments for improving material resource efficiency is not widespread. Some of the preconditions seem to include a historical tradition of relying on voluntary instruments as well as good experience with this approach, as demonstrated by reports from those countries that embrace it.
- In several countries there is increasing collaboration between industry, non-governmental organisations and policymakers from different ministries to address priority sectors or materials, providing a win-win situation for all parties. There is growing awareness that regulatory/top-down measures are not the only ones needed for economies to become more resource efficient; bottom-up and collaborative approaches can be equally effective.
- A significant number of countries reported using a mix of different policy instruments to address priority topics. Many countries work on similar issues and face similar problems, and there is a large variety of approaches among them, so exchanging experience and information on the effectiveness of approaches would appear to bring additional value.

9 Targets for material resource efficiency

This chapter summarises country responses to the following question.

- What targets (measurable and with a timeline) have been set for material resource efficiency? (Question 10)

This chapter provides an overview of the types of targets that countries have set for themselves and shows selected examples. A full list of targets reported by countries is presented in Annex 8, while further details are available in individual country profiles.

Some 240 targets for material resource efficiency were reported by 30 countries. To facilitate the overview,

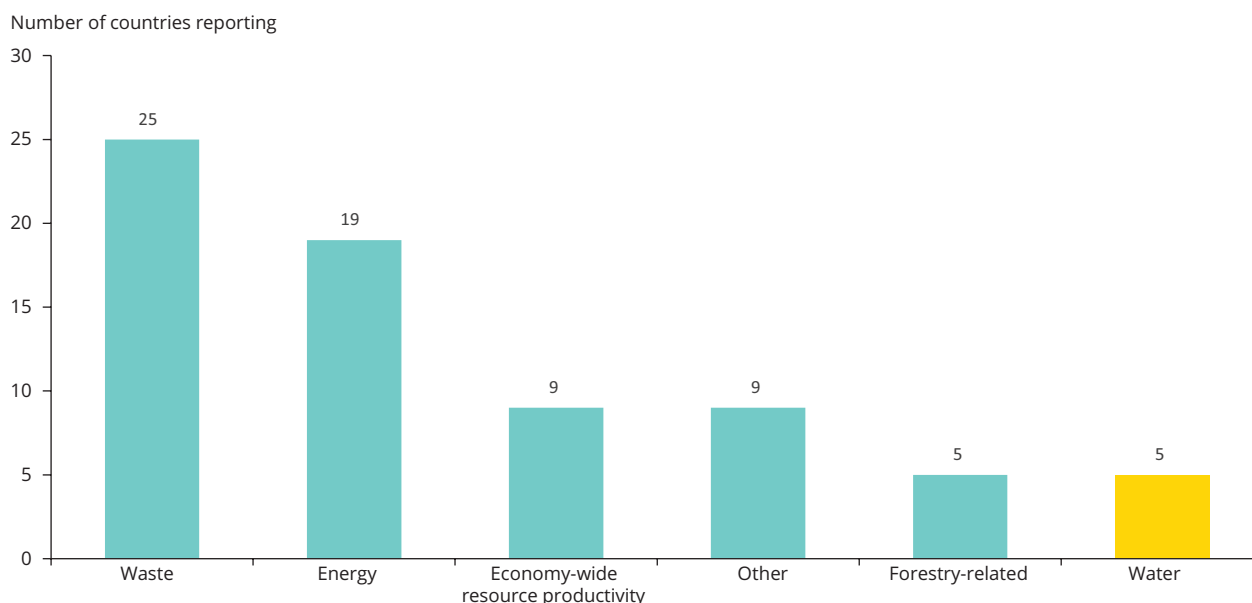
reported targets are grouped below according to policy area, with the major categories being waste, energy and economy-wide resource productivity (Figure 9.1).

The immediate conclusion from the analysis of responses is that countries adopt material resource efficiency targets in those areas where targets are embedded in EU regulations, such as energy and waste. The one exception is targets for economy-wide resource productivity, where nine countries have set such national targets despite the fact that the EU itself has adopted none (Chapter 1).

Box 9.1 Policy objectives and targets

While the policy objectives set in material resource efficiency policies tend to be general and descriptive (Chapter 3), targets are specific, quantifiable and measurable, and are usually accompanied by a deadline by which they are to be reached. Moreover, targets usually call for regular monitoring of trends or of the distance to a target.

Figure 9.1 Number of countries reporting on targets, by type of target



Note: Water is outside the scope of this report, but is shown here because five countries reported targets related to water.

9.1 Economy-wide resource productivity targets

Nine countries reported having adopted a measurable material resource efficiency/productivity target, frequently based on the EU lead indicator relating gross domestic product (GDP) to domestic material consumption (DMC).

- **Austria** is striving for a 50 % increase in resource efficiency (GDP/DMC) by 2020 relative to 2008, and aspires to a four- to ten-fold improvement by 2050, as presented in its national Resource Efficiency Action Plan (REAP, Box 9.2).
- **Estonia** reports aiming for a 10 % increase in resource efficiency to EUR 0.46/kg (GDP/DMC) as part of a Coalition Agreement of the Estonian Government for the period 2015–2019.
- **France** aims for a 30 % increase in resource productivity (GDP/DMC) between 2010 and 2030 as well as a decrease in per person DMC over the same period.
- **Germany** has a target of doubling abiotic material productivity within the period 1994–2020, included in its 2002 National Sustainable Development Strategy.
- **Hungary** stipulates reducing its material intensity (DMC/GDP) to 80 % of the 2007 level, by 2020, in the 2011 National Environmental Technology Innovation Strategy (Box 9.3), which is part of the Hungarian National Reform Programme.
- **Latvia** adopted a target for resource productivity (GDP/DMC) to reach EUR 710/tonne in 2030, with

intermediate targets of EUR 540/tonne in 2017 and EUR 600/tonne in 2020 (Box 9.4).

- **Poland**, in its Strategy for Innovation and Efficiency of the Economy, adopted a target of increasing resource productivity to EUR 0.45/kg by 2015 and EUR 0.5/kg by 2020 (GDP/DMC).
- **Portugal** stipulates an increase in national resource productivity from EUR 1.14/kg in 2013 to EUR 1.17/kg in 2020 and EUR 1.72/kg in 2030 in its Green Growth Commitment (Box 9.5).
- **Slovenia's** target for resource productivity anticipates that overall resource productivity by 2023 should increase to EUR 1.5/kg DMC, from 1.07 in 2011.

No country reported having a target to reduce the extraction or consumption of materials such as minerals, metals or biomass, be it as a percentage reduction from a reference year or in absolute terms.

In addition, some countries reported on regional (subnational) targets. One such example is Flanders (Belgium), which has elaborated a set of targets for the generation and recovery of waste as well as the use of mineral resources. By 2020, Flanders aims to increase the share of alternatives in the total amount of mineral resources and the share of mineral resources sourced from Flanders in the total amount of mineral resources used.

Other countries that mentioned regional targets include Bulgaria, Ireland, Latvia and the United Kingdom, although those targets were related to municipal waste.

Box 9.2 Targets in the national Resource Efficiency Action Plan and the RESET2020 initiative, Austria

To reduce resource consumption and improve resource efficiency, the Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft elaborated the Austrian Resource Efficiency Action Plan (REAP) in 2012. REAP will be implemented through the initiative RESET2020 and updated to include emerging issues.

The interim goal pursued by REAP is to decouple resource consumption from economic growth and to increase resource efficiency by at least 50 % by 2020 relative to 2008. The long-term goal strives for a four- to ten-fold increase in resource efficiency by 2050.

Furthermore, REAP includes measures regarding resource-efficient production, public procurement, circular-flow economy and awareness raising that are to be implemented within a programme of measures.

For further information, see country profile.

Box 9.3 Targets in the National Environmental Technology Innovation Strategy, Hungary

The 2011 National Environmental Technology Innovation Strategy (NETIS) is part of the Hungarian National Reform Programme. The vision is to foster environmental industries and technology, to focus on environmental innovation, to reduce primary material use and encourage reuse and recycling, and to ensure a paradigm shift from an end-of-pipe approach to environmental issues towards the prevention of problems.

Hungary has adopted 17 targets to be achieved by 2020. These are expressed in percentage terms against 2007 levels. For example, materials, energy and water intensity per unit of GDP is to be reduced to 80 %; the share of renewables in electricity generation is to rise by 275 %; municipal solid waste generation will fall by 30 %; and employment in environmental industries should rise to twice the 2007 level. Another target is to reduce material intensity and energy intensity (respectively DMC/GDP and tonnes of oil equivalent (toe)/GDP) by 20 % by 2020 relative to 2007.

Targets and development areas are clustered around the following topics: waste, water, air, noise and vibration, agriculture and soil protection, remediation, renewable energy, and the construction industry.

For further information: http://kornyezettechnologia.kormany.hu/admin/download/b/4f/50000/NETIS_English.pdf.

Box 9.4 Intermediate targets as milestones to reach targets for 2030, Latvia

Latvia's Sustainable Development Strategy until 2030, adopted in 2010, includes a comprehensive set of targets on a range of topics related to material use and resource and energy efficiency. The targets for the year 2030 are in many cases complemented by a set of intermediate targets (for 2017 and 2020, for example), which are specified in the National Development Plan of Latvia for 2014–2020 or in relevant mid-term sectoral policies. For example, the 2030 target for resource productivity of EUR 710/tonne is flanked by interim targets to achieve resource productivity of EUR 540/tonne in 2017, and EUR 600/tonne in 2020 (measured as GDP/DMC).

Latvia regularly publishes a monitoring report on indicators, where trends towards targets are monitored, reported to the government and made available to the public. The latest monitoring report was produced in 2015.

For further information, see country profile.

Box 9.5 The Green Growth Commitment and its set of targets, Portugal

With its Green Growth Commitment (GGC), Portugal seeks a new national development model. The GGC's vision is to 'foster green economic growth in Portugal with national impact and international visibility, stimulating green economic activities, promoting the efficient use of resources and contributing to sustainability'.

Portugal set the target of **increasing national resource productivity** from (GDP) EUR 1.14/kg in 2013 to EUR 1.17/kg in 2020 and EUR 1.72/kg in 2030. This is part of a comprehensive set of targets, including:

- increasing the incorporation of waste in the economy — from 56 % in 2012 to 68 % in 2020 and 86 % in 2030;
- improving energy efficiency (energy intensity) from 129 toe/EUR 1 million (2011 euros) of GDP in 2013, to 122 in 2020 and 101 in 2030;
- promoting the sustainable use of metal resources, which may reach 1 % of GDP and create 25 000 jobs;
- reducing energy consumption in public administration by 30 % by 2020 and 35 % by 2030;
- reducing energy consumption in buildings by 25 % by 2020 and 30 % by 2030.

For further information, see country profile.

Latvia regularly publishes a monitoring report on indicators, where trends towards targets are monitored, reported to the government and made available to the public. The latest monitoring report was produced in 2015.

For further information, see country profile.

9.2 Waste-related targets

A majority of countries (25) reported having national targets for the recycling of certain waste streams, including:

- organic waste, paper, cardboard, glass, wood, metal, plastic and packaging wastes, electrical or electronic equipment and batteries, mainly to be collected from households;

- construction and demolition waste, metal wastes, and industrial and hazardous wastes, mainly from the industrial sector.

The targets reported by countries are listed in Annex 8. Table 9.1 presents a selection of these to illustrate the broad range of topics and approaches they cover. Targets are grouped into five categories: waste generation caps or limits; waste reduction targets; collection targets; recycling targets; and recovery targets.

Table 9.1 Examples of waste-related targets reported by countries, clustered by objective

Waste generation caps and limits	• Cap household waste at 560 kg per person by 2010 (Flanders, Belgium) • Stabilise industrial waste at 2010 levels by 2020 (France) • Decrease the generation of residual household waste to less than 100 kg/person by 2020 and less than 30 kg/person by 2025 (Netherlands) • Municipal waste generation not to exceed 410 kg/person by 2020 (Portugal)
Waste reduction targets	• Decrease food waste by 15 % by 2020 and 30 % by 2025 (Flanders, Belgium) • Reduce the generation of hazardous waste by 20 % by 2010 compared to 2000 (Croatia) • Stabilise the amount of municipal waste at the level of the early 2000s and then ensure a decreasing trend by 2016 (Finland) • By 2020, achieve a 10 % reduction in per person generation of household and similar waste, compared to 2010 (France) • Halve food waste by 2025 (France) • Reduce the generation of municipal solid waste (kg/person) to 70 % of the 2007 level by 2020 (Hungary) • Achieve a 1 % annual reduction in the per person quantity of household waste in the period 2015–2021 (Ireland) • By 2020, reduce waste generation by 18 % compared to average waste generation in the period 2008–2012 (Portugal) • By 2016, achieve a minimum reduction of 7.6 % (by weight) of municipal waste generated per person relative to 2012 (Portugal) • Achieve a 10 % reduction in waste by 2020 compared to that generated in 2010 (Spain) • Reduce all waste by 7 % by 2017 and by 15 % by 2025 compared to 2011 (Scotland, United Kingdom) • Achieve annual reductions of 1.2 % in household waste, 1.4 % in industrial waste, 1.2 % in commercial waste, and 1.4 % in construction waste by 2050 relative to 2006/2007 (Wales, United Kingdom)
Collection targets	• Collect 65 % of waste electrical and electronic equipment (WEEE) by 2018, and 75 % in the service sector by 2018 (Denmark) • Collect 55 % of batteries by 2018 (Denmark) • Achieve a selective collection rate of more than 75 % for household waste and waste produced by small companies, offices, stores and services by 2020 (Netherlands) • By 2020, recover 47 kg of recyclable waste after sorting per person per year (Portugal) • Improve the system of management of specific waste streams (waste tyres, used batteries and accumulators, waste oils, end-of-life vehicles, WEEE) in order to achieve 4 kg per person of separately collected WEEE by the end of 2019 and at least 45 % of batteries and accumulators by the end of 2016 (Serbia) • Collect 4 kg of household WEEE per inhabitant in 2014/15, or the average volume of WEEE collected in the last three years, whichever is greater; in 2016, collect a volume equivalent to 48 % of the average volume of electrical and electronic equipment placed on the market in Slovakia in the last three years (Slovakia) • Achieve separation and biological treatment of at least 50 % of food waste from households by 2018 (Sweden)

Table 9.1 Examples of waste-related targets reported by countries, clustered by objective (cont.)

Recycling targets	- Recycle 50 % of organic waste, paper, cardboard, glass, wood, plastic and metal waste from households by 2022 (Denmark) - Recycle 70 % of paper, cardboard, glass, metal and plastic packaging from the service sector by 2018 (Denmark) - Recycle 60 % of organic waste by 2018 (Denmark) - Recycle 80 % of phosphorus in sewage sludge by 2018 (Denmark) - Recycle some 50 % of all municipal waste for materials and use 30 % for energy recovery by 2016, with not more than 20 % of the total deposited in landfill (Finland) - Replace 5 % of the gravel and crushed stone used in earthworks with industrial and mining waste by 2016 (Finland) - Increase the share of recycled quarry materials from 6 % to more than 10 % of domestic production within the next 10–15 years (France) - Recycle 80 % of collected waste by 2030 (Latvia) - Recycle at least 85 % of industrial waste by 2015 (Netherlands) - Recycle at least 95 % of construction and demolition waste by 2015 (Netherlands) - Increase the overall recycling rate (including energy recovery) to at least 80 % by 2015 (Norway) - Recycle 55 % of packaging waste by 2025 (Serbia) - Recycle 50 % of municipal waste by 2030 (Serbia) - Recycle and compost 45 % of household waste by 2016 (Northern Ireland, United Kingdom) - Recycle 60 % of household waste by 2020 and 70 % of all waste by 2025 (Scotland, United Kingdom) - Recycle 70 % of industrial and commercial waste by 2024/25 (Wales, United Kingdom) - Recycle 70 % of municipal waste by 2024/25 (Wales, United Kingdom) - Recycle 90 % of construction and demolition waste by 2019/20 (Wales, United Kingdom)
Recovery targets	- Achieve 95 % recovery and reuse and 85 % recycling in the processing of selected end-of-life vehicles by 2015 (Czech Republic) - Reach 25 % energy recovery from garden waste by 2018 (Denmark) - Recover 70 % of shredder waste by 2018 (Denmark) - Achieve a 75 % recovery rate for demolition and construction waste by 2020 (Estonia) - Recover 100 % of all municipal sludge and manure by 2016 (Finland) - Reach 100 % energy recovery (incineration) of used tyres by 2014 (the former Yugoslav Republic of Macedonia) - Treat at least 50 % of food waste from households, catering services, shops and restaurants with the aim of recovering plant nutrients by 2018, with at least 40 % treated in such a way that energy is also recovered (Sweden) - Achieve a 60 % recovery rate for glass, plastic, metal, and paper and cardboard from packaging materials, and 15 % for wood by 2020 (Turkey)

Many reported waste-related targets stem from various EU directives, including the Waste Framework Directive, Landfill Directive and Packaging and Packaging Waste Directive, and often refer to the corresponding milestones of the EU Roadmap to a Resource Efficient Europe.

It is worth noting that in several cases EU membership aspirants, including the former Yugoslav Republic of Macedonia, Serbia and Turkey, and non-EU countries

(Norway and Iceland) also reported having targets in line with the relevant EU directives.

Very few countries have adopted waste generation caps or limits. A more usual scenario is to set percentage-based waste reduction targets, most commonly related to municipal and household waste. However, in a few cases targets have been set for waste generation in general, or a specific type of waste, such as food waste (Box 9.6).

Box 9.6 Targets for the prevention or management of food waste

The topic of food waste, and in particular of preventing it, has received significant attention in recent years on the EU policy agenda. The December 2015 European Commission proposal for amending the Waste Directive includes a target of halving food waste by 2030, in line with the United Nations Agenda for Sustainable Development. However, this attention has not yet broadly converted into concrete targets adopted by countries. Reported targets for food waste include:

- reducing food waste by 15 % by 2020, and by 30 % by 2025 (Flanders, Belgium);
- halving food waste by 2025 (France);
- separating and biologically treating at least 50 % of food waste from households, catering services, shops and restaurants, with the aim of recovering plant nutrients, with at least 40 % treated in such a way that energy is also recovered (Sweden).

For further information, see country profiles.

Some noteworthy examples of national targets that go beyond EU requirements include:

- at least 51 % recycling of plastic packaging waste and 43 % of wood packaging waste by 2021 (Netherlands);
- 60 % recycling of organic waste by 2018 (Denmark);
- a 61–64 % recycling rate for municipal waste by 2020 (Slovenia);
- separate collection and recycling of more than 70 % of household biowaste by 2025 (Bulgaria);
- a 75 % selective collection rate for household waste and waste produced by small companies, offices, stores and services by 2020 (Netherlands);
- 80 % recycling of collected waste by 2030 (Latvia);
- 80 % recycling of phosphorus in sewage sludge by 2018 (Denmark);
- an 85 % recycling rate for industrial waste by 2015 (Netherlands);
- 90 % recycling of construction and demolition waste by 2019/20 (Wales, United Kingdom);
- a 95 % recycling rate for construction and demolition waste by 2015 (Netherlands);
- a 100 % recovery rate for all municipal sludge and manure by 2016 (Finland).

9.3 Energy-related targets

The second area with many existing targets relates to energy use and energy efficiency, where 19 countries reported having adopted targets. At present, targets in this group are also overwhelmingly driven by EU directives. Individual countries have their own indicative targets as a contribution to the achievement of the overall EU climate and energy targets, which were agreed on the basis of each country's starting point and capability.

The examples of energy-related targets presented in Table 9.2 were selected to present a variety of country approaches, and have been clustered into four groups:

- reduction targets for primary energy consumption;
- reduction targets for final energy consumption;
- targets to increase energy efficiency (or to decrease energy intensity) at the national scale and for certain sectors;
- targets for increasing the share of energy from renewable sources at national scale and in certain sectors.

Some notable targets among those listed in Table 9.2 include:

- having a 25 % share of renewables in final energy by 2020 (Estonia);
- making all new public buildings near zero energy by 2017 (Finland);
- the 30 % reduction target for fossil fuel consumption by 2030 compared to 2012 (France);

Table 9.2 Examples of energy-related targets reported by countries, clustered by objective

Primary energy consumption	• Decrease primary energy consumption by 20 % between 2008 and 2012 (Croatia) • Reduce fossil fuel consumption by 30 % by 2030 compared to 2012 (France) • Reduce primary energy consumption by 20 % by 2020 and by 50 % by 2050 relative to 2008 (Germany) • Reduce primary energy consumption by 24 % compared to the business-as-usual trend by 2020 (Italy) • Reduce primary energy consumption by 25 % by 2020 (Portugal) • Make savings of 20 % in primary energy consumption by 2020 (cumulative) (Slovakia)
Final energy consumption	• Reduce energy consumption by 9 % over the period 2011–2018 (Albania) • Reduce final energy consumption by 9 % compared to the 2001–2005 average by 2016 (Croatia) • Make new final energy savings of 47.78 petajoules (10¹⁵ joules) by 2020 (Czech Republic) • Maintain final energy consumption at or below the 2010 level by 2020 (Estonia) • Reduce final energy consumption by 50 % by 2050 compared to 2012, with an intermediate target of 20 % by 2030 (France) • Reduce energy demand by 20 % by 2020 (Ireland) • Achieve up to 9 % in energy savings by 2018 compared to the 2002–2006 average (the former Yugoslav Republic of Macedonia) • Achieve final energy savings of 9 % of the 2001–2005 annual average final energy consumption by 2016 (Poland) • Reduce energy consumption in public administration by 30 % by 2020 and 35 % by 2030 (Portugal) • Reduce energy consumption in buildings by 25 % by 2020 and 30 % by 2030 (Portugal) • Reduce energy consumption by 9 % over the period 2010–2018 (Serbia) • Achieve 23 % savings in final energy consumption by 2020 (cumulative) (Slovakia) • Achieve 11 % energy savings by 2020 (Slovakia) • Decrease annual energy consumption in public enterprise buildings by 10 % by 2015 and 20 % by 2023 (Turkey)
Energy efficiency and related targets	• Through branch agreements, improve energy efficiency by 11.4 % over the period 2014–2020 (Wallonia, Belgium) • Make all new public buildings near zero energy by 2017 (Finland) • Double energy productivity by 2020 compared to 1990 (Germany) • Reduce energy intensity in the economy (gross domestic energy consumption/GDP) to 0.15 toe/EUR 1 000 of GDP by 2030 (Latvia) • The final energy consumption target value (in fixed 2000 prices) for 2015 and 2020 was established at 0.2 kilograms of oil equivalent (kgoe)/EUR 1 (the 2010 baseline was 0.24 kgoe/EUR 1) (Poland) • Reduce energy intensity from 129 toe/EUR 1 million (2011 euros) of GDP in 2013, to 122 in 2020 and 101 in 2030 (Portugal) • Reduce energy intensity by 20 % by 2023 relative to 2011 (Turkey) • Reduce energy intensity in each industrial sub-sector by 10 % within ten years, starting from 2012 (Turkey)

Table 9.2 Examples of energy-related targets reported by countries, clustered by objective (cont.)

Renewable energy	• By 2020, increase the share of renewables to 20 % excluding hydropower; 35 % including hydropower (Croatia) • Increase the share of energy from renewable sources to 14 % of final gross energy consumption by 2020 (Czech Republic) • Increase the share of renewables in final energy to 25 % by 2020 (Estonia) • Increase the share of renewable energy sources to 32 % of final energy consumption by 2030, and to 40 % of electricity production (France) • Increase the share of renewable energy sources to 14.65 % (Hungary) • Increase the share of renewables in electricity production by a factor of 2.75 from the 2007 level by 2020 (Hungary) • Have a 19–20 % share of renewable energy in gross final energy consumption (Italy) • Have a 23 % renewable share in primary energy consumption (Italy) • Have a 40 % share of energy produced from renewable sources in total gross final energy consumption by 2030 (Latvia) • Increase the share of renewables from 13.8 % in 2005 to 21 % in 2020 (the former Yugoslav Republic of Macedonia) • Base 67.5 % of total energy consumption on renewable sources by 2020 (Norway) • Increase the share of renewable energy sources to 15 % by 2020, with further growth in subsequent years (Poland) • Increase the share of renewables in gross final energy consumption to 31 % in 2020 and 40 % in 2030 (Portugal) • Have a 27 % share of renewable energy in gross final energy consumption by 2020 (Serbia) • Have a 14 % share of energy from renewable sources in gross final energy consumption by 2020 (Slovakia) • Increase the sectoral targets for the share of energy from renewable sources to 14.6 % (heating and cooling), 24 % (electricity) and 10 % (transport) by 2020 (Slovakia) • In addition, several countries reported a target to reach a 10 % share of renewables in all transport modes by 2020 (which is mandatory in accordance with the EU Renewable Energy Directive).
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Note: It is worth noting that in the area of energy efficiency there are no mandatory minimum targets with which countries need to comply, nor are there interim targets or a clear path like those for greenhouse gas emissions and renewables.

- the 50 % reduction target for final energy consumption by 2050 compared to 2012, and the intermediate target of 20 % by 2030 (France);
 - increasing the share of renewable energy sources to 32 % of final energy consumption by 2030, and to 40 % of electricity production (France);
 - doubling energy productivity by 2020 compared to 1990 (Germany);
 - reducing primary energy consumption by 20 % by 2020 and by 50 % by 2050 relative to 2008 (Germany);
 - having a 40 % share of energy produced from renewable sources in total gross final energy consumption by 2030 (Latvia);
 - having 67.5 % of total energy consumption based on renewable sources by 2020 (Norway);
 - reducing energy consumption in public administration by 30 % by 2020 and 35 % by 2030 (Portugal).
- As already mentioned in earlier chapters, for many countries energy and material resource efficiency are two different policy fields. Several countries did not mention energy-related targets at all, despite having them. It is also worth noting that energy targets are expressed in energy or percentage terms, and not in terms of tonnes of consumed fossil energy carriers, even though the latter make up about a quarter of most countries' total DMC (Chapter 2).

9.4 Targets in other areas

In addition to the resource productivity, waste and energy-related targets listed above, countries reported some 40 targets in various other areas. This was a rather broad group covering a range of issues.

Five countries reported targets related to forestry or the use of timber. Examples include:

- increase by 20 % the consumption of wood and wood products from sustainable forestry over the period 2004–2014 (from 1.1 m³ per person to 1.3 m³) (Germany);
- forest cover to reach 55 % of total territory by 2030 (Latvia), and 35 % (Lithuania);
- increase the volume of certified timber and other forest products on the market by 50 % by 2020 compared to 2010 (Portugal).

Even though water was outside the scope of this study, five countries reported targets related to water.

Most common in this group were targets to reduce water loss in the distribution system (Latvia, Portugal and Turkey).

Only three countries reported greenhouse-gas-related targets even though practically all countries do have such targets. The low number of reports can again be attributed to the focus of this work on material resource efficiency, while in the majority of countries energy and climate change are subject to a separate policy framework.

One interesting finding emerging from the country reports is an increasing number of initiatives on material resource efficiency taken by public authorities and local governments within their areas of competence. The reported targets go beyond the most obvious topic of sustainable public procurement, and include reducing energy consumption in public administration, reducing the use of paper, or increasing the use of sustainable transport. Examples of specific targets set for the public sector are presented in Box 9.7.

Box 9.7 Examples of targets set for the public sector and government

Finland

- All new public buildings should be near zero energy by 2017.
- Finnish public-sector employees are to strive to rearrange their working routines so that by 2015 they will travel 10 % less than in 2010.
- By 2015 all vehicles purchased for mass transport should have emissions lower than 100 g/km; or at least 30 % of vehicle fleets should use electric, ethanol, gas or hybrid solutions.
- Purchased electricity for public buildings must come 100 % from renewable sources.
- Catering in central government organisations should increase the share of organic food to 10 % by 2015 and 20 % by 2020.

France

- For public authorities, reduce office paper consumption by 30 % by 2020.
- Achieve a 25 % share of recycled paper in all paper use by 2017, and a 40 % share by 2017 for public authorities.
- Achieve a 50 % share of reused or recycled building waste materials in road construction materials purchased by national and local authorities in 2017, rising to 60 % by 2020.

Portugal

- Reduce energy consumption in public administration by 30 % by 2020 and 35 % by 2030.

Turkey

- Reduce annual energy consumption in public enterprise buildings and facilities by 10 % by 2015 and 20 % by 2023.

Considerations for policy

- Although clear policy objectives and ambitious targets help policy implementation, the formulation of targets for material resource efficiency is clearly a challenge. This applies to both the EU and national levels.
- The targets that countries have in place are mainly in those areas where EU legislative intervention is strong, such as waste and energy. Interestingly, while EU-set targets determine the minimum ambition level for Member States, they also clearly influence other countries, both those aspiring to join the EU and those that do not harbour such ambitions.
- The resource productivity indicator (the ratio of gross domestic product to domestic material consumption, GDP/DMC) is already operational at a country level and regularly updated by Eurostat. It can serve as a headline indicator, and nine countries have based their targets on it even though the EU itself does not have a target for material resource efficiency. The national targets vary in terms of required levels of resource productivity, which indicates differences in economic structure across countries.
- Recent progress in analytical methods makes it worth exploring more advanced and disaggregated uses of material flow accounting (MFA) indicators to help steer policy, for example within economic sectors or for specific materials. A few countries are already applying material footprint methodology (raw material consumption, RMC), although targets based on RMC are yet to be set.
- Significant effort in recent years went into various initiatives on raw materials supply. The European Commission is maintaining the EU list of critical raw materials, and several countries are conducting their own analyses to identify national lists. This is mainly driven by economic concerns including access to resources, security of supply and price volatility, where close monitoring of trends and the setting of targets can help to give an effective policy response to those strategic challenges.
- Given that some countries have already developed a national set of targets for material resource efficiency, there is significant potential benefit from the exchange of experience and sharing of good practice among frontrunner countries and their less advanced counterparts, whether through bilateral exchange or at broader forums.

10 Indicators to monitor material use and resource efficiency

Countries were asked what indicators they use, or compile, to monitor material resource use and improvements in material resource efficiency. Such indicators are fundamental to supporting policy decisions, benchmarking and assessing the current situation, and monitoring and communicating progress towards resource efficiency objectives.

Thirty countries out of 32 provided information on the indicators they use to measure progress in improving material resource efficiency. However, the level of detail and coverage varied significantly. An overview of responses on material efficiency indicators is presented in Figure 10.1 (by number of reporting countries) and in Figure 10.2 (by number of indicators per theme).

The indicators reported by the largest number of countries (25) were based on material flow accounting (MFA) and compiled in accordance with Eurostat methodology (Figure 10.1).

The next group reported by the largest number of countries (24) focused on waste management. The

indicators in this group were generally related to total waste generation or addressed different types of waste.

Seventeen countries reported using energy-related indicators. The most frequently mentioned indicators covered production and consumption of energy and energy efficiency (19 reports), followed by indicators on the generation and use of renewable energy (7 reports).

Figure 10.2 Reported material resource efficiency indicators, by theme

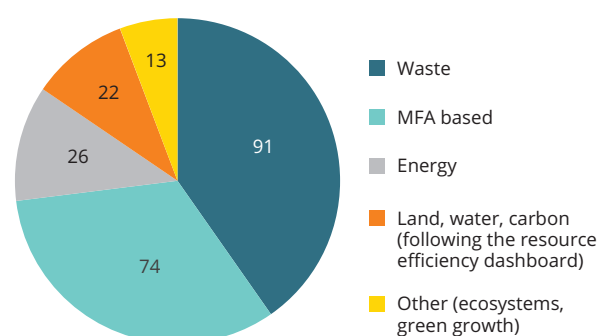
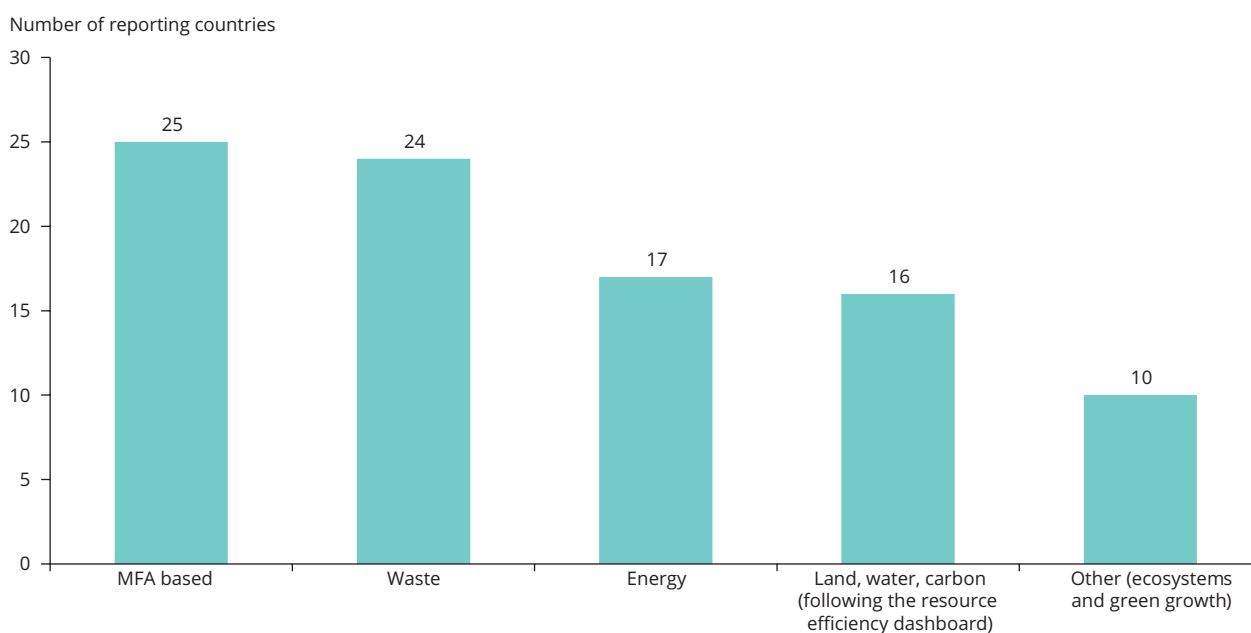


Figure 10.1 Indicators to measure material resource efficiency, by number of reporting countries



Sixteen countries reported using resource efficiency indicators that go beyond 'material resources'. This group, somewhat similar to the dashboard of indicators in the EU Resource Efficiency Scoreboard (Annex 6), covered such topics as water use, supply and recovery (11 reports), land use (7 reports), and carbon intensity (4 reports).

- DMC per person (9);
- direct material input (DMI) (8);
- domestic extraction (7);
- raw material consumption (RMC) (7).

10.1 Indicators based on material flow accounting

This group of indicators, reported by the highest number of countries (25), is based on the Eurostat economy-wide MFA framework, and figures are produced in compliance with EU Regulation 691/2011 on environmental economic accounts. The most frequently reported indicators in this group were, in descending order:

- resource productivity (the ratio of gross domestic product to domestic material consumption — GDP/DMC) (17 reports);
- DMC (16);

MFA-based indicators are in use both within and outside the EU, as demonstrated by reports from Serbia, Switzerland and Turkey.

In addition, eight countries reported various initiatives to estimate their global material footprints, typically using RMC as the indicator (Box 10.1).

A third of the countries reported that material use and resource efficiency indicators are published regularly, typically as part of national (or regional) sustainable development indicator reports or an annual environmental yearbook — including Belgium (Wallonia), Croatia, Estonia, Hungary, Italy, Latvia, the Netherlands (Box 10.2), Poland, Serbia and Slovenia.

Box 10.1 Raw material consumption and estimating global material footprints

In 2012, Eurostat published first estimates of the global material footprints of the EU (the EU-27 as a bloc). The raw material consumption (RMC) indicator, which takes into account materials 'embedded' in exports and imports (Box 2.1), is an alternative to the currently used domestic material consumption (DMC) indicator.

In the future, when estimates are of sufficient quality and are available for all Member States, RMC (related to GDP) may replace DMC to monitor resource productivity in the context of the EU's growth strategy for the coming decade — Europe 2020. At the time of writing, countries are invited to compile their national RMC figures on a voluntary basis, using methodological guidelines prepared by Eurostat.

Eight countries reported working on various initiatives that use RMC. **Austria** and the **Czech Republic** reported monitoring resource efficiency using DMC and RMC. **Finland** published a pilot study in 2013 comparing DMC and RMC for the National Material Efficiency Programme. **France** developed a material footprint approach to better account the influence of raw material imports and hidden flows, and has included RMC in its strategy Sustainable Development 2015–2020. In **Germany**, the Resource Efficiency Programme (ProGress) envisages RMC per person as one of its indicators. The **Netherlands** monitors the efficiency of raw material use relative to domestic consumption (RMC/DMC) in the biannual Dutch Sustainability Monitor. In 2015, **Switzerland** used RMC in a pilot study on the country's material footprint. The **United Kingdom** reported using GDP/RMC to monitor the efficiency of resource use in its annual digest of waste and resource statistics.

For further information, see country profiles.

Box 10.2 Material monitoring and footprint reporting system, the Netherlands

The Netherlands has developed protocols for monitoring specific industries including bio-based industries and construction and demolition. These indicators are published in the bi-annual Dutch Sustainability Monitor and include the efficiency of raw material use relative to domestic consumption (RMC/DMC); economic dependency on rare or critical materials and resources; transition to a bio-based economy; and the worldwide impact (footprint) of consumption and production in the Netherlands.

In addition, statistical data on the use of land and natural resources (energy, food, fisheries, forestry, mining, and footprints of domestic production and consumption) are published frequently in an online Compendium.

The Ministry of Infrastructure and the Environment is working together with the National Statistical Agency on extending the existing monitoring system from 2016 to include data on (waste) water, repair and reuse of products, 'dematerialisation' of goods and services, and recycling, substitution and sustainability of raw material use.

For further information, see country profile.

10.2 Waste-related indicators

Indicators on waste generation and management make up another large group of reported indicators (91 indicators reported by 24 countries). For this group, the high number of reporting countries results from the requirements laid down in EU waste-related directives.

Many countries reported general indicators on waste generation and management. Among specific waste streams, packaging waste (6 reports), waste electrical and electronic equipment (WEEE) (5 reports), organic and food waste (4), municipal waste (4) and hazardous waste (4) were the most frequently mentioned.

10.3 Energy-related indicators

Another frequently mentioned group of indicators relates to energy — 26 indicators reported by 17 countries addressed energy consumption, energy efficiency and the use of renewables.

It is worth noting that all EU countries are required to collect data on energy consumption and efficiency and on the share of renewables in their overall energy mix.

With this in mind, the fact that only 11 EU Member States mentioned energy-related indicators in their answers seems to indicate that many countries consider energy as a topic separate from material resource efficiency.

10.4 Indicators related to carbon, water and land use

Another sizeable group includes indicators similar to those in the dashboard of indicators of the EU Resource Efficiency Scoreboard. Some reported examples include:

- water use/supply and recovery (Wallonia (Belgium), Bulgaria, Croatia, Iceland, Ireland, Italy, Liechtenstein, Lithuania, Poland, Serbia and Turkey);
- land use (Germany, Liechtenstein, the former Yugoslav Republic of Macedonia, Serbia and Switzerland);
- carbon-related indicators (Denmark, Germany, Iceland and Switzerland);
- water intensity (Iceland and Turkey) (Box 10.3).

Box 10.3 Measuring water use efficiency, Turkey

The Ministry of Science, Industry and Technology in Turkey launched a new set of indicators in 2015 to monitor sustainable production trends in the Turkish manufacturing industry. Sustainable production indicators are designed as the ratio of several environmental parameters to the economic variable (value added at constant prices), to measure the use of a resource — in this case water — and the pollution generated per unit of economic output. Indicators are also expected to show whether there has been any decoupling of water use and pollution generation from economic growth.

For further information, see country profile.

10.5 Other indicators

A variety of other indicator types were reported, including on the value of ecosystem services, forests, green economy and pollution intensity. Some indicators are used to ensure sustainable management of resources (Box 10.4).

With the exception of RMC and the handful of examples of footprint-type indicators presented in Box 10.1, most reported indicators are calculated with the domestic perspective in mind, only considering what is happening within national borders.

However, in a few cases reported indicators were compiled on a regional (subnational) level. Flanders (Belgium) is monitoring the share of Flemish raw materials in its total use of raw materials. In Finland, the FISU (Finnish Sustainable Communities) programme for cities and municipalities includes four indicators to evaluate the region's steps towards 'resource wisdom': carbon footprint, ecological footprint, material loss, and the perceived well-being of city residents. The FISU Network service centre provides expert assistance to municipalities in calculating these indicators.

There also appears to be an increasing use of sector-oriented indicators, typically measuring a ratio between a given environmental parameter and the gross value added (GVA) of a given sector. Examples include:

- Wallonia (Belgium) monitoring eco-efficiency in six sectors of the economy;
- Denmark monitoring resource efficiency at the sectoral level;
- France measuring the share of recycled materials used by industry;
- Italy monitoring eco-efficiency in agriculture;
- the Netherlands introducing protocols for monitoring specific industries including bio-based industries and construction and demolition;

- Serbia monitoring energy efficiency in industry;
- Turkey's development of a set of sustainable production indicators in the manufacturing industry, measuring water use and pollution generation per unit of economic output;
- Scotland (United Kingdom) monitoring waste generation relative to GVA in different sectors.

Some examples of indicators focusing on more sustainable production in industry are the number of eco-labels issued, as in Poland; by-products traded between industries, as in Portugal; and green growth indicators in Slovakia, monitored in accordance with Organisation for Economic Co-operation and Development (OECD) methodology.

Very few countries reported using indicators that take into account the cost of materials in selected industries. Although the cost of resources is a critical factor in stimulating a transition to a more resource-efficient society, only Denmark (Box 10.5) and Switzerland named an indicator relating to the creation of value compared to material costs in industry.

In a few cases, countries reported monitoring the value of ecosystems and the ecological footprint as part of resource efficiency indicators. The Turkish government is planning to carry out a valuation of natural resources and ecosystem services to facilitate informed policymaking. Latvia reported using the ecological footprint — measured in global hectares per inhabitant — as a strategic indicator.

Very few countries reported using indicators to monitor the consumption patterns or awareness of citizens. Examples, however, include Finland using waste generation relative to household consumption as one of their indicators; Ireland compiling an indicator on domestic building energy ratings; and the Netherlands monitoring the global footprint of Dutch consumption. Slovakia reported using a set of sustainable consumption and production indicators.

Box 10.4 Monitoring sustainable use of natural resources, Estonia

Estonia provided an example of a policy for securing the sustainable use of nationally strategic resources, including forests, oil shale and construction minerals. Estonia's broad set of indicators for sustainable development monitors, among other things, the use of forest reserves. If there is a risk that timber extraction exceeds growth over a long period, the state may intervene to limit felling. Moreover, the National Development Plan for the Utilisation of Oil Shale stipulates the use of the best available technology in mining and processing.

For further information, see country profile.

Finally, Belgium, France, Germany, the Netherlands, Switzerland and the United Kingdom mentioned preparatory initiatives to develop metrics and

indicators for the circular economy. No country reported having a coherent set of such indicators in place.

Box 10.5 Monitoring the economic efficiency of resource use in industry, Denmark

Denmark compiles an annual growth and competitiveness publication, which in recent years included an indicator on the creation of value relative to material costs. This is compared across countries. Data are based on the World Input-Output Database. The most recent publication (2014) is available at: <http://www.evm.dk/publikationer/2014/09-09-14-redegoerelse-om-vaekst-og-konkurrenceenve-2014>.

Recently Statistic Denmark, supported by the Danish Business Authority and the Danish Environmental Protection Agency, developed a number of indicators to assess resource efficiency at the sectoral level. The indicators include among others GVA related to input (DKK), the purchase of input materials as a percentage of turnover (DKK), intensity of energy use (gigajoules), and waste production (kilograms) per unit of GVA. Detailed information is available for different sectors.

For further information, see country profile.

Considerations for policy

- The indicators reported by most countries as being used to monitor material resource efficiency are Eurostat-produced indicators based on material flow accounting (MFA). Countries also tend to use indicators on waste generation and management as a measure of material resource efficiency.
- Very few countries develop their own indicators for material resource efficiency and closing material loops. Overall, most countries are making use of the EU Resource Efficiency Scoreboard, which indicates that the model bringing together a number of relevant indicators in one place is well received. Some countries even reported maintaining scoreboards of their own, although these tend to be more broad in coverage, addressing sustainable development, for example, rather than specifically resource efficiency.
- The resource productivity indicator (the ratio of gross domestic product to domestic material consumption, GDP/DMC) and a suite of MFA indicators are regularly updated by Eurostat. Recent progress in analytical methods, including decomposition and input/output analysis, allows for more advanced, disaggregated uses of MFA-based indicators to help steer policy, for example within economic sectors and for specific materials. Furthermore, several countries are applying a material footprint approach such as raw material consumption (RMC).
- Although trends in material resource efficiency can be monitored at the economy-wide MFA level, there is scant information available to monitor trends in material use and resource productivity in specific sectors or for specific materials. Some countries are currently working on material- or sector-specific indicators. One future direction could be to focus attention on resource efficiency in individual sectors or industries.
- Although most countries have identified priority materials, very few reported collecting data on trends in the use of materials identified as a national priority or those on the EU list of critical raw materials. Where such information is available, it most frequently focuses on nationally strategic materials such as energy carriers and selected metals and minerals. Ongoing work on the Raw Materials Scoreboard to be adopted at EU level in 2016 may provide some guidance.
- Given the volatility in prices of raw materials in recent years, it can be expected that the cost of materials will need to be more strongly reflected in countries' future strategies for material resource efficiency and for securing nationally strategic supplies. At present, indicators on this are very scarce.
- No country reported having a coherent set of indicators in place for the circular economy and closing material loops. Some, including Belgium, Germany and the Netherlands, are already carrying out experimental work on the development of indicators that specifically target transition to a circular economy. This may help to address the challenges of measuring circularity and system change.
- Indicators that are currently available or in use do not seem well suited to measuring the environmental impacts of material use or the decoupling of resource use from its impacts. Furthermore, almost all are compiled from a domestic perspective, focusing inside national (and in a few cases regional) borders.
- There are strong links between improving material resource efficiency, consumption patterns, and environmental awareness related to material use. A coherent set of indicators addressing these aspects would complement those in current use.

11 Institutional set-up and stakeholder involvement

This chapter provides an overview of country responses to two separate questions.

- What is the institutional set-up for developing and implementing material resource efficiency policies at the national level? (Question 14)
- How is the process organised to ensure stakeholder participation? (Question 15)

Full details are presented in individual country profiles.

11.1 Institutional set-up for developing and implementing material resource efficiency policies

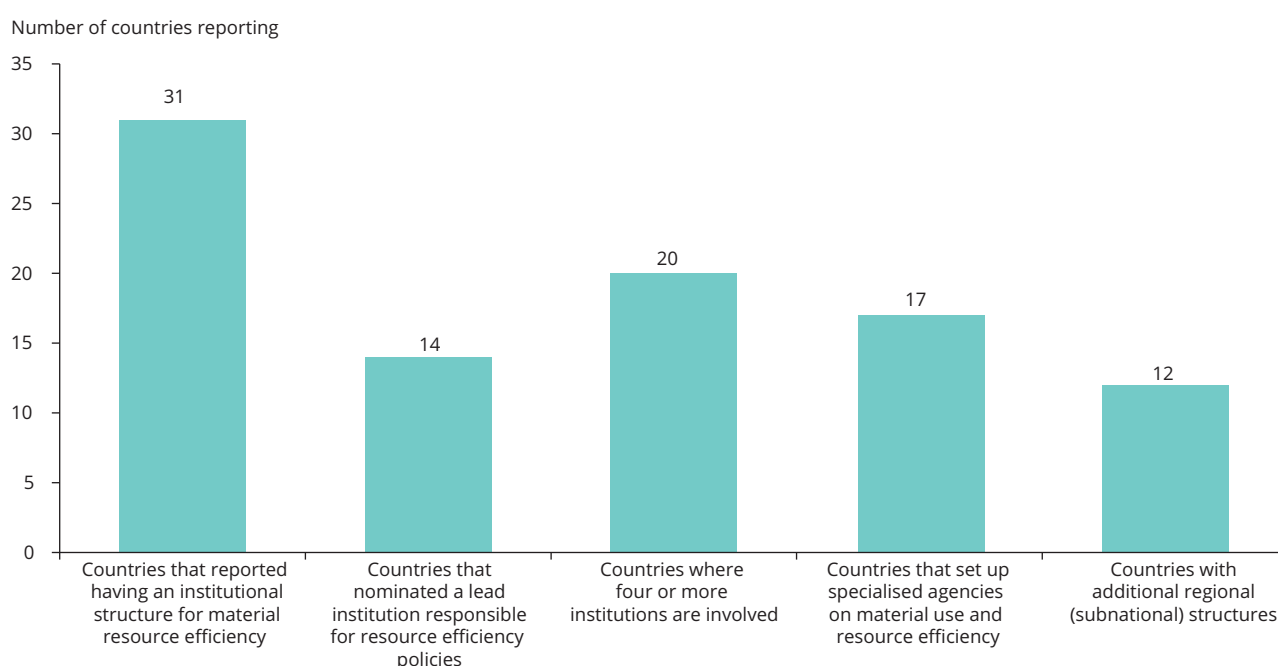
Countries reported a wide variety of organisational arrangements and forms of institutional set-up for developing and implementing material resource

efficiency policies. This is similar to the mix of institutions and actors reported in the 2011 EEA report *Resource efficiency in Europe*, but with a noticeably stronger role for ministries emerging in the 2015 analysis.

Material resource efficiency is a cross-cutting issue involving several domains and policy levels. The institutional set-up reflects this, having evolved in different ways depending on national governance structure, and ranging from fairly centralised approaches, such as in France or Poland, to more decentralised ones, as in Belgium and the United Kingdom. In addition, about a third of the countries reported having in place regional (subnational) or local institutions involved in the topic.

Figure 11.1 provides an overview of how reporting countries organise their institutional structure to support material resource efficiency.

Figure 11.1 An overview of institutional set-up reported by countries



Thirty-one participating countries reported having an institutional structure in place at the national level. Typically, the responsibility is dispersed across a variety of institutions, primarily among those ministries directly responsible for priority resources or sectors (Chapter 6). The most frequently mentioned in this context are ministries of the environment, energy, economy and agriculture. Although less frequently, transport, finance, forestry and industry ministries were also reported to have some responsibility.

It is worth noting that 20 countries reported having four or more ministries or agencies with responsibility for material resource efficiency. While this illustrates the multi-faceted nature of the topic, it also hints at possible difficulties in ensuring policy coherence.

Fourteen countries have nominated one institution — typically at the ministerial level — to take the leading or coordinating role nationally, while involving other institutions. Some notable examples include England (United Kingdom) and its Resource Programme Steering Group (Box 11.1), and Ireland, where the government set up a high-level cross-government committee to oversee implementation of the strategy Our Common Future.

Latvia reported on a special cross-sectoral coordination centre. Subordinated directly to the prime minister, the centre is responsible for implementing and monitoring the Sustainable Development Strategy and National Development Plan, which set out the goals and objectives for material use and resource efficiency. In 2013, the German government decided to establish a National Platform on Resource Efficiency to provide the Federal Government with a tool for sharing and discussing relevant information on resource efficiency with industrial and environmental associations and trade unions.

Seventeen countries have established specialised agencies responsible for certain types of resources or issues. Examples include the Natural Resources Agency in Albania, Natural Resources Wales (United Kingdom), public waste agencies such as OVAM in Flanders (Belgium), WRAP in the United Kingdom and Zero Waste Scotland (United Kingdom), and energy agencies in Albania, the former Yugoslav Republic of Macedonia, Portugal and Slovakia.

Environment agencies (11) were reported to play a role in material resource efficiency in several countries: Austria, Croatia, Germany, Iceland, Ireland, Norway,

Box 11.1 Resource Programme Steering Group, England (United Kingdom)

The Resource Programme Steering Group (England only), led by the UK Department for Environment, Food and Rural Affairs (Defra), was established as a cross-Whitehall group to ensure that, across interested and key government departments, there is a mutual understanding of resource use and management policy and the contribution it makes to government objectives.

The Resource Programme Steering Group meets on a quarterly basis and aims to:

- provide a steer on any resource decisions that need to be taken and what impact a course of action will have on government and other external stakeholders;
- update relevant parties on recent developments within the resource programme, on how sustainable resource policy contributes to government priorities — in particular looking at growth, public perception of the way in which resource issues are addressed and dealt with and what are the key concerns — and, importantly, on how it contributes to protecting public health;
- provide a forum for discussion about resource policy and any issues relating to the area.

In addition, the Steering Group works with the Environment Agency in performing its regulatory duties on waste activities and in tackling waste crime and poor compliance, and with the Waste Resources and Action Programme (WRAP) to support businesses, civil-society organisations, local authorities and households in becoming more efficient in the way they manage and use resources.

There is also considerable contact on a day-to-day basis between Defra policy officials and their counterparts in other government departments, particularly the Department for Business, Innovation and Skills (BIS). Defra also regularly consults with the Department for Energy and Climate Change (DECC) and the Department for Communities and Local Government (DCLG). There is also regular engagement with relevant counterparts in Northern Ireland, Scotland and Wales.

For further information, see country profile.

Portugal, Serbia, Slovakia, Sweden (Box 11.2) and the United Kingdom. In general, specialised and environment agencies tend to play a supporting role, assisting the leading or coordinating institution in drafting policies or providing data and information on which the policies will be based.

In addition, Belgium and the United Kingdom have further subsidiary institutions at the regional level. In the United Kingdom, for example, with a devolved responsibility for environmental matters, England, Northern Ireland, Scotland and Wales all have their own jurisdiction and policy plans when it comes to resource efficiency, waste or recycling policies. Two countries — Germany and Serbia — reported having institutions dedicated to material resource efficiency at the regional level (regional efficiency or cleaner production centres), while the overall responsibility for the theme remains central.

Some countries reported having set up institutions to assist business and industry in the implementation of material resource efficiency projects. Belgium mentioned a Reference Centre on Circular Economy set up to assist small and medium enterprises (SMEs) in Wallonia, Finland referred to a Material Efficiency Centre, Croatia and Serbia reported national Cleaner Production Centres, and Ireland a Clean Technology Centre at national scale.

In a few cases, countries noted the role played at the local level by municipalities (Bulgaria and Latvia) and counties (Croatia and Ireland). In the case of Serbia, a Network of Energy Managers of cities and

municipalities, industries and public utility companies was put in place to increase energy efficiency in the production, transmission, distribution and resource efficiency of energy.

A few countries have set up a dedicated committee or body to address the issue of material resource efficiency. The cross-government committee of Ireland's Our Sustainable Future, for example, is chaired by the environment ministry and includes high-level representatives from all relevant government ministries. Another example of a focused institutional set-up is the Defra-led Resource Programme Steering Group in England (United Kingdom) (Box 11.1), which cooperates with WRAP. Both are internal governmental mechanisms. It is possible that other countries have panels or boards like these, but they have not reported on them explicitly.

A noteworthy example was reported by the Netherlands, where a government-wide programme on circular economy will be developed in 2016 with close cooperation between at least four ministries — Infrastructure and the Environment (lead institution); Economic Affairs; Foreign Affairs; and Interior and Kingdom Relations.

As discussed elsewhere, the topics of energy and material resource efficiency have separate policy frameworks and tend to be managed by different institutions. For matters related to energy use and energy efficiency, a fairly typical scenario is that the ministry of economy or energy is responsible for the development of policies for energy supply, ensuring

Box 11.2 System to achieve environmental quality, Sweden

Sweden has adopted 16 national Environmental Quality Objectives. Along with the Generational Goal and the Milestone Targets, they guide all the environmental work by providing directions on what should be achieved, how and at what pace. The Environmental Quality Objectives system consists of goals on three levels.

- A Generational Goal defines the direction of the changes that need to occur in society within one generation if the Environmental Quality Objectives are to be met. Decisions concerning the Goal are taken by the Swedish Parliament.
- Environmental Quality Objectives define the state of the Swedish environment that is expected to result from environmental action. Decisions on the Objectives are taken by the Swedish Parliament.
- Milestone Targets are steps on the way to achieving the Generational Goal and the Environmental Quality Objectives. In the first instance, Targets will be decided by the government. However, if the Parliament steps in, or if the government considers it appropriate, they will be decided by the Swedish Parliament.
- For each of the 16 Environmental Quality Objectives there is a responsible authority.

The Swedish Environmental Protection Agency is responsible for coordinating the whole follow-up system of the Environmental Quality Objectives, including data provision.

For further information, see country profile.

access to fuels and, where applicable, mining of fossil fuels. Meanwhile the ministry of the environment would typically be responsible for implementing environmental policies related to energy use, including climate action.

One interesting initiative was reported by the Netherlands, where energy efficiency and resource efficiency have traditionally been disconnected. Efforts are now under way to connect the two topics. For example, in the agreements for energy savings between the Ministry of Economic Affairs and relevant industry sectors, options are explored for making energy savings by using new or fewer materials.

In contrast, there seems to be a rather close connection between the responsibilities for waste and material resource efficiency, to a large degree due to an emphasis on recycling and the use of secondary raw materials. In terms of organisation and jurisdiction, however, waste management and waste prevention are not automatically linked to material resource efficiency, as they require the involvement of different actors and capacities. Waste management and recycling in fact constitute an area where responsibility for planning and implementation is frequently delegated to regional government.

Countries that reported a substantial role for regional or local government in the field of material resource efficiency include Austria, Belgium, Bulgaria, Croatia, Germany, Ireland, Italy, Latvia, the Netherlands, Norway, Portugal and Serbia. The majority of examples were related to waste management.

All in all, the institutional set-up for material resource efficiency has evolved since 2011. Material resource efficiency has benefited from general resource efficiency initiatives and growing economic interest in the topic. Nonetheless, the responsibilities and scope

of existing institutional structures often continue to overlap and/or remain only vaguely defined. In many countries, a wide range of ministries is involved, and many of those have a broad portfolio of topics and interests in addition to resource efficiency themes.

The diversity of institutional set-ups implies a number of challenges to the implementation of material resource efficiency programmes and measures. In addition, cross-country coordination in the context of, for example, resource-efficient value-chain management or the cross-border management of resources and secondary raw materials, would need dedicated networking and cooperation mechanisms because the structures in place are very different from country to country. No country reported working on mechanisms like these at present.

11.2 Processes for organising and ensuring stakeholder participation

Almost all countries (30) reported having processes and/or procedures in place to ensure the involvement of stakeholders in the development of material resource efficiency initiatives. It appears that in most cases they follow standard generic procedures for stakeholder consultation in environmental policymaking.

Some countries, however, reported innovative multi-stakeholder initiatives, providing them as examples of good practice. These include the Resource Programme Steering Group in the United Kingdom (Box 11.1); the Centre for Resource Efficiency (CERISE) in Sweden (Box 11.3); the Flanders' Materials Programme in Belgium (Box 11.4); the Green Economy Dialogue in Switzerland (Box 11.5); the National Council for Ecological Transition in France (Box 11.6); the Green

Box 11.3 Centre for Resource Efficiency, Sweden

The work of Sweden's Centre for Resource Efficiency (CERISE) involves companies, authorities and research institutes. The Centre's objective is to support competitiveness and resource efficiency in industry through a reduction in the use of resources and increased material efficiency, improved energy efficiency, greater efficiency in the use of ecosystem services, and reduced environmental impact. Participants represent various industries such as energy, pulp and paper, manufacturing, chemicals, waste and recycling.

The network organises seminars and several of the Centre's partners participate in research projects addressing different issues in material resource efficiency. The steering group of CERISE consists of representatives from industry, the IVL Swedish Environmental Research Institute, the Swedish Environmental Protection Agency and the Ministry of the Environment and Energy.

For further information: <http://cerise.ivl.se>.

Box 11.4 Flanders' Materials Programme, Belgium

The Flanders' Materials Programme, a public-private partnership, was founded in 2012. The Programme was launched to streamline the multitude of public and private initiatives in the field of sustainable materials management. It brings together individuals and organisations from the public sector, the business world, academia and non-governmental organisations (NGOs) to work jointly on sustainable materials management.

Ambitious long-term vision development, policy research and action in the field are combined. This is done in the respective contexts of Plan C, the Policy Research Centre for Sustainable Materials Management (SuMMa) and the Flanders' Materials Programme Agenda 2020, whereby the three pillars strengthen each other.

In order to lay the foundation for a circular economy by 2020, in which materials are used in smart closed cycles, the Programme focuses on closing material cycles in four economic clusters and on five enablers.

Economic clusters were chosen for their potential from a primary resources and materials perspective and because of the existing expertise within these domains in Flanders. The economic clusters are: sustainable materials in construction, bio-economy, critical metals in a continuous cycle, and sustainable chemistry and plastics in a continuous cycle.

Enablers such as sustainable design, smart collaboration, smart investment, new materials and new materials technologies, along with better regulation, aim to ensure that each leverage project, business case and innovation does not have to face the same obstacles.

For each cluster and each enabler five priority actions were put forward.

For further information: <http://www.vlaamsmaterialenprogramma.be/english>.

Growth Coalition in Portugal (Box 11.7); and the Green Deal programme in the Netherlands (Box 8.5).

Many countries report working through public consultation. Concerning how the process is organised to ensure stakeholder participation, it is usually led by a specific ministry — in most cases the environment ministry — or an environmental agency responsible for organising the consultations, workshops, seminars, hearings or dialogues. Stakeholders generally come from a wide spectrum of organisations, and include experts from government, business, academia, NGOs,

trade unions, industrial associations, local and regional authorities, chambers of commerce, communities and a range of sectors. In reality, the composition depends on the stakeholder mechanism employed and the task addressed.

Some countries reported adjusting measures and programmes to specific aspects of material resource efficiency policies. Examples where stakeholder involvement was carried out in a target-oriented manner include Austria (Resource Efficiency Action Plan), the Czech Republic (Secondary Raw Materials

Box 11.5 Green Economy Dialogue, Switzerland

The new Green Economy Dialogue programme of the Swiss Federal Office for the Environment directly brings together interested stakeholders from the private sector, NGOs, science and academia, to work in conjunction on voluntary measures that promote resource conservation and efficiency. With this targeted multi-stakeholder approach, the Swiss Federal Government is pursuing an open and systemic approach to solving stakeholder-identified key challenges in a collaborative and effective manner. The programme, initiated by the Swiss Federal Council in its Green Economy Action Plan, alludes to other initiatives, such as the United Nations Environment Programme's Inquiry into the Design of a Sustainable Financial System, with its Swiss stakeholder response. Key elements include the involvement and connection of people with responsibility and accountability for the sustainability and business performance of their organisations and a will to approach the green economy agenda in a systemic way, and the setting of SMART (specific, measurable, actionable, relevant and time-based) objectives and actions.

For further information: <https://www.gruenewirtschaft.admin.ch/grwi/en/home.html>.

Box 11.6 National Council for Ecological Transition, France

The French National Council for Ecological Transition is consulted on any proposed legislation addressing environmental or energy issues, as well as on national strategies related to sustainable development, biodiversity and corporate social responsibility, all of which include topics related to material resource efficiency. The Council is chaired by the minister in charge of the environment, and its members are representatives of all society stakeholders (communities, relevant management institutions, environmental protection associations, representatives of civil society, parliamentarians). The Council is kept informed about changes in the national sustainable development performance indicators that measure progress towards ecological transition.

The Council is also in charge of supporting the preparation of international negotiations on environment and sustainable development, as well as the preparation and follow-up of national environmental conferences, which are annual stakeholder meetings that define and debate various actions to be pursued during the following year. A few topics are selected each year; in 2013, one was the circular economy. Lastly, the Council is also in charge of monitoring implementation of the roadmaps adopted at these conferences. Its operational work is commonly conducted in working groups involving the French state, local elected officials, environmental protection associations, employers and labour unions, as well as parliamentarians, under so-called six-party governance.

For further information: <http://www.developpement-durable.gouv.fr/National-strategy-of-ecological.html>.

Policy), Germany (the Resource Efficiency Programme ProgRess), Liechtenstein (Action Plan on the Use of Recycled Concrete), the Netherlands (Green Deal), Portugal (Green Growth Commitment) (Box 11.7), and the United Kingdom (Zero Waste Scotland).

During Germany's preparation of ProgRess, detailed discussions were organised with relevant experts and representatives of civil society, industrial associations and the Federal States. Public participation was ensured through internet consultation and numerous opinions and contributions from associations, civil society and the scientific sector were incorporated into the Programme. The Federal Environment Ministry carried out a broad consultation in the first half of 2011 (through meetings, events and expert feedback rounds) and evaluated around 100 written opinions.

The forthcoming update of ProgRess (due in 2016) even included an online debate for collecting stakeholder input.

In addition, some countries reported setting up working groups with a variety of stakeholders whose work does not specifically target material resource efficiency as such, but often addresses it as part of a broader theme, be it discussing (new) legislation or the topic of a circular economy. Countries with this kind of working group include Belgium, Bulgaria, the Czech Republic, France, Ireland, Latvia, Liechtenstein, Poland, Serbia, Slovakia and Sweden.

In Ireland, for example, a National Waste Prevention Committee includes a broad stakeholder group that meets periodically to provide strategic direction for the

Box 11.7 Green Growth Coalition, Portugal

The Green Growth Coalition was founded in February 2014 and, in its Green Growth Commitment, brings together the efforts of about a hundred associations and representatives of business, scientific and financial organisations, as well as government agencies, foundations and NGOs.

The Coalition assumed that at least as important as the content of its Commitment was the underlying process of participation and co-responsibility in its formulation and implementation. There was a particularly active four-month process of public consultation, during which different agents explored and debated the different topics that constitute the Commitment, allowing opportunities, weaknesses and constraints to be identified. This process contributed to the conciliation of interests, providing greater consistency and robustness to the Commitment. In fact, the final document resulted from the spirit of the discussion and the work of a wide range of actors who are aware of the huge potential for economic growth and competitiveness that sustainability and the environment represent.

For further information: <http://www.crescimentoverde.gov.pt/compromisso>.

Environmental Protection Agency in implementing the National Waste Prevention Programme. In the Czech Republic, a working group was set up to develop the Secondary Raw Materials Policy.

Denmark reported a number of partnerships between stakeholders in value chains. Examples include partnerships in the area of food waste, recycling, and the prevention of construction and packaging waste. The Netherlands mentioned value-chain agreements for plastics and phosphate.

In most cases, no information was provided on whether processes are organised in a task-specific, ad hoc

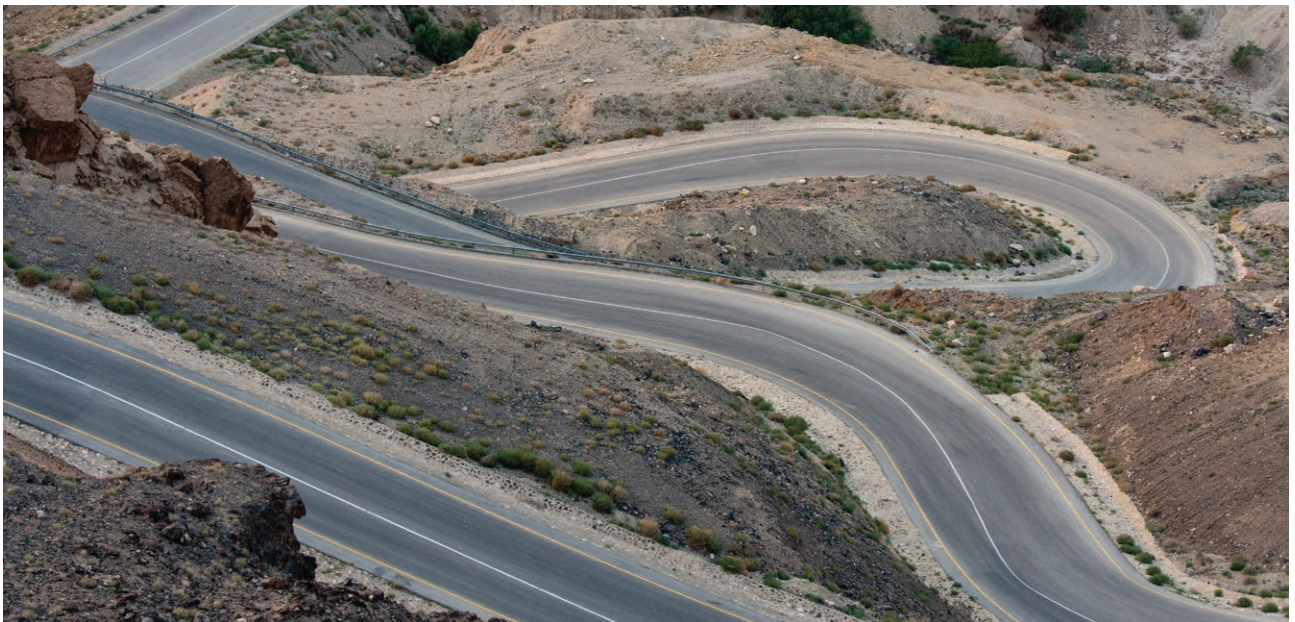
format — which is the case for the Czech Republic — or follow the formalised procedures usually applied to the development of legislative policy, as happens in Estonia.

In summary, there is a wide range of stakeholder involvement mechanisms in the area of material resource efficiency, and they are organised very differently from country to country. While stakeholders typically include experts from government, business, science, NGOs and consultants in environmental protection and resource conservation, a variety of new and original multi-stakeholder approaches has emerged in recent years.

Considerations for policy

- A wide variety of institutional arrangements are in place to develop and implement policies for material resource efficiency, reflecting differences in national conditions and requirements. In most cases several ministries are involved, with overlapping responsibilities and competencies.
- According to a number of country responses, it is not always clear which ministry has the leading role. Therefore, there is a continued need to streamline arrangements to ensure effective use of institutional capacities, to improve the coherence of policies across various fields, and to avoid overlap of responsibilities.
- Dedicated resource efficiency agencies and ministries supporting multi-stakeholder cooperation contribute to ensuring policy coherence. Various new and original multi-stakeholder approaches have emerged in recent years, which could play a role in cross-country knowledge transfer. Examples include partnerships along value chains, voluntary agreements, or coalitions of stakeholders to work out a common solution.
- In addition to the prominent role played by central government ministries in coordinating activities on the national scale, there are several examples of programmes and initiatives increasingly taking place at the regional or local level.

PART III THE ROAD AHEAD



12 Countries' reflections on the future direction of material resource efficiency policies and support mechanisms

This chapter provides an overview of country responses to two separate questions.

- Which way should resource efficiency go in the future? (Question 18)
- What international support mechanism would you find most useful for the exchange of experience and sharing of lessons from the implementation of material resource policies? (Question 16)

Detailed country answers are available in individual country profiles, as well as in Annex 9 and Annex 10.

12.1 Countries' recommendations for the future direction of material resource policies

Countries were invited to share their views and recommendations on the direction that material resource efficiency policies should take in the future. Twenty out of 32 countries responded to this optional question, offering a wide variety of suggestions that can be grouped into the following categories:

- better definitions, scope and focus;
- integration of material resource efficiency into other policies, and broader stakeholder involvement;

- improvement of data availability;
- a more systemic approach;
- addressing other challenges.

Better definitions, scope and focus

As discussed in Chapter 4, the scope of material resources or resource efficiency is not clearly defined in EU policies, and there are large differences in how these topics are treated in individual countries. Some countries suggested including soil and water in material resources. Pointing this out, several countries argued for making a clear distinction between natural resources and material resources (Box 12.1).

The current catch-all description of material resource efficiency does not support effective focusing of policy effort, and some countries expressed an opinion that a clearer scope of material resource efficiency is needed to advance concrete policy measures.

Concerning the focus of policy intervention, it clearly needs to correspond to countries' specific situations. For example, Latvia suggested that small countries with limited industry might want to focus on the potential for more material resource efficiency in households and address public consumption.

Box 12.1 Voice from Italy

Future activities should be more detailed and focused on specific objectives and outputs. Potential next steps could be to:

- provide a clear differentiation in the definitions of 'natural resources' and 'material resources';
- initiate best-practice networks and partnerships among EU agencies and with other non-European environmental agencies in the communication of objectives, methodologies, indicators and targets relating to the catalogue of material resource efficiency as a contribution to the development of global networks to support the sustainable use of resources;
- further refine strategies, specify indicators and propose technical, legal and economic instruments for examining and managing mainstream material flows;
- elaborate integrated environmental and economic accounting systems;
- promote national reform programmes dealing with resource efficiency policies.

Integration of material resource efficiency into other policies, and broader stakeholder involvement

Countries frequently see material resource efficiency as a horizontal policy issue because materials are a substantial component of thousands of products and processes. This is illustrated by calls from several countries to integrate material resource efficiency into other related policies, such as:

- **waste policy**, by allowing waste to be used as a resource, by opening markets for secondary materials, or by shifting from end-of-pipe pollution control to preventive approaches resulting in zero waste;
- **product policy**, by promoting longer product lifespan, by considering reparability during product design, or by promoting life-cycle analysis and life-cycle costing to determine priorities (Box 12.2);
- **consumption-oriented policy**, by creating conditions for shared ownership such as car sharing, or for hiring services rather than purchasing goods (Box 12.3);
- **economic and tax policy**, by creating financial mechanisms to support the circular economy, or by shifting taxes from labour to material resource use;
- **energy policy**, by highlighting the links and interdependencies between the use of energy and materials;

- **circular economy policy**, by integrating resource efficiency into circular economy policy (and vice versa);
- linking resource efficiency to global development **goals on food resources and food waste**.

Several countries also recommended organising a broad and regular economic and environmental stakeholder debate, not only among policymakers, but also between policymakers and implementing parties — including industry, businesses and authorities. This seems to reflect the expanding policy agenda, increasingly moving from addressing environmental issues to dealing with economic threats and opportunities.

Improving the availability and harmonisation of data

Thanks to the recent EU Regulation 691/2011 on European environmental economic accounts and the efforts of Eurostat, economy-wide material flow accounting (MFA) data are available with an increasingly shorter time delay. However, unless combined with other tools such as input/output analysis, MFA data on their own are not well suited to depict the complex material metabolism within economies. Some countries called for developing better (national) accounting systems and better indicators to monitor material resource use and efficiency, and have expressed the need for a better knowledge base in general. One specific challenge

Box 12.2 Voice from Serbia

Resource efficiency must be mainstreamed in national policies and regulations. As a voluntary initiative, it has so far failed to decouple economic growth and the well-being of people from resource use. In addition, the pricing of energy, water and other raw materials must include their real cost, calculated, for example, using life-cycle assessment.

Box 12.3 Voice from Wallonia (Belgium)

Actions in the field of resource efficiency mainly focus on material resources and waste recovery. Resource efficiency should include a broad concept of the circular economy in order to close the loop. More systemic solutions could be considered in the future, including ecodesign; ending planned obsolescence; sharing of goods such as cars or washing machines; and hiring of services rather than purchase of goods. Resource efficiency measures and strategies should contribute to the realisation of the energy transition to a low-carbon economy.

Box 12.4 Voice from Flanders (Belgium)

There has to be room for learning by doing. The transition to a circular economy and to becoming more resource efficient is a complex process in which room for experiments is necessary. Through these experiments, conditions and barriers can be identified and the road to a successful transition can be revealed. Legislators must have the opportunity to create room for experiments and frontrunners, to learn from them and to transpose new insight to legislation and policies.

is to produce timely raw material consumption (RMC) calculations, which will require technical and methodological support (Box 12.6).

A more systemic approach

Materials are present in all societal systems, from housing to mobility, food, the energy system and infrastructure. Several countries see a need for a much more systemic, full-value-chain approach to material resource use and efficiency, through:

- better understanding of material systems;
- stimulating experiments to take place in practice, and learning by doing (Box 12.4);
- wider awareness raising about economic opportunities and new business models;

- targeting the end user and addressing consumption patterns (Box 12.5).

Addressing other challenges

The complexity of managing material flows and resource efficiency in global and ever changing value chains is reflected in several country responses:

- resource efficiency should focus on the materials phase first, rather than on waste;
- globalisation and its consequences remain a challenge to the governance of material resource efficiency;
- recycling presents an increasing techno-economic challenge due to the ongoing dispersion of ever more different materials in ever smaller amounts in a large variety of products.

Box 12.5 Addressing consumption patterns

Reflecting on future directions in material resource efficiency, several countries emphasised the importance of addressing consumption patterns.

Estonia: 'The shift in focus from waste policies to resource policies to influence consumption patterns.'

Latvia: 'In small countries with limited industry, the highest resource efficiency potential lies in the household and changes in public consumption practices.'

Poland: 'The other question is combining resource efficiency with more rational consumption (...) the consumption of resources in some Western countries will need to take account of the limited amounts of resources.'

Portugal: 'On the side of consumption, satisfying results are much harder to obtain. Mindsets and behaviour are not easily changed (...) the economic and financial crisis has had profound and hopefully long-lasting effects on consumer behaviour.'

Furthermore, half a dozen countries — Hungary, the Netherlands, Poland, Scotland (the United Kingdom), Slovakia and Switzerland — pointed out the need to change the way we design products, for example through product policy, ecodesign or increased durability.

Box 12.6 Reflections on major challenges, Austria

- Public and private institutions for environmental protection as well as industry/economy need to take the lead.
- Markets for the recycling of secondary raw materials need to be established through harmonised initiatives.
- Climate protection calls for low-energy buildings, requiring insulation materials and material compounds that take into account the challenges to reusing or recycling used products and materials.
- How can the capacity of all EU Member States to perform a timely calculation of RMC be ensured?
- What is the optimal recycling rate for different materials and waste?
- How can a material resource and life-cycle environmental impact tax be introduced?
- How should transfrontier shipments of secondary raw materials be managed?

12.2 Countries' views on international support mechanisms

A vast majority of the 29 countries that responded to the question about an international support mechanism recognised the need for exchanging experience and sharing lessons learned at both national and international levels.

Countries identified a large number of **international organisations, mechanisms or networks** that do already — or should in the future — play a role in supporting such an exchange. The reported organisations, in order of frequency, include:

- European Environment Agency (EEA) (12 responses);
- European Commission, including Directorates-General for Environment, Energy, Regional and Urban Policy, Internal Market, Industry, Entrepreneurship and SMEs, and the Joint Research Centre; and the Commission's working groups such as the Raw Materials Supply Group (10 responses);
- United Nations in general, or more specifically the United Nations Environment Programme (UNEP), the United Nations Economic Commission for Europe (UNECE) and the United Nations Development Programme (UNDP) (8);
- Organisation for Economic Co-operation and Development (OECD), for example the Working Party on Resource Productivity and Waste (WPRPW) (4);
- European Topic Centre on Waste and Materials in a Green Economy (ETC/WMGE) (3);
- European Semester (2);
- European Resources Forum (ERF) (2);
- World Resources Forum (WRF) (1);
- European Resource Efficiency Platform (EREP) (1);
- Green Growth Knowledge Platform (1);
- Nordic Waste Group (1);
- Ellen MacArthur Foundation (1);
- International Energy Agency (IEA) (1);
- Excellence Centre envisaged in the 2014 Green Action Plan for SMEs (1).

About a dozen participating EU Member States suggested a range of topics that they feel would be best addressed at the EU level or call for the

Box 12.7 Country voices on topics requiring attention or leadership at the EU level

Austria: 'On the level of the European Commission a common platform for industrial and environmental concerns/policies would be helpful.'

Flanders (Belgium): 'It is crucial that we keep the frontrunner position in Europe. Falling back on national initiatives is not an option. KIC Raw Materials is a great contributor to innovation, knowledge gathering, research and development and education. If the EU wants to keep its frontrunner position, KIC Raw Materials has a crucial role to play.'

Wallonia (Belgium): 'At European level, we should explore how to better integrate resource efficiency in the Europe 2020 strategy including through the introduction of a non-binding aspirational EU target and country-specific recommendations in the European Semester mechanism.'

Ireland: 'The proposed European Resource Efficiency Excellence Centre would be a very effective support mechanism.'

Italy: 'Initiate best-practice networks and partnerships among EU agencies and with other non-European environmental agencies.'

Netherlands: 'Important topics include removing EU-wide barriers and regulatory obstacles.'

Poland: 'One of the most important international (in this case EU) forums regarding resource efficiency from the economic perspective is the Raw Materials Supply Group (RMSG), organised and led by the European Commission.'

Scotland (United Kingdom): 'We recognise the value of European leadership to complement this domestic action, for example in areas such as ecodesign and common targets.'

leadership of the EU. The list includes such topics as ecodesign, target setting, common platforms for industrial and environmental concerns/policies, raw materials policy, removing EU-wide barriers and regulatory obstacles, best-practice networks, or a resource efficiency excellence centre at EU level. Some examples are presented in Box 12.7.

Some countries also identified a number of channels that provide financial support for capacity building, preparing for EU *acquis*, and implementing projects to learn from one another. They included the World Bank, the International Monetary Fund, EU delegations, and the European Structural and Investment Funds (including public-private partnerships and bilateral programmes).

Although several countries highlighted various United Nations institutions as important channels for the countries, somewhat surprisingly, UNEP's International Resource Panel was not mentioned by countries at all. This may indicate that, building on its international achievements and a series of recent policy-relevant reports, the Panel may now want to reach out and engage more vigorously with policymakers at the country level.

Regarding the **desired format for exchanging experience** and sharing lessons learned, countries did not identify a clear preference. The most frequently cited mechanisms were:

- workshops and conferences (11);
- webinars (7);

- internet-based platforms providing information, tools, case studies and data (7);
- bilateral cooperation (2);
- continuous monitoring dialogue through the European Semester (2).

With respect to contents and topics, countries indicated having an interest in exchanging experience and good practice on a wide range of themes. Topics that were mentioned more than once include:

- good (policy) practices in general (7);
- indicators (4);
- green/circular/sharing economy (4);
- industrial versus environmental concerns (3);
- resource efficiency as a tool for achieving the goals of sustainable development (3);
- tax incentives (2);
- economic governance (2);
- setting priorities in a way that addresses both resource efficiency and energy efficiency (2).

Finally, several countries, including Latvia, Lithuania, Poland, Portugal and the United Kingdom (Box 12.8), expressed interest in exchanging experience and learning from non-European countries, for example through the OECD network or United Nations channels.

Box 12.8 International support mechanisms, the United Kingdom

- EEA-related events.
- Commission meetings (for example Commission-chaired meetings on resource efficiency, eco-innovation, eco-labelling, sustainable consumption and production and Environmental Technology Verification, amongst others, and ad hoc bilateral meetings with Commission officials).
- EU-funded initiatives such as DYNAMIX and POLFREE.
- Other relevant workshops, conferences and meetings, organised, for example, by the IEEA and OECD.
- Meetings linked to international agreements such as the Basel Convention.
- UNEP meetings, in particular global meetings in New York and meetings related to the 10-Year Framework of Programmes on sustainable consumption and production patterns (10YFP).

Box 12.9 Topics of interest for the exchange of best practice, the Netherlands

Important topics include:

- the development of new business models;
- natural capital and primary resources;
- new ambition in European product policy;
- the concept of waste;
- food loss and food waste;
- finance for circular innovation (boosting access to financing for initiatives that contribute to the transition to a circular economy);
- removing EU-wide barriers and regulatory obstacles.

13 Final thoughts on policy development and implementation

This final chapter offers some EEA considerations for the development of future policies on material resource efficiency and the circular economy. It builds on the analysis of the information provided by the countries and on the points for policy consideration presented at the end of each chapter in Part II.

13.1 Material resource efficiency — understanding key concepts and the evolving approach

- Key concepts — including resource efficiency and the scope of material resources — are clearly defined neither in national policies nor at the EU level. Such a vague scope makes it difficult to carry out an insightful assessment of progress towards resource efficiency objectives.
- Only five respondents have adopted dedicated resource efficiency strategies or action plans, three at the national and two at the subnational level. Most countries incorporate material use and resource efficiency in a wide variety of other strategies and policies, including on waste and energy, industrial development and reform programmes, or in environmental or sustainable development strategies.
- In most cases, countries use fairly vague, catch-all notions of 'resource efficiency', 'natural resources' and 'raw materials'. The intuitive shorthand of 'doing more with less' seems sufficient for policy needs. However, several countries recommend better clarification of the definitions and scope of material resources and resource efficiency so as to develop more coherent policy responses.
- Despite a number of soft EU policy initiatives on resource efficiency in recent years, only eight EU Member States explicitly pointed to compliance with EU requirements as a policy driver. It is not clear why this is the case. One reason could be that material resource efficiency is now perceived as a strategic economic issue of national concern that countries are addressing in their own interests, so they see less need for guidance from the EU.

Another reason could be the limited EU regulatory regime for material resource efficiency.

- Reflecting on the direction that material resource efficiency policies should take in the future, countries identified the following groups of issues:
- better definitions, scope and focus;
- integration of material resource efficiency into other policies, and broader stakeholder involvement;
- improvement of data availability;
- a more systemic approach;
- addressing other challenges.

13.2 Opportunities for synergy

- Material resource efficiency and waste management are viewed as very closely related issues. This indicates an opportunity to address both themes together, through, for example, the circular economy, recovery of secondary materials or initiatives on industrial symbiosis.
- Energy and resource efficiency are still largely disconnected from a programmatic point of view. Reducing demand for energy through energy efficiency initiatives is generally subject to its own policy framework, and often outside the scope of material energy efficiency. This might deserve more attention in future, as there are many potential synergies between the two in line with the Seventh Environment Action Programme (7EAP) objective to 'turn the Union into a resource-efficient ... low-carbon economy'.
- Some countries emphasised the potential contribution of material resource efficiency initiatives to addressing security-of-supply issues on the one hand, and economic competitiveness and (green) job creation on the other. In light of competitiveness, growth and jobs being high on

the EU policy agenda, this dimension may deserve stronger emphasis in future policies on material resource efficiency, to demonstrate the benefits of material resource efficiency as a synergistic approach to reducing environmental pressure, addressing economic challenges and tackling climate change at the same time.

- Concerns about health and well-being — one of the strategic objectives of the 7EAP — play only a marginal role in driving material resource efficiency policies. While resource efficiency today is seen primarily as an economic issue with a strong environmental component, its potential to benefit health and well-being is also worth emphasising and illustrating in practice.
- Reducing dependence on imports and securing stable access to resources were shown to be some of the most important concerns, but only a handful of countries specifically referred to the EU list of critical raw materials. This may signal a need to intensify communication efforts concerning EU initiatives on raw materials.
- Addressing food waste, identified as a priority by about half the reporting countries, is interesting in that it combines material resource efficiency with climate benefits. Furthermore, reductions in greenhouse gas emissions occur not only during the production and consumption phases, but to a significant degree during waste management. It may be worth identifying and highlighting other such cases of synergistic co-benefits.
- Surprisingly little was mentioned about the link between resource efficiency and innovation, education and social considerations. This is perhaps something to reflect on in light of the Europe 2020 objective to achieve smart and inclusive growth.
- The manufacturing industry has been identified as a priority sector for material resource efficiency by two thirds of countries. It would also be useful to further emphasise material efficiency within ecodesign policy. The Ecodesign Directive provides a policy framework that could be further adapted to aid the transition to a material resource-efficient economy.
- There are some examples of financial support/seed financing for new business models in a circular economy to help initiate implementation at the company level. Overall, however, only a couple of countries reflected on the business and industry perspective on resource efficiency. This shows that

there is space for awareness raising about material resource efficiency as a means of improving competitiveness and production efficiency, or as a way to create niche market opportunities.

- Few responses (3 countries) identified the service sector — which accounts for two thirds of most European economies — as a priority, indicating that the potential role of services in improving material resource efficiency could be explored further.

13.3 Deploying the circular economy

- A few countries (Belgium, Germany and the Netherlands) reported having dedicated national strategies for addressing the circular economy and closing material loops. However, many acknowledged the need to move away from the linear model, stating that the transition to a circular economy is a political priority.
- Most of the reported circular economy initiatives are targeted at waste and secondary raw materials and at the abiotic part of the economy. Only a couple of countries explicitly commented that the circular economy needs to go beyond increasing recycling and the use of secondary raw materials. It might therefore be worth considering how policies on the transition to a circular economy could encourage initiatives beyond waste and recycling. In addition, the transition to a circular economy and the closing of loops will require significantly extended value chains and life cycles.
- The approach to closing material loops in a circular economy is still developing, but the topic is interpreted differently by different stakeholders and countries. It would be useful to demonstrate successful initiatives where the circular economy helps achieve other key policy objectives, such as those related to the climate, competitiveness or employment agendas.
- For the majority of countries, compliance with existing legislation is the main driver of any action taken at the national level, which could guide circular economy thinking. At present, only about a third of the responding countries identified the concept of a circular economy and closing material loops as a policy driver for material resource efficiency.
- There are examples of regional (subnational) circular economy initiatives, such as those in Belgium or Germany. When expanding the knowledge base for the circular economy, it is

worth keeping an eye on successful initiatives at the regional and local levels.

- One of the challenges for both material resource efficiency and the circular economy is to develop adequate indicators to monitor trends and measure progress, and to set targets where appropriate. Measuring the degree of circularity is quite challenging within the established statistical system in Europe, so it may be useful to monitor the progress of ongoing experiments in this field, for example in Belgium, Germany or the Netherlands.
- Given the broad scope and variety of interpretations of the circular economy and material resource efficiency, a useful approach might be to support the exchange of experience and information between countries on good practices in the development and implementation of circular economy policies and initiatives.

13.4 Setting the monitoring system and targets

- Although clear policy objectives and ambitious targets help policy implementation, the formulation of objectives and targets for material resource efficiency is clearly a challenge within a multi-level political-administrative system and with a broad range of actors. This applies at both the EU and national levels.
- Targets already in place at national or subnational levels are mainly in those areas where EU legislative intervention is strong, such as waste and energy. Interestingly, while EU-set targets determine the minimum ambition level for Member States, they also clearly influence other countries, both those aspiring to join the EU and those that do not harbour such ambitions.
- The indicators most commonly reported as being used to monitor material resource efficiency are Eurostat-produced indicators based on material flow accounting (MFA). The resource productivity indicator (gross domestic product relative to domestic material consumption, GDP/DMC) is already operational at a country level and regularly updated by Eurostat. It can serve as a headline indicator, and nine countries already base their targets on it even though the EU itself does not have a target for material resource efficiency.
- Countries also tend to use indicators on waste generation and management as a measure of

material resource efficiency. Few countries have developed their own indicators for material resource efficiency and closing material loops. Overall, most countries reported making use of the EU Resource Efficiency Scoreboard, which indicates that the model bringing together a number of relevant indicators in one place is well received.

- Recent progress in analytical methods such as decomposition and input/output analysis allows for more advanced, disaggregated uses of MFA-based indicators to help steer policy, for example within economic sectors and for specific materials. A few countries are currently working on material- or sector-specific indicators. One future direction — drawing on Swiss and Danish examples — could be to focus attention on resource efficiency in individual economic sectors or industries.
- Significant effort in recent years went into various initiatives on raw materials supply. The European Commission is maintaining the EU list of critical raw materials, and several countries are conducting their own analyses to identify national lists. Setting up a monitoring framework and indicators to observe trends concerning access to resources, security of supply and price volatility could help to give an effective policy response to those strategic challenges.
- No country reported having a coherent set of indicators in place for the circular economy and closing material loops. Some, including Belgium, Germany and the Netherlands, are, however, carrying out experimental work on the development of indicators that specifically target transition to a circular economy. This may help to address the challenges of measuring circularity and system change.
- Currently used or available indicators do not seem well suited to measuring the environmental impacts of material use or the decoupling of resource use from its effects. Furthermore, almost all are compiled from a domestic perspective focusing inside national borders, although Eurostat and several countries have experimented with applying material footprint methodology (raw material consumption, RMC).
- Given that some countries have already developed a national set of targets for material resource efficiency, there is significant potential to benefit from the exchange of experience and sharing of good practice between frontrunner countries and their less advanced counterparts, whether through bilateral exchange or at broader forums.

13.5 Institutional arrangements and support

- A wide variety of institutional arrangements are in place to develop and implement policies for material resource efficiency, reflecting national conditions and requirements. However, in most cases several ministries are involved, with overlapping responsibilities and competencies. Further streamlining of institutional arrangements in which several ministries are involved could ensure more effective use of capacities and help improve policy coherence.
- The drivers for material resource efficiency have expanded from environmental concerns to include economic interests, so engagement could be strengthened between policymakers from different policy fields, as well as with implementing parties. Several countries reported increasing collaboration between industry, non-governmental organisations and policymakers from different ministries to address priority sectors or materials, providing a win-win situation for all parties.
- There is growing awareness that regulatory/top-down measures are not the only ones needed for economies to become more resource efficient; bottom-up and collaborative approaches can be equally effective. Various new and original multi-stakeholder approaches have emerged in recent years that could play a role in cross-country knowledge transfer. Examples include partnerships along value chains, voluntary agreements, or coalitions of stakeholders working on common solutions.
- Practically all countries see benefits in exchanging information and good practice on material resource efficiency. They identified a wide variety of institutions that could support such exchanges, with the European Commission and the EEA mentioned

most often. Workshops and conferences were listed as the preferred format, followed by webinars and internet-based information platforms.

13.6 In conclusion...

The overall picture that emerges from this survey is that the economic benefits of improved efficiency and circularity of resource use are increasingly being recognised and acted upon. At the same time, continued attention is needed to secure related environmental and social co-benefits.

Despite a growing number of national strategies, the wide scope and conceptual complexity of the issue leaves much room for improvement in policy initiatives and their implementation. Further integration of policies regarding energy, material resources and waste would appear particularly beneficial.

There is scope for an increased focus on upstream measures to close material loops (such as ecodesign, business models, consumer behaviour and corresponding incentives) to complement the well-established downstream measures for waste management and prevention laid down in the EU environmental *acquis*.

Concrete targets have been adopted and corresponding monitoring mechanisms are in development in many countries, but major gaps still exist regarding compatible waste and material flow statistics and accounts, sectoral performance indicators, enablers of progress, and environmental and socio-economic co-benefits.

The need for capacity building is widely recognised, with the exchange of national experiences and propagation of effective practices seen as central to the harmonisation of key concepts and methods as well as to increased policy coherence and impact.

Annex 1 Participating countries

Albania	Kosovo, under United Nations Security Council Resolution (UNSCR) 1244/99
Austria	
Belgium	Latvia
Bulgaria	Liechtenstein
Croatia	Lithuania
Czech Republic	Netherlands
Denmark	Norway
Estonia	Poland
Finland	Portugal
former Yugoslav Republic of Macedonia, the	Serbia
France	Slovakia
Germany	Slovenia
Hungary	Spain
Iceland	Sweden
Ireland	Switzerland
Italy	Turkey
	United Kingdom

Annex 2 Questions covered in the survey

National strategies or action plans for (material) resource efficiency:

Question 1. Does your country have a dedicated National Resource Efficiency Strategy or Action Plan?

Question 2. Are the term 'resource efficiency' and the scope (which resources are addressed) explicitly defined? If yes, how? Are raw materials/material resource efficiency defined differently/separately, to distinguish them from the broad scope of resource efficiency? If yes, how?

Question 3. What other national policies and strategies address material resource efficiency among various other topics?

Question 4. What general policy objectives for material resource efficiency are set in the above policies?

Question 5. What are the major factors and concerns that drive material resource efficiency policies in your country?

Priority material resources:

Question 6. Have individual types/categories of material resources been identified as a priority in national material resource efficiency policies?

Question 7. What is the policy approach towards closing the material loop(s) in the economy/circular economy?

Question 8. Have individual industries/economic sectors been identified as a priority for material resource efficiency?

Question 9. Have specific consumption categories been identified as a priority for material resource efficiency?

Targets and indicators:

Question 10. What targets (measurable and with a timeline) have been set for material resource efficiency?

Question 11. What indicators does your country use/compile, to monitor material resource use and improvements in material resource efficiency?

Policy instruments:

Question 12. Which policy instruments are considered most important in your country — and why — to improve material resource efficiency?

Question 13. If you would like to share specific examples of material resource efficiency initiatives/ policy instruments as a good-practice 'showcase' from your country, please provide a short description (up to 500 words).

Institutional set-up:

Question 14. What is the institutional set-up to develop and implement material resource efficiency policies at the national level?

Question 15. How is the process organised to ensure stakeholder participation?

Question 16. What international support mechanism would you find most useful for the exchange of experience and sharing of lessons from the implementation of material resource efficiency policies?

Optional questions:

Question 17. Please share information or comments on any recent policy developments in your country regarding natural resources in the broader sense of the term.

Question 18. Which way should resource efficiency go in the future?

Question 19. Any other views or suggestions.

Question 20. Please comment or share your views on the trends in use and efficiency of material resources in your country, presented in the online fiches.

Annex 3 Country showcases presented in this report

Chapter 3 National strategies or action plans for material resource efficiency and policy objectives

Box 3.1	Resource Efficiency Action Plan, Austria
Box 3.2	National Material Efficiency Programme, Finland
Box 3.3	Resource Efficiency Programme, Germany
Box 3.4	Energy Transition for Green Growth Act (2015), France
Box 3.5	Action Plan for Self-Sufficiency in Raw Materials, the Czech Republic
Box 3.6	Denmark Without Waste, Denmark
Box 3.7	Our Sustainable Future, Ireland
Box 3.8	Generational Goal, Sweden
Box 3.9	Preparing the ground for the circular economy, the Netherlands
Box 3.10	Management of natural resources, the former Yugoslav Republic of Macedonia

Chapter 4 Scope of material resource efficiency

Box 4.3	Examples of indirect definitions of material resource efficiency
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Chapter 5 The driving forces of material resource efficiency

Box 5.1	Policy drivers, the Czech Republic
Box 5.2	Driving forces for material resource efficiency, Latvia
Box 5.3	Driving forces for material resource efficiency, the Netherlands
Box 5.4	Policy drivers, Ireland
Box 5.5	Policy drivers, Poland
Box 5.6	Guiding principles, Germany

Chapter 6 Priority material resources, industries and consumption categories

Box 6.1	Some reported criteria for selecting priority materials and/or industries
Box 6.2	Specific product groups targeted by a recycling fund, Iceland
Box 6.3	Identifying nationally critical materials, Poland
Box 6.4	Priorities in raw materials policy, Slovakia
Box 6.5	Resource Security Action Plan, the United Kingdom
Box 6.6	Waste prevention and the manufacturing industry, Denmark
Box 6.7	Eco-labels in the tourism industry, the former Yugoslav Republic of Macedonia
Box 6.8	The service sector as a priority, Spain
Box 6.9	Using life-cycle analysis to identify priorities for resource efficiency, Switzerland

Chapter 7 Closing material loops in a circular economy

Box 7.2	From Waste to Resource, the Netherlands
Box 7.3	Preferential loops for the circular economy, the United Kingdom
Box 7.4	A circular economy in the construction sector, Flanders (Belgium)
Box 7.5	Developing a new circular economy strategy, Scotland (United Kingdom)
Box 7.6	Circular economy and industrial symbiosis, Turkey

Box 7.7	The circular economy and green public procurement
Box 7.8	A 'decatalogue' for a circular economy, the Czech Republic
Box 7.9	Modelling closed material loops, Flanders (Belgium)
Box 7.10	The circular economy at the subnational level, Belgium and Germany

Chapter 8 Policy instruments and examples of good practice

Box 8.1	Levies on plastic carrier bags
Box 8.2	The Act on Consumption and preventing planned product obsolescence, France
Box 8.3	Support for small and medium enterprises
Box 8.4	Supporting industrial symbiosis
Box 8.5	Green Deals, the Netherlands
Box 8.6	No more food waste?

Chapter 9 Targets for material resource efficiency

Box 9.2	Targets in the national Resource Efficiency Action Plan and the RESET2020 initiative, Austria
Box 9.3	Targets in the National Environmental Technology Innovation Strategy, Hungary
Box 9.4	Intermediate targets as milestones to reach targets for 2030, Latvia
Box 9.5	The Green Growth Commitment and its set of targets, Portugal
Box 9.6	Targets for the prevention or management of food waste
Box 9.7	Examples of targets set for the public sector and government

Chapter 10 Indicators to monitor material use and resource efficiency

Box 10.2	Materials monitoring and footprint reporting system, the Netherlands
Box 10.3	Measuring water use efficiency, Turkey
Box 10.4	Monitoring sustainable use of natural resources, Estonia
Box 10.5	Monitoring the economic efficiency of resource use in industry, Denmark

Chapter 11 Institutional set-up and stakeholder involvement

Box 11.1	Resource Programme Steering Group, England (United Kingdom)
Box 11.2	System to achieve environmental quality, Sweden
Box 11.3	Centre for Resource Efficiency, Sweden
Box 11.4	Flanders' Materials Programme, Belgium
Box 11.5	Green Economy Dialogue, Switzerland
Box 11.6	National Council for Ecological Transition, France
Box 11.7	Green Growth Coalition, Portugal

Chapter 12 Future direction of material resource efficiency policies and support mechanisms

Box 12.1	Voice from Italy
Box 12.2	Voice from Serbia
Box 12.3	Voice from Wallonia (Belgium)
Box 12.4	Voice from Flanders (Belgium)
Box 12.5	Addressing consumption patterns
Box 12.6	Reflections on major challenges, Austria
Box 12.7	Country voices on topics requiring attention or leadership at the EU level
Box 12.8	International support mechanisms, the United Kingdom
Box 12.9	Topics of interest for the exchange of best practice, the Netherlands

Annex 4 Good-practice initiatives reported by countries

Albania

- 'Let's clean Albania in one day' initiative

Austria

- The Food is Precious initiative (*Lebensmittel sind kostbar*)
- The Eco-Business Plan Vienna initiative
- Consultation programme Ecoprofit
- REPANET and REVITAL initiatives

Belgium

Federal:

- Defining criteria for recycled content in new products

Flanders:

- OVAM, the Public Waste Agency of Flanders
- Flemish Materials Programme

Wallonia:

- The RESSOURCES network
- Reverse Metallurgy project

Bulgaria

- Operational Programme 'Innovation and Competitiveness 2014–2020'
- Assessing and reporting the value of ecosystems and their services

Croatia

- International Waste Management Symposium in 2014

Czech Republic

- Car battery recycling
- Textile reuse and recycling
- Red containers for e-waste separate collection
- Vision 2024 and a 'decatalogue' for a circular economy
- Preference for buying products made from secondary raw materials for state needs

Denmark

- Raising awareness of advantages of resource efficiency and best practices
- Policy instruments to enable resource efficiency:
 - Green21
 - Fund for Green Business Development
 - The Danish Eco-innovation Program
 - Danish Green Investment Fund
 - Task Force for Increased Resource Efficiency
 - Green industrial symbiosis

Estonia

- Environmental charges
- Green Investment Scheme
- Packaging deposit system

Finland

- Sitra — the Finnish Innovation Fund
- Motiva Oy and the Material Efficiency Centre
- Carbon Neutral Municipalities (HINKU)
- Finnish Sustainable Communities (FISU)
- Tekes — the Finnish Funding Agency for Innovation, the Green Growth programme 2011–2015 and the Green Mining programme 2011–2016
- Programme to Promote Sustainable Consumption and Production and the Peloton Club centre for energy-smart start-ups; the Ekokoti — ecological solutions to everyday life project; the Ilmastolounas (Climate Lunch) project; and the Save the Food project

former Yugoslav Republic of Macedonia, the

- Financial support from the clean development mechanism for the construction and development of biogas plants

France

- Promotion of the extension of product lifespan through the 2014 Act on Consumption

Germany

- Resource efficiency in public procurement: Guideline for Sustainable Building and mandatory rules for the use of the Assessment System for Sustainable Building (BNB)

Hungary

- European Week for Waste Reduction
- Thematic Prevention Days
- 1st Eco-innovation Conference

Iceland

- The Icelandic Recycling Fund

Ireland

- Stop Food Waste initiative and the Stop Food Waste Challenge
- Local Authority Prevention Network
- Free trade Ireland
- Revival by Community Re-Use Network Ireland
- The Environment Fund and the plastic bag levy and landfill disposal levy
- Producer Responsibility Obligations

Italy

- Institute for Environmental Protection and Research (ISPRA) projects on sustainable development
- PROFORBIOMED project on the use of wood biomass
- initiatives by the Sustainable Development Foundation

Latvia

- Campaign 'Let's live warmer'
- Climate Change Financial Instrument

Lithuania

- Waste Management Forum
- Second-hand trade
- Public awareness campaigns

Netherlands

- The Green Deals programme
- Realisation of Acceleration towards a Circular Economy (RACE) initiative
- Covenant on the improvement of recycling: more and better
- Close cooperation with municipalities to minimise waste generation
- Value-chain agreements on plastics and phosphates
- Packaging agreement between companies
- Circular design In the programme Nederland Circulair!
- Task Force to address obstacles to resource efficiency related to shared or overlapping competencies
- Awareness raising initiatives
- Prioritising resources and selection of key value chains

Norway

- Ban on disposing of biodegradable waste in landfill
- Branch agreements on extended producer responsibility regarding packaging waste

Poland

- Thermo-modernisation and Renovation Fund as a source of Financial support for thermo-modernisation investment in housing
- GreenEvo for green technologies
- White certificate scheme for energy efficiency improvements
- Workshops to present waste prevention strategies and concepts in individual sectors and a national information platform dedicated to waste prevention
- Reuse initiatives
- Reuse corners and separate municipal waste collection facilities

Portugal

- The project Menu Dose Certa

Serbia

- Resource Efficiency Projects in the Food Processing Industry
- Implementation of cleaner production in 10 IPPC (integrated pollution prevention and control) production facilities within the electric power industry
- Eco-profit projects in the towns of Pančevo and Čačak
- Implementation of cleaner production in 20 Serbian companies from different sectors
- Sustainable tourism for rural development

Slovakia

- Methodological Guide for Public Authorities and Entities: Green public procurement
- Sustainable Aggregates Planning project

Slovenia

- Green development model of Šentrupert municipality
- Reuse centres network
- Separate waste collection in Ljubljana and Vrhnika

Spain

- Voluntary agreement schemes

Sweden

- System for Environmental Quality Objectives, Milestone Targets and the Generational Goal

Switzerland

- Reffnet.ch project and demonstrating the advantages of resource-efficient solutions
- FOEN Initiatives to estimate the environmental impacts (footprints) associated with imports

Turkey

- Potential Benefits of Resource Efficiency in Turkish Manufacturing Industry project
- TSKB development bank support for energy efficiency and renewable energy projects
- Valuing natural resources pilot study

United Kingdom*England*

- Action Based Research (ABR) Programme
- Royal Society of Arts and Manufacturing (RSA) Great Recovery Project
- Pilot Resources Dashboard

England, Wales and Scotland

- Developing resource-efficient business models (REBus) project led by WRAP

Northern Ireland

- Carrier Bag Levy
- Prosperity Agreements

Scotland

- Scottish Institute for Remanufacture
- Scottish Materials Brokerage Service
- Resource Efficient Scotland
- Carrier Bag Charge

Wales

- Resource Efficient Wales
- Accelerating Reprocessing Infrastructure Development capital support programme
- Case Studies by Eco-design Centre Wales
- Plastic bag legislation

Annex 5 Economy-wide material flow accounts and derived indicators

To monitor economy-wide material flows, Eurostat has applied an accounting methodology and a number of indicators that describe the material throughput and material stock additions in a (national) economy expressed in tonnes. Economy-wide material flow accounts (EW-MFAs) cover the extraction of biomass, fossil fuels, metal ores and metals, and industrial minerals, as well as imports and exports of all goods, but exclude water and air.

The most frequently used MFA indicators, expressed in tonnes or in tonnes per person, are:

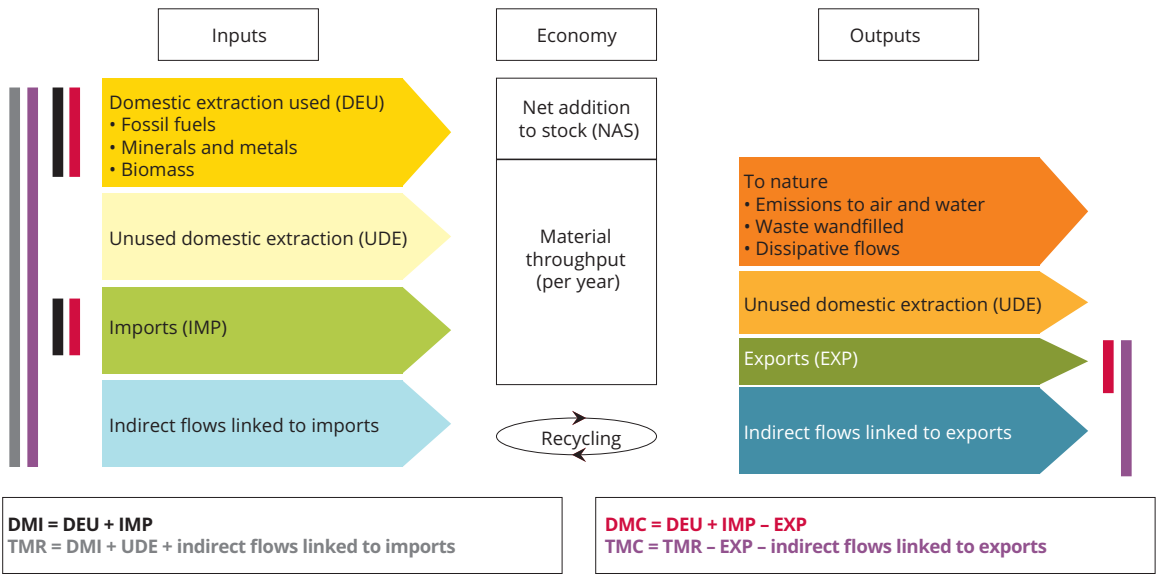
- **domestic extraction used (DEU)**, which sums all natural resources that are extracted in a given country and used in the economy;
- **direct material input (DMI)**, which measures the input of materials into the economy, that is DEU plus physical imports of goods (IMP);
- **domestic material consumption (DMC)**, which equals DMI minus exports (EXP) and thus represents

the domestic material consumption of an economy (the EU lead resource productivity indicator is a ratio of GDP to DMC);

- because DMC does not include 'hidden' upstream flows related to imports and exports of raw materials and products, Eurostat has developed a model to estimate raw material consumption (RMC) for the aggregated EU economy; **raw material consumption** is defined as the annual quantity of raw materials extracted from domestic territory, plus all physical imports and minus all physical exports expressed in raw material equivalents, that is the amount of domestic extraction required to provide those traded goods.

Although not part of official Eurostat statistics, total material requirement (TMR) is sometimes used to include hidden or indirect material flows associated with both domestic material extraction (unused domestic extraction, UDE) and the materials imported (raw material equivalents, RME, and unused extraction abroad).

Figure A.5 Economy-wide material flow accounts (EW-MFAs) and derived indicators



Source: Environmental pressures from European consumption and production, EEA 2013.

Annex 6 The Resource Efficiency Scoreboard

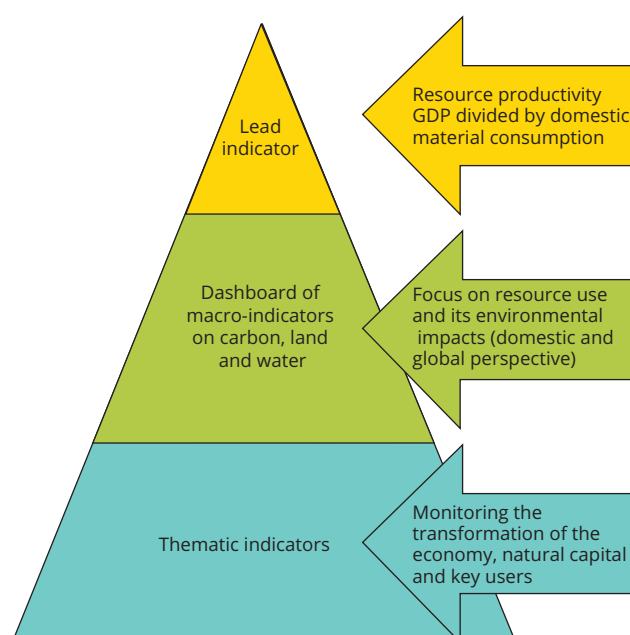
Table A.6 Lead indicator and dashboard indicators of the EU Resource Efficiency Scoreboard

Lead indicator	Unit	Source
Resource productivity	EUR/kg	Eurostat
Dashboard indicators		
Materials		
Domestic material consumption (DMC) per person	tonnes/person	Eurostat
Land		
Productivity of artificial land	million PPS/km ²	Eurostat
Built-up areas	km ²	Eurostat
Water		
Water exploitation index	%	Eurostat
Water productivity	EUR/m ³	Eurostat and EEA
Carbon		
Greenhouse gas emissions per person	tonnes of CO ₂ -equivalent	EEA
Energy productivity	EUR/kg of oil equivalent	Eurostat
Energy dependence	%	Eurostat
Share of renewable energy in gross final energy consumption	%	Eurostat
Thematic indicators		
turning waste into a resource		
Generation of waste excluding major mineral wastes	kg/person	Eurostat
Landfill rate of waste excluding major mineral wastes	%	Eurostat
Recycling rate of municipal waste	%	Eurostat
Recycling rate of e-waste	%	Eurostat
Supporting research and innovation		
Eco-innovation index	index (EU = 100)	Eco- innovation Observatory
Getting the prices right		
Total environmental tax revenues as a share of total revenues from taxes and social contributions	%	Eurostat
Energy taxes by paying sectors — households	%	Eurostat
Biodiversity		
Index of common farmland bird species	index (1990 = 100)	Pan-European Common Bird Monitoring Scheme
Area under organic farming	%	Eurostat
Landscape fragmentation	number of meshes/ 1 000 km ²	EEA

Table A.6 Lead indicator and dashboard indicators of the EU Resource Efficiency Scoreboard (cont.)

Thematic indicators (cont.)		
Safeguarding clean air		
Urban population exposure to air pollution by particulate matter — PM _{2.5}	µg/m ³	EEA
Urban population exposure to air pollution by particulate matter — PM ₁₀	µg/m ³	EEA
Urban population exposed to PM ₁₀ concentrations exceeding the daily limit value (50 µg/m ³ on more than 35 days in a year)	%	EEA
Land and soils		
Soil erosion by water — area eroded by more than 10 tonnes per hectare per year	%	EC Joint Research Centre
Gross nutrient balance on agricultural land — nitrogen	kg/hectare	Eurostat
Gross nutrient balance on agricultural land — phosphorus	kg/hectare	Eurostat
Addressing food		
Daily calorie supply per person by source — total	kilocalories	FAO
Improving buildings		
Final energy consumption in households by fuel — total petroleum products	%	Eurostat
Ensuring efficient mobility		
Average CO ₂ emissions per km from new passenger cars	gram of CO ₂ /km	EEA
Pollutant emissions from transport — NO _x	index (2000 = 100)	EEA
Modal split of passenger transport — passenger cars	% in total inland passenger-km	Eurostat
Modal split of freight transport — by road	% in total inland freight tonne-km	Eurostat

Note: * The Resource Efficiency Scoreboard can be found at: <http://ec.europa.eu/eurostat/web/environmental-data-centre-on-natural-resources/resource-efficiency-indicators/resource-efficiency-scoreboard>

Figure A.6 The resource efficiency scoreboard three-tier system of indicators

Source: EC, Resource Efficiency Scoreboard 2014 Highlights, 2014, p. 6.

Annex 7 Strategies that specifically focus on or include material resource efficiency, reported by countries

Three countries — Austria, Finland and Germany — reported having a dedicated national strategy for material resource efficiency or a material resource efficiency action plan.

The **Austrian Resource Efficiency Action Plan** (REAP) was adopted in 2012 and includes a target to decouple resource consumption from economic growth and to increase resource efficiency by at least 50 % by 2020.

The 2014 **Finnish National Material Efficiency Programme — Sustainable Growth through Material Efficiency** aims simultaneously to achieve economic growth, the rational use of natural resources, and disengagement from harmful environmental effects.

The 2012 **German Resource Efficiency Programme** (ProgRes) (update expected in 2016) sets out to ensure more sustainable extraction and use of natural

resources and a reduction in associated environmental pollution.

There are two further material resource efficiency strategies, but adopted at the regional (subnational) level: the **Flemish Sustainable Materials Management Programme** (2011) and **Zero Waste — Safeguarding Scotland's Resources** (2013). Both go beyond recycling and reuse; in the case of Flanders (Belgium), with a focus on closing material loops and a set of measures for achieving a circular economy, and in the case of Scotland (United Kingdom), by including materials, energy and water.

All 32 participating countries reported a wide spectrum of national policies or strategies that address material resource efficiency through other topics and under a range of headings. These are summarised in the table below.

Table A.7 Various strategies related to material resource efficiency, as reported by countries

Country	Other strategies/other resources	Waste and reuse	Green economy	Green public procurement	Innovation	Sectoral	Local/ regional	Other
Albania	National Action Plan for Energy Efficiency (NEEP) 2011–2018; Intersectoral Draft Strategy on the Environment (2015–2020)							
Austria	Raw Materials Plan; Energy Strategy; Low Carbon Strategy	Waste Prevention Programme (2011), including 'Food is Precious'	Masterplan Green Jobs	Sustainable Public Procurement	Strategy on Research, Technology and Innovation; funding investments for reducing environmental impacts; nanotechnology	Production of the Future		Nano-technology Initiative Austrian Eco-Label Education on Sustainable Development
Belgium								
Flanders	Mineral Resources Strategy (2010); Flemish Materials Programme (2008–2015); Environmental Policy Plan (MINA 4); River Basin Management; No Net Loss (biodiversity) (2015); Flemish Air Quality Plan	Executive Plan on Management of Household Waste (2008–2015), including Food	Green Infrastructure and Restoration Economy (2012)			Construction/Buildings Policy Programme; Mobility (72 measures to green the transport fleet)		
Wallonia	1st Walloon Sustainable Development Strategy (2013); Air-Climate-Energy Plan (2014–2022); Forest Code (2008); Certification of Sustainable Forest Management	Waste Plan (2015); Reference Centre on Circular Economy (to assist SMEs) (2013)		Action Plan on Sustainable Public Procurement (2013)	Marshall Plan 4.0; Marshall Plan 2.0 (for SMEs)	GreenWin (chemistry and sustainable materials, waste and effluents); NEXT Programme (2012) for a circular economy; Eco-zoning (2011) for SMEs; Employment-Environment Alliances (2011); Voluntary Energy-CO ₂ -sectoral strategies	Regional Policy Statement (2014–2019)	Eco-zoning Project (2011 to date)
Bulgaria	National Development Plan Bulgaria 2020 and Action Plan 2015–2017 (14 measures for resource efficiency and waste management)				Strategy for Smart Specialisation 2014–2020		Waste Management Plan (2014–2020)	Government Programme for Sustainable Development 2014–2018; Partnership Agreement 2014–2020 (including measures for water and waste); National Reform Programme

Table A.7 Various strategies related to material resource efficiency, as reported by countries (cont.)

Country	Other strategies/other resources	Waste and reuse	Green economy	Green public procurement	Innovation	Sectoral	Local/ regional	Other
Croatia	Sustainable Development Strategy (2009); Forest Policy and Strategy (2003); Energy Development Strategy (2009); Energy Efficiency Programme (2008–2016); Action Plan for Energy Efficiency (2014–2016); Action Plan for Renewable Energy Sources (2020); Act for Energy Efficiency in Final Consumption; Water Management Strategy; Marine Environment and Coastal Areas Management Strategy (2014)	Waste Management Strategy (2005); Waste Management Plan (2007–2015); Sustainable Waste Management Act (2013)			Entrepreneurship Development Programme (2013–2020)	Strategy for the Industrial Processing of Wood and Paper (2004); Transport Development Strategy (2014–2030); Programme for Energy Renovation of Public Buildings, Family Houses, Apartment Buildings, Commercial Buildings (2014–2020); Agriculture Act (2015)		Industry Strategy (2014–2020); Environmental Protection and Energy Efficiency Fund (for energy renovation of buildings); Strategy and Action Plan for the Protection of Biological and Landscape Diversity; Tourism Development Strategy (2014–2020)
Czech Republic	Raw Materials Policy (2015) (mineral resources); State Energy Policy; Renewable Energy Action Plan (2012); National Energy Efficiency Plan (NAPEE) (2014)	Secondary Raw Materials Policy (2014) (10 commodities); Action Plan for Self-sufficiency (2015); Waste Prevention Programme (2015–2024); Waste Management Plan (2015–2024)				Strategy for Growth — Agriculture and Food Industry (2013)		
Denmark	Sustainable Denmark (2014)	Denmark Without Waste I and II (2013, 2015); Green Industrial Symbiosis	Fund for Green Business Development	National Strategy for Intelligent Public Procurement (2013)	Growth Plan for Water, Bio and Environmental Solutions (2013) (88 initiatives)	Growth Programme for SMEs (including focus on resource efficiency)		Task Force for Increased Resource Efficiency (interministerial initiative) Training Programme for Employees on Resource Efficiency
Estonia	National Strategy on Sustainable Development (2005); Estonian Environmental Strategy 2030 (2007); National Development Plan for the Use of Construction Minerals (2011–2020); Forestry Development Plan (2011); National Development Plan for the Use of Oil Shales; Water Management Plans (2015–2021); Rural Development Plan (2014–2020)	Waste Management Plan (2014–2020)			Entrepreneurship Growth Strategy (2014–2020)	National Development Plan for Energy Sector 2020 (2009)		National Reform Programme 2020 (2011) Knowledge-based Estonia (one area: more effective use of resources)
Finland	Natural Resources Strategy: Using Resources Intelligently (2009); Mineral Strategy (2010); Energy and Climate Strategy (2013); Bioeconomy Strategy (2014); Programme to Promote Sustainable Consumption and Production (2005)	Towards a Recycling Society — National Waste Plan until 2016 (2008) Including Consumption						

Table A.7 Various strategies related to material resource efficiency, as reported by countries (cont.)

Country	Other strategies/other resources	Waste and reuse	Green economy	Green public procurement	Innovation	Sectoral	Local/ regional	Other
former Yugoslav Republic of Macedonia, the	Sustainable Development Strategy (2010); Strategy for Renewable Resources (2010); Strategy for Energy Efficiency (until 2020); First National Energy Efficiency Action Plan (2010–2018); Second Energy Efficiency Action Plan (until 2015); National Strategy for Sustainable Development of Forestry (2006); Water Strategy; National Strategy for Clean Development Mechanism (2007)	Waste Management Strategy (2008–2020); National Plan for Waste Management (2009–2015)			National Strategy for Clean Development Mechanism (2007)	National Programme on Energy Efficiency of Public Buildings (2012–2018); National Strategy with Action Plan for Organic Agriculture (2008–2011); Industrial Development Policy (2009–2020)		
France	Act on Energy Transition and Green Growth (2015)	Waste Prevention Programme (2014–2020) Including Extended Producer Responsibility Scheme for Furniture Waste (2012)						
Germany	National Raw Materials Strategy (2010); Policy Strategy Bio-Economy (2013)	Closed Cycle Management Act (2012)	Memorandum for a Green Economy (2012)		National Research Strategy BioEconomy 2030 (2010)		Innovation strategies in Federal States (e.g. Saxony, Saxony-Anhalt, North Rhine-Westphalia)	
Hungary	4th National Environment Programme; Nature Conservation Master Plan (NNCMP); National Framework Strategy on Sustainable Development (2012–2024); National Energy Strategy 2030; National Energy Efficiency Action Plan (2020); National Renewable Action Plan (2010–2020); Mineral Resources Utilisation and Stock Management Action Plan (2013); National Forest Programme (2006–2015)	National Waste Management Plan (2014–2020)	New Széchenyi Plan (for green development)		National Environmental Technology Plan (2011–2020)	National Building Energy Strategy (2015–2020)		National Reform Programme (2015)
Iceland	Climate Action Plan (2010); Energy Policy (2011)	Waste Management Policy (2013–2024)	Promoting Green Economy (2011)					Iceland 2020 (for the economy and society) (2011)
Ireland	Our Sustainable Future (2012) (70 measures); Roadmap for a Resource Efficient Ireland (2014); Integrated Marine Plan (IMP); National Policy for Climate Action and Low Carbon	Resource Opportunity (waste management and prevention roadmap) (2012); National Waste Prevention Programme — Towards a Resource Efficient Ireland (2014–2020) Including rx3 Programme (publication of standards for recyclates and secondary materials)	Delivering our Green Potential (2012)	Action Plan for Green Public Procurement	Green Enterprise Guide (2011)		Regional Waste Management Plans (2015–2021)	

Table A.7 Various strategies related to material resource efficiency, as reported by countries (cont.)

Country	Other strategies/other resources	Waste and reuse	Green economy	Green public procurement	Innovation	Sectoral	Local/ regional	Other
Italy	Environmental Action Strategy for Sustainable Development (2002); National Energy Strategy (2013); Action Plan on Energy Efficiency (2014); National Plan on Agricultural Biodiversity (2008); Bill on limiting land use consumption and reusing built-up land (2013); Regulation on environmental cost of water use (2015)	National Programme on Waste Prevention (2013) Including Plan to Prevent Food Waste (2014)	Bill to promote green economy (2015)	Action Plan on Green Public Procurement (2013)			Regional Environmental Action Plans (since 2009); Local Provincial Waste Action Plans; several regional programmes (Emilia-Romagna, Lombardy, Sicily, Sardinia)	Action Plan on Terrestrial Faunistic Resources (2012)
Kosovo (under UNSCR 1244/99)	Law on mines and minerals (2010); Mining Strategy (2012–2025); Law on Kosovo's forests (2003); Strategy and Action Plan on Biodiversity	Law on Waste; Waste Management Strategy (2013–2022)						
Latvia	Sustainable Development Strategy of Latvia until 2030 (2010); National Development Plan of Latvia for 2014–2020 (2012); Environmental Policy Guidelines for 2014–2020 (2014); National Energy Development Guidelines for 2016–2020 (2016); Rural Development Programme 2014–2020 (2015)	State Waste Management Plan 2013–2020 (2013)			Smart Specialisation Strategy (2013); National Science, Technology Development and Innovation Guidelines 2014–2020 (2013)	Transport Development Guidelines 2014–2020 (2013); Electromobility Development Plan for 2014–2020; Railway for 2012–2020 (2012); Ship Energy Efficiency Management Plans; Guidelines for Forestry and Related Sectors for 2015–2020 (2015); National Industrial Policy Guidelines for 2014–2020 (2011) (energy efficiency)		
Liechtenstein		Action Plan on the Use of Recycled Concrete (for public buildings) (2010)						
Lithuania	National Sustainable Development Strategy; Environmental Protection Strategy (2015); Strategy and Action Plan for the National Climate Change Management Policy by 2050 (2012); Renewable Energy Resources Development Strategy (2010); Energy Independence Strategy (2012); National Rural Development Programme (2014–2020)	Waste Prevention Programme; National Waste Management (2014–2020)		Green Public Procurement Criteria	Innovation Development Programme (2014–2020)	Multi-apartment Buildings Renovation Programme (2013); Public Buildings Renovation Programme (2014–2022); Forestry Sector Development Programme (2012–2020); Investment Promotion and Industrial Development Programme (2014–2020)		National Reform Programme (2011); National Progress Programme (2012); National Communication Development Programme (2014–2022)

Table A.7 Various strategies related to material resource efficiency, as reported by countries (cont.)

Country	Other strategies/other resources	Waste and reuse	Green economy	Green public procurement	Innovation	Sectoral	Local/ regional	Other
Netherlands	Raw Materials Memorandum (2011); Programme on Bio-based Economy (2012)	From Waste to Resource (2014/2015); Coordinating Programme on Circular Economy; Waste Management Plan 2 (prevention) (2009)	Policy for Green Growth (2013)	Policy on Green Public Procurement	Innovation Policy (agri-food, horticulture, high-tech, etc.)	Green Chemistry 2050		Green Deals
Norway	Biogas Strategy (2014); Mineral Strategy (2013)	From Waste to Resource (2013)						
Poland	Energy Security and the Environment Strategy (ESES) (2014); Energy Policy of Poland (EPP) 2030; Energy Efficiency Action Plan (NEEAP 2014); Action Plan on Security of Non-Energy Raw Materials (critical materials); White Paper on the Protection of Strategic Deposits (2015); Programme for Development of Low-Emission Economy (NPDLEE); National Policy on Forests (1997); National Programme for the Augmentation of Forest Cover (2014); Forest Management Strategy (2014–2030)	National Waste Management Plan (2014); National Waste Prevention Programme			Strategy for Innovation and Efficiency of the Economy (SIEE) (to increase resource efficiency)	Sustainable Development Strategy for Rural Areas, Agriculture and Fishing		
Portugal	Framework Act on the Environment; Operational Programme Sustainability and Efficiency (POSEUR 2020); National Energy Efficiency Action Plan (2013); National Strategy for Forests; Strategic Framework for Climate Policy (2015); National Strategy for Climate Change Adaptation	National Plan for Waste Management (2015) Including Strategic Plan for Municipal Waste (PERSU 2020); National Plan for Industrial Waste Prevention; Strategic Plan for Hospital Waste; Used Tyres; Used Oil; Construction and Demolition Waste (2008/2011)	Green Growth Commitment (GGC) (2015)	Strategy for Ecological Public Procurement (2007)	Eco-Design for Energy-Related Products (2009)			

Table A.7 Various strategies related to material resource efficiency, as reported by countries (cont.)

Country	Other strategies/other resources	Waste and reuse	Green economy	Green public procurement	Innovation	Sectoral	Local/ regional	Other
Serbia	National Strategy on the Sustainable Use of Natural Resources and Goods (2012); National Programme for Environmental Protection (2010–2019); Second Action Plan for Energy Efficiency (2013–2015); Renewable Energy Action Plan by 2020 (2013); Strategy for Agriculture and Rural Development (2014–2024)	National Waste Management Strategy (2010–2019)			Industrial Development Strategy and Policy for Industrial Development (2011–2020); Strategy for Support of SMEs, Entrepreneurship and Competitiveness (2015–2020)	Energy Sector Development Strategy by 2015 (2005)		
Slovakia	Sustainable Development Strategy; National Forest Programme; Raw Materials Policy (2004); Energy Policy (2014); Energy Security Strategy (2008); Concept of Energy Efficiency (2007); Concept of Using Renewable Energy Sources (2003); Strategy for the Higher Utilisation of Renewable Energy Sources (2007)	Waste Prevention Programme (2014–2018); Waste Management Plan (2016–2020) Including Limiting storage of biodegradable waste going to landfill			Innovation Strategy (2014–2020)	Long-term strategy for the use of agricultural and non-agricultural crops for industrial purposes; Concept of Development of Slovak Agriculture (2013–2020); concept of using agricultural and forestry biomass for energy purposes		National Reform Programme (2014)
Slovenia	Action Plan Wood is Beautiful	Action Plan on Municipal Solid Waste	Framework Programme for Transition to a Green Economy (2015–2016)		Industrial Policy (2013); Smart Specialisation Strategy (2015)			
Spain	National Plan on Energy Efficiency (2014–2020) (biomass, fossil fuels)	National Programme on Waste Prevention (2014–2020); National Plan on Waste (2015–2020) Including Royal Decree on waste electronic and electrical equipment			Industrial Policy (wood, metals)	National Integrated Plan on Tourism (2012–2015)	Basque Country, Catalunya, Galicia	National Plan on Smart Cities
Sweden	Environmental Code (material efficiency included in the Generational Goal); Minerals Strategy	Waste Management Plan (2012–2017); Waste Prevention Programme Including Construction and engineering sector; food chain						
Switzerland		Technical Ordinance on Waste	Green Economy Action Plan (2013)		Reffnet (SMEs)			

Table A.7 Various strategies related to material resource efficiency, as reported by countries (cont.)

Country	Other strategies/other resources	Waste and reuse	Green economy	Green public procurement	Innovation	Sectoral	Local/ regional	Other
Turkey	10th Development Plan (2014–2018); National Eco-Efficiency and Cleaner Production Programme (2014–2017); EU Integrated Environmental Approximation Strategy (2007–2023); Energy Efficiency Strategy Paper (2012–2023); Energy Efficiency Law (2015); Watershed Management Strategy (2014–2023)	National Recycling Strategy and Action Plan (2014–2017) Including Packaging waste (2011)			Eco-Efficiency and Cleaner Production Programme (2014–2017)			Input Supply Strategy and Action Plan (2013–2015); Productivity Strategy and Action Plan (2015–2018)
United Kingdom								
England	Resource Security Action Plan (RSAP) (critical materials) (2012)	Waste Prevention Programme (2013)	Green Deal		Green Investment Bank; Innovate UK			Waste Resources and Action Programme (WRAP)
Northern Ireland	Sustainable Development Strategy (2010)	Waste Management Strategy – Delivering Resource Efficiency (2013); The Road to Zero Waste (2014)						
Scotland	Safeguarding Scotland's Resources (2013); Low Carbon Scotland (2013–2017)	Zero Waste; National Litter Strategy	Scotland's Economic Strategy					
Wales	One Wales — One Planet; Climate Change Strategy; Water Strategy	Towards Zero Waste; Waste Prevention Programme Including Food Strategy (2010)	Innovation Strategy					Fly-tipping Strategy

Annex 8 Targets for material resource efficiency reported by countries

The table below shows the targets reported by countries. Listed are those targets that have a quantified objective and a deadline by which to achieve it. While some countries reported on energy targets

— particularly those that include energy in the scope of material resource efficiency because of the link to fossil materials — others did not because they consider energy policy as a separate field.

Country	Targets reported in the country profiles
Economy-wide resource productivity (9 countries, reporting 9 targets)	
Austria	• Increase resource efficiency (gross domestic product related to domestic material consumption — GDP/DMC) by 50 % by 2020 compared to 2008, and work towards a four- to ten-fold increase in efficiency by 2050
Estonia	• Increase resource productivity (GDP/DMC) by 10 % during the period 2015–2019 (EUR 460/tonne)
France	• increase resource productivity (GDP/DMC) by 30 % between 2010 and 2030 (as well as reducing DMC/person over the same period)
Germany	• Double abiotic material productivity (GDP/DMC) over the period 1994–2020
Hungary	• Reduce material intensity (DMC/GDP) to 80 % of the 2007 level by 2020
Latvia	• Increase resource productivity (GDP/DMC) to EUR 710/tonne in 2030, with intermediate targets of EUR 540/tonne in 2017 and EUR 600/tonne in 2020
Poland	• Increase resource productivity (GDP/DMC) with a measurable target for 2015 of EUR 450/tonne and for 2020 of EUR 500/tonne
Portugal	• Increase the productivity of materials (GDP/DMC) from EUR 1 140/tonne of materials consumed in 2013 to 1 170 in 2020 and 1 720 in 2030
Slovenia	• Increase overall resource productivity (GDP/DMC) to EUR 1 500/tonne by 2023, from 1 070 in 2011
Waste (25 countries, reporting 124 targets)	
Belgium	• Cap household waste at 560 kg/person by 2010 (Flanders) • Limit residual household waste to less than 150 kg/person by 2010 (Flanders) • From 2015, no recyclable waste or waste that can be incinerated coming from households and industry is to be sent to landfill as long as there is enough regional incineration capacity (Flanders) • Reduce food waste by 15 % by 2020 and 30 % by 2025 (Flanders)
Bulgaria	• Achieve separate collection and recycling of more than 70 % of household biowaste by 2025 • Achieve separate collection and recycling of more than 50 % of household waste paper, metal, plastic and glass by 2020 • Recycle and recover more than 70 % of total construction and demolition waste (by weight) by 2020
Croatia	• Reduce the final disposal of waste as well as the amount of hazardous waste generated by 20 % by 2010 compared to 2000

Country	Targets reported in the country profiles
Czech Republic	• Have separate collection of paper, plastics, glass and metals by 2015 • Increase to at least 50 % (by weight) the preparation of household waste consisting of paper, plastic, metal, and glass for reuse and recycling by 2020 • Reduce the maximum quantity of biodegradable municipal waste deposited in landfill so that by 2020, the share of this component would be at maximum 35 % (by weight) of the total quantity of biodegradable municipal waste produced in 1995 • Increase to at least 70 % (by weight), the preparation of construction and demolition waste and other such types of material recovery for reuse and recycling, including backfilling with waste as a substitute for other materials, by 2020 • Increase overall packaging recycling to 70 % by 2020 • Increase the overall recovery of packaging waste to 80 % by 2020 • Increase recycling of plastic packaging to 50 % by 2020 • Increase recycling of metal packaging to 55 % by 2020 • Achieve 55 % overall recovery of consumer packaging by 2020 • Achieve 50 % recycling of consumer packaging by 2020 • Achieve a minimum collection level for waste electrical and electronic equipment (WEEE) in the years 2016–2021 and 65 % separate waste collection in 2021 • Achieve 45 % separate collection of waste portable batteries and accumulators by 2015/16 • Achieve high efficiency in recycling waste batteries and accumulators by 2015: lead-acid batteries 65 %; nickel-cadmium batteries 75 %; other batteries and accumulators 50 % • Achieve 95 % recovery and reuse and 85 % recycling in the processing of selected end-of-life vehicles (selected wrecked cars) by 2015 • Achieve 80 % separate collection of waste tyres by 2020, and 100 % recovery of waste tyres by 2016
Denmark	• Recycle 50 % of organic waste, paper, cardboard, glass, wood, plastic and metal waste from households by 2022 • Collect 75 % of waste electronic equipment from the service sector by 2018 • Recycle 70 % of paper, cardboard, glass, metal and plastic packaging from the service sector by 2018 • Recycle 60 % of organic waste by 2018 • Achieve 25 % energy recovery from garden waste by 2018 • Collect 65 % of waste electronic equipment by 2018 • Collect 55 % of batteries by 2018 • Recover 70 % of shredder waste by 2018
Estonia	• Decrease waste deposited in landfill by 30 % by 2030 compared to 2005 • Recycle 50 % of municipal waste by 2020 • Recycle biodegradable waste at a rate of 13 % of total municipal waste generation by 2020 • Recycle 60 % of total packaging waste generated by 2020 • Recover 75 % of demolition and construction waste by 2020 • For equipment put on the market in the previous three years, collect 65 % of the total share of WEEE generated, by 2020 • Collect 45 % of portable batteries and accumulators by 2016 • Ensure that the biodegradable waste share in municipal waste sent to landfill is not more than 20 % by the year 2020 • Achieve a biodegradable waste recycling level of 13 % by 2020

Country	Targets reported in the country profiles
Finland	- Recover 100 % of all municipal sludge by 2016 - Stabilise the amount of municipal waste at the level of the early 2000s by 2016 and then ensure a decreasing trend - Recover 50 % of all municipal waste as recycled materials and 30 % as energy in 2016, with not more than 20 % sent to landfill - Recover 100 % of manure by 2016 - Use 70 % of all construction waste for material and energy recovery by 2016 - Replace around 5 % of the gravel and crushed stone used in earthworks with industrial and mining waste by 2016 - Aim for some 90 % of all sludge generated in rural areas to be treated in wastewater treatment plants and the remaining 10 % in biogas plants at farms by 2016
former Yugoslav Republic of Macedonia, the	- Reduce biodegradable waste sent to landfill to 75 % by 2014 - Reduce greenhouse gas emissions (landfill only) by approximately 25 % (CO₂-equivalent) by 2014 - Achieve 50 % recovery and 25 % recycling of packaging waste by 2018 - Achieve 100 % energy recovery of used tyres through incineration by 2014 - Recover or reuse 70 % of end-of-life vehicles by 2018
France	- Reduce per person generation of household and similar waste by 10 % by 2020 compared to 2010 - Stabilise industrial waste at 2010 levels by 2020 - Achieve 55 % recycling (including organic waste) of non-hazardous, non-inert waste by 2020 and 65 % by 2025 - Achieve a 70 % recycling target for construction and demolition waste by 2020 - Reduce the non-hazardous, non-inert waste sent to landfill by 30 % by 2020 compared to 2010 and 50 % by 2025 - Reduce food waste by 50 % by 2025 - Implement formal extended producer responsibility schemes for a number of materials and products, e.g. textiles, electronic equipment, batteries and cars, each having specific targets (see country profile) - Increase the share of recycled quarry materials from 6 % to above 10 % of domestic production within the next 10–15 years - Achieve a 70 % reuse/recycling/recovery rate for road construction and maintenance waste by 2020 for public authorities
Hungary	- Increase the share of construction and demolition waste utilised to at least 70 % (by volume) by 2020 - Decrease the generation of municipal solid waste (kg/person) to 70 % of the 2007 level by 2020 - Increase the recycling of packaging waste by a factor of 1.5 in 2020 compared to the 2007 level
Iceland	Bring recycling targets for packaging waste, motor vehicle waste, biodegradable waste, WEEE, construction and demolition waste and household waste in line with EU waste policy goals
Ireland	Achieve a 1 % annual reduction in the per person quantity of household waste over the period 2015–2021
Latvia	- Recycle 80 % of collected waste by 2030 - Increase preparation for reuse and recycling of waste materials such as paper, metal, plastic and glass from households (at least, and possibly others if these waste streams are similar to waste from households) to a minimum of 50 % overall (by weight), by 2020 - Increase preparation for reuse, recycling and other material recovery, including backfilling operations using waste as a substitute for other materials, to a minimum of 70 % (by weight), by 2020 - Reduce the amount of biodegradable municipal waste going to landfill after 16 July 2013 to 50 % of the total amount (by weight) of biodegradable waste produced in 1995, further reducing it to 35 % by 16 July 2020 - Ensure that by 13 August 2016, the collected amount of WEEE from private households reaches 4 kg/inhabitant annually - By 14 August 2016, increase the WEEE collection rate to 40–45 % by average weight per appliance that was placed on the Latvian market in the last three years - By 14 August 2021, increase the collection rate of WEEE to 65 % by average weight per appliance that was placed on the Latvian market in the last three years or by 85 % of all electrical and electronic equipment produced in Latvia

Country	Targets reported in the country profiles
Lithuania	• Prepare 50 % of household waste (paper, plastic, metal, glass) for reuse or recycling by 2020 • Decrease landfill disposal of biodegradable municipal waste from 505 000 tonnes in 2011 to 268 100 tonnes in 2020, and eliminate landfill disposal of biodegradable municipal waste by 2030 • Recycle or otherwise use 65 % (by weight) of municipal waste by 2020 • Prepare 70 % (by weight) of non-hazardous construction and demolition waste for reuse, recycling and other material recovery
Netherlands	• Decrease the annual generation of residual household waste to less than 100 kg/person by 2020 and less than 30 kg/person by 2025 • Achieve a 75 % or higher selective collection rate of household waste and waste produced by small companies, offices, stores and services by 2020 • Recycle at least 95 % of construction and demolition waste by 2015 • Recycle at least 85 % of industrial waste by 2015 • Decrease the amount of residual waste sent to incineration or landfill from 10 million tonnes in 2012 to less than 5 million tonnes in 2022 • Recycle at least 51 % of plastic packaging waste and 43 % of wood packaging waste by 2021 • Recycle 90 % of glass packaging waste by 2015 • Recycle 85 % of metal packaging waste by 2030
Norway	• Increase the overall recycling rate (including energy recovery) to at least 80 % by 2015
Poland	• Prepare a minimum of 50 % of municipal waste such as paper, metals, plastics and glass from households for reuse and recycling by 2020 • Prepare at least 70 % (by weight) of construction and demolition materials for reuse, recycling and other forms of recovery by 2020
Portugal	• Increase the incorporation of waste in the economy from 56 % in 2012 to 68 % in 2020 and 86 % in 2030 • By 2020, achieve a recovery of 47 kg/person of recyclable waste after sorting • Reduce waste generation by 18 % by 2020, compared to the 2008–2012 average waste generation • Increase the preparation of construction and demolition waste for reuse, recycling and other forms of material recuperation to 70 % by 2020 • Increase the preparation of municipal waste for reuse, recycling and other forms of material recuperation to 50 % of the recyclable share by 2020 • Reduce the share of biodegradable municipal waste sent to landfill by 35 % by 2020 relative to 1995 • Progressively eliminate waste disposal in landfill, achieving 0 % direct deposition of waste in landfill by 2030 • Achieve a minimum 7.6 % reduction (by weight) in per person municipal waste generation by 2016 relative to 2012 • Achieve a minimum 10 % reduction (by weight) in per person municipal waste generation by 2020 relative to 2012, not to exceed 410 kg/person annually • Ensure recycling of at least 70 % (by weight) of packaging waste by 2020 • Limit the production of Group IV medical waste to 8 % by 2016 • Dissociate economic growth and waste production by reducing the amount of waste produced per EUR 1 000 of wealth generated from 0.10 tonnes in 2008–2012 to 0.082 tonnes in 2020
Serbia	• Reduce biodegradable waste disposal in landfill by 25 % by 2022, 50 % by 2026 and 65 % by 2030 • Achieve at least 60 % reuse and 55 % recycling of packaging waste by 2025 • Recycle more than 50 % of municipal waste by 2030 • Improve the system of management of specific waste streams (tyres, batteries and accumulators, oils, vehicles, WEEE) to achieve 4 kg/person of separately collected WEEE by the end of 2019 and at least 45 % of batteries and accumulators by the end of 2016

Country	Targets reported in the country profiles																																																						
Slovakia	• Reduce the amount of biodegradable municipal waste sent to landfill to 40 % of that generated in 1995 by 2020 • Increase the preparation of household waste such as paper, metal, plastic and glass for reuse and recycling to at least 50 % by 2020 • Increase the preparation of construction and demolition waste for reuse, recycling and recovery to at least 70 % by 2020 • Collect 4 kg/inhabitant of household WEEE in 2014/15, or the average volume of WEEE collected in Slovakia in the last three years, whichever is greater; in 2016, collect a volume equivalent to 48 % of the average volume of electrical and electronic equipment placed on the market in Slovakia in the last three years • By 2015, individual producers are to collect for recycling a volume of waste batteries and accumulators equivalent to 40 % of the volume each producer has placed on the market in Slovakia in the previous year, and 45 % by 2016																																																						
Slovenia	• Achieve a 61–64 % recycling rate for municipal waste by 2020																																																						
Spain	• Achieve 10 % waste prevention (reduction in waste generated) by 2020 compared to 2010 • Recycle at least 50 % (by weight) of domestic and commercial waste paper, glass, plastic, biowaste and other recyclables by 2020 • Reuse, recycle and otherwise recover at least 70 % (by weight) of non-hazardous construction and demolition waste by 2020																																																						
Sweden	• Separate and biologically treat at least 50 % of food waste from households, catering services, shops and restaurants by 2018, with the aim of recovering plant nutrients, and with at least 40 % treated in such a way that energy is also recovered • Prepare for reuse, recycling and other material recovery at least 70 % (by weight) of non-hazardous construction and demolition waste by 2020																																																						
Turkey	<table><tr><th colspan="6">Annual recovery targets for packaging waste (%)</th></tr><tr><th>Year</th><th>Glass</th><th>Plastic</th><th>Metal</th><th>Paper/ cardboard</th><th>Wood</th></tr><tr><td>2014</td><td>44</td><td>44</td><td>44</td><td>44</td><td>5</td></tr><tr><td>2015</td><td>48</td><td>48</td><td>48</td><td>48</td><td>5</td></tr><tr><td>2016</td><td>52</td><td>52</td><td>52</td><td>52</td><td>7</td></tr><tr><td>2017</td><td>54</td><td>54</td><td>54</td><td>54</td><td>9</td></tr><tr><td>2018</td><td>56</td><td>56</td><td>56</td><td>56</td><td>11</td></tr><tr><td>2019</td><td>58</td><td>58</td><td>58</td><td>58</td><td>13</td></tr><tr><td>2020</td><td>60</td><td>60</td><td>60</td><td>60</td><td>15</td></tr></table>	Annual recovery targets for packaging waste (%)						Year	Glass	Plastic	Metal	Paper/ cardboard	Wood	2014	44	44	44	44	5	2015	48	48	48	48	5	2016	52	52	52	52	7	2017	54	54	54	54	9	2018	56	56	56	56	11	2019	58	58	58	58	13	2020	60	60	60	60	15
Annual recovery targets for packaging waste (%)																																																							
Year	Glass	Plastic	Metal	Paper/ cardboard	Wood																																																		
2014	44	44	44	44	5																																																		
2015	48	48	48	48	5																																																		
2016	52	52	52	52	7																																																		
2017	54	54	54	54	9																																																		
2018	56	56	56	56	11																																																		
2019	58	58	58	58	13																																																		
2020	60	60	60	60	15																																																		
United Kingdom	• Achieve 45 % recycling and composting by 2015 (Northern Ireland) • Reduce all waste by 7 % by 2017 and 15 % by 2025 compared to 2011 (Scotland) • Recycle 60 % of household waste by 2020 and 70 % of all waste by 2025 (Scotland) • Achieve annual reductions in waste generation of 1.2 % (household), 1.4 % (industrial), 1.2 % (commercial), and 1.4 % (construction) until 2050 relative to 2006/07 (Wales) • Recycle 70 % of municipal waste by 2024/25 (Wales) • Recycle 70 % of industrial and commercial waste by 2024/25 (Wales) • Recycle 90 % construction and demolition waste by 2019/20 (Wales)																																																						

Country	Targets reported in the country profiles
Energy (19 countries, reporting 70 targets)	
Albania	Decrease energy consumption by 9 % over the period 2011–2018
Belgium	Under branch agreements (2014), improve energy efficiency by 11.4 % over the period 2014–2020 (Wallonia)
Croatia	- Increase the share of renewables to 20 % by 2020 (excluding large hydropower plants) - Achieve a 35 % share of electricity produced from renewable energy sources (including hydropower) by 2020 - Decrease final energy consumption by 9 % by 2016 compared to the 2001–2005 average - Decrease primary energy consumption by 20 % over the period 2008–2012 - Have a 10 % share of renewables in all transport modes by 2020 - Have a 20 % share of renewable energy in gross final energy consumption by 2020
Czech Republic	- Have a 10.8 % share of renewables in gross final energy consumption in transport by 2020 - Have a 14% share of energy from renewable sources in gross final energy consumption by 2020 - Achieve 47.78 petajoules (10^{15} joules) of new final energy savings by 2020
Estonia	- Have a 25 % share of renewables in final energy by 2020 - Have a 10 % share of renewables in the transport sector by 2020 - Maintain final energy consumption by 2020 at or below the 2010 level
Finland	- Make all new public buildings near zero energy by 2017 - Ensure that all vehicles purchased for mass transport have emissions lower than 100 g/km by 2015; or that at least 30 % of vehicle fleets use electric, ethanol, gas or hybrid solutions - Ensure that purchased electricity for public buildings comes 100 % from renewable sources
former Yugoslav Republic of Macedonia, the	- Make energy savings of up to 9 % by 2018 compared to the average in the period 2002–2006 - Increase the share of renewables from 13.8 % in 2005 to 21 % in 2020 - Increase the share of biofuels in total fuel consumption in the transport sector to 10 % by 2020
France	- Reduce final energy consumption by 50 % by 2050 compared to 2012, with an intermediate target of 20 % by 2030 - Reduce fossil fuel consumption by 30 % by 2030 compared to 2012 - Increase the share of renewables to 32 % of final energy consumption by 2030 and to 40 % of electricity production by 2030 - Undertake the energy-efficient renovation of 500 000 dwellings a year from 2017 - Retrofit 100 % of building stock to comply with low energy consumption standards and renovate all private residential buildings for which primary energy consumption exceeds 330 kilowatt-hours (kWh)/m² per year by 2025 - Have a 10 % share of renewables in the energy used in transport by 2020 and 15 % by 2030 - Improve vehicle fuel efficiency, with the 2 l/100 km car on the market in 2030
Germany	- Reduce primary energy consumption by 20 % by 2020 and 50 % by 2050 relative to 2008 - Double energy productivity by 2020 compared to 1990
Hungary	- Reduce energy intensity (tonnes of oil equivalent (toe)/GDP) to 80 % of the 2007 level by 2020 - Increase the share of renewable energy sources to 14.65 % - Decrease import dependence on fossil fuels to 75 % of the 2007 level by 2020 - Achieve energy savings of 40 petajoules by renovating residential and public buildings by 2020 - Reduce energy use toe/tonne-kilometre (tkm) to 80 % in road transport and to 85 % in train transport over the period 2007–2020 - Increase the share of renewables in electricity production by a factor of 2.75 from the 2007 level by 2020
Ireland	Reduce energy demand by 20 % by 2020
Italy	- Reduce primary energy consumption by 24 % by 2020 compared to the business-as-usual trend - Have a 19–20 % share of renewables in gross final energy consumption by 2020 - Have a 23 % share of renewables in primary energy consumption by 2020

Country	Targets reported in the country profiles
Latvia	• Reduce energy intensity (gross domestic energy consumption/GDP) to 280 toe/EUR 1 million by 2020 and 150 toe/EUR 1 million by 2030 • Have a 40 % share of renewables in total gross energy consumption by 2020 • Have a 10 % share of renewables in gross energy consumption in transport by 2020 • Reduce energy consumption for heating by 50 % relative to 2009 and reach an aspirational target of 150 kWh/m² by 2020
Norway	• Base 67.5 % of total energy consumption on renewable sources by 2020
Poland	• Increase the share of energy from renewable sources to 15 % by 2020 with further growth in subsequent years • Have a 10 % share of biofuels in the transport fuels market • Aim for final energy consumption of 200 toe/EUR 1 million (in fixed 2000 prices) as the target value established for 2015 and 2020, compared to a 2010 baseline of 240 toe/EUR 1 million • Achieve final energy savings of 9 % of annual average final energy consumption over the period 2001–2005 by 2016 • For 2016 the target final energy saving is 53 452 gigawatt-hours (gWh) (4.6 million toe) in the sectors not covered by the EU emissions trading system • Achieve a two-fold increase in power generation by 2020 compared to 2006 with the use of highly efficient cogeneration technology • Achieve primary energy consumption of 96.4 million toe by 2020
Portugal	• Improve energy efficiency by reducing energy intensity from 129 toe/EUR 1 million of GDP in 2013, to 122 toe/EUR 1 million in 2020 and 101 toe/EUR 1 million in 2030 • Reduce energy consumption in public administration by 30 % in 2020 and 35 % in 2030 • Reduce energy consumption in buildings by 25 % in 2020 and 30 % in 2030 • Increase the share of renewables in gross final energy consumption to 31 % in 2020 and 40 % in 2030 (from 25.7 % in 2013) • Reduce primary energy consumption by 25 % by 2020
Serbia	• Reduce energy consumption by 9 % by 2018 relative to 2010 • Have a 27 % share of renewables in gross final energy consumption by 2020 • Have a 10 % share of renewables in the transport sector by 2020
Slovakia	• Make savings of 23 % in final energy consumption by 2020 (cumulative) • Make savings of 20 % in primary energy consumption by 2020 (cumulative) • Make energy savings of 11 % by 2020 • Have a 14 % share of energy from renewable sources in gross final energy consumption by 2020 • Increase the sectoral targets for the share of energy from renewable sources to 14.6 % (heating and cooling), 24 % (electricity) and 10 % (transport) by 2020
Turkey	• Decrease energy intensity by 20 % by 2023 relative to 2011 • Decrease energy intensity in each industrial sub-sector by 10 % within ten years (starting from 2012) • Aim for 25 % of building stock to be sustainable buildings by 2023 (reference year 2010) • Decrease annual energy consumption in public enterprise buildings and facilities by 20 % by 2023 • Increase the number of certified energy managers to at least 5 000 and the number of expert energy efficiency consultancy companies in industrial sectors to 50 across the country by the end of 2015

Country	Targets reported in the country profiles
Water (5 countries, reporting 8 targets)	
Hungary	Reduce water intensity (m³/GDP) to 80 % of the 2007 level by 2020
Latvia	Reduce water losses in centralised water supply systems to 5.5 % of the total amount of water supplied to the system by 2020
Poland	- Reduce water consumption from the 2010 baseline of 10.3655 km³ to 10.100 km³ by 2020 - Reduce the industrial share of total water use from the 2010 74 % baseline to 65 % by 2020
Portugal	Improve water efficiency by reducing unbilled water from 35 % in 2012 to a maximum of 25 % by 2020 and 20 % by 2030
Turkey	- Decrease water loss and leakage rates to a maximum of 30 % in five years and a maximum of 25 % for the following four years in metropolitan and provincial municipalities - Decrease water loss and leakage rates to a maximum of 30 % in nine years and a maximum of 25 % for the following five years in other municipalities - Complete sectoral water allocation planning by basin by 2020 and prepare and implement river basin management plans for four selected river basins in 2015 and for all (a total of 25) by 2020
Forestry-related (5 countries, reporting 7 targets)	
Germany	Increase by 20 % the consumption of wood and wood products from sustainable forestry in the period 2004–2014 (from 1.1 m³/person to 1.3 m³/person)
Latvia	- Increase forest cover to 55 % of total territory by 2030 - Ensure a 16.3 million tonne CO₂-equivalent sink in the forestry sector by 2020
Lithuania	- Increase forest cover to 35 % of the territory of the country by 2030 - Increase the volume of forest felling residues and non-merchantable timber used for biofuel production to 500 000 m³ by 2020, compared with 328 000 in 2014
Poland	Expand national forest cover to 30 % by 2020 and 33 % by 2050
Portugal	Increase the volume of certified timber and other forest products on the market by 50 % by 2020 compared to 2010
Others (9 countries, reporting 22 targets)	
Belgium	- Increase the share of alternatives in the total amount of mineral resources required relative to 2013 by 2020 (Flanders) - Increase the share of Flemish mineral resources in the total amount of mineral resources required relative to 2013 by 2020 (Flanders) - Through branch agreements (2014), reduce CO₂ emissions by 16.1 % over the period 2014–2020 (Wallonia)
Denmark	Recycle 80 % of phosphorus in sewage sludge by 2018
Estonia	- Increase productivity, per employed person, to 73 % of the EU average by 2015 and to 80 % by 2020 - Ensure that the increase in greenhouse gas emissions from sectors outside the EU emissions trading system (buildings, transport, agriculture, waste, etc.) remains below 11 % by 2020 relative to 2005
Finland	- Catering in central government organisations should increase the share of organic food to 10 % by 2015 and 20 % by 2020 - Finnish public-sector employees to strive to rearrange their working routines so that they will travel 10 % less in 2015 compared to 2010 - By 2015 all vehicles purchased for mass transport should have emissions lower than 100 g/km, or at least 30 % of vehicle fleets should use electric, ethanol, gas or hybrid solutions
France	- Reduce public authority office paper consumption by 30 % by 2020 - Increase use of recycled paper to 25 % by 2017 and 40 % by 2017 for public authorities - Achieve a 50 % share of reused or recycled building waste materials in road construction materials purchased by national and local authorities in 2017, rising to 60 % in 2020 - Improve nitrogen management with 1 000 farm biogas plants by 2020
Hungary	Reduce waste water to 70 % of the 2007 volume by 2020

Country	Targets reported in the country profiles
Latvia	• Bring 18 % of Latvia's territory under specially protected nature area status by 2030 • Bring 12 % of managed agricultural lands under organic farming by 2020 and 15 % by 2030 • Aim for managed agricultural lands to make up 95 % of total agricultural lands by 2030 • Aim for an ecological footprint of less than 2.5 global hectares (*) per inhabitant by 2030 • Achieve 50 % asphalt coverage for local roads and 100 % for regional roads by 2030 • Reduce greenhouse gas emissions by 47 % by 2030 compared to 1990
Portugal	• Increase the passenger-kilometres in public transport by 15 % from 2014 to 2020
Turkey	• Upgrade economically irrigable areas from 5.6 million hectares to 8.5 million hectares by 2023

Note: * The global hectare represents the average productivity of all biologically productive areas (measured in hectares) on Earth in a given year.

Annex 9 International support mechanisms for exchange of experience and sharing of lessons

The table below presents a summary of country responses to Question 16 on international support mechanisms for exchange of experience and sharing

of lessons. Countries that did not provide comments have been omitted.

Country	Institution/entity/network	Proposed format	Topic
Albania	International Monetary Fund (IMF); EU delegations; World Bank; United Nations Development Programme (UNDP); UN-Energy	Providing support	Material resource efficiency
Austria	European Resources Forum (ERF); EEA; European Topic Centre on Waste and Materials in a Green Economy (ETC/WMGE); European Commission (EC)	EC: platform for industrial and environmental concerns	Industrial versus environmental concerns
Belgium	Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES); European Semester		Biodiversity and ecosystem services
Bulgaria	European Resource Efficiency Platform (EREP); European Structural and Investment Funds (ESIF); public-private partnerships; European Semester	European Semester: continuous monitoring dialogue	Integration of resource efficiency into other policy areas; economic governance
Croatia	EEA	Webinars	Information exchange on policies, indicators, etc.
Czech Republic	European funds	Projects	Tax incentives, green public procurement and support for industrial symbiosis
Denmark	EU Member States; United Nations (UN)	Regular meetings	Sustainable Development Goals (SDGs); indicators
Estonia		Online tools; workshops	Good practices; methods of raising attention for both energy and resource efficiency
former Yugoslav Republic of Macedonia, the	United Nations Economic Commission for Europe (UNECE); Intergovernmental Panel on Climate Change (IPCC); EC Joint Research Centre (JRC); EEA	Capacity-building workshops and training	
France	EEA	Webinars	Indicators such as footprints and other tools
Germany	European Resources Forum; World Resources Forum (WRF)	Conferences (science policy)	Knowledge exchange among policymakers, scientists and key industrial players
Hungary	EEA	Platform where countries exchange best practices and organise expert meeting Eionet webinars	Best practices
Iceland			Economic and tax aspects

Country	Institution/entity/network	Proposed format	Topic
Ireland	EEA; EC working groups; informal European workshops on resource efficiency	European Resource Efficiency Excellence Centre to reach out to SMEs (COM(2014) 440 final)	
Italy	EEA; EC; UN		
Latvia	EEA; Organisation for Economic Co-operation and Development (OECD)	Webinars; annual events; publications; EEA website	Improve policy planning, best practices and cross-sectoral integration
Lithuania	EEA; UN; OECD	Seminars; consultations; internet database	Best practices and country comparison
Netherlands	Ellen MacArthur Foundation initiatives	Conferences	New business models, natural capital, food losses, financing circular innovation, and removing regulatory obstacles and EU-wide barriers
Norway	Nordic Waste Group		Waste policy and resource efficiency policy
Poland	EU Raw Materials Supply Group (RMSG)	Experience exchange between EU, Member States and industry and civil society Experience exchange with the USA, Korea, Japan	Best practices
Portugal	OECD (environmental policy committees, such as the Working Party on Resource Productivity and Waste)	Mechanism to gather and share information	Relevance of EU long-term strategy on natural resources (2005)
Serbia	1. ETC/ WMGE; 2. Network for resource-efficient and cleaner production (RECPNet, www.recpnet.org); 3. Balkan Network of RECP (Albania, Bulgaria, Croatia, Macedonia, Moldova, Montenegro, Serbia)	Platform; webinars; expert meetings	Best practices
Slovakia		Webinars; meetings; conferences; bilateral cooperation	
Slovenia	EU (e.g. similar to collaboration between DG Energy and DG Regional and Urban Policy on energy efficiency)	EU-level platform	Data, indicators, case studies, reports, good practices, policy documents, initiatives on resource efficiency and circular economy, supportive instruments EU financial instruments extending scope from energy efficiency to resource efficiency
Spain	EEA; EC; UN		Using Eco-Management and Audit (EMAS) (awards) to also include (material) aspects of resource efficiency
Sweden	EEA; ETC/WMGE	Webinars	Shared economy, collaborative consumption, resource efficiency of stocks
Switzerland	Green Growth Knowledge Platform (GGKP)	Information	Theory and practice on green economy
Turkey		Online platforms; bilateral programmes; projects	Exchange between policymakers and implementing parties (producers, experts)
United Kingdom	EEA; EC; OECD; UNEP; IEEA	Workshops; meetings; conferences; EU research projects	

Annex 10 Country reflections on the way resource efficiency should go in the future

This annex presents countries' responses to Question 18: Which way should resource efficiency go in the future? Countries that did not provide comments have been omitted.

Albania

Resource efficiency in the near and distant future needs to meet certain objectives regarding waste production and recycling in the energy-producing cycle. The waste produced by the iron industry will become a threat due to the storing of enormous volumes of waste on river banks and in open fields. Action plans and strategies include the recycling of waste left by natural resources industries, but considerable funds and human resources are needed as well as the necessary political support. The potential for using solar energy in Albania is very high, following the example of other Mediterranean countries.

Austria

Major challenges

- Public and private institutions for environmental protection as well as industry/economy need to take the lead.
- Markets for the recycling of new secondary raw materials need to be established by harmonised initiatives.
- Climate protection calls for low-energy buildings, requiring insulation materials and material compounds taking into account the challenges to reuse/recycle used products/materials.
- How can the capacity of all EU Member States to perform a timely calculation of raw material consumption (RMC) be ensured?
- What is the optimal recycling rate for different materials and waste?
- How can a material resource and life-cycle environmental impact tax be introduced?
- How should transfrontier shipments of secondary raw materials be managed?

Belgium

Wallonia

Action in the field of resource efficiency mainly focuses on material resources and waste recovery. Resource efficiency should include a broad concept of the circular economy in order to close the loop. More systemic solutions could be considered in the future, including ecodesign; end of planned obsolescence; sharing goods such as cars or washing machines; and hiring of services rather than purchase of goods.

Resource efficiency measures and strategies should contribute to the realisation of the energy transition to a low-carbon economy.

Flanders

From the perspective of material resource efficiency, Flanders is convinced that a shift in thinking in terms of waste towards a materials perspective is crucial. In order to achieve this, a holistic view of materials is necessary and a value chain approach is a prerequisite. This means that when developing a new policy and legislative framework the whole material chain of materials and products has to be considered, not just parts of the chain. Smart connections between the different phases are crucial.

Materials management is of great European interest, not just a regional or national matter. Materials should not disappear, be it exported outside Europe to places that lack proper recycling infrastructure, being incinerated or sent to landfill, or poorly recycled within Europe. Materials should be treated inside Europe at a high-quality level. European indicators that give insight on how raw materials leak away from our economies can help with the further development of materials management and the transition towards a circular economy.

Currently, Europe is still a frontrunner when it comes to separate collection, recycling, reuse and product standardisation. It creates jobs. It also creates an export product in the form of knowledge and expertise. It is crucial that we keep the frontrunner position in Europe.

Emerging economies are more than willing to take over. Falling back on national initiatives is not an option. KIC Raw Materials is a great contributor to innovation, knowledge gathering, research and development and education. If the EU wants to keep its frontrunner position, KIC Raw Materials has a crucial role to play.

There has to be room for 'learning by doing'. The transition to a circular economy and to becoming more resource efficient is a complex and comprehensive process in which room for experiments is necessary. Through these experiments, conditions and barriers can be identified and the road to a successful transition can be revealed. Legislators must have the opportunity to create room for experiments and frontrunners, to learn from them and to transpose new insight to legislation and policies.

Croatia

- Circular economy and new business models.
- Shift focus from waste policies to resource policies and consumption patterns.
- Integration of established EU policies and their direction to resource efficiency targets (EU/national).
- Revision and improvement of economic instruments to support resource efficiency.

Czech Republic

- Circular economy and new business models.
- Environmental tax reform (as an important prerequisite).

Estonia

Resource efficiency should focus more on the materials phase rather than on waste, because waste prevention relies on the efficient use of raw materials — the secondary raw materials market, quality sorting, etc.

The main obstacle is the shift in focus from waste policies to resource policies to influence consumption patterns.

France

France suggests that the EEA focuses on materials, soil and water inputs.

Hungary

In Hungary as in other Central and Eastern European Countries, raising awareness is very important. Product design procedures should consider resource efficiency as a priority issue.

Ireland

A strong focus is needed on messaging, so that the public and business operators think about 'resource efficiency' in the same way that thinking about 'energy efficiency' has now become natural.

Italy

Future activities should be more detailed and focused on specific objectives and outputs, keeping in mind the original objectives of the working group. As a suggestion, potential next steps for the group could be to:

- provide a clear differentiation in the definitions of 'natural resources' and 'material resources';
- initiate best-practice networks and partnerships among EU agencies and with other non-European environmental agencies in the communication of objectives, methodologies, indicators and targets relating to the Catalogue of Material Resource Efficiency as a contribution to the development of global networks to support the sustainable use of resources;
- further refine strategies, specify indicators and propose technical, legal and economic instruments for examining and managing mainstream material flows;
- elaborate integrated environmental and economic accounting systems;
- promote national reform programmes dealing with resource efficiency policies.

Latvia

In small countries with limited industry, the highest resource efficiency potential lies in changing household and public consumption practices.

Resource efficiency will be radically increased in the extraction industries (earth minerals, water) and in forestry.

Linking resource efficiency to global development goals concerning food resources and food waste should be put higher on the agenda.

Netherlands

Include resource efficiency in circular economy policy.

Poland

It seems that resource efficiency started as a chiefly environmental question, but it is increasingly recognised as a pillar of economic effectiveness. This will probably be more and more emphasised, as uneconomic projects cannot succeed in the long term.

A general trend in the use of resources in the economy is the widening number of raw materials used in increasingly compact form, which is particularly visible in the facilities for generating renewable energy or used in the construction of electric vehicles or information technology (IT) equipment that use a whole range of different raw materials.

The other question is combining resource efficiency with more rational consumption — it will be extremely hard to escape the point where the consumption of resources in some Western countries will need to take account of the limited amounts of resources.

The life cycle of products and particularly the lifetime or durability of products is very important. Commercial revenues may be earned when consumers have to buy new products often, but this raises issues of resource efficiency and waste.

The resource efficiency policy should take into account the need for improving the quality and durability of the products — and concerns many sectors as well as products of different economic value. It is worth indicating that in the past many products were more durable than they are today; shoes or cars are examples. Poor materials and workmanship are used to increase sales and cut costs. The development of electronics aimed at making life easier by automating simple actions has transformed simple products into complex IT machines equipped with a lot of additional elements, each of which can fail, and increased consumption and waste production. There is also a broader issue of product design and expert knowledge when in many cases it is not possible to repair a single element of a product, meaning that the whole item has to be exchanged and becomes waste. The other aspect is the proper definition of quality — an example could be the food sector where the appearance of products, fruit for example, is too often treated as the reason to waste it even though the products are healthy and nutritious.

According to the static approach to resources, mineral deposits are being depleted and they are non-renewable and limited. However, a dynamic approach emphasises that the scantiness of a resource refers to a specific area and time period. Scientific and technical development, geological studies, substitution, recycling and reuse present opportunities to increase the resource base to compensate for consumption. Humankind has invented many applications for specific material resources and then dropped some to use or invent others, and will no doubt continue to do so.

Portugal

It is clear that a global transition in resource use patterns will play a central role in addressing the long-term, often complex and cumulative impacts that unsustainable systems of production and consumption have had and continue to have on the environment and people's health.

On the side of production, one possible and promising approach is life-cycle assessment (LCA), which looks at resource use and environmental impacts along the full life cycle of a product, from extraction to recycling or disposal. By showing where the critical instances of resource use are located, LCA is a powerful tool for increasing resource efficiency. On the side of consumption, satisfying results are much harder to obtain. Mindsets and behaviour are not easily changed — and yet there is reason to be hopeful. Adding to a growing environmental conscience, the economic and financial crisis has had profound and hopefully long-lasting effects on consumer behaviour. Largely due to its effects, as consumers, we are reducing our carbon footprint by buying locally, recycling, repairing, reusing, sharing and so on.

Such consumer behaviour, along with that of a growing number of industries for which increasing resource efficiency in production is not merely a response to environmental objectives but a core determinant of economic competitiveness and sustainable growth, decisively contributes to greening the economy, and slowly but surely puts us on course towards a circular economy, where decoupling of economic growth from resource use slowly becomes a reality and the material loop starts closing. Green growth plans or strategies such as the recently launched Portuguese Green Growth Commitment are clear contributors to this transition.

Another impactful trend pushing towards the establishment of a green economy is the increasing role of eco-innovation, an approach to technological

development that embodies the need to reduce negative impacts on the environment. Moreover, the replacement of subtractive manufacturing methods (generally characterised as having high disruptive potential), with additive manufacturing or 3D printing, as it is commonly known, could lead to a drastic reduction in waste generation throughout the whole production process which, together with the small-scale production it allows and the increased use of sustainable raw materials, should result in a significant reduction in the consumption of scarce natural material resources — undoubtedly an important step towards decoupling. In addition, the trend for local production, which can increasingly take place near the point of consumption, avoiding large distribution networks, may bring major benefits in terms of greenhouse gas emissions. These are some of the fundamental conditions on the path to a green economy.

Serbia

Resource efficiency must be mainstreamed in national policies and regulations. As a voluntary initiative, it has so far failed to decouple economic growth and the well-being of people from resource use. In addition, the pricing of energy, water and other raw materials must include real cost, calculated, for example, using life-cycle assessment.

The main focus should be on promoting sustainable consumption patterns using:

- regulatory instruments;
- economic instruments (including the special category of green public procurement);
- communication-based instruments (including the special category of labelling);
- voluntary and procedural instruments.

Slovakia

Resource efficiency is a key way to the future. For industry, especially for manufacturing, end-of-pipe policy will not be enough for cleaning waste water and air, recycling and improvements in energy efficiency. It will be necessary to apply new methods and eco-innovation in manufacturing (product design, optimisation of the production value chain, etc.), and consumers will have to change their ways of thinking and consumption patterns.

Slovenia

Resource efficiency should move] towards changing basic systems (urban/housing, food, mobility, energy...).

Spain

Resource efficiency should work on] improving communication and awareness of the links between competitiveness-employment-resource efficiency and sustainability.

Switzerland

It is important to address environmental impacts along the whole value-chain of products. Therefore, a recent Federal Office for the Environment (FOEN) research project evaluated to what degree Swiss footprints are consistent with planetary boundaries. (For the final report, see <https://archive-ouverte.unige.ch/unige:74873>)

Our novel methodological approach builds on others, including a similar 2013 study for Sweden by Björn Nykvist and colleagues, and may contribute to the European vision of 'living well, within the limits of our planet'. URL <http://www.naturvardsverket.se/Om-Naturvardsverket/Publikationer/ISBN/6500/978-91-620-6576-8>.

An interesting scientific contribution, which should be discussed in policy formulation, is also Stefan Brinzeu's *Possible Target Corridor for Sustainable Use of Global Material Resources* (2015).

United Kingdom

England

A key component of boosting growth, protecting the environment and human health is developing and delivering a sustainable, resilient and resource-efficient economy. With a rising global demand for material resources, the need to address the environmental impacts of resource extraction, use and disposal, and the opportunities for economic growth, it is essential that we make the best use of materials and resources. This includes key resources such as glass, paper, metal, plastic, wood, minerals, chemicals, textiles, batteries, agricultural residues and discarded equipment.

Improving resource productivity is a central aim of the circular economy model, which works to maximise the lifetime and value of our products. This recognises that the things that society throws away, such as packaging, food scraps and unwanted or broken appliances, all have a potential value. In reducing the use of virgin materials and treating waste as a valuable resource, businesses can seize economic opportunities by using energy, water and resources more efficiently and

reducing their exposure to fluctuating commodity prices. Indeed, Defra's 2015 *Resource Management: A Catalyst for Growth and Productivity* report (www.gov.uk/government/publications/resource-management-a-catalyst-for-growth-and-productivity) has shown that the waste and resource management sector makes a significant contribution to the economy, through extracting greater value from waste, improving resource efficiency and increasing exports. The relevant sectors, including waste management, recycling, reuse, repair and leasing of household goods activities, generated GBP 41 billion (approximately EUR 63 billion) gross value added (GVA) and supported around 672 000 jobs in 2013.

The circular economy concept is becoming increasingly mainstreamed in the UK economy and growing in recognition internationally. A study undertaken for Defra (2011) estimated that GBP 23 billion (approximately EUR 30 billion) per annum of no/low-cost financial resource efficiency improvements, including use of energy, water and waste, were still available to UK businesses. The UK government is therefore keen to support the United Kingdom's transition to a more circular economy, ensuring that the right framework is in place so that businesses have the tools and the freedom to realise the benefits. This can include a number of approaches, such as fiscal incentives, targeted and effective regulation and enforcement, and improving the quality and quantity of recyclates.

Northern Ireland

Northern Ireland believes that improving resource efficiency, and the innovative reuse and recycling of materials, will help society to move towards a circular economy. This approach will be a real bonus for the economy and the environment. It will provide local opportunities to develop skills and employment resulting in wider social benefits for the community. Energy will be saved, carbon emissions reduced, and materials prevented from being dumped needlessly in landfills.

The report, *Job Creation in the Circular Economy — Increasing Resource Efficiency in Northern Ireland*, (undertaken by WRAP for the INTERREG IVB ReNEW project, <http://www.wrap.org.uk/sites/files/wrap/ReNEW%20CE%20Employment%20Report.pdf>) highlights the benefit of increased employment, potentially over 13 000 jobs, that emerge from a circular economy. It shows the potential of the circular economy to deliver greater employment opportunities across a range of skills to the local economy. Importantly, it shows the potential for employment opportunities across Northern Ireland.

Therefore, future resource efficiency targets and measures need to recognise quality and other societal benefits rather than solely concentrating on quantitative recycling targets that may reduce quality and divert resources away from establishing an integrated local circular economy.

Scotland

Scotland has already taken action to move towards a zero-waste economy, including:

- a waste reduction target of 15 % by 2025 as part of our waste prevention strategy, Safeguarding Scotland's Resources;
- a 70 % recycling rate of all material streams by 2025 as part of our Zero Waste Plan;
- a legal requirement to separate out key recyclable materials and food waste from business and domestic premises;
- introducing a ban on recyclable materials going to energy from waste;
- introducing a landfill ban on biodegradable material from 2021;
- creating Resource Efficient Scotland, a one-stop 'should' for energy, material and water efficiency for businesses;
- introducing a minimum 5-pence (6-cent) charge on single-use carrier bags in October 2014.

The next stage is to move to a more circular economy, keeping material circulating in higher-value uses for longer. Scotland was the first nation to join the Ellen MacArthur Foundation Circular Economy 100 (CE100) and has already taken a number of often innovative actions, including:

- launch of the Scottish Institute for Remanufacturing, to grow this strategically important sector — the first such centre in Europe and one of only four in the world;
- launch of the Scottish Circular Economy Network, to help achieve a more circular economy through collaboration and business-led initiatives;
- introduction of a Material Reclamation Facility (MRF) Code of Practice to standardise testing, increase transparency and promote higher-quality recycling;
- launch of the Scottish Materials Brokerage, offering collaborative waste contracts to deliver better value and encourage investment in domestic reprocessing.

There is also a range of future actions being examined as part of a Scottish Circular Economy Strategy, to be launched in early 2016, including a national food waste reduction target (one of the first in the world)

and proposals to boost areas such as circular design, reuse, repair and finding high-value uses for biological materials.

We recognise the value of European leadership to complement this domestic action, for example in areas such as ecodesign and common targets.

Wales

Our policies, actions and targets set out in Towards Zero Waste, the national waste strategy in Wales, are based on achieving closed-loop recycling in Wales, which is crucial in developing the circular economy. We are working on developing the circular economy in Wales and support the EU plan to achieve these outcomes.

What are we doing?

Preventing waste is important to develop the circular economy and we have introduced a range of measures to help achieve this. We have:

- set aspirational waste prevention targets for the key waste streams in our waste management plan;
- published a Waste Prevention Programme in December 2013;
- funded the Waste Resources and Action Programme (WRAP) to support green procurement and develop a Wales Re-use Alliance network.

We want to see high-quality recycling in Wales and have introduced a range of interventions to make this happen:

- set local authority statutory recycling targets under the Waste (Wales) Measure 2010;
- set a 70 % recycling target by 2025 for other key waste streams such as commercial and industrial;

- published a Collections Blueprint for local authorities which recommends that they follow a kerbside sort approach to deliver the quality product for recycling that we need for our markets.

We are proposing in our Environment Bill:

- a requirement on all businesses and public-sector bodies to keep seven key recyclable materials separate at source;
- an additional requirement for food, cardboard and wood to be collected separately;
- a ban on recyclable wastes to energy from waste;
- a ban on recyclable wastes to landfill;
- a ban on the disposal of food waste to sewer.

The Well-being of Future Generations (Wales) Act places obligations on the public sector, which has a duty to set and deliver objectives to achieve the goals.

According to the Well-being of Future Generations (Wales) Act 2015 and specifically its well-being goal, a prosperous Wales is: 'An innovative, productive and low carbon society which recognises the limits of the global environment and therefore uses resources efficiently and proportionately (including acting on climate change); and which develops a skilled and well-educated population in an economy which generates wealth and provides employment opportunities, allowing people to take advantage of the wealth generated through securing decent work' (www.senedd.assembly.wales/mglIssueHistoryHome.aspx?lId=10103).

We have provided new core funding to our delivery providers, i.e. WRAP, Constructing Excellence in Wales, and FareShare for an additional two and a half years.

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European Environment Agency

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