Modelling of Milestones for achieving Resource Efficiency

Task 1: Turning milestones into quantified objectives

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DISCLAIMER	**The project team does not accept any liability for any direct or indirect damage resulting from the use of this report or its content. This report contains the results of research by the authors and their personal opinions and is not to be perceived as the opinion of the European Commission.**

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1. Introduction

1.1 Background

Europe's successful economic development over the past century is based on the ever-increasing use of natural resources over time. Nonetheless, if we continue with our current patterns of consumption, it would be impossible to avoid irreversible damage to the planet's natural environment and jeopardise its very ability to provide these resources and the ecosystem services that we are so dependent upon. Resource efficiency is seen as the path where economic development and human well-being can progress with lower resource use and environmental impacts.

The Flagship Initiative for a Resource-Efficient Europe

The European Commission published in January 2011 its Flagship Initiative for a Resource Efficient Europe[1] under the Europe 2020 Strategy. It establishes the importance of using all types of natural resources (and not just energy) efficiently for the European economy and environment. The Initiative is expected to boost productivity, improve competitiveness, drive down costs and secure growth and jobs for Europe. The Flagship Initiative provides a framework for policy actions for the next decade, which will guide the Commission's efforts in many different policy areas. In particular, all the relevant policies and actions related to production and consumption should take resource efficiency issues into account.

Under the Flagship Initiative, the European Commission published a Roadmap to a Resource Efficient Europe[2] in September 2011. This Roadmap provides a framework for future actions and milestones to be met by 2020. The achievement of these milestones would allow reaching the necessary structural change for a Resource Efficient Europe in 2050. These milestones include strategic goals on key aspects for Resource Efficiency such as the economy, the natural capital and ecosystem services, and specific issues in important sectors: food, mobility and buildings. Some of these milestones specified in the Roadmap are easily quantifiable targets, but others have not yet been clearly quantified. Therefore, the development of a more specific set of targets is necessary in order to progress with the Flagship Initiative's next steps and actions. The Roadmap for a resource efficient Europe states that the setting of these specific indicators and targets should take place by 2013.

[1] European Commission (2011) A resource-efficient Europe – Flagship initiative under the Europe 2020 Strategy. COM (2011) 21.

[2] European Commission (2011) Roadmap to a Resource Efficient Europe, COM (2011) 571.

Setting targets related to resource use

Targets are specific policy objectives. They are given by a defined performance indicator that can be measured or quantified, e.g. a reduction of domestic material consumption by x % compared to a reference year. A target sets a clear orientation, it provides concrete guidance and helps prioritise actions to achieve a policy objective. If properly enforced and supported by an appropriate mix of policy measures to ensure fair global market conditions and a level playing field, it can be a powerful approach to addressing environmental issues. Long-term objectives provide actors in society, e.g. governmental organisations and companies, certainty, stability and time to achieve the target in the most efficient manner.

Scientific knowledge about environmental thresholds and carrying capacity can serve as a starting point for defining acceptable levels of risk and environmental impact on which a target could be set. For resources such as fossil fuels, land, water and fish stocks, there is some understanding of the limits to when long-term depletion and degradation occurs. For other energy and material resources, the limitation of the resource base is less clear. Instead, the knowledge of the absorption capacities of nature's ecosystems could be used for target setting. A clear example of this is the limit of a maximum 2°C rise in global mean temperature, or 350 ppm CO_2 in the atmosphere, which is used to define EU's GHG emission targets.

An important aspect when proposing targets is balancing ambition, feasibility and acceptance to determine the most appropriate level. The majority of indicators in the proposed basket of indicators have strong links to socio-economic activities and entities, e.g. material consumption and GHG emissions. Some of the indicators are however more relevant on a specific ecosystem scale rather than a national/ economy-wide level, e.g. river basins are more suitable for water indicators, human harvest or HANPP (Human Appropriation of Net Primary Production) is more relevant for agro-ecological zones. Another important consideration is how EU-wide targets could be disaggregated to Member State level or across different sectors of the economy. Some possible approaches include disaggregation according to equity of effort sharing, relative ease/difficulty to achieve the target, demographic characteristics, economic structure and features of the ecosystems including climate.

The cost-effectiveness of setting a target is an important aspect of any target-setting exercise. Although the Flagship Initiative recommends a clear vision and objectives to guide resource efficiency policy in the EU, target oriented policy may not always be the best approach. Depending on how a target and its associated indicator are defined, the mix of supporting policy instruments, and how they are implemented, target setting could lead to unintended consequences. This is of particular importance when considering how the use of resources is interlinked. For example, the targets set for biofuels in transport have demonstrated that it can have significant consequences for global land use.

Whatever the approach chosen to set targets for resource use and efficiency, it is advisable that the targets are based on relevant existing indicators, and that the knowledge of resource use and its environmental impacts is well developed.

1.2 Objectives of the study

The overall aim of this study is **to analyse the suitability of establishing quantified resource efficiency targets for the milestones proposed by the European Commission under the Flagship Initiative for a Resource-Efficient Europe**.

The objective of this Task 1 report is as a first step to translate the milestones into quantified targets based on identifying the best available indicators. Each target should be specific, measurable, (ambitious but) attainable, relevant to the milestone (i.e. a good proxy) and proposed for the year 2020.

2. Methodology

All the milestones mentioned in the Resource Efficiency Roadmap[3] were reviewed using the same framework for identifying and analysing quantifiable objectives (i.e. targets). Following the European Commission's policy impact assessment guidelines, elements of the 'SMART' (Specific, Measurable, Achievable, Realistic, Time-dependent) and 'RACER' (Relevant, Accepted, Credible, Easy and Robust) criteria frameworks were used to analyse each milestone. SMART criteria are used to ensure that policy objectives are clear and well defined. RACER criteria are used to ensure that indicators used for policy purposes are fit for purpose.

The first step in reviewing the milestones was to clarify the terms and concepts, which described the milestone. Based on the text describing each of the milestones the project team drew out the key concepts and attempted to define them in relation to current EU policy. If the main concepts had multiple interpretations, these were discussed, compared and the most pertinent interpretation were used to define the concept. Reports from the EU, the OECD and other international agencies constituted the primary source of information for this step. This first step aimed to satisfy the 'Specific' criterion.

The next step involved identifying indicators that could be used to define the milestone and be used as a target (satisfying the criterion 'Measurable'). For each of the identified objectives, the project team identified the relevant indicators of the key concepts mentioned in the milestones (several were already mentioned in the Roadmap[4]). These included related indicators from Eurostat (sustainable development indicators[5,6]), EEA (sustainable consumption and production indicators[7]), DG Economic and Financial Affairs (iGrowGreen framework[8]), DG Environment (resource efficiency scoreboard[9]) and OECD (green growth indicators[10]). Based on the data availability (i.e. time series and Member States) and aggregation/disaggregation (i.e. EU level, Member State, regions, sector, organisation) of the indicator, the most appropriate indicator(s) to represent the milestone was proposed (satisfying the criteria 'Accepted, Credible, Easy and Robust).If no directly related indicator is available, a proxy indicator was suggested. The main drawbacks of the proxy indicator were noted. Any ideas for developing better indicators to monitor progress in the field covered by the milestone were also mentioned. The project team also checked whether the identified indicator actually was able to appropriately represent the milestone (satisfying the criterion 'Relevant').

[3] European Commission (2011) Roadmap to a Resource Efficient Europe, COM (2011) 571.

[4] European Commission (2011) Analysis associated with the Roadmap to a Resource Efficient Europe, Part II. SEC(2011) 1067.

[5] Eurostat (2009) Sustainable development in the European Union - 2009 monitoring report on the EU sustainable development strategy.

[6] European Sustainable Development Network (ESDN). Website: www.sd-network.eu/

[7] ETC/SCP (2011) Progress in Sustainable Consumption and Production in Europe. Indicator-based Report. European Topic Centre on Sustainable Consumption and Production.

[8] http://ec.europa.eu/economy_finance/db_indicators/igrowgreen/index_en.htm

[9] http://ec.europa.eu/environment/consultations/pdf/consultation_resource.pdf

[10] OECD (2011) Monitoring progress towards Green Growth. OECD Indicators. Draft report, February 3, 2011.

Then the current level of progress of the indicator was investigated in order to get an idea of what level of ambition could be feasible for the target (satisfying the criterion for 'Achievable/Attainable'). For example, best performing Member States provided an idea of what is feasible. The potential for technology, innovation, policy and social change was considered to inform on what would be an ambitious and realistic target (satisfying the criterion for 'Realistic') for 2020 or any other timeline (satisfying the criterion 'Time-dependent'). Based on this, the project team then proposed appropriate targets that the Commission and stakeholders can consider for the Flagship Initiative for a Resource Efficient Europe.

Please note that the review and analysis of suitable indicators and targets for the milestones was performed as a preliminary broad assessment. The review of indicators and targets was done internally at BIO Intelligence Service and did not involve any external consultation. The aim was to identify the most appropriate indicators and targets and investigate them further in Task 2 of this study. Task 2 will examine the progress of selected milestones in each of the Member States and identify policies and policy mixes that could be employed to achieve the proposed targets.

This document provides a summary of the review performed. The results of this preliminary analysis is presented in a table form to provide an overview of the most relevant indicators that were identified. If any EU level targets already exist, these are mentioned. A few notes are provided to give an idea of the current status or progress in the EU of the indicator. A colour coding is used to indicate if the indicator or target is suitable for the milestone (see the following table). Notes are provided to support the qualitative assessment of the suitability of the indicator and target.

Table 2-1: Explanation for colour coding in the overview tables

	Green	Orange
Attainable	The target is feasible, but will require moderate changes for stakeholders in levels of activity, behaviour or technology.	The target is ambitious, and will require significant changes for stakeholders in levels of activity, behaviour or technology.
Relevant	The indicator describes or addresses the milestone well.	The indicator is a proxy and only indirectly describes or addresses the milestone.
Measurable	The data or methodology behind the indicator is credible, easy to gather and robust. It can be used directly for the target.	The data or methodology behind the indicator is still under development or has some gaps and cannot be used directly.
Acceptable	The indicator is expected to be accepted by the majority of the affected stakeholders as credible and robust.	The indicator is expected to be opposed by some stakeholders as credible and robust.
Disaggregation	The indicator can be disaggregated to Member State or sector level	The indicator only applies to EU level and does not apply to individual Member States.

NB! The assessments of indicators and targets are based on incomplete information and research. The results presented in this document reflect the project team's best estimate and personal opinion at this stage of the study and is not to be perceived in any way as the opinion of the European Commission.

3. Turning milestones into quantified objectives

The Roadmap for a Resource Efficient Europe describes several key milestones to be met by 2020 (quantified objectives) which will allow achieving a resource efficient economy in Europe in 2050. The Roadmap structures the milestones under the following headings:

- Transforming the Economy
    1. **Sustainable consumption**
    2. **Sustainable production**
    3. **Turning waste into a resource**
    4. **Supporting research and innovation**
    5. **Environmentally harmful subsidies and getting the prices right**
    6. **Environmental Tax Reform**
- Natural Capital and Ecosystem Services
    7. **Ecosystem services**
    8. **Biodiversity**
    9. **Minerals and metals**
    10. **Water**
    11. **Air**
    12. **Land and soils**
    13. **Marine resources**
- Key Sectors
    14. **Food**
    15. **Mobility**
    16. **Buildings**
- Governance and Monitoring
    17. **New pathways to action**
    18. **Supporting resource efficiency internationally**
    19. **Benefits from environmental legislation**

The following sections address each of the above milestones. Each milestone is described and the main issues that are mentioned in the milestone are defined. Then, in a table format, the most relevant indicator(s) that was identified was listed. If any EU level targets already exist, these are mentioned. A few notes are provided to give an idea of the current status or progress in the EU of the indicator. A colour coding is used to indicate if the indicator or target is suitable for the milestone (see the following table). Notes are provided to support the qualitative assessment of the suitability of the indicator and target.
Abbreviations used for other indicator sets (often mentioned under measurable):

- **SDS** - Eurostat's Sustainable Development Strategy indicators[11,12]
- **EEA SCP** – the European Environmental Agency's Sustainable Consumption and Production indicators[13]
- **iGG** - DG Economic and Financial Affairs (iGrowGreen framework[14]
- **OECD** - OECD Green Growth indicators[15]
- **SBRE** – DG Environment's Scoreboard on Resource Efficiency[16]

NB! The assessments of indicators and targets are based on incomplete information and research. The results presented in this document reflect the project team's best estimate and personal opinion at this stage of the study and is not to be perceived in any way as the opinion of the European Commission.

[16] DG Environment (2012) Consultation Paper: Options for Resource Efficiency Indicators

3.1.1 Milestone 1: Improving products and changing consumption patterns

Milestone 1: *By 2020, citizens and public authorities have the right incentives to choose the most resource efficient products and services, through appropriate price signals and clear environmental information. Their purchasing choices will stimulate companies to innovate and to supply more resource efficient goods and services. Minimum environmental performance standards are set to remove the least resource efficient and most polluting products from the market. Consumer demand is high for more sustainable products and services.*

This milestone encompasses three key issues that could be monitored using the following proxies/indicators:

- 1.1 The **supply or availability of resource efficient products** (and services) on the market
    a) Number of Ecolabel awards
    b) Share of products with good environmental performance
    c) Number of product groups with minimum environmental performance standards (MEPs)
    d) Percentage of green products sold by retailers in the EU
- 1.2 The **uptake or demand of resource efficient products** (and services) by citizens and public authorities
    a) Percentage of the value and number of public procurement contracts that include GPP criteria
    b) Energy/ Carbon (or GHG) Footprint per capita – as a proxy for EU consumption as it includes the impacts of products produced abroad
    c) Number and value of green products purchased by households
    d) Output or share of green products in total output
    e) Market share of the EU Ecolabel + other certified product environmental labels in the EU
- 1.3 The **availability of environmental information** which is a prerequisite for improving the environmental performance of products and services on the market
    a) Number of products with Environmental Product Declarations (EPDs) (or Product Environmental Footprint (PEF)) / Number of companies using EPDs (or PEF)
    b) Number of products under the EU Energy Labelling scheme
    c) Number of products and services with some form of environmental information provided
    d) Complaints on misleading green claims

Table 3-1: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 1: Improving products and changing consumption patterns							
1.1 Availability of resource efficient products and services							
1.1.a Number of Ecolabel awards (EU Ecolabel and other recognised environmental labels) *[policy response indicator]*	No existing target *Total number of EU Ecolabel licenses valid:* *2009: 1015* *2010: 1064* *2011: 1357*	By 2020, **at least 5000 EU Ecolabel** licences have been awarded	270% increase (ambitious)	- Relatively low interest in EU Ecolabel - Ecolabels are not representative of the entire market	Indicator is already used and data is readily available The indicator is: - credible - easy - robust *Used by iGG, EEA SCP and SDS.*	Yes, the indicator is accepted	Yes - By Member State - By national ecolabel scheme
		By 2020, **at least 3000 EU Ecolabel** licences have been awarded	120% increase (feasible)				
1.1.b Share of products with good environmental performance *[policy response indicator]*	No existing target	By 2020, at least 50% of products under the EU Energy Label, cars and tyres should be rated with an A or higher.	Feasible (could even be higher)	- Product categories are among the most resource intensive - Good proxy for environmental performance	Requires market data not collected by governmental organisations *Alternative:* *EEA SCP023 (Developments in energy efficiency of average household appliances)*	Yes, the indicator would probably be accepted	Yes - By Member State
	No existing target Making voluntary requirements mandatory	By 2020, all products under the EU Ecolabel and EU Energy Star Programme categories should comply with the current criteria	Feasible	- Fairly broad range of products	Possible to verify whether this has been achieved, but requires market surveillance similar to Ecodesign requirements	Yes, the indicator would probably be accepted	Yes - Compliance by Member State
1.1.c Number of	No existing target	By 2020, all product	Feasible	Product categories are	The implementation of	Yes, the	Not applicable –

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
product groups with MEPs (energy efficiency or other requirements) *[policy response indicator]*	*15 product groups with implementing regulations under the Ecodesign Directive 17 are in the process of drafting regulation, and 12 product groups are in the process of preparatory study or early stages of drafting*	groups included in the Ecodesign Working Plan 2009-2011 and the Ecodesign Working Plan 2012-2014 should have MEPs via ecodesign Implementing Measures or industry voluntary agreements adopted		among the most resource intensive	the legislation for MEPs could be easily tracked. The compliance with MEPs and voluntary agreements requires market surveillance	indicator would probably be accepted	only EU level
1.1.d Percentage of green products sold by retailers in EU	No existing target *Estimated at 2.5% of total European retail sales. Expected to double in 2015.*	By 2020, 20% of total retail sales in the EU are green	Feasible	Good indicator of availability and consumption of resource efficient products	Requires estimates/ surveys from market research firms. Without any clear definitions, not robust	Indicator might not be seen as robust or credible	Yes - By Member State - By product category
1.2 Uptake of resource efficient products and services							
1.2.a Percentage of the value and number of public procurement contracts that include GPP criteria *[policy response indicator]*	In 2008, the European Commission set an indicative target that, by 2010, 50% of all public tendering procedures should be green in the EU *In 2009/2010, 29% of the contracts signed by public authorities (with an economic share of around 38%*	By 2020, 100% of the value of public procurement contracts include Green Public Procurement (GPP) EU core criteria by 2020 *[indicator proposed in the Annex 6 to the Roadmap]*	Ambitious (The UK demonstrated it is possible to reach 75%, but this could potentially be 100%)	Good indicator of public authorities driving demand for resource efficient products and services	Could be available, but based on surveys from public authorities *Used by iGG*	Yes, although clear reporting guidelines should be developed and there would be definitional issues	Yes - By Member State - By product category
		By 2020, 75% of the value of public procurement contracts include Green Public Procurement (GPP) EU core criteria by 2020 *[indicator proposed in the*	Feasible				

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	of the total value) included some kind of GPP criteria[17]*.*	*Annex 6 to the Roadmap]*					
1.2.b Energy/ Carbon (or GHG) Footprint per capita	No existing target, but the European Commission's proposal for a 2050 target for EU *territorial* GHG emissions corresponds to 2 tonnes CO_2-eq. per capita	Carbon (or GHG) Footprint should be less than 2 tonnes CO_2-eq. per capita in 2050.	Ambitious	- Takes into account environmental impacts caused by EU consumption	- Calculation methodology still being developed *Carbon Footprint is proposed to be used in SBRE* *Alternatives:* - *Ecological Footprint* - *JRC's life cycle based resource indicator, e.g. 'basket of products'* - *Could also be related to GDP (similar to an intensity indicator)*	Depends on calculation methodology	Yes - By Member State - By product category
1.2.c Number and value of green products purchased by households	No existing target *[indicator proposed in the Annex 6 to the Roadmap]*	None suggested	NA	- Good indicator of availability and consumption of resource efficient products	- No good indicator, estimates based on surveys. - Percentage of green products sold by retailers in the EU is better to use	No available indicator is robust or credible and therefore not acceptable	NA
1.2.d Output or share of green products in total output	No existing target *[indicator proposed in the Annex 6 to the Roadmap]*	None suggested	NA	- Indicator does not capture overall green consumption well	- No good indicator due to lack of definition - Surveys are not reliable	No, due to state of suitable indicators	NA

[17] CEPS (2012) The uptake of Green Public Procurement in the EU27. Submitted to the European Commission, DG Environment.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
					- Environmental Goods and Service Sector is too limited *Proxy:* - Market size of Environmental Goods and Services (used by OECD and iGG)		
1.2.e Market share of the EU Ecolabel + other certified product environmental labels in EU	No existing target *At present, about 5% of agricultural land in the EU is farmed organically* *In 2010, the penetration of office equipment certified with the EU Energy Star was around 50%*	None suggested	NA	- Relatively low interest in EU Ecolabel - Ecolabels are not representative of the entire market	- No market data is gathered on EU Ecolabel or other labels - Labels vary in how 'green' they are	The indicator would probably be accepted, if it was available	NA
1.3 Availability of environmental information for products and services							
1.3.a Number of products with EPDs (or PEF) / Number of companies using EPDs (or PEF)	No existing target *According to EPD System, almost 200 organisations from 16 countries have developed and published more than 400 EPDs*	By 2020, 1000 companies will have used the PEF methodology to provide environmental product information of their products [ambitious]	Feasible	- Products with EPDs or PEF will not necessarily be representative of the entire market - Covers only one methodology, there are others that are valid	- Yes, but data not systematically gathered - The harmonised Product Environmental Footprint (PEF) methodology has not been officially adopted yet.	Yes, the indicator would probably be accepted	Yes - By Member State - By product category

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
1.3.b Number of products under the EU Energy Labelling scheme *[policy response indicator]*	No existing target *EU Energy Labelling currently covers 12 product groups in addition to labelling for tyres and cars*	By 2020, double as many product groups have energy labelling requirements compared to 2010	Feasible	- Not representative of the market but addresses resource intensive products	Yes, as this depends on the implementation of legislation The compliance of the legislation will require market surveillance	Yes, the indicator would probably be accepted	Yes - Compliance by Member State
1.3.c Number of products and services with some form of environmental information provided *[policy response indicator]*	No existing target	By 2020, all final goods put on the EU market provide some form of environmental information to the consumer.	Feasible	- First step towards providing clear, reliable and comparable environmental information of products	Yes, but it would require market surveillance to verify - Could be limited to products with production volumes over a certain threshold, e.g. 200,000 sold per year	Without a harmonised methodology, environmental information will not be comparable Reliability of information can also be questioned	Yes - Compliance by Member State
1.3.d Complaints on misleading green claims	No existing target	None proposed	NA	- Could be a proxy for the reliability of environmental product information and consumer confidence in green products	Yes, the indicator is already used, but not systematically. Some data is readily available	Possibly	NA

Resource efficient products and services refers to products and services with improved environmental performance over their life cycle compared with conventional products and services, i.e. they have a positive impact on the environment or are less damaging to the environment than other products or services on the market. Other terms also used in Commission documents are: '*green products and servic*es' and '*sustainable products and services*'[18]. To be pragmatic, products and services that comply to the following can be defined as resource efficient:

- EU Ecolabel
- Green Public Procurement (GPP) criteria
- EU Energy Star
- EU Organic label
- the top levels of the EU Energy Label (e.g. A and above)
- and other recognised national labels (e.g. Blue Angel, Nordic Swan, etc.)

The European Commission is expected to propose a harmonised Product Environmental Footprint methodology[19] for all products in the EU that could be used to define green products and services, but this will only be ready in a few years time.

3.1.1.1 Availability of resource efficient products and services

As there are no clear definitions, there is no single indicator that can currently track the availability or supply of resource efficient products and services. Market research companies have provided estimates of the market size of 'green' products but this is not gathered in a systematic manner. An alternative approach is to survey retailers and ask them whether how much green products represent in their turnover[20]. Unless there is a clear definition of this, retailers would provide estimates based on their own definitions.

A proxy for the availability of resource efficient products and services could be the number of Ecolabel awards and/or the number of product groups with minimum environmental performance standards (energy efficiency or other requirements). Although both could be easily tracked, they only represent a fraction of products that could be considered resource efficient.

Uptake of resource efficient products and services

The data on the uptake or demand of resource efficient products and services are not gathered systematically. Only estimates have been provided based on market research firms, studies and surveys. As green criteria are not well defined, the methodology for gathering data is not consistent.

[18] Besides improved environmental attributes, sustainable products and services also take into account of social aspects, e.g. fair trade.

[19] JRC (2012) Product Environmental Footprint (PEF) Guide. European Commission, Joint Research Centre (JRC), Institute for Environment and Sustainability (IES).

[20] TNS Political & Social (2012) SMEs, Resource Efficiency and Green Markets. At the request of the European Commission. Eurobarometer 342.

The closest available indicator for share of green products in total output is the Turnover from Environmental Goods and Services Sector (used in iGreenGrowth[21]), but this is a very narrow definition of green products and services as it only includes "*technologies, goods and services that have been produced for the environment ('environmental purpose')*"[22]. In principle, all products and services can be more resource efficient.

EEA's SCP indicator set uses the share of household expenditure on COICOP categories, but it is only possible to identify categories that cause more pressure on the environment (per Euro spent) than others. It does not provide information on green products, which can be part of any of the categories.

The JRC has proposed a 'basket-of-products' indicator[23] (similar to what is used to track prices of consumer products) to reflect the environmental impact and the resources used that are associated with the final consumption of an average citizen in the EU-27 over the entire life cycle of goods and services. The basket-of-product indicators are based on apparent domestic final consumption and it includes several demand categories (nutrition, shelter, consumer goods, mobility and services). This indicator is still in development, but it is expected to be tested next year.

[21] DG Economics and Financial Affairs (2011) iGrowGreen (iGG). Setting up an indicator-based assessment framework to identify country-specific challenges to promote greener growth.

[22] Eurostat (2009) The environmental goods and services sector.

[23] JRC (2010) Decoupling indicators, Basket-of-products indicators, Waste management indicators. Framework, methodology, data basis and updating procedures. Joint Research Centre, Institute for Environment and Sustainability.

3.1.2 Milestone 2: Boosting efficient production

> ***Milestone 2**: By 2020, market and policy incentives that reward business investments in efficiency are in place. These incentives have stimulated new innovations in resource efficient production methods that are widely used. All companies, and their investors, can measure and benchmark their lifecycle resource efficiency. Economic growth and wellbeing is decoupled from resource inputs and come primarily from increases in the value of products and associated services.*

There are four key concepts to be developed in this milestone:

- **2.1 Incentives for business investment in resource efficiency**
  - 2.1.a Share of private spending on R&D on resource efficiency
  - 2.1.b Number of known 'substances of very high concern' (SVHC) included on the REACH Candidate list
- **2.2 Innovations in resource efficient production methods**
  - 2.2.a Number of patents related to resource efficiency and environmental issues
  - 2.2.b Share of companies with environmentally related innovation
- **2.3 Company resource efficiency performance**
  - 2.3.a Proportion of companies using Organisational Environmental Footprint
  - 2.3.b Proportion of companies with certified Environmental Management Systems such as ISO 14001 and EMAS
- **2.4 Decoupling of economic growth and well-being from resource inputs**
  - 2.4.a Resource productivity (measured as GDP/DMC)
  - 2.4.b Resource productivity (measured as GDP/RMC)
  - 2.4.c Energy productivity of EU industry

Similar to the milestone on products and consumption patterns, there is no clear definition of what is resource efficient. The Commission also uses the terms 'sustainable production' and 'eco-innovation' to cover many of the same aspects in this milestone. Besides the criteria defined for some products such as Ecodesign requirements or EU Ecolabel, the Commission provides Best Available Techniques (BAT) reference documents[24] (so-called BREFs) that support the Industrial Emissions Directive for the permitting and control of industrial installations.

Company resource efficiency performance can be tracked through certified Environmental Management Systems such as ISO 14001 and EMAS. The Commission is currently developing a common methodological approach to assess, display and benchmark the environmental performance of companies (Organisational Environmental Footprint'[25]), which is based on a comprehensive assessment of environmental impacts over the life-cycle.

[24] http://eippcb.jrc.es/reference/

[25] JRC (2012) Organisation Environmental Footprint (OEF) Guide. European Commission, Joint Research Centre (JRC), Institute for Environment and Sustainability (IES).

Table 3-2: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 2: Boosting efficient production							
2.1 Incentives for business investment in resource efficiency							
2.1.a Share of private spending on R&D on resource efficiency	No existing target *Eurostat's Statistics on science, technology and innovation includes private sector R&D expenditure related to environment and energy, but no specification of resource efficiency related R&D*	By 2020, **the share of private R&D spending on resource efficiency should be doubled** compared with 2010	- Feasible, if incentives for businesses are right	- Yes, if possible to determine what is resource efficiency related R&D	Indicator for R&D expenditure exists, butDifficult to determine what is resource efficiency related R&D Data is however already available for environment and energy related R&D expenditure *OECD's Green Growth indicator set includes expenditure in environmental technologies (in % of total R&D)*	Potentially, if clear definitions of resource efficiency are provided	Yes - By Member State - By sector - By socio-economic objective (environment, energy, defence, etc.)
2.1.b Number of known 'substances of very high concern' (SVHC) included on the REACH Candidate list *[policy response indicator]*	Target is to have 136 SVHCs on the REACH Candidate list. *Currently there are 57 SVHCs on the REACH Candidate list.*	By 2020, all relevant SVHCs are on the REACH Candidate list *[indicator and target proposed in the Annex 6 to the Roadmap]*	Feasible	- Yes to eliminate hazardous substances and encourage investment in more environmentally friendly production methods	Yes, as this depends on the implementation of legislation The compliance of the legislation will require surveillance	Yes, the indicator would probably be accepted	Yes - Compliance by Member State
2.2 Innovations in resource efficient production methods							

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
2.2.a Number of patents related to resource efficiency and environmental issues / eco-innovation	No existing target	No target proposed	NA	Patents are often used as a proxy for the outputs of R&D, but is not an actual measure of innovation	Same indicator as **4.2.a Number of patents related to resource efficiency and environmental issues**		
2.2.b Share of companies with environmentally related innovation	No existing target *In 2011, roughly 30% of companies in the EU introduced eco-innovative production processes or methods, whereas 25% have introduced eco-innovative products or services in the market*[26]	No target proposed	NA	Same indicator as **4.2.c Number or share of companies with resource efficient innovations**	The share of enterprises with procedures in place to regularly identify and reduce environmental impacts as % of all surveyed enterprises with innovation activity. This was last polled in an Eurobarometer survey in 2011.	Concept accepted but question over measurement rigour	Yes - By Member State - By sector By organisation size
2.3 Company resource efficiency performance							
2.3.a Proportion of companies using Organisational Environmental Footprint (OEF)	No existing target *OEF have not been officially adopted yet. ISO 14001 is the most related and common scheme. Organisations in Europe registered under ISO 14001 in*	By 2020, 1000 companies will have used the OEF methodology to provide environmental product information of their products *[indicator proposed in*	Feasible	- OEF will not be representative of all companies - Companies may use other methodologies	- The harmonised Organisation Environmental Footprint (OEF) methodology has not been officially adopted yet.	Yes, the indicator would probably be accepted. OEF is a voluntary measure	Yes - By Member State - By sector - By organisation size

[26] Flash Eurobarometer (2011) Attitudes of European entrepreneurs towards eco-innovation. Survey conducted by The Gallup Organization, Hungary upon the request of DG Environment.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	2009: 89,237	*the Annex 6 to the Roadmap]*					
2.3.b Proportion of companies with certified Environmental Management Systems such as ISO 14001 and EMAS	No existing target Organisations in the EU (public and private) registered under EMAS: 2010: 4531 2011: 4530 2012: 4581 Organisations in Europe registered under ISO 14001 in 2009: 89,237	By 2020, at the share (% of total) of private organisations registered under EMAS should be doubled compared to 2010.	Feasible	- Yes, but might not be representative of the entire industry	Indicator is already used and data is readily available The indicator is: - credible - easy - robust Used by EEA SCP and SDS. *Alternative or complementary indicator:* - Number of companies in the EU signing the UN Global Compact - Number of companies publishing environmental reports according to the Global Reporting Initiative	Yes, although some companies prefer not to publish their environmental performance	Yes - By Member State - By sector
2.4 Decoupling of economic growth and well-being from resource inputs							
2.4.a Resource productivity (measured as GDP/DMC)	No existing target, besides a general objective of decoupling	By 2020, resource consumption (measured by DMC/RMC) in the EU	Feasible	- The indicator is the lead indicator for the Resource Efficiency Roadmap - DMC does not	Eurostat has DMC data from their economy-wide Material Flow Accounts (EW-MFA)	Yes, the indicator is accepted by most, but RMC is preferred	Yes - By Member State - By main material category

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	[provisional lead indicator as the best available proxy for resource efficiency used in the Roadmap]	and all its Member States should be absolutely decoupled from economic growth (measured by GDP). *Resource consumption should decrease while GDP increases.*		include the upstream (or indirect) material flows of internationally traded products. - GDP is a national (economic) indicator that does not cover the supply chain and not all is linked with production - The indicator could be used as a proxy for decoupling	for all Member States for the years 2000 to 2009 *SDS, iGG and SBRE use GDP/DMC* *OECD disaggregates non-energy, biotic and abiotic material productivity* *EEA SCP uses GDP/DMI (Domestic Material Input)*		The existing accounts do not allow disaggregation by economic sector. To do this requires additional analysis using input-output tables.
2.4.b Resource productivity (measured as GDP/RMC)			Feasible		Eurostat provides estimates for RMC measured in Raw Material Equivalents (RME) of the EU-27 economy for the years 2000 to 2009, but not at Member States level.	Yes, the indicator is accepted by most	Yes - By main material category Eurostat does not currently provide this indicator by Member State, but could potentially do so.
2.4.c Energy productivity of EU industry (measured as GDP/final energy consumption)	2020 energy target: 20% reduction of (projected 2020) energy consumption by 2020[27]	By 2020, energy productivity of EU industry should increase by 20% compared to 2010.	Feasible	- Final energy consumption relates directly to energy consumed in the EU, but does not include energy consumption of EU imports - GDP is a national	Eurostat tracks final energy and GDP *Alternatively, total primary energy intensity could be used (toe per million GDP) – part of EEA's core set of indicators*	Yes, the indicator is accepted by most	Yes - By Member State - By major industry sectors
		By 2020, final energy consumption of	Feasible			Yes, the indicator is	Yes - By main material

[27] http://ec.europa.eu/news/energy/110622_en.htm

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
		industry in the EU and all its Member States should be absolutely decoupled from economic growth (measured by GDP).		(economic) indicator that does not cover the supply chain and not all is linked with production	*Gross inland energy consumption (GIEC)*	accepted by most	category

3.1.3 Milestone 3: Turning waste into a resource

Milestone 3: *By 2020, waste is managed as a resource. Waste generated per capita is in absolute decline. Recycling and re-use of waste are economically attractive options for public and private actors due to widespread separate collection and the development of functional markets for secondary raw materials. More materials, including materials having a significant impact on the environment and critical raw materials, are recycled. Waste legislation is fully implemented. Illegal shipments of waste have been eradicated. Energy recovery is limited to non-recyclable materials, landfilling is virtually eliminated and high quality recycling is ensured.*

The key issues of this milestone are:

- **3.1 Reduction of waste generation**
  - 3.1.a Total waste generated per capita
  - 3.1.b Municipal Solid Waste generated per capita
- **3.2 Shifting to more resource efficient waste management**
  - 3.2.a Recycling rates
  - 3.2.b Landfill rate
  - 3.2.c Reuse (waste prevention)
  - 3.2.d Energy recovery
- **3.3 Development of the market for recycling and recycled materials**
  - 3.3.a Recycling industry turnover
  - 3.3.b Secondary material prices/ Material prices for recyclates
  - 3.3.c Volume of secondary material/ recyclates
  - 3.3.d Proportion of secondary raw material used in the EU economy compared to primary raw material
- **3.4 Compliance to EU waste legislation**
  - 3.4.a Compliance
  - 3.4.b Illegal shipments

Waste is defined in the Waste Framework Directive (2008/98/EC) as *"any substance or object which the holder discards or intends or is required to discard"*. Waste legislation at EU level comprises the Waste Framework Directive (2008/98/EC), the Waste list Decision (2000/532/EC), and the Waste Shipments Regulation (EC 1013/2006). Other pieces of legislation such as the WEEE Directive (2002/96/EC), ELV Directive (2000/53/EC), Packaging and packaging waste

Directive (94/62/EC) and Batteries Directive (2006/66/EC) also tackle waste issues by holding producers responsible of the waste generated at the end of life of products.

The Waste Framework Directive dictates a priority for waste management following the hierarchy:

1. Prevention (including reuse – products are not considered waste)
2. Preparation for reuse
3. Recycle (including composting)
4. Recovery (including energy recovery)
5. Disposal (landfilling, incineration without energy recovery, etc.).

Illegal shipments of waste are defined in the Regulation EC 1013/2006, but are difficult to track.

Critical raw materials have been identified in the EU Communication "Tackling the challenges in commodity markets and on raw materials" (COM(2011) 25 final).

Secondary raw materials are not defined in any piece of EU legislation. Standards for the quality of some recycled material are being developed. A secondary raw material can be defined as a materials issued from a waste recycling process that may be used again in production as starting material.

Table 3-3: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 3: Turning waste into a resource							
3.1 Reduction of waste generation							
3.1.a Total waste generated per capita	No existing target *Total waste per capita in 2010:* *5.0 tonnes (-5% compared to 2004)* *Ten Member States generate less than 3 tonnes per capita* *Construction and demolition (C&D) waste constitutes about a third of total waste.*	By 2020, **total waste per capita is halved** compared with 2010 *[indicator proposed in the Annex 6 to the Roadmap, the milestone states "waste generated per capita is in absolute decline"]*	Ambitious: corresponds to the level of the ten best performing Member States	- Waste statistics are dominated by construction and demolition (C&D) waste, which might be an issue for Member States with a lot of construction activity - An alternative indicator is total waste excluding mineral waste	Yes, Eurostat tracks waste generation but some waste streams do not have reliable data (e.g. C&D waste) *Used by iGG. Total waste proposed to be used in SBRE.* *SDS uses non-mineral waste generation.* *EEA SCP uses waste generation other than mining and agricultural waste and residual waste from waste treatment*	Yes, probably more so if C&D waste is excluded	Yes - By Member State
3.1.b Municipal Solid Waste generated per capita	*Total MSW per capita in 2010:* *438 kg (+2% compared to 2004) About half of the Member States are under 400 kg per capita*	By 2020, **municipal waste per capita is reduced by 10%** compared with 2010	Feasible: corresponds to 400 kg per capita	- Yes, related to consumption - Does not address industrial waste - Related to the milestone for food waste	Yes, Eurostat tracks household waste data *Used by SDS. MSW proposed to be used in SBRE.*	Yes, although MSW data is accounted for differently in Member States	Yes - By Member State
3.2 Shifting to more resource efficient waste management							

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
3.2.a Recycling rates	Recycling targets exist for MSW, ELV, WEEE, batteries, packaging and C&D waste	New targets for reuse/ recycling/ recovery to be proposed for all streams with existing targets as well as industrial waste. *[indicator proposed in the Annex 6 to the Roadmap]*	Depends on level of ambition	- Helps promote material efficiency in the economy	Yes, Eurostat tracks recycling but some waste streams do not have reliable data (e.g. C&D waste) - *Recycling of MSW used by iGG, EEA SCP and SDS.Also proposed in SBRE.* - *Recycling of packaging waste used by EEA SCP.*	Yes, but some waste indicators (e.g. C&D) might not be accepted by all due to differences in reporting	Yes - By Member State - By sector - By material
3.2.b Landfill rate	Target for Member States to reduce the amount of biodegradable MSW that they landfill to 35% of 1995 levels by 2016 (for some countries by 2020)	By 2020, no hazardous, biodegradable or recyclable waste should be sent to landfill *[taken directly from the Roadmap, indicator proposed in the Annex 6 to the Roadmap]*	Feasible	- Avoids environmental impacts and increases material efficiency - It might not be relevant to include some inert waste materials, such as mineral C&D waste	Yes, Eurostat tracks waste that is landfilled but some waste streams do not have reliable data *Landfill rate of MSW is proposed to be used in SBRE.*	Yes, the indicator is accepted	Yes - By Member State - By material
3.2.c Reuse (waste prevention)	No existing targets for reuse specifically By Dec 2013, all Member States must establish National Waste Prevention Programmes	None proposed as no suitable indicator *[indicator proposed in the Annex 6 to the Roadmap]*	NA	Informs of the progress to a circular economy	There is no specific data on reuse rates of products Not included in waste statistics as reuse is not considered waste treatment (only preparing for reuse)	No accepted indicator	NA
3.2.d Energy	No existing targets	By 2020, no recyclable	Ambitious, depends	Avoids environmental	Yes, Eurostat tracks	Yes, the	Yes

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
recovery	*In 2010, 30.8 Mt of recyclable waste was sent to energy recovery and 1.5 Mt was sent to incineration without energy recovery*	materials are sent to incineration and energy recovery	on economic incentives	impacts and increases material efficiency	waste where energy is recovered	indicator is accepted	- By Member State - By material
3.3 Development of the market for recycling and recycled materials							
3.3.a Recycling industry turnover	No existing target *The recycling industry turnover:* *2005: €33.0 billion* *2008: €50.7 billion*	No targets proposed	NA	- Turnover can inform on the activity of the industry, but setting economic targets on a specific sector might not be effective	- Yes, the business statistics cover the recycling industry *Used by iGG.*	Indicator is accepted	Yes - By Member State - By sector - By organisation size
3.3.b Secondary material prices/ Material prices for recyclates	No existing target	No targets proposed	NA	- The price (and therefore also the volume) of secondary materials is highly influenced by the price of raw materials and overall economic development - Revenues for secondary material pay for waste management schemes	Yes, Eurostat tracks price developments and volume of traded glass, paper and plastics	Indicator is accepted	Yes - By material: glass, paper and plastics
3.3.c Volume of secondary material/ recyclates	No existing target	No targets proposed	NA			Indicator is accepted	
3.3.d Proportion of secondary raw material used in the EU economy compared to	No existing target *In 2011:* *Glass: 23.1%* *Paper: 41.2%*	By 2020, the proportion of secondary raw material used for glass and paper production in the EU should be over	Feasible	Yes, as it informs of efficient use of materials and progress towards a circular/ closed loop economy	Yes, by comparing volume of secondary material with production statistics	The indicator is accepted	Yes - By material: glass, paper and plastics

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
primary raw material	*Plastic: 0.02%* *In 2009:* *Copper: 45.7%*	50%. *[indicator proposed in the Annex 6 to the Roadmap]* Targets for other material streams could be considered.			*EEA SCP is considering share of recycled material in key material streams consumed in Europe* *Similar to the Recycling Input Rate (RIR) for metals*		
3.4 Compliance to EU waste legislation							
3.4.a Compliance to EU waste legislation	EU waste legislation sets different targets and requirements for Member States	By 2020, all Member States should have fully implemented EU waste legislation. *[taken directly from the Roadmap]*	Feasible	Yes, as it is directly related to the milestone	Yes, currently being done A scoring method by BIPRO (2012)[28] based on 18 criteria and weighted scores could be used as a performance indicator of implementation of waste legislation in the EU Member States.	Yes	Yes - By Member State - By waste stream
3.4.b Illegal shipments	Illegal shipments of waste should be prevented and reported	By 2020, illegal shipments of waste have been eradicated. *[taken directly from the Roadmap]*	Feasible	Yes, as it is directly related to the milestone	Illegal shipments of waste are only reported when discovered. It is not possible to directly measure the illegal shipments of waste. One can however report the amounts of discovered illegal shipments.	Yes	Yes - By Member State - By type of waste

[28] BIPRO (2012) Screening of waste management performance of EU Member States. Prepared for European Commission DG ENV.

3.1.4 Milestone 4: Supporting research and innovation

Milestone 4: *By 2020, scientific breakthroughs and sustained innovation efforts have dramatically improved how we understand, manage, reduce the use, reuse, recycle, substitute and safeguard and value resources. This has been made possible by substantial increases in investment, coherence in addressing the societal challenge of resource efficiency, climate change and resilience, and in gains from smart specialization and cooperation within the European research area.*

This milestone covers several issues with the three key issues being:

- **4.1 Investment in research and innovation** related to resource efficiency (inputs)
  - 4.1.aTotal R&D expenditure related to resource efficiency
- **4.2 Results of scientific and innovation efforts related to resource efficiency (outputs)**
  - 4.2.a Number of patents related to resource efficiency and environmental issues
  - 4.2.b Eco-innovation performance
  - 4.2.c Number or share of companies with resource efficient innovations
- **4.3 Implementation of research and innovation policy** (coherence, specialisation and cooperation) related to resource efficiency, climate change and resilience (process)
  - 4.3.a Public R&D expenditure related to resource efficiency
  - 4.3.b EU R&D expenditure related to resource efficiency
  - 4.3.c EU eco-innovation expenditure

While it is clear how to track research and development expenditure, it is not so clear what is the share of expenditure dedicated to resource efficiency. Traditionally, the statistics report on R&D expenditure related to energy and the environment, but resource efficiency is broader in terms and more similar to eco-innovation and sustainable development. There are different definitions of eco-innovation but typically they relate to whether the innovation is less environmentally harmful (or more environmentally beneficial) than the use of relevant alternatives.

In order to get an idea of the productivity of research and development activities one should consider the outcomes, outputs and impacts. This is often difficult to do as the relationship between investment and outcome is not straightforward, and there is often long lag times between R&D efforts and useful results. Patents and publications are used as proxies for the immediate outputs of R&D activities, but these do not necessarily indicate the (economic and societal) value of research. The amount or rate of new resource efficient products, processes and solutions (including their turnover) could be used to inform on the performance of R&D efforts, but as mentioned under the milestone for resource efficient products, it is difficult to identify these types of products.

Table 3-4: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 4: Supporting research and innovation							
4.1 Investment in research and innovation related to resource efficiency							
4.1.aTotal R&D expenditure related to resource efficiency/ eco-innovation	By 2020, 3% of the EU's GDP to be invested in R&D. *Total R&D expenditure in the EU is currently just over 2% of GDP. Only Finland, Sweden and Denmark have shares over 3%.*	By 2020, 10% of R&D expenditure in the EU should be related to resource efficiency	Feasible	Yes, but resource efficiency or eco-innovation is wider than just energy and environment R&D expenditure	- Statistics on R&D (public and private) expenditure currently do not allow the share of expenditure related to eco-innovation or resource efficiency to be determined. - Eurostat could collect data according to NABS socio-economic objectives such as energy and environment.	Difficult to agree on what research is related to resource efficiency.	Could be disaggregated - By Member State - By topic - By socio-economic objective (e.g. energy, environment) - By source of funds (e.g. business, government, etc.) - By fields of science
4.2 Results of scientific and innovation efforts related to resource efficiency							
4.2.a Number of patents related to resource efficiency and environmental issues / eco-innovation	No existing target	No target proposed	NA	Patents are often used as a proxy for the outputs of R&D, but is not an actual measure of innovation	Eurostat tracks patent applications to the European Patent Office Possible to identify those related to the environment *Similar indicators are used in EEA SCP, iGG (biodiversity related patents, green patents per GDP) and OECD (e.g. environmentally related patents).*	Yes, indicator is generally accepted.	Could be disaggregated - By Member State - By topic (e.g. electric & hybrid vehicles, energy efficiency, renewable energy, air pollution, water pollution, waste management)
4.2.b Eco-innovation performance	No existing target	No target proposed	NA	- Eco-innovation performance is relevant for this milestone as it tries	The Eco-innovation Observatory has developed a composite index of EU Member States' eco-	Composite index that has only recently been	Yes - By Member State - By eco-innovation inputs, activities,

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
				to capture the different dimensions of research and innovation	innovation performance[29] *The Eco-innovation Index is proposed to be used in SBRE.*	developed	outputs, environmental and socio-economic outcomes
4.2.c Number or share of companies with resource efficient innovations	No existing target *In 2011, roughly 3 in 10 companies in the EU introduced eco-innovative production processes or methods and 25% introduced eco-innovative products or services in the market[30].*	No target proposed	NA	- Good indicator of share/trends of companies adopting resource efficient practices and offering resource efficient solutions	Requires surveys (which could focus on SMEs) in the EU (Eurobarometer), therefore would need to carried out regularly As there is no clear definition of eco-innovation or resource efficient innovations, the indicator is not robust *OECD proposes to use environmentally related innovation*	Concept accepted but question over measurement rigour	Yes - By Member State - By size of company - By sector
4.3 Implementation of research and innovation policy related to resource efficiency							
4.3.a Public R&D expenditure related to resource efficiency/ eco-innovation *[policy response indicator]*	No existing target *In 2010, Estonia's public spending in environment related R&D was over 10% of total public spending.[31] Most other Member States the share was 2-4%.*	By 2020, 10% of public R&D expenditure (of total public R&D spending) in the EU should be related to resource efficiency	Feasible	Yes, but resource efficiency or eco-innovation is wider than energy and environment R&D expenditure	- OECD collects data of member countries government appropriations and outlays for R&D according to energy or environmental objectives. - IEA has data on energy-related R&D budgets. *Used by EEA SCP and OECD*	Limited interpretation of resource efficiency/ eco-innovation	Could be disaggregated - By Member State - By socio-economic objective (e.g. energy, environment) Not all EU Member States are members of OECD.

[29] EIO (2012) The Eco-Innovation Gap: An economic opportunity for business. Eco-Innovation Observatory. Funded by the European Commission, DG Environment.

[30] EC (2011) Innovation for Resource Efficiency: A selection of FP6 and FP7 projects. Available at: http://ec.europa.eu/research/environment/pdf/innovation_for_resource_efficiency.pdf

[31] OECD Statistical Database. http://stats.oecd.org/Index.aspx?DataSetCode=GREEN_GROWTH#

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
4.3.b EU R&D expenditure related to resource efficiency *[policy response indicator]*	No existing target, but budget is agreed *Under FP7, 8.4% of the budget was allocated to energy and environment (including climate change).*	Under Horizon 2020 (the next EU Framework Programme for Research and Innovation) 50% of the budget should be allocated to resource efficiency related projects *[indicator proposed in the Annex 6 to the Roadmap]*	Depends on the definition of resource efficiency related research	- FP research projects should reflect the priorities of the EU and the major challenges of its citizens - Important that funding is targeted towards priority areas of resource efficiency to ensure results can be concretely used	A clear definition of resource efficiency related resource is needed Could be monitored through a website similar to FP7-4-SD: FP7 projects related to sustainable development (www.fp7-4-sd.eu/)	Yes, the indicator would probably be accepted	Target relates to EU funding, but could be extended to Member States
4.3.c EU eco-innovation expenditure *[policy response indicator]*	No existing target, but budget is agreed *For 2008-2013, about €200 million was allocated to projects under the Eco-Innovation initiative*	Under the next Programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME) for 2014 to 2020, at least €400 million are made available for eco-innovation projects.	50% increase (feasible)	- Support to SMEs should reflect the priorities of Flagship Initiative for a Resource Efficient Europe - Indicator covers only EU part of the expenditure (not national or private)	Yes, as can be derived from the European Commission's budget and accounts	Yes, the indicator would probably be accepted	EU level only

3.1.5 Milestone 5: Environmentally Harmful Subsidies

***Milestone 5**: By 2020, Environmentally Harmful Subsidies will be phased out, with due regard to the impact on people in need.*

At present, there is no commonly adopted definition for a subsidy, and there is no established rule for setting which subsidy should be considered as environmentally harmful. The completion of this milestone therefore requires that clear definitions are adopted at least at the EU level.

Environmentally harmful subsidies are present in many sectors (e.g. energy, agriculture, manufacturing industry, etc.) and at many levels (e.g. producers, consumers, etc.). A complete mapping of current status with respect to EHSs is very difficult. One area, which could serve as a good starting point is fossil fuel subsidies. Recently, the OECD and the IEA have compiled inventories of subsidies leading to an increased use of fossil fuels. EHS in other sectors could also be considered.

- **5.1 Phasing out fossil fuel subsidies**
  - 5.1.a Annual value of all fossil fuel subsidies
  - 5.1.b Difference between excises on unleaded petrol and diesel
  - 5.1.c Difference between standard and households' energy consumption VAT rates
- **5.2 Phasing out other environmentally harmful subsidies**
  - 5.2.a Fiscal loss due to subsidies of company cars (% of GDP)

IEEP et al. (2010)[32] propose the following definitions of an EHS based on OECD (1998[33] and 2005[34]):

- *"A result of a government action that confers an advantage on consumers or producers, in order to supplement their income or lower their costs, but in doing so, discriminates against sound environmental practices"; and*
- *"All other things being equal, the environmentally harmful subsidy increases the levels of output/use of a natural resource and therefore increases the level of waste, pollution and natural exploitation to those connected".*

The narrowest definition of a subsidy only considers direct transfers of funds. However, this definition is too narrow because a government can resort to many tools to provide public support to a target group. For example, governments can freely provide goods or services to private agents, which is quite equivalent to a direct money transfer in terms of consequences.

[32] IEEP et al. (2010) Environmentally Harmful Subsidies: Identification and Assessments. Report to DG Environment.
[33] OECD (1998) Improving the environment through reducing subsidies, OECD, Paris
[34] OECD (2005) Environmentally Harmful Subsidies: Challenges for Reform, OECD, Paris.

Furthermore and conversely to money transfers and the provision of goods and services, government can also provide "off-budget" public support. For example, revenues that are not collected, due to tax credits, can also be considered as a type of subsidies. The OECD 2011 inventory[35] distinguishes between:

1. Direct transfer of funds
2. Tax revenue foregone
3. Other government revenue foregone
4. Transfer of risk to government
5. Induced transfers

Many aspects of this milestone such as. environmental tax reform, water pricing and the valuation of ecosystem services are included in their respective milestones.

[35] OECD (2011) Inventory of Estimated Budgetary Support and Tax Expenditures for Fossil Fuels, OECD Publishing.

Table 3-5: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / Current progress	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 5: Phasing out Environmentally Harmful Subsidies							
5.1 Phasing out fossil fuel subsidies							
5.1.a Annual value of all fossil fuel subsidies	No existing target at EU level, but some countries have realised or are about to realise reforms to eliminate EHSs associated with fossil fuels[36] *G20 leaders committed in 2009 to "rationalize and phase out over the medium term inefficient fossil fuel subsidies that encourage wasteful consumption".*	By 2020, all fossil fuel subsidies in the EU should be phased out. *[taken directly from the Roadmap (assuming that fossil fuel consumption is a major cause to environmental damage)]*	Feasible	- Yes, the indicator is directly related to the milestone, although it does not cover all EHSs.	Using the OECD PSE-CSE framework[37] *Alternative: Use the International Energy Agency's price gap method to determine fossil fuel consumer subsidies*	Yes, the OECD framework indicator will probably be accepted.	Yes - By Member State - By type of subsidy
5.1.b Difference between excises on unleaded petrol	No existing target	*Supporting target* By 2020, there should be no	Feasible	- Does not cover all fossil fuel subsidies	Based on an OECD methodology *Used by iGG.*	More simple indicator than OECD indicator	Yes - By Member State

[36] IEA, OPEC, OECD and World Bank (2011) *Joint report by IEA, OPEC, OECD and World Bank on fossil-fuel and other energy subsidies: An update of the G20 Pittsburgh and Toronto Commitments*.

[37] "The PSE-CSE framework distinguishes among those measures that benefit producers (PSE: Producer Support Estimate), consumers (CSE: Consumer Support Estimate), and those that benefit producers collectively, or that do not support current production, such as industry-specific R&D (GSSE: General Services Support Estimate)". For more information, see the OECD's PSE Manual, available online at: www.oecd.org/agriculture/PSE" (OECD, 2011).

Possible indicators	Existing target / Current progress	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
and diesel (€/1000 l)		difference between excises on unleaded petrol and diesel in all EU Member States					
5.1.c Difference between standard and households' energy consumption VAT rates (in %)	No existing target, but related to Environmental Tax Reforms occurring in several Member States	*Supporting target* By 2020, VAT rates for solid fuels, fuel oil, natural gas and electricity consumption should not be reduced compared to other products in all EU Member States	Feasible	- Removing these reduced tax rates would free-up budgetary resources that could be used, in turn, to more directly target the social objectives that might have been supported via the subsidies.	Data needs to be gathered and calculated. *iGG intends to use it.*	More simple indicator than OECD indicator	Yes - By Member State
5.2 Phasing out other environmentally harmful subsidies							
5.2.a Fiscal loss due to subsidies of company cars (% of GDP)	No existing target	*Supporting target* By 2020, there should be no tax exemptions for company cars in any EU Member States	NA	- A favourable tax treatment of company cars distorts and imposes a welfare cost to society. - It encourages car ownership and affects the choice of car model, as well as driving habits, and in this way aggravates the environmental problems caused by the transport sector.	Data needs to be gathered and calculated. *iGG intends to use it.*	The indicator would potentially be accepted	Yes - By Member State

3.1.6 Milestone 6: Environmental Tax Reform

***Milestone 6**: By 2020, a major shift from taxation of labour towards environmental taxation, including through regular adjustments in real rates, will lead to a substantial increase in the share of environmental taxes in public revenues, in line with the best practice of Member States.*

The objective of this milestone is to create a shift in EU Member States' taxation systems from labour taxes to environmental taxes, with the purpose of fostering employment, economic growth and reducing environmental impacts.

Two indicators/proxies for this milestone have been identified:

- **6.1 Environmental taxes as share of total taxes and social contributions**
- **6.2 Total value of environmental taxes paid**

In the national accounting framework, taxes are "*compulsory payments to the government, where the benefits provided to the taxpayer are not directly linked to the payment*" [38], conversely to fees or charges whose payment is directly linked to a specific service. Governments generally raise revenues through various types of taxes, principally labour-based taxes and taxes on the consumption of products (e.g. value-added taxes).

Eurostat[39] defines an environmental tax as a "*tax whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific negative impact on the environment*". Note that the motivation of the tax can be merely environmental (i.e. limiting the use of goods that have a specific negative impact on the environment) or fiscal (i.e. raising public revenues) or a combination of both.

The absolute values of the revenues raised from labour and environmental taxation, along with the relative share of environmental taxes versus labour-based ones can be used to track progress with this milestone. In this respect, Eurostat[40] regularly calculates the tax rates related to labour and environmental taxation in the EU.

Furthermore, looking at the breakdown of revenues from environmental taxes according to the source of pollution or the kind of targeted resources (energy, transport, water, waste management, etc.), this may provide relevant information on progress made to develop environmental taxation.

[38] Eurostat (2001) *Environmental taxes: a statistical guide*.
[39] Eurostat (2001) *Environmental taxes: a statistical guide*.
[40] Eurostat (2012) *Taxation Trends in the European Union: Data for the EU Member States, Iceland and Norway*, Eurostat Statistical Books.

Table 3-6: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 6: Environmental Tax Reform							
6.1 Environmental taxes as share of total taxes and social contributions	No existing target at EU level, but some countries have realised or are about to realise environmental tax reforms *In 2010, total environmental taxes in the EU were 6.2% of total taxes and social contributions. Bulgaria and Malta already have shares greater than 10%.*	By 2020, the share of environmental taxation in public revenues will have been increased to an EU average of more than 10%. *[indicator and target proposed in the Annex 6 to the Roadmap]*	Feasible	- Yes, as it can lead to green growth and reducing environmental impacts	Yes, tracked by Eurostat *Used by SDS, OECD and EEA SCP.*	Yes , the indicator is accepted	Yes - By Member State - By type of tax (energy tax, transport tax, taxes on resources/ pollution)
6.2 Total value of environmental taxes paid	No existing target *In 2010, the total revenue from environmental taxes in the EU-27 was about €292 billion, corresponding to 2.4% of EU GDP and 6.2 % of the total revenues derived from all taxes and social contributions*[41]*.*	No target proposed *[indicator proposed in the Annex 6 to the Roadmap]*	NA	- Share of total taxes is more relevant as a target, because MS must ensure constant revenue to avoid tax base erosion	Yes, tracked by Eurostat *iGG uses various individual indicators for environmental taxes: transport tax (excl. fuel), pollution and resource taxes, diesel/ petrol excise duty ratio, carbon tax, etc. Environmental taxes is proposed to be used in SBRE.*	Yes, the indicator is accepted	Yes - By Member State - By type of tax (energy tax, transport tax, taxes on resources/ pollution)

[41] Eurostat – Statistics explained: http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Environmental_taxes

3.1.7 Milestone 7: Ecosystem services

***Milestone 7**: By 2020 natural capital and ecosystem services will be properly valued and accounted for by public authorities and businesses.*

This milestone covers two key issues that could be tracked with the following indicators/proxies:

- **7.1 Mapping and assessing the state and value of ecosystems and their services**
  - 7.1.a Number and share of environmental assessments (e.g. Environmental Impact Assessments (EIA) and Strategic Environmental Assessment (SEA)) that recognise, quantify and evaluate (economically) ecosystem services
  - 7.1.b Amount of funding for projects that evaluate ecosystem services economically
  - 7.1.c Number and share of ecosystems and their services in the EU that have been mapped and assessed
  - 7.1.d Total value of ecosystem services in the EU
- **7.2 Maintaining and enhancing ecosystems and their services**
  - 7.2.a Land cover changes
  - 7.2.b Coverage of protected areas (Natura 2000 Network area)
  - 7.2.c Conservation status of habitats
  - 7.2.c Fragmentation of natural and semi-natural areas
  - 7.2.d Fragmentation of river systems
  - 7.2.e Expenditure on environmental protection
  - 7.2.f Funding for green infrastructure
  - 7.2.g Share of degraded ecosystems
  - 7.2.g Share of degraded ecosystems where restoration actions have been taking place

Maintaining and enhancing ecosystems and their services are also covered under the milestones related to freshwater (good status), marine resources (good ecological status), land and soils and food.

The stop of biodiversity loss (Milestone 8) is a clear and specific target itself but the restoration of degraded ecosystems and the EU contribution to averting global biodiversity loss will have to be further defined: level of restoration, definition of degraded ecosystems, means of restoration, etc.

The OECD[42] defines natural capital as follows in its glossary of statistical terms:

"Natural capital are natural assets in their role of providing natural resource inputs and environmental services for economic production. Natural capital is generally considered to comprise three principal categories: natural resource stocks, land and ecosystems. All are considered essential to the long-term sustainability of development for their provision of "functions" to the economy, as well as to mankind outside the economy and other living beings."

On the other hand, ecosystem services are *"the benefits people obtain from ecosystems"* (MEA, 2005)[43]. Therefore, ecosystem services are one type of natural capital asset, with natural resource stocks and land.

Two issues with natural capital are to be resolved by the milestone:

- *Proper valuation*: natural assets are usually difficult to estimate in monetary terms, because they generate many externalities and can suffer from irremediable damage (e.g. biodiversity loss). The systematic use of economic tools to value natural capital is necessary.
- *Proper accounting in the economy*: based on various estimates of natural capital assets, proper accounting in the economy would imply that people pay for using natural capital assets and for the positive externalities that they produce. Creating markets for external effects originating from natural assets would contribute to protect them through the revenues raised, but also by limiting overexploitation of natural resources.

Proper valuation is necessary to guarantee proper accounting in the economy. Therefore, institutional development at the EU level and MSs to assess the value of natural resources, land use and environmental services is necessary. The correct valuation of environmental services will imply the enforcement of new economic instruments such as taxes or quotas.

[42] OECD (2008) Strategic Environmental Assessment and Ecosystem Services, *Eighth Meeting of DAC Network on Environment and Development Co-operation (ENVIRONET)*.

[43] MEA (Millennium Ecosystem Assessment) (2005) *Ecosystems and Human Well-being: Synthesis*. Island Press, Washington, DC.

Table 3-7: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 7: Ecosystem services							
7.1 Mapping and assessing the state and value of ecosystems and their services							
7.1.a Number and share of environmental assessments (EIA and SEA) that recognise, quantify and evaluate (economically) ecosystem services	No existing specific target *Large projects Directive 2011/92/EU (known as the 'Environmental Impact Assessment' (EIA) Directive large projects must assess the environmental impacts, prior to their approval or authorisation. The same applies for public plans or programmes under the 'Strategic Environmental Assessment' (SEA) Directive)*	By 2020, all EIA and SEA of public and private projects should recognise, quantify and evaluate (economically) ecosystem services	Feasible	Yes, directly related to the milestone	Potentially, but reporting system must be established. Surveillance is required.	Yes, the indicator would probably be accepted by most	Potentially, yes - By Member State - By type of project (e.g. long-distance railway lines, motorways and express roads, airports, waste installations, waste water treatment plants)
7.1.b Amount of funding for projects that evaluate ecosystem services economically *[policy response indicator]*	No existing specific target *Over 500 UK scientists and economists were involved in the UK National Ecosystem Assessment, which was funded by £1.3m (€1.6m).*	By 2020, €50 million will be set aside for funding projects that evaluate ecosystem services economically	Feasible	Yes, directly related to policy implementation of the milestone	Potentially, if budgeted	Yes, the indicator would be probably be accepted by most. (It is another issue whether the results will be acceptable)	Potentially, yes - By Member State - By type of ecosystem service
7.1.c Number and share of ecosystems and	Target 2 of the EU Biodiversity target: By 2020, ecosystems and	By 2014, the state of ecosystems and their services in Member	Depends on the definition of main ecosystems and their services and assessment	Yes, directly related to the milestone	Potentially, but reporting system must be established.	Yes, the indicator would probably be accepted	Potentially, yes - By Member State - By type of

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
their services in the EU that have been mapped and assessed *[policy response indicator]*	their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems.	States territory have been mapped and assessed. By 2020, Member States will assess the economic value of ecosystem services, and promote the integration of these values into accounting and reporting systems at EU and national level (both are part of Action 5 of the EU Biodiversity Strategy) *[both targets proposed in the Annex 6 to the Roadmap]*	methodology				ecosystem service
7.1.d Total value of ecosystem services in the EU	No existing specific target	Assess the economic value of ecosystem services, and integrate these values into accounting and reporting systems at EU and national level by 2020.	NA	The milestone is more concerned with proper evaluation than the actual value of ecosystem services	It is possible to assess the value of ecosystem services, but the value will depend on the context and its use .	Probably not	Potentially, yes - By Member State - By type of ecosystem service
7.2 Maintaining and enhancing ecosystems and their services							
7.2.a Land cover changes	No existing specific target	Same indicator as **12.2.a Resulting land**		Yes, but only relates to some types of	Calculated based on Eurostat's European land	Yes, the indicator is accepted	Yes

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	In 2006, for the same geographical area as surveyed in 1990, regularly cultivated land had decreased by 0.8 %; mixed cultivated land by 0.4 %; and semi-natural agro – ecosystems by 2.6 %.[44]	**take** (conversion from (semi-natural areas to artificial land cover)		ecosystems, not all	use/cover area frame statistical survey (LUCAS) Changes in agro-ecosystem areas between the years 1990, 2000 and 2006 can be determined.		- By Member State - By type of land area (e.g. regularly cultivated, mixed cultivated, semi-natural areas)
7.2.b Coverage of protected areas (Natura 2000 Network area) *[policy response indicator]*	No existing target *In 2011, 17.5% of national area in the EU was part of the Natura 2000 Network, corresponding to 751,150 km²* [45]	By 2020, 20% of terrestrial area in the EU is a protected area under Natura 2000.	Feasible	- Yes, ensures the quality and coverage of ecosystems - Does not relate to all types of ecosystems	The Natura Barometer managed by the DG ENV with EEA monitors Natura 2000 area however be possible to do. *SEBI 4*	Yes, the indicator is accepted	Yes - By Member State - By SPAs under the Birds Directive or SCIs under the Habitats Directive
7.2.c Conservation status of habitats	The EU Biodiversity Strategy: Achieve a significant and measurable improvement in the status of all species and habitats covered by EU nature legislation by 2020 compared to current assessments: (i) 100 % more habitat	Same as Biodiversity Strategy	Ambitious	- Yes, ensures the quality of ecosystems - Does not relate to all types of ecosystems	Tracked by EEA ETC/Biodiversity *SEBI 4*	Yes, the indicator is accepted	Yes - By Member State - By conservation status

[44] EEA (2010) EU 2010 biodiversity baseline. European Environment Agency. Technical report No 12/2010

[45] Natura 2000 – European Commission Nature and Biodiversity Newsletter – Number 31 January 2012. http://ec.europa.eu/environment/nature/info/pubs/docs/nat2000newsl/nat31_en.pdf

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	assessments and 50 % more species assessments under the Habitats Directive show an improved conservation status; and (ii) 50 % more species assessments under the Birds Directive show a secure or improved status. *In 2008, 17 % of Annex I habitat types assessments in the EU were 'favourable'; 28% were 'unfavourable'; 37% were 'bad'; conservation status was 'unknown' for 18 %.*						
7.2.c Fragmentation of natural and semi-natural areas	No specific target, besides the EU Biodiversity Strategy	No target proposed	NA		Tracked by EEA ETC/Biodiversity *SEBI 13*		
7.2.d Fragmentation of river systems	No specific target, besides the EU Biodiversity Strategy	No target proposed	NA		Tracked by EEA ETC/Biodiversity *SEBI 14*		
7.2.e Expenditure on environmental protection *[policy response indicator]*	No specific target, besides the EU Biodiversity Strategy	Same indicator as: **17.1.a Environmental Protection Expenditures (EPE)**					

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
7.2.f Funding for green infrastructure *[policy response indicator]*	No existing target, besides the Biodiversity Strategy: By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems.	Establishing sufficient functional green infrastructure in all MS for maintaining and enhancing ecosystems and their services. *[target proposed in the Annex 6 to the Roadmap]*	Depends on how the indicator is defined	Green infrastructure is important for ecosystems and biodiversity	Potentially, if budgeted	Yes, the indicator would be probably be accepted by most.	Yes - By Member State - By type of green infrastructure (e.g. protected areas, restoration zones, multi-functional zones, green urban areas, natural connectivity features, etc.)
7.2.g Share of degraded ecosystems	No specific target, besides the EU Biodiversity Strategy: By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems.	By 2020, the share of degraded ecosystems that are considered degraded should be halved.	Ambitious	Directly relevant for the state of natural capital and ecosystems	There is no standardised method to assess the state of ecosystems at present. Nonetheless, several indicators can be used to inform of the state of ecosystems	Depends on what indicator is used	
7.2.g Share of degraded ecosystems where restoration actions have been taking place *[policy response indicator]*	Biodiversity Strategy: By 2020, ecosystems and their services are maintained and enhanced by establishing green infrastructure and restoring at least 15% of degraded ecosystems.	By 2020, at least 15% of the ecosystems that were considered degraded in 2010 are restored. *[target proposed in the Annex 6 to the Roadmap]*	Feasible	Directly relevant for the state of natural capital and ecosystems	There is no standardised method to assess the state of ecosystems at present. Nonetheless, several indicators can be used to inform of the state of ecosystems	Depends on what indicator is used	

3.1.8 Milestone 8: Biodiversity

***Milestone 8**: By 2020 the loss of biodiversity in the EU and the degradation of ecosystem services will be halted and, as far as feasible, biodiversity will be restored.*

A framework for measuring progress towards halting the loss of biodiversity in the EU already exists: Streamlining European Biodiversity Indicators (SEBI). The indicator set is aligned with the focal areas of the Convention of Biological Diversity (CBD) and is used to measure the six key targets of the EU Biodiversity Strategy:

- Target 1: Fully implement the Birds and Habitats Directives.
- Target 2: Maintain and restore ecosystems and their services.
- Target 3: Increase the contribution of agriculture and forestry to maintaining and enhancing biodiversity.
- Target 4: Ensure the sustainable use of fisheries resources.
- Target 5: Combat invasive alien species.
- Target 6: Help avert global biodiversity loss.

SEBI (which follows the CDB focal areas) can be used to structure the relevant indicators for this milestone:

- 8.1 Status and trends of the components of biological diversity
- 8.2 Threats to biodiversity
- 8.3 Ecosystem integrity and ecosystem goods and services
- 8.4 Sustainable use
- 8.5 Status of access and benefits sharing
- 8.6 Funding to biodiversity
- 8.7 Public awareness and participation

Biodiversity and ecosystem degradation can be monitored in many ways. The following is a proposal for the most relevant indicators and proxies:

- **8.1 Status and trends of the components of biological diversity**
  - 8.1.a Abundance and distribution of selected species (Common Bird Index)
  - 8.1.b Red List Index for European species
  - 8.1.c Share of fish and shellfish populations within safe biological limits (indicators: Fishing Mortality and Maximum Sustainable Yield)
  - 8.1.d Species of European interest
  - 8.1.e Sufficiency of sites designated under the EU Habitats Directive
  - 8.1.f Sites designated under the EU Habitats and Birds Directives

- **8.2 Threats to biodiversity**
  - 8.2.a Critical load exceedance for nitrogen
  - 8.2.b Invasive alien species in Europe
  - 8.2.c Impact of climatic change on bird populations
- **8.3 Ecosystem integrity and ecosystem goods and services**
  - 8.3.a Marine Trophic Index of European seas
  - 8.3.b Fragmentation of natural and semi-natural areas
  - 8.3.c Fragmentation of river systems
  - 8.3.d Nutrients in transitional, coastal and marine waters
  - 8.3.e Freshwater quality
- **8.4 Sustainable forestry**
  - 8.4.a Forest: growing stock, increment and fellings
  - 8.4.a Forest: deadwood (m3/ha)
- **8.5 Status of access and benefits sharing**
  - 8.4.a Patent applications based on genetic resources
- **8.6 Funding to biodiversity**
  - 8.6. a Financing biodiversity management

Many of the key issues of the biodiversity milestone are already addressed in other milestones (e.g. ecosystems, water, land, food (agriculture), etc.).

Other indicators to measure biodiversity, include among others:

- Species richness
- Shannon index
- Simpson index (or species diversity index)
- Piélou index
- Number of landraces and varieties used by farmers in-situ
- Number of plant species included in positive lists
- Proportion of plant varieties

The loss of biodiversity can be measured in terms of number of species lost per year and the degradation/restoration of ecosystems can be measured by using any of the existing indicators for it.

Table 3-8: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 8: Biodiversity							
8.1 Status and trends of the components of biological diversity							
8.1.a Abundance and distribution of selected species (Common Bird Index)	Biodiversity Strategy: Halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them insofar as is feasible, while stepping up the EU contribution to averting global biodiversity loss. *The farmland bird and common bird indices fell at average annual rates of 2.3 and 1.2 percentage points respectively between 1990 and 2000. The Common Bird Index has fluctuated but remained stable since then, while the Common Farmland Species has continued to fall.*	Same as the Biodiversity Strategy	Ambitious	- Same headline indicator chosen for SDS - Birds are considered good proxies for biodiversity and the integrity of ecosystems. - This indicator is an aggregated index integrating the population abundance and the diversity of a selection of common bird species associated with specific habitats. Rare species are excluded.	Yes The Common Bird Index is based on 148 species. The EU aggregate figure is an estimate based on 18 Member States collected by volunteer observers through the Pan-European Common Bird Monitoring Scheme and compiled by Statistics Netherlands. *SEBI 01* *Used by SDS. Alternatively or complementarily, butterflies or other species may be used, e.g. livestock genetic diversity*	Yes, the indicator is accepted	Two groups of bird species are presented in this indicator: farmland specialists and all common bird species.
8.1.b Red List Index for European species	Biodiversity Strategy target. Several Red List Species are	By 2020, all Red List species in the EU should be	Ambitious	- The Red List includes endangered	The IUCN Red List categories provide information on the risk of a species becoming extinct. Global Red Lists using the	Yes, the indicator is accepted	Results for the EU are currently (mid 2010) available for mammals, amphibians

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	threatened.	stable and have an increasing trend.		species	current criteria have been compiled since 1996.		and reptiles, butterflies, dragonflies and saproxylic beetles.
8.1.c Share of fish and shellfish populations within safe biological limits (indicators: Fishing Mortality and Maximum Sustainable Yield)	Biodiversity Strategy target. Marine Strategy target.	See target under **13.2.a Share of fish and shellfish populations within safe biological limits**			*Same as* **13.2.a (and 14.3.h) Share of fish and shellfish populations within safe biological limits (indicators: Fishing Mortality and Maximum Sustainable Yield)** Headline indicator in SDS *SEBI 21*		-
8.1.d Species of European interest	Biodiversity Strategy target.	Same as the Biodiversity Strategy			*SEBI 03*		
8.1.e Sufficiency of sites designated under the EU Habitats Directive *[policy response indicator]*	Biodiversity Strategy target. Marine Strategy target. *The sufficiency of EU designated areas was 89% in 2010 in the EU. Belgium, Denmark, Greece, Luxembourg, the Netherlands, Sweden and the UK have already achieved 100% sufficiency.*	By 2020, all EU Member States have achieved 100% sufficiency of designated areas under the EU Habitats Directive	Feasible	Indicates the degree of implementation of the Natura 2000 network	The indicator calculates the sum, by bio-geographical region and per country, of the proportion of habitats and species that are sufficiently represented in the list of sites proposed by Member States, in relation to the number of species and habitats on the Commission's reference lists of habitat types and species for each bio-geographic region. Headline indicator in SDS *SEBI 05*	Yes, the indicator is accepted	Yes - By Member State - By bio-geographic region
8.1.f Sites designated under the EU Habitats	Biodiversity Strategy target. Marine Strategy target.	See targets for indicators: **7.2.b Coverage of**		Yes, ensures the quality and	The Natura Barometer managed by the DG ENV with EEA monitors Natura 2000 area.	Yes, the indicator is accepted	Yes - By Member State - By Special Protected

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
and Birds Directives *[policy response indicator]*		**protected areas (Natura 2000 Network area) 13.1.b The number and area of Marine Protected Areas (MPAs)**		occurrence of habitats and the distribution and abundance of species	Same as: **7.2.b Coverage of protected areas (Natura 2000 Network area) 13.1.b The number and area of Marine Protected Areas (MPAs)** Directly related to descriptor 1 of the Marine Strategy for GES *Alternatively: Nationally designated protected areas SEBI 07, Habitats of European interest SEBI 05*		Areas (SPAs) under the Birds Directive or Sites of Community Importance (SCIs) under the Habitats Directive
8.2 Threats to biodiversity							
8.2.a Critical load exceedance for nitrogen	No existing target, but various EU Directives, e.g. the Nitrates Directive, the Water Framework Directive, etc.	See targets for **12.3.d Gross nutrient balance** and **14.3.c Gross nutrient balance**			*SEBI 09*		
8.2.b Invasive alien species in Europe	Biodiversity Strategy target. Marine Strategy target. *The cumulative number of alien species introduced has been constantly increasing since the 1900s. While the increase may be slowing down or levelling off for terrestrial and freshwater species,*	No target proposed	NA	The number of invasive species in Europe should be minimised.	*SEBI 10*		

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	this is certainly not the case for marine and estuarine species[46]						
8.2.c Impact of climatic change on bird populations	*The Climatic Impact Indicator, which illustrates the impact of climate change on bird populations, has increased strongly in the past twenty years, coinciding with a period of rapid climatic warming in Europe.*[47]	No target proposed	NA	Not the most appropriate indicator to cover the milestone.	*SEBI 11* The Climatic Impact Indicator (CII) measures the divergence between the population trends of bird species projected to expand their range and those predicted to shrink their range due to climatic change. The indicator is based on a combination of observed population trends monitored from 122 common bird species in 20 European countries over 26 years, and projected potential shrinkage or expansion of range size for each of these species at the last part of this century (2070–2099), derived from climatic envelope models. The ensemble in this case is the average climate envelope forecast based on six differing future scenarios.		
8.3 Ecosystem integrity and ecosystem goods and services							
***8.3.a* Marine Trophic Index of European seas**	Biodiversity Strategy target. Marine Strategy target.	Same as the Biodiversity Strategy/ Marine			Methodology for this indicator is currently under discussion		

[46] EEA (2009) Progress towards the European 2010 biodiversity target — indicator fact sheets. EEA Technical report No 5/2009.

[47] EEA (2009) Progress towards the European 2010 biodiversity target — indicator fact sheets. EEA Technical report No 5/2009.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
		Strategy target			*SEBI 12*		
8.3.b **Fragmentation of natural and semi-natural areas**	No existing target	No target proposed	NA		Same as: **7.2.c Fragmentation of natural and semi-natural areas** Tracked by EEA ETC/Biodiversity *SEBI 13*		
8.3.c **Fragmentation of river systems**	No existing target	No target proposed	NA		Same as: **7.2.d Fragmentation of river systems** Tracked by EEA ETC/Biodiversity *SEBI 14*		
8.3.d **Nutrients in transitional, coastal and marine waters**	No existing target, but various EU Directives, e.g. the Nitrates Directive, the Water Framework Directive, etc. *Average nitrate concentrations in European groundwaters have declined since 2004. The average nitrate concentration in European rivers decreased by approximately 11% between 1992 and 2010 (from 2.5 to 2.2 mg/l N). Average orthophosphate concentrations in European rivers have decreased markedly over the last two decades, being more than halved between 1992 and 2010 (54% decrease). Also average lake phosphorus concentration decreased over the period 1992-2010 (by 31%), the major part of the decrease*	See targets for **12.3.d Gross nutrient balance** and **14.3.c Gross nutrient balance**			*SEBI 15*		

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	occurring in the beginning of the period, but is still ongoing.[48]						
***8.3.e* Freshwater quality**	Water Framework Directive	Same as **9.2.1 Share of water bodies in good ecological and chemical status**			Same as: **9.2.1 Share of water bodies in good ecological and chemical status** *SEBI 16* *Alternatively, SDS headline indicator Biochemical oxygen demand in rivers, EU*		
8.4 Sustainable forestry							
***8.4.a* Forest: growing stock, increment and fellings**	*The ratio of felling to increment is relatively stable at around 60 % in Europe. The ratio of felling to increment is forecast to increase to between 70 % and 80 % by 2010.* [49]	No target proposed	NA	This particular indicator addresses just one aspect of the sustainability of the forest sector.	*SEBI 17*		
***8.4.a* Forest: deadwood** (m^3/ha)	*Deadwood on forest land varied between 4 and 23 m^3/ha in 2005. In most countries for which data are available, deadwood on forest land either increased or remained stable between2000 and 2005, except for the Czech Republic where deadwood decreased from about 21 to 12 m^3/ha. Austria and*	No target proposed	NA	This particular indicator addresses just one aspect of the sustainability of the forest sector.	Not yet available for all countries. *SEBI 18* *Used in SDS.*		

[48] http://www.eea.europa.eu/data-and-maps/indicators/nutrients-in-freshwater/nutrients-in-freshwater-assessment-published-3

[49] http://www.eea.europa.eu/data-and-maps/indicators/nutrients-in-freshwater/nutrients-in-freshwater-assessment-published-3

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	Lithuania were the Member States with the highest levels of deadwood in 2005						
8.5 Status of access and benefits sharing							
***8.4.a* Patent applications based on genetic resources**	No existing target	None proposed	NA		Same as: **4.2.a Number of patents related to resource efficiency and environmental issues / eco-innovation**		
8.6 Funding to biodiversity							
8.6. a Financing biodiversity management	No specific target, besides the EU Biodiversity Strategy	See target under **17.1.a Environmental Protection Expenditures (EPE)**			Related to Expenditure of environmental protection		

3.1.9 Milestone 9: Water

***Milestone 9**: By 2020, all WFD River Basin Management Plans (RBMPs) have long been implemented. Good status - quality, quantity and use - of waters was attained in all EU river basins in 2015. The impacts of droughts and floods are minimised, with adapted crops, increased water retention in soils and efficient irrigation. Alternative water supply options are only relied upon when all cheaper savings opportunities are taken. Water abstraction should stay below 20% of available renewable water resources.*

This milestone covers several issues, which can be tracked with the following indicators/proxies:

- **9.1 The status of fresh water resources (quality and quantity)**
  - 9.1.a Number (or share) of RBMPs adopted
- **9.2 Water quality and quantity**
  - 9.2.a Share of water bodies in good ecological and chemical status
- **9.3 Water availability**
  - 9.3.a Water exploitation index (WEI)
  - 9.3.b Over-abstraction of water (over-allocation and illegal abstraction)
- **9.4 Water efficiency**
  - 9.4.a Total annual water abstraction per capita (m^3/yr/capita)
  - 9.4.b Water productivity (euro/m^3)
  - 9.4.c Water domestic consumption per capita (m^3/yr/capita)
  - 9.4.d Water consumption per sector (m^3/yr)
  - 9.4.e Water Footprint (m3)
  - 9.4.f Number of water using products with Ecodesign requirements related to water efficiency
  - 9.4.g Number of organisations using water labelling, certification, standards and schemes
- **9.5 Water pricing and metering**
  - 9.5.a Number (or share) of RBMPs with measures to improve water metering
  - 9.5.b Number (or share) of RBMPs with water pricing system to foster more efficient use of water

The River Basin District (RBD) is the main unit for management of river basins. In most cases the RBDs have been established respecting the hydrological boundaries of the river basins, thereby

keeping the catchment intact. However, in some Member States the administrative boundaries, rather than the hydrological boundaries of the catchment, have dictated the designation of the RBD[50].

River Basin Management Plans (RBMPs) are comprehensive documents that cover many aspects of water management. The geographical scope of the RBMPs does not correspond exactly to the number of River Basin Districts (RBDs), and a number of different models can be identified (e.g. production of one or several RBMP for the national part of the international RBD and for different sub-basins depending on Member States).

Water quality and quantity are intimately related within the concept of "good status". Good status consists of requirements on surface and groundwater in terms of quality and quantity. It is defined in the *Annexes to the Water Framework Directive (WFD)*. A general requirement for ecological protection ("good ecological status"), and a general minimum chemical standard ("good chemical status") was introduced to cover all surface waters.

Behind the propositions to develop adapted crops, increase water retention in soils and improve irrigation efficiency lies the concept of "water efficiency" (or how to reduce the use of water to produce the same output). The Commission has proposed to develop a common EU methodology for setting water efficiency targets[51]. The focus would be on water efficiency of river basins and particularly irrigation efficiency and leakage from water distribution networks.

Water abstraction is the volume of water that is abstracted (i.e. extracted or withdrawn) from natural hydrological sources such as groundwater and surface water. Water abstraction must be distinguished from water consumption: abstracted water does not return to the water bodies within a defined system (e.g. drinking, gardening).

Water availability is a function of the total flow of water through a basin, its quality, and the structures, laws, regulations and economic factors that control its use . It can be defined through comparison with a "water-stress" threshold. A water body is considered to be under stress when the abstraction of freshwater represents 20% of the long-term average freshwater resources. Severe scarcity occurs where this percentage exceeds 40% . The emerging concept of ecological flows, highlighted in the recent Blueprint, is not included in the WFD, and would gain in being further considered in the Roadmap. This concept reflects the amount of water required for the aquatic ecosystem to continue to thrive and provide the services we rely upon. So far, there is no common definition of ecological flows across the EU, nor a common understanding of how it should be calculated.

[50] Commission Staff working document. European overview. Accompanying the document: Report from the Commission to the European Parliament and the Council on the Implementation of the Water Framework Directive (2000/60/EC) River Basin Management Plans. {COM(2012) 670 final}. http://ec.europa.eu/environment/water/water-framework/pdf/CWD-2012-379_EN-Vol1.pdf

[51] European Commission (2012) A Blueprint to Safeguard Europe's Water Resources. COM(2012) 673

Table 3-9: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 9: Water							
9.1 Implementation of river basin management plans (RBMP)							
9.1.a Number (or share) of RBMPs adopted	The Water Framework Directive requires all Member States set up RBMPs for all river basins. 25 Member States have adopted and reported 121 RBMPs for their national parts of the River Basin Districts (RBDs) (out of a total of 174)	By 2012, all RBMPs are implemented. *[taken directly from the Roadmap]*	Probably be delayed Monitoring is insufficient and inadequate in many Member States	- Yes, directly related to the milestone contributes to clean water, reducing impacts of droughts and floods, biodiversity	Member States are required to adopt and report their RBMP to the European Commission through the Water Information System for Europe (WISE)	Yes, the indicator is accepted by most	Yes - By river basin - By Member State
9.2 Water quality and quantity							
9.2.a Share of water bodies in good ecological and chemical status	The Water Framework Directive requires all Member States to achieve good status for all water bodies by 2015. Good ecological status is currently achieved in 43% of the reported freshwater bodies.	By 2015, good status of waters is attained in all EU river basins. By 2020, good quality and quantities of water will be ensured in all EU river Basins. *[taken directly from the Roadmap and also listed in the Annex 6 to the Roadmap]]*	Ambitious Good status of all water bodies is likely to be achieved for only half (53%) of the EU waters by 2015.	- Yes, directly related to the milestone - contributes to securing the availability of good quality water and biodiversity	Yes, Member States are required to report - Good ecological and chemical status for surface waters - Good quantitative and chemical status for groundwater - At present there is not sufficient information to quantify the share of water bodies with	Yes, the indicator is accepted by most	Yes - By river basin - tracked for water bodies with good, moderate and poor status for surface water and ground water, disaggregated by water bodies

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
					good chemical status[52]. - About 40% of water bodies have an unknown status.		
9.3 Water availability							
9.3.a Water exploitation index (WEI)	The EEA proposed to use WEI to determine if a country is water stressed (WEI > 20%) Belgium, Spain, Italy and Malta have a WEI between 40% and 20%.	By 2020, water abstraction should stay below 20% of available renewable water resources. *[taken directly from the Roadmap]*	Ambitious	The indicator is available, but not the best to inform of water availability gives an indication of how the total water demand puts pressure on the water resource can be used as a proxy for water consumption the data for water abstraction is more complete than water consumption.	The water exploitation index (WEI) in a country is the mean annual total abstraction of freshwater divided by the long-term average freshwater resources. Available through EEA criticised for its inability to distinguish the water returned to the environment, e.g. water used for cooling *Used by iGG, EEA SCP and SDS. Proposed to be used in SBRE. OECD uses the indicator for available freshwater availability* *Alternative indicators in development:* - WEI+ - ecological flows	Some Member States (e.g. Belgium) disapprove of this indicator as it includes water used for cooling purposes.	Yes - By river basin - By Member State

[52] EEA (2012) European waters — assessment of status and pressures. European Environment Agency.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
9.3.b Over-abstraction of water (over-allocation and illegal abstraction) *[policy response indicator]*	Although all Member States have reduced their abstraction of water over the past decade, over-abstraction is currently considered the second most common pressure on ecological status of water bodies in the EU.	By 2020, there should be no over-abstraction of water (over-allocation and illegal abstraction)	NA (No indicator/ data available)	The allocation of water use should be based on ecological flow, which is currently not well defined.	No available data on: - Number of abstraction permits allocated and amount of water abstraction authorized (m^3) - Share of illegal abstraction compared to abstractions under permits (%).	- Yes, the indicator would probably be accepted by most	Yes - By river basin - By Member State
9.4 Water efficiency							
9.4.a Total annual water abstraction per capita (m^3/yr/capita)	No existing targets. *Annual water abstraction per capita varies considerably across the EU. In 2009, Estonia withdraws over 1000 m^3/yr/capita, Bulgaria over 800 m^3/yr/capita. Denmark and Luxembourg withdraw less than 100 m^3/yr/capita. Although, data is not available for all Member States, the EU average is thought to be around 450 m^3/yr/capita.*	By 2020, total annual abstraction in all Member States should be less than 500 m^3 (or roughly 1400 l/cap/day)	Feasible	When annual per capita abstraction exceeds 500 m^3 water productivity is often low[53]	Available from EEA, but several data gaps. iGG uses extraction from groundwater and surface water, respectively.	- Yes, the indicator is accepted	Yes - By river basin - By Member State
9.4.b Water productivity (euro/m^3)	No existing targets. *Water productivity varies across the EU. In 2009, Luxembourg had the*	No target proposed	NA	Not suitable for setting a target as it depends on the economic activity	Available from EEA by country (not all Member States) and river basin	- Yes, the indicator is accepted	Yes - By river basin - By Member State

[53] EEA (2012) Towards efficient use of water resources in Europe.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	highest at about 800 €/m³. Denmark, Ireland, Estonia and Sweden between 100 and 400€/m³. Most of the other Member States have values below 100 €/m³.						
9.4.c Water domestic consumption per capita (m³/yr/capita)	No existing targets	No target proposed	NA (Data not robust)	Relevant for tracking consumer behaviour	Data is incomplete and unreliable	- Yes, the indicator is accepted	Yes - By Member State
9.4.d Water consumption per sector (m³/yr)	No existing targets	No target proposed See target and indicator **14.3.i Water supplied to agriculture for irrigation purposes**	NA (Data not robust)	Water used for cooling processes in industry might not be so relevant to be included	Data is incomplete and unreliable	- Yes, the indicator is accepted	Yes - By Member State - By sector
9.4.e Water Footprint (m³) *Volume of blue and green water needed for the production of goods and services consumed by the inhabitants of a country.*	No existing targets	No target proposed	NA	Relevant for tracking the efficiency of products and the impact of EU's water consumption abroad	Data are available (average for 1995-2005) for one year by Water Footprint Network, relies on a crude methodology in industrial sectors *Water Footprint or Embodied Water is proposed to be used in SBRE*	- Methodology and data still need to be developed	Yes - By Member State - By product groups - By type of water (green, blue and grey)
9.4.f Number of water using products with Ecodesign	No existing targets Water-using equipment was originally part of the	By 2020, Ecodesign requirements related to water use should be considered for five	Feasible	- Relevant for tracking products' efficient use of water - Related to MEPS for	The implementation of the legislation for MEPs could be easily tracked.	- Yes, the indicator would probably be	Not applicable, only EU level

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
requirements related to water efficiency *[policy response indicator]*	Working Plan 2009 – 2011, but no preparatory study was launched. Water-related products is on the indicative list of priority product groups for the Working Plan 2012-2014.[54]	water-using products.		products	The compliance with MEPs and voluntary agreements requires market surveillance	accepted	
9.5.g Number of organisations using water labelling, certification, standards and schemes	No existing targets There are several different types of water labelling, certification, standards and schemes that could be used to track progress on organisations' efficient use of water, e.g. the European Water Stewardship, etc.	None proposed	NA	- Relevant for tracking organisations' efficient use of water, but would not be representative of the entire economy	Not sufficiently developed	- Indicator not developed	NA
9.6 Water pricing and metering							
9.6.a Number (or share) of RBMPs with measures to improve water metering *[policy response indicator]*	No existing targets Only 40 % of RBMP include measures to improve water metering	None proposed	NA	- Relevant for determining the actual consumption of water and water efficiency	No existing indicator, not sufficiently defined	- Indicator not developed	NA
9.6.b Number (or share) of RBMPs	No existing targets Only 49% of RBMPs plan	None proposed	NA	- Relevant for right pricing of resources, environmental	No existing indicator, not sufficiently defined	- Indicator not developed	NA

[54] European Commission (2012) Establishment of the Working Plan 2012-2014 under the Ecodesign Directive. Commission Staff Working Document.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
with water pricing system to foster more efficient use of water *[policy response indicator]*	to change the water pricing system to foster a more efficient use of water			taxation and determining cheapest alternative water supply options			

3.1.10 Milestone 10: Minerals and metals

No milestone proposed

Although the Roadmap to a Resource Efficient Europe did not propose a specific milestone for minerals and metals, the analysis document supporting the roadmap proposed an indicator to track resource productivity of minerals and metals, similar to the lead indicator for the Roadmap.

There are three key issues regarding resource efficiency of minerals and metals:

- **10.1 Mineral and metal consumption**
  - 10.1.a Domestic Material Consumption (DMC) of minerals and metals (per capita)
  - 10.1.b Raw Material Consumption (RMC) of minerals and metals (per capita)
- **10.2 The resource productivity of minerals and metals**
  - 10.2.a Resource productivity of minerals and metals (measured as GDP/DMC)
  - 10.2.b Resource productivity of minerals and metals (measured as GDP/RMC)
- **10.3 The security of supply of critical minerals and metals**
  - 10.3.a Recycling rates of Critical Raw Materials
  - 10.3.b Available (global) stocks or reserves of selected minerals: metallic minerals, industrial minerals, fossil fuels, critical raw materials and extraction rates

Table 3-10: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 10: Minerals and metals							
10.1 Mineral and metal consumption							
10.1.a Domestic Material Consumption (DMC) of minerals and metals (per capita)	No existing target. *The average DMC per person in the EU is about 16 tonnes. This consists of 5.1 tonnes of sand and gravel (32%); 3.8 tonnes of fossil fuel (24%); 3.5 tonnes of biomass (21%); 2.9 tonnes of other non-metallic minerals (18%); and 0.6 tonnes of metal ores (4%).*	No target proposed for DMC of minerals and metals.	NA	- DMC does not include the upstream (or indirect) material flows of internationally traded products.	Eurostat has data from their economy-wide Material Flow Accounts (EW-MFA) for all Member States for the years 2000 to 2009 *SDS uses DMC. DMC of metals is proposed by OECD EEA SCP uses DMC for total and selected minerals and fossil fuels*	Yes, the indicator is accepted but RMC or TMR is preferred	Yes - By Member State - By main material group DMC is not disaggregated by sector
10.1.b Raw Material Consumption (RMC) of minerals and metals (per capita)	No existing target. UNEP's International Resource Panel proposed an average global metabolic rate of 6 tonnes/ capita in their "Tough	No quantified target proposed for RMC of minerals and metals. *The majority of construction materials are needed to maintain*	NA	- RMC is a good indicator to monitor an economy's material consumption.	Eurostat provides estimates for RMC measured in Raw Material Equivalents (RME) of the EU-27 economy for the years 2000 to	Yes, the indicator is accepted	Yes - By main material group At present only EU-27 level, but can be developed at Member

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	contraction and convergence" scenario for 2050.[55] *The average RMC per person in the EU is about 17 tonnes. This consists of 3.9 tonnes of fossil fuel (23%); 3.4 tonnes of biomass (20%); 7.9 tonnes of non-metallic minerals including sand and gravel (47%); and 1.6 tonnes of metal ores (10%).*	*the existing building stock and infrastructure. Metals are required for the construction and production of energy efficient products and infrastructure. It would not be appropriate to limit the consumption of minerals and metals, but instead increase the use through reuse and recycling.*			2009.		State level RMC is not disaggregated by sector
10.2 The resource productivity of minerals and metals							
10.2.a Resource productivity of minerals and metals (measured as GDP/DMC)	No existing target, besides a general objective of decoupling	By 2020, the consumption of minerals and metals (measured by DMC/RMC) in the EU and all its Member States should be absolutely decoupled from economic growth (measured by GDP). *[GDP/DMC indicator proposed in the Annex 6 to the Roadmap] Mineral and metal*	Feasible	- DMC does not include the upstream (or indirect) material flows of internationally traded products. - GDP is a national (economic) indicator that does not cover the supply chain and not all is linked with the use of metals and minerals - The indicator could be used as a proxy for decoupling	Yes, the data is readily available and the indicator could be easily calculated	The indicator is not used widely, but could be accepted. RMC is preferred	Yes - By Member State
10.2.b Resource productivity of minerals and metals (measured as GDP/RMC)					Yes, the data is readily available and the indicator could be easily calculated	The indicator is not used widely, but could be accepted	At present only EU-27 level, but can be developed at Member State level

[55] UNEP (2011) Decoupling natural resource use and environmental impacts from economic growth, A Report of the Working Group on Decoupling to the International Resource Panel.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
		consumption should decrease while GDP increases.					
10.3 The security of supply of critical minerals and metals							
10.3.a Recycling rates of Critical Raw Materials	No existing target, but 14 raw materials have defined as critical in terms of supply risk by the European Commission *Most critical raw materials have very low recycling rates. Besides platinum group metals and tungsten all are under 20%.*	By 2020, the recycling rates of all critical raw materials should be 20%	Ambitious	- Recycling and the supply of secondary material directly reduces supply risk	Difficult to measure	Yes, the indicator would be accepted	Yes - By critical raw material
10.3.b Available (global) stocks or reserves of selected minerals: metallic minerals, industrial minerals, fossil fuels, critical raw materials and extraction rates	No existing target	Indicator is not appropriate to set a target	NA	- This indicator influences supply risk, but many other factors also come to play	Tracked by various geological surveys, e.g. British Geological Survey (BGS) and BGR (Federal Institute for Geosciences and natural resources), Germany , etc. *Proposed by OECD*	Yes, the indicator would be accepted	Yes - By mineral or metal

3.1.11 Milestone 11: Air

***Milestone 11**: By 2020, the EU's interim air quality standards will have been met, including in urban hot spots, and those standards will have been updated and additional measures defined to further close the gap to the ultimate goal of achieving levels of air quality that do not cause significant impacts on health and the environment.*

The two key issues of this milestone are:

- **11.1 Air emissions**
  - 11.1.a Emissions of sulphur oxides (SO_x)
  - 11.1.b Emissions of nitrogen oxides (NO_x)
  - 11.1.c Emissions of non-methane volatile organic compounds (NMVOC)
  - 11.1.d Emissions of ammonia (NH_3)
  - 11.1.d Emissions of particulate matter ($PM_{2.5}$)
  - 11.1.e Tropospheric (ground level) ozone emissions
- **11.2 Air quality**
  - 11.2.a Concentrations of Particulate Matter (PM_{10}) in ambient air
  - 11.2.b Urban population exposure to air pollution by ozone
  - 11.2.c Urban population in areas with PM_{10} concentrations exceeding daily limit values

Air pollution is detrimental to human health and the environment, causing significant economic impacts, and can travel over long distances (i.e. over national boundaries). With regard to human health, exposure to air pollution such as particulate matter[56] and ozone[57] is linked to acute and chronic respiratory and cardiovascular effects, impaired lung development in children and reduced birth weight[58]. Evidence suggests that current concentrations of fine particles cause 500,000 premature deaths each year in the EU and its immediate neighbourhood[59]. Ecosystems, biodiversity and agriculture also suffer damage and depletion from air pollution (either directly or as it makes its way into soil and water), through acidification, eutrophication and ozone damage to vegetation. Although major sources of air pollution are the energy sector and road transport, a

[56] Fine dust emitted by certain human activities (primary particles) or which are formed in the atmosphere (secondary particles) from gases such as sulphur dioxide (SO_2), nitrogen oxides (NO_x) and ammonia (NH_3). Particles differ in size: large particles (PM_{10}) are between 2.5 and 10 m in diameter, while fine particles (PM2.5) are less than 2.5 m in diameter. Particulate matter is one of the pollutants with the largest impact on human health.

[57] Ozone that is formed through chemical reactions between volatile organic compounds (VOCs) and NO_x in the presence of sunlight and which accumulates at low altitudes. VOCs are emitted into the atmosphere from natural sources or as a result of human activities (e.g. use of solvents, paints and varnishes, vehicle exhaust gases, etc.).

[58] EEA (2010) The European environment – State and outlook 2010: Synthesis, pp. 96-100

[59] EEA (2010) The European environment – State and outlook 2010

broad range of sectors are responsible for the emissions of atmospheric pollutants (except for NH_3 whose dominant source is agricultural activities)[60].

Air emissions and air quality data are collected on an annual basis. The urban population exposure to air pollution by particulate matter is calculated as the population-weighted annual mean concentration of particulate matter. The Eurostat database contains datasets on PM10 emissions from transport, and the European Environmental Agency records annual concentration average values of several air pollutants, among which PM10, since 2005. However these datasets are presented in the form of annual or seasonal averages and therefore do not serve for this objective. A systematic measuring of particulate matter concentration would be necessary for the evaluation of this target.

In order to limit air pollution, policies have been put in place to limit individual sources and national emissions (national maximum emissions limits or 'ceilings'). The Gothenburg Protocol, under the 1979 Convention on Long-range Transboundary Air Pollution, and the National Emission Ceilings Directive[61] (NECD) set 2010 emissions ceilings for four pollutants (SO_2, NO_x, VOCs and NH_3) for each Member State[62].

The Thematic Strategy on Air Pollution[63] proposed objectives for 2020 (compared with the situation in 2000)[64]. The Strategy stated that the following emissions decreases, compared with the year 2000, would need to be achieved:

- SO_2 by 82%
- NO_x emissions by 60%
- VOCs by 51%
- NH_3 by 27%
- primary ($PM_{2.5}$) by 59%, supplemented by setting a limit value of 25 g/m³ and an interim reduction target of 20% to be attained between 2010 and 2020.

The establishment of maximum pollutant concentrations in the air affects a number of different agents: local or regional authorities are most likely the responsible for measuring the pollutant concentrations as well as achieving the milestone. The main source of particulate matter emissions is transport.

[60] EC (2011) Analysis associated with the Roadmap to a Resource Efficient Europe: Part II
[61] Directive 2001/81/EC
[62] ec.europa.eu/environment/air/pollutants/ceilings.htm
[63] COM(2005) 446
[64] europa.eu/legislation_summaries/environment/air_pollution/l28159_en.htm

Table 3-11: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 11: Air							
11.1 Air emissions							
11.1.a Emissions of sulphur oxides (SO_x)	Air Quality targets exist *Total EU-27 emission of SO_x have fallen dramatically over the period 1997 to 2010.* *Total EU-27 emission of NO_x have fallen by approximately 50% over the period 1997 to 2010.* *Total EU-27 emissions of NMVOC fell from 1990 to 1992, before stabilising at approximately 50% of the 1990 level, increasing significantly in 2005 and remaining relatively stable to 2010.* *Total EU-27 emissions of NH_3 have fallen steadily over the period 1990 to*	By 2020, SO2 emissions should decrease by 80% compared with the year 2000. *[from the Thematic Strategy on Air Pollution]*	Feasible	Yes, one of the main emissions affecting air quality	Data available from Eurostat: [tsdpc260]	Yes, accepted by most	Yes - By Member State - By sector
11.1.b Emissions of nitrogen oxides (NO_x)		By 2020, NOx emissions should decrease by 60% compared with the year 2000. *[from the Thematic Strategy on Air Pollution]*	Feasible According to a study total NO_x emissions in Europe in 2030 will be reduced to around half the level of emissions measured in 2005 under the reference scenario.[65] In a sustainable scenario, which also includes climate policies, NO_x emissions will fall even further, by about a third.	Yes, one of the main emissions affecting air quality	Data available from Eurostat: [tsdpc270]	Yes, accepted by most	Yes - By Member State - By sector

[65] Colette, A., Granier, C., Hodnebrog, O et al. (2012) Future air quality in Europe: a multi-model assessment of projected exposure to ozone. Atmospheric Chemistry and Physics. 12: 10613-10630. Doi:10.5194/acpd-12-14771-2012.See: www.atmos-chem-phys-discuss.net/12/14771/2012/acpd-12-14771-2012.html

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
11.1.c Emissions of non-methane volatile organic compounds (NMVOC)	*2010.*	By 2020, VOCs emissions should decrease by 50% compared with the year 2000. *[from the Thematic Strategy on Air Pollution]*	Feasible	Yes, one of the main emissions affecting air quality	Data available from Eurostat: [tsdpc280]	Yes, accepted by most	Yes - By Member State - By sector
11.1.d Emissions of ammonia (NH_3)		By 2020, NH_3 emissions should decrease by 50% compared with the year 2000. *[from the Thematic Strategy on Air Pollution]*	Feasible	Yes, one of the main emissions affecting air quality	Data available from Eurostat: [tsdpc290]	Yes, accepted by most	Yes - By Member State - By sector
11.1.d Emissions of particulate matter ($PM_{2.5}$)	*The trend of particulate matter air pollution in EU-27, which has fallen over the period 1997 to 2010, although the downward trend is not consistent throughout the period.*	By 2020, primary (PM2.5) emissions should decrease by 59%, supplemented by setting a limit value of 25 g/m³ and an interim reduction target of 20% to be attained between 2010 and 2020.compared with the year 2000.	Feasible	Yes, one of the main emissions affecting air quality	European Environment Agency, Eurostat (tsdtr440) *Used by SDS for transport*	Yes, accepted by most	Yes - By Member State - By sector

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
11.1.e Tropospheric (ground level) ozone emissions	No targets on emissions, only on concentration thresholds. The third Daughter Directive (2002/3/EC) on ambient air quality assessment and management relating to ozone states a long-term objective of 120 mg of ozone per m^3 as a maximum daily 8-hour mean within a calendar year[66].	No target proposed See target proposed under **11.2.b Urban population exposure to air pollution by ozone**	NA	Yes, one of the main emissions affecting air quality	European Environment Agency, Eurostat (tsdtr430) *Used by SDS for transport*	Yes, accepted by most	Yes - By Member State - By sector
11.2 Air quality							
11.2.a Concentrations of Particulate Matter (PM_{10}) in ambient air	Many Member States failed emissions obligations for 2010 under NECD[67] (12 of 27 Member States exceeded one or more of the ceilings) and several air quality standards are widely exceeded in the EU's most densely populated areas.	By 2020, concentrations of Particulate Matter (PM10) in ambient air should not exceeding 50 µg/m^3 per 24 hours more than 35 times a year. *[indicator and target proposed in the Annex 6 to the Roadmap]*	Feasible	Yes, informs directly of air quality	Data available from AirBase (the European Air quality dataBase), which provides statistical data on air pollutant parameters. Managed by the European Topic Centre for Air Pollution and Climate Change Mitigation under EEA. *Proposed to be used in SBRE.*	Yes, accepted by most	Yes - By Member State

[66] Eurostat: Urban population exposure to air pollution by ozone (tsdph380)

[67] www.clickgreen.org.uk/analysis/general-analysis/123215-half-of-european-nations-break-air-pollution-laws,-report-shows.html

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
11.2.b Urban population exposure to air pollution by ozone	The third Daughter Directive (2002/3/EC) on ambient air quality assessment and management relating to ozone states a long-term objective of 120 mg of ozone per cubic meter as a maximum daily 8-hour mean within a calendar year[68].	By 2020, urban population exposure to ozone should not exceed 120 micrograms of ozone per cubic meter as a maximum daily 8-hour mean within a calendar year. *[from the Air Quality Directive]*	Ambitious According to a study, projections of ozone exposure levels indicate that the number of European citizens experiencing exposure above the 120 mg threshold will decrease substantially by 2030, by 55% in a reference scenario and by 85% in a sustainable scenario.[69]	Yes, informs directly of air quality	Available from Eurostat: [tsdph380]; population-weighted concentration of ozone to which the urban population is potentially expose *Used by SDS*	Yes, accepted by most	Yes - By Member State
11.2.c Percentage of urban population in areas with PM_{10} concentrations exceeding daily limit values	The limit value is 50 µg PM_{10}/m^3 (24 hour average, i.e. daily), not to be exceeded more than 35 times a calendar year and to be met by 2005.[70]	Keep 2010 target for 2020. *[indicator proposed in the Annex 6 to the Roadmap]*	Feasible	Yes, informs directly of air quality	Available from Eurostat: Urban population exposure to air pollution by particulate matter [tsdph370]; population-weighted concentration of PM10 to which the urban population is potentially exposed.	Yes, accepted by most	Yes - By Member State

[68] Eurostat: Urban population exposure to air pollution by ozone (tsdph380)

[69] Colette, A., Granier, C., Hodnebrog, O et al. (2012) Future air quality in Europe: a multi-model assessment of projected exposure to ozone. Atmospheric Chemistry and Physics. 12: 10613-10630. Doi:10.5194/acpd-12-14771-2012.See: www.atmos-chem-phys-discuss.net/12/14771/2012/acpd-12-14771-2012.html

[70] For $PM_{2.5}$ concentrations: Average PM2.5 concentrations in the urban background were about 16 mg/m^3 in 2008. This is below the EU target value of 20 mg/m^3 for 2010 for the average urban background concentration. Concentrations in busy streets were about 18 mg/m^3 in 2008. This is below the EU target value of 25 mg/m^3 for 2010 that applies anywhere.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	For example, up to 62% of Europe's urban population remains potentially exposed to ambient air concentrations of fine particle matter (PM 10) in excess of the EU limit value set for the protection of human health.[71]				*Used by SDS. Proposed to be used in SBRE.*		

[71] EEA (2010) The European environment – State and outlook 2010: Synthesis pp. 96-100

3.1.12 Milestone 12: Land and soils

***Milestone 12**: By 2020, EU policies take into account their direct and indirect impact on land use in the EU and globally, and the rate of land take is on track with an aim to achieve no net land take by 2050; soil erosion is reduced and the soil organic matter increased, with remedial work on contaminated sites well underway.*

This milestone covers several issues, where the following indicators/proxies are relevant:

- **12.1 Impact of EU policies on land use**
  - 12.1.a Area under organic farming
  - 12.1.b Domestic land demand (ha)
  - 12.1.c Artificial land per capita
  - 12.1.d Actual Land Demand (Land Footprint) (ha)
  - 12.1.e The resulting intensity of land use (%): Human Appropriation of Net Primary Production
  - 12.1.f Fragmentation of natural and semi-natural areas
- **12.2 The rate of land take**
  - 12.2.a The resulting land take (conversion from (semi-natural) areas to artificial land cover)
  - 12.2.b Average annual area actually sealed (ha/yr)
- **12.3 The quantity and quality of soils**
  - 12.3.a Area of land subject to erosion rate > 10 tonnes/ha/yr (ha)
  - 12.3.b Agricultural land affected by water erosion
  - 12.3.c Surface of soils with organic matter level < 3.5% (ha)
  - 12.3.d Gross nutrient balance
- **12.4 Remediation activities**
  - 12.4.a Number of contaminated sites
  - 12.4.b Share of contaminated sites where remediation actions have been taken

Land use corresponds to the socio-economic description (functional dimension) of areas: areas used for residential, industrial or commercial purposes, for farming or forestry, for recreational or conservation purposes, etc[72]. 'Land use' must be distinguished from 'land cover', which corresponds to a (bio)physical description of the earth's surface (including areas

[72] EEA: http://glossary.eea.europa.eu

of vegetation (trees, bushes, fields, lawns), bare soil, hard surfaces (rocks, buildings) and wet areas and bodies of water (watercourses, wetlands)[73]. For example, grasslands (land cover) can be used or not for agricultural purposes (land use). Unlike land cover, land use is difficult to observe directly. This explains why land cover is often used as a proxy for land use. Yet, the distinction between these two concepts is important since it impacts on the development of classification systems, data collection and information systems in general.

Soil is generally defined as the top layer of the earth's crust, formed by mineral particles, organic matter, water, air and living organisms. It is the interface between earth, air and water and hosts most of the biosphere (COM/2006/0231 final). Over 320 major soil types have been identified in Europe.

EU policies, e.g. in the field of agriculture, energy, transport, biodiversity, may influence more or less directly the way land is used, both within the EU and abroad. The subsequent needs for resources abstraction, commodities production, development of infrastructures, etc., can trigger modifications of usage (e.g. agricultural vs. urban area; land abandonment) or modifications of practices (e.g. intensification), implying possible conflicts between competing needs and significant effects on ecosystems and habitats (e.g. fragmentation). The distinction between direct and indirect impacts is emerging and increasingly present in the literature.

Land take refers to the increase of artificial land on (semi)natural areas, i.e. the area of land that is 'taken' by infrastructure itself and other facilities that necessarily go along with the infrastructure, such as filling stations on roads and railway stations[74]. Land take is directly related to potential conflicts within land demands and uses. Soil sealing is the most intense form of land take, which consists in the destruction or covering of soils by buildings, constructions and layers of completely or partly impermeable material (asphalt, concrete, etc.)[75].

Soil erosion consists in the removal of soil material by water or wind. It is a natural process, occurring over geological time[76]. Most concerns about erosion are related to accelerated erosion, where the natural rate has been significantly increased mostly by human activity (inappropriate land management, overgrazing, construction), which provokes soil degradation. Runoff is the most important direct driver of severe soil erosion by water.

Soil organic matter level: The amount of organic material stored in the soil can be expressed in two ways, as organic matter or organic carbon. Soil organic matter (SOM) is a key indicator of soil quality and productivity.

Contamination may result from deliberate or accidental release or disposal of substances (such as trace elements, organic compounds, gases such as carbon dioxide or methane, or even plant nutrients like nitrogen or phosphorous) in, on or under the land. In practice, the term "contaminated sites" is mostly used to reflect whether contamination poses a significant level of

[73] EEA: http://glossary.eea.europa.eu

[74] European Commission. Phare Multi Country Transport.Programme Co-ordination Unit. 1999. Transport and the environment: A multi-country approach.

[75] http://ec.europa.eu/dgs/jrc/downloads/jrc_reference_report_2012_02_soil.pdf

[76] http://eusoils.jrc.ec.europa.eu/library/themes/erosion/

risk to humans, water, buildings, or ecosystems. In the absence of a legal and harmonised definition in the EU, and given the lack of scientific information about many substances and the site specific nature of risks, MS (and local authorities) are given considerable discretion to decide, case by case, whether such risks exist. Significant differences of interpretations can occur where it is not scientifically possible to estimate risks accurately. These interpretations condition the levels of remediation to protect human health and the environment that may be implemented based on the determined levels of risks.

A number of indicators, already applicable or under development, allow tracking progress towards more sustainable policies regarding land uses and better protection of soil resources.

Table 3-12: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / Current progress	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 12: Land and soils							
12.1 Impact of EU policies on land use							
12.1.a Area under organic farming	No existing target *In 2010, 5% of EU agricultural land was farmed organically. Austria, Sweden, Estonia and the Czech Republic have more than 10%.*	By 2020, 10% of EU's agricultural land should be organic.	- Feasible (100% increase)	- Relevant for biodiversity, but not necessarily resource efficiency of land (organic yields tend to be lower)	- Eurostat *Used by iGG and SDS. SEBI 20* *Also EEA CSI 026 and AEI 4* *Alternative*: share of land under agri-environmental commitment (e.g. in the context of the CAP).	Yes, the indicator is accepted by most	Yes - By Member State
12.1.b Domestic land demand (*ha*)	No existing target, but several EU strategies relate to land use Built-up and other man-made areas account for around 4% of the total area in the EU. Member States are responsible for their land use policies, e.g. urban environment, agricultural land, forestry, habitat protection sites (Natura 2000), etc.	See the target for **12.2.a the resulting land take**	- NA	- The indicator **12.2.a the resulting land take** is more relevant for the milestone -	- Available from EEAs CORINE system for 1990, 2000 and 2006 and calculated based on EEA methodological standards. - The methodology to compile Domestic Land Demand is not finalised yet, but is thought to be credible, transparent, and robust. *Artificial land/built up land is proposed to be used in SBRE*	Yes, the indicator is accepted by most	Yes - By Member State - By land category

Possible indicators	Existing target / Current progress	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
12.1.c Artificial land per capita	No existing target *In 2006 each EU citizen disposed of 389 m² of artificial surfaces*	By 2020, there should be less than 400 m² of artificial surface per EU citizen	- Ambitious as land take is still increasing	- The indicator is relevant, but the target must be consistent with the target for land take	- Available from EEAs CORINE system for 1990, 2000 and 2006	Yes, the indicator is accepted by most	Yes - By Member State
12.1.d Actual Land Demand (Land Footprint) (*ha*)	No existing target	By 2020, EU's net demand of foreign land should be zero.	Ambitious - encompasses important trade-offs with trade activities.	- The indicator is relevant for EU's land use outside its boundaries	- Indicator under development - Only pilot data for selected countries are available from academic groups - Actual Land Demand is rather easy to compile, transparent, robust, comparable to economic accounts and indicators. - data on built-up land is difficult to obtain on the global level and this indicator only accounts for EU impacts on foreign agricultural and forestry land *Indirect land use / embodied land for agricultural and forestry products proposed to be used in SBRE* *Alternative existing indicator:* - *Ecological Footprint SEBI23* -	Methodology still needs to be developed	Yes - By Member State - By land category

Possible indicators	Existing target / Current progress	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
12.1.e The resulting intensity of land use (%): Human Appropriation of Net Primary Production	No existing target	By 2020, HANPP in regions with high suitability for intensive cropland should not exceed 75%	Ambitious	- HANPP is a measure for land use intensity and can inform on pressures on biodiversity - It is difficult to set a level as some productive land can have high levels of HANPP	- Indicator under development - Only pilot data for selected countries are available from academic groups	Methodology still needs to be developed and accepted by stakeholders	Yes - By agro-ecologic zone
12.1.f Fragmentation of natural and semi-natural areas[77]	No existing target, but several EU related strategies, e.g. Green Infrastructure, Biodiversity.	No target proposed	NA	Relevant for biodiversity	Tracked by EEA for SEBI 13	Yes, the indicator is accepted by most	NA
12.2 The rate of land take							
12.2.a The resulting land take (ha/yr) (conversion from (semi-natural) areas to artificial land cover)	No existing target. *In the EU, more than 900 km² are subject to 'land take' every year for housing, industry, roads or recreational purposes*	By 2020, net annual land take (of artificial land) does not exceed 800 km² per year at the EU level. *[proposed in the Annex 6 to the Roadmap]* By 2050, there is no net land take (of artificial land) in the EU. *[taken directly from the*	Feasible (20% reduction)	- Yes, good indicator for the milestone - Land take reduces the ability of ecosystems to function properly - Not a proxy for land sealing	Calculated based on Eurostat's European land use/cover area frame statistical survey (LUCAS)	Yes, the indicator is accepted by most	Yes - By Member State

[77] Fragmentation involves dividing up contiguous ecosystems (or landscape unit) into smaller areas called "patches" (Forman, 1995), with possible significant ecological effects:

- Habitat surfaces decreases;
- Patch isolation impedes the circulation of individuals and populations;
- Barriers (e.g. development of transport infrastructures) decrease habitat connectivity.

Possible indicators	Existing target / Current progress	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
		Roadmap]					
12.2.b Average annual area actually sealed (ha/yr)	No existing target *In the EU, about 500 km² of land converted to artificial land is actually sealed every year. In 2006, 2.3 % of the EU's territory were actually sealed.*	No target proposed	NA	- Yes, good indicator for the milestone - Land sealing informs of the actual pressure on the land and its soils	- CORINE data sets on sealing are only available for the year 2006 - Data not readily available - it is not possible to give soil sealing trends at EU or Member State level - Land take cannot be generally used as a proxy, shares of sealed surfaces vary considerably among Member States	Yes, the indicator would be probably accepted by most	NA
12.3 The quantity and quality of soils							
12.3.a Area of land subject to erosion rate > 10 tonnes/ha/yr (ha)	No existing target, only the EU Soil Thematic Strategy A recent new model of erosion constructed by JRC has estimated the surface area affected by erosion in the EU-27 at 1.3 million km². Of this area, almost 20% is subject to soil loss in excess of 10 tonnes/ha/yr[78]	By 2020, the area of land in the EU that is subject to soil erosion of more than 10 tonnes per hectare per year should be reduced by at least 25%. *[proposed in the Roadmap Analysis Part II]*	Ambitious	- Yes, but soil erosion is also the result of wind and weather	No available data for the indicator Soil erosion on the basis of the EEA indicator "Soil erosion by water" and the PESERA and/or RUSLE models of the JRC. *SDS proposes to use the share of total land at risk of soil erosion. Soil erosion by water is proposed to be used in SBRE.*	Yes, the indicator would be probably accepted by most	NA

[78] State of soil in Europe, 2012

Possible indicators	Existing target / Current progress	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
12.3.b Agricultural land affected by water erosion	No existing target, only the EU Soil Thematic Strategy *Through Good Agricultural and Environmental Conditions (GAEC)) it is expected that 21.4% of the utilised agricultural area will be covered by measures targeting soil quality in the period 2007-2013*[79].	No target proposed	Ambitious	- Yes, but soil erosion is also the result of wind and weather	Measured on the basis of the EEA indicator "Soil erosion by water". Indicators can be estimated based on data from the PESERA and/or RUSLE models of the JRC. Assessing trends in soil erosion rates, both from wind and water, in Europe is difficult because of a lack of systematic approaches and data	Yes, the indicator would be probably accepted by most	NA
12.3.c Surface of soils with organic matter level < 3.5% (ha)	No existing target, only the EU Soil Thematic Strategy Soil organic matter content is highly variable. Some 45% of soils in Europe have a low or very low organic matter content (0-2% organic carbon).	By 2020, soil organic matter levels do not decrease overall and increase for soils currently with less than 3.5% organic matter. *[proposed in the Roadmap Analysis Part II]*	Feasible	- Yes, a good indicator of soil quality	- Soil organic matter levels can be identified on the basis of LUCAS results, but insufficient data - Trends in soil organic matter levels: increase or decrease in overall organic matter levels (%)	Yes, the indicator would be probably accepted by most	Yes - By Member State
12.3.d Gross nutrient balance	No existing target, but various EU Directives,	In 2020, the N,P,K surpluses will be	Feasible	- Informs of losses of N or P to the environment, and the sustainable use	For both nutrients, data are available by country through Eurostat[81,82], with	Yes, the indicator is	Yes - By Member State - By nutrient:

[79] COM(2012)46 final. Implementation of the Soil Thematic Strategy and on-going activities. 13/02/2012.

[81] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Nitrogen_balance_in_agriculture

Possible indicators	Existing target / Current progress	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	e.g. the Nitrates Directive, the Water Framework Directive, etc. *According to EEA, nutrient surpluses are expected to be moderately reduced in 2020 (by 6%, 8% and 12% for N, P, K respectively)*[80]	reduced compared with the baseline scenario by 25%, 70%, and 57%, respectively. *[based on EEA modelling]*		of soil N or P resources - Depends on many factors including climate conditions, soil type and soil characteristics, soil P and N saturation, management practices	various time series, between 1985 and 2009. *SEBI 19* *Used by OECD* *EEA CSI 025 and AEI 15* *Gross nutrient balance of nitrogen and phosphorus is proposed to be used in SBRE.*	accepted by most	nitrogen (N), phosphorus (P), phosphate (P_2O_5), potassium (K), potash (K_2O)
12.4 Remediation activities							
12.4.a Number of contaminated sites	No existing target The number of sites where potentially polluting activities have taken place stands at approximately 3 millions[83].	None proposed	NA	Milestone addresses remediation of contaminated sites, not on soil contamination itself	Estimates of the number of contaminated sites in the European Union range from 300 000 to 3 million. This wide range in estimation is due to the lack of a common definition for contaminated sites and relates to different approaches to acceptable risk levels, targets to be protected and exposure parameters[84]	NA	Yes - By Member State

[82] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Phosphorus_balance_in_agriculture

[80] http://www.eea.europa.eu/data-and-maps/indicators/agri_fo3-gross-nutrient-balance-outlook/agri_fo3-gross-nutrient-balance-outlook

[83] State of soil in Europe (2012)

[84] http://www.eugris.info/FurtherDescription.asp?e=4&Ca=2&Cy=0&T=Contaminated%20land

Possible indicators	Existing target / Current progress	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
12.4.b Share of contaminated sites where remediation actions have been taken	No existing EU target, but national targets exist in most Member States Around €3.1 billion have been allocated to the rehabilitation of industrial sites and contaminated land as part of the Cohesion Policy in the period 2007-2013[85]	By 2020, Member States should have started undertaking remediation actions on all contaminated sites already identified in 2010. *[taken directly from the Roadmap, indicator and target proposed in the Annex 6 to the Roadmap]*	Feasible	Directly related to the milestone.	Data is collected from Member States Based on the EEA Core Set Indicator 15 "Progress in management of contaminated sites"	Yes, the indicator is accepted by most	Yes - By Member State

[85] SEC(2010) 360.

3.1.13 Milestone 13: Marine resources

***Milestone 13**: By 2020, good environmental status of all EU marine waters is achieved, and by 2015 fishing is within maximum sustainable yields.*

The two key issues of this milestone are:

- **13.1 Achieving good environmental status in all EU waters**
  - 13.1.a The number of Member States that have developed a Marine Strategy
  - 13.1.bThe number and area of Marine Protected Areas (MPAs)
- **13.2 Sustainable fishing**
  - 13.2.a Share of fish and shellfish populations within safe biological limits (indicators Fishing Mortality and Maximum Sustainable Yield)
  - 13.2.b Fishing fleet capacity (total engine power (kW)

The Marine Strategy Framework Directive [86]already sets the objective to *"achieve or maintain Good Environmental Status (GES) of the EU's marine waters by 2020"*. Good Environmental Status (GES) is *"the environmental status of marine waters where these provide ecologically diverse and dynamic oceans and seas which are clean, healthy and productive"*. The Directive sets out eleven key aspects or so-called descriptors for how GES should be monitored:

1. Biodiversity is maintained
2. Non-indigenous species do not adversely alter the ecosystem
3. The populations of commercial fish species are healthy
4. Elements of food webs ensure long term abundance and reproduction
5. Eutrophication is minimised
6. Sea floor integrity ensures the functioning of the ecosystem
7. Permanent alteration of hydrographical conditions does not adversely affect the ecosystem
8. Concentrations of contaminants have no effects
9. Contaminants in seafood are within safe levels
10. Marine litter does not cause harm
11. Introduction of energy (including underwater noise) does not adversely affect the ecosystem

A more detailed set of criteria and indicators were developed to help Member States to determine what each descriptor means in practice and how to measure progress[87].

[86] European Union (2011) Seas for Life. Protected – Sustainable – Shared European Seas by 2020.

[87] COMMISSION DECISION of 1 September 2010 on criteria and methodological standards on good environmental status of marine waters. Available at: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2010:232:0014:0024:EN:PDF

Table 3-13: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 13: Marine resources							
13.1.Good environmental status							
13.1.a The number of Member States that have developed a Marine Strategy *[policy response indicator]*	All Member States must develop a Marine Strategy, which includes (among other things): - Establishment of a monitoring programme by 2014 - Development of a programme of measures designed to achieve or maintain GES by 2015	By 2015, all Member States have developed a Marine Strategy to achieve or maintain GES in their marine waters. *[taken directly from the Roadmap; originally from the EU Marine Strategy]*	Yes	- The indicator monitors the progress of the efforts of Member States, but not what the actual status of marine waters are, or whether it is feasible that the overall objective is achieved	Yes The Water Information System for Europe (WISE) is envisioned to have a common platform called WISE-Marine for Member State reporting	Yes, the indicator would be probably accepted by most	Yes - By Member State
13.1.b The number and area of Marine Protected Areas (MPAs) *[policy response indicator]*	No specific target *In January 2011, EU Member States had designated 566 marine Special Protection Areas (SPAs) under the Birds Directive, covering 110,220 km²; and 1,247 Sites of Community Importance (SCIs) under the Habitats Directive, covering 149,732 km². This is a total of 198,760 km² marine Natura 2000 sites*[88] [89]	By 2020, at least 10% of the marine EU area is covered by a coherent network of MPAs. *[proposed in the Roadmap Analysis Part II]*	Unsure of feasibility – needs to be investigated further. In the Baltic Sea in 2010, protected marine areas represented 14.7% of territorial waters and 4.6% of exclusive economic zones of each country.[90] An estimated 3% of the total Mediterranean coastline is included in SPAs, these cover an	- Yes, ensures the quality and occurrence of habitats and the distribution and abundance of species - directly related to descriptor 1 of the Marine Strategy for GES	The Natura Barometer managed by the DG ENV with EEA monitors Marine Natura 2000 area, but does not provide the share of the total EU area. This would however be possible to do. *iGG proposes Extent of marine domain site of community importance relative to Exclusive*	Yes, the indicator would be probably accepted by most	Yes - By Member State - By SPAs under the Birds Directive or SCIs under the Habitats Directive - By type of zone (e.g. territorial waters, exclusive economic zone)

[88] Natura 2000 – European Commission Nature and Biodiversity Newsletter – Number 31 January 2012. http://ec.europa.eu/environment/nature/info/pubs/docs/nat2000newsl/nat31_en.pdf

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
			estimated 1.1% of the total area.[91]		*Economic Zone / length of coastline*		
13.2 Sustainable fishing							
13.2.a Share of fish and shellfish populations within safe biological limits (indicators: Fishing Mortality and Maximum Sustainable Yield)	GES of the Marine Strategy includes that populations of all commercially exploited fish and shellfish are within safe biological limits, exhibiting a population age and size distribution that is indicative of a healthy stock. *88% of Europe's fish stocks are being fished beyond their maximum sustainable yield and 30% are being fished beyond safe biological*	By 2015, all fish and shellfish populations are fished within maximum sustainable yield in all areas in which EU fishing fleets operate. *[taken directly from the Roadmap; originally from the Implementation Plan adopted at the World Summit on Sustainable Development, Johannesburg, 2002[92], reconfirmed in the*	Ambitious	- Achieving or maintaining good environmental status requires that Fishing Mortality values are equal to or lower than the level capable of producing Maximum Sustainable Yield (MSY) - Directly related to descriptor 3 of the Marine Strategy for GES	Fishing Mortality is estimated from appropriate analytical assessments based on the analysis of catch (to be taken as all removals from the stock, including discards and unaccounted catch) at age or at length and ancillary information. Data on Fishing Mortality and MSY is provided by International Council for the Exploration of the Sea (ICES).	Yes, the indicator is accepted by most (but not always respected)	Yes - By type of fish or shellfish - By marine area

[89] http://www.marbef.org/wiki/Marine_Protected_Areas_in_Europe#_note-6

[90] Helsinki Commission (2010) Towards an ecologically coherent network of well-managed Marine Protected Areas – Implementation report on the status and ecological coherence of the HELCOM BSPA network. Baltic Sea Environment Proceedings No. 124A. Baltic Marine Environment Protection Commission. http://www.helcom.fi/stc/files/Publications/Proceedings/bsep124A.pdf

[91] UNEP-WCMC (2008) National and Regional Networks of Marine Protected Areas: A Review of Progress. UNEP-WCMC, Cambridge. http://www.unep.org/regionalseas/publications/otherpubs/pdfs/MPA_Network_report.pdf

[92] European Commission (2006) Implementing sustainability in EU fisheries through maximum sustainable yield. COM(2006) 360 final.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	levels, which means that they may not be able to replenish.	*Reform of the Common Fisheries Policy*[93]*]* Same target and indicator as 14.3.h			*Similar to the indicator used by SDS: Fish catches from stocks outside safe biological limits. Also proposed to be used in SBRE.* *Alternative indicators: Fish catch / landings per Total Allowable Catch*		
13.2.b Fishing fleet capacity (total engine power (kW)	No existing target	No target proposed	NA	- Fishing fleet capacity is only indirectly related to fish catch / landings	Yes *Used by SDS*	Yes	Yes - Member State

[93] European Commission (2011) Reform of the Common Fisheries Policy. COM(2011) 417 final.

3.1.14 Milestone 14: Food

***Milestone 14**: By 2020, incentives to healthier and more sustainable food production and consumption will be widespread and will have driven a 20% reduction in the food chain's resource inputs. Disposal of edible food waste should have been halved in the EU.*

The four key issues are covered by this milestone:

- 14.1 the **supply or availability** of healthy, sustainable and affordable food
  - 14.1.a Development in total calorie intake per capita compared to daily requirements
  - 14.1.b Development in consumption of different meat and dairy products (bovine, pork, poultry, butter, cheese, milk) per capita per year
  - 14.1.c Share of organic food available
- 14.2 The **uptake or demand** of healthy and sustainable food and drink products by citizens and public authorities
  - 14.2.a Percentage of the value and number of catering public procurement contracts that include GPP criteria
- **14.3 Sustainable production methods in the food chain**
  - 14.3.a Human Appropriation of Net Primary Production (intensity of land use)
  - 14.3.b Development in global GHG, acidification emissions, ground ozone precursor emissions and global material use per capita activated by European expenditure on food and drink
  - 14.3.c Gross nutrient balance
  - 14.3.d Area under organic farming
  - 14.3.e Use of pesticides and plant protection
  - 14.3.f Use of greenhouses
  - 14.3.g Ecological Footprint of cropland, grazing and fishing
  - 14.3.h Share of fish and shellfish populations within safe biological limits
  - 14.3.i Water supplied to agriculture for irrigation purposes
  - 14.3.j Actual Land Demand (Land Footprint) (ha) for EU food consumption
- **14.4 The reduction of waste along the food chain with final consumers**
  - 14.4.a Amount of food waste (based on waste statistics)

- 14.4.b Amount of food waste (based on the difference between food supply and nutritional requirement)

In the EU, there is an absence of definitions and clear rules of what is considered as a 'sustainable production and consumption'. To be pragmatic, food and drink products that comply with the following could be considered as 'sustainable' as they imply that they comply with a set of environmental criteria that is beyond the average product on the market:

- Green Public Procurement (GPP) criteria;
- EU Organic label;
- Marine Stewardship Council (MSC) – for seafood;
- other recognised / national labels (e.g. Rainforest Alliance Certification[94], Swedish climate certification[95], etc.)

The European Commission is working with stakeholders to propose a harmonised methodology for assessing the environmental impacts of food and drink products[96], however this is not yet completed.

The term 'food chain' covers the whole life cycle of food and drinks produced and consumed in the EU. It is characterised by a large variety of actors (e.g. farmers, fishermen, manufacturers, distributors, retailers, caterers, consumers), products (e.g. food, feed, fertilisers, equipment, packaging) and processes (e.g. planting, animal breeding, harvesting, slaughter, food processing, distribution, retail, cooking). Trade in food commodities and products links the dispersed and partly global production base with consumption remote from production resulting in significant resource flows. Even though the EU has a high level of self-sufficiency for indigenous food products, it depends on significant flows of supporting resources, particularly animal feeds, vegetable oil, and tropical food products.

WHO[97] and the EC[98] provide dietary recommendations, according to physical traits of the target group, while Member States define nutritional guidelines for their citizens. Total energy (calorie), protein and other dietary requirements are therefore calculated on the basis of national demographics and the nutritional guidelines. Availability and affordability of food should reflect the needs of a nutritionally balanced diet, within the context of sustainable and resource efficient production.

Food waste (in a broad sense) can be both edible and inedible. Edible food waste is considered avoidable, although some of this is not unanimously considered edible[99]. The distinctions that can be made are:

- Edible food waste

[94] www.rainforest-alliance.org.uk/certification-verification

[95] www.klimatmarkningen.se/in-english

[96] European Food Sustainable Consumption and Production Round Table: www.food-scp.eu/node/33

[97] www.who.int/nutrition/topics/nutrecomm/en/index.html

[98] www.efsa.europa.eu/en/topics/topic/drv.htm

[99] WRAP (2009) Household Food and Drink Waste in the UK

- *Avoidable food waste*: food that is thrown away that was, at some point prior to disposal, edible (e.g. slices of bread, apples, meat)
- *Possibly avoidable food waste*: food that some people eat and others do not (e.g. bread crusts, potato skins)

- Inedible food waste
  - *Unavoidable food waste*: Waste arising from food preparation that is not, and has not, been edible under normal circumstances (e.g. bones, egg shells, pineapple skins)

It should noted that 'edible material' waste or loss is measured only for products that are directed to human consumption. This distinguishes 'planned' non-food uses to 'unplanned' non-food uses (e.g. food that was originally meant for human consumption but which fortuity leaves the human food chain).

Although it is clear that certain aspects of the current food system are unsustainable, there are no clear definitions on what constitutes 'sustainable' food, and there is therefore no single indicator that can be used to assess progress toward this goal. However, there are a range of indicators available that provide insight into specific issues that impact on the sustainability of food and drink consumption and production.

Table 3-14: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 14: Addressing food							
14.1 The supply or availability of healthy, sustainable and affordable food							
14.1.a Development in total calorie intake per capita compared to daily requirements	No existing EU target, but most Member States have guidelines for a healthy diet	No target proposed *[The Roadmap Analysis Part II proposed: Amount of animal proteins (including meat and dairy products) consumed per person is in line with WHO recommendations]*	NA	Yes, informs of a healthy diet	This indicator would need to be calculated using figures for supply to the EU and Average Dietary Energy Requirements (ADER)[100]. ADER data is no longer available at FAOSTAT. The indicator would need to be calculated based on nutrition guidelines and Member State demographics. *Used by EEA SCP.*	Yes, the indicator would probably accepted by most. Some stakeholders would claim that daily requirements depend on the individual person and his/ her level of activities.	Yes - By Member State - By nutritional energy supply (proteins, fats, carbohydrates)
14.1.b Development in consumption of different meat and dairy products (bovine, pork, poultry, butter, cheese, milk) per capita per year	No existing EU target, but most Member States have guidelines for a healthy diet	No target proposed *[proposed in the Roadmap Analysis Part II]*	NA	This indicator in fact refers to available supply to the market, not actual consumption (accounting for losses in the supply chain before consumer purchase) but does not consider waste by the consumer.	Data on supply is available at FAOSTAT Food Supply module 'Livestock Primary Equivalent'. *Used by EEA SCP. Proposed to be used in SBRE.*	Yes, the indicator would probably accepted by most.	Yes - By Member State

[100] Average Dietary Energy Requirements (ADER) is a measure of the average caloric needs of a population depending on its age/sex structure and average height distribution

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
14.1.c Share of organic food available	No existing EU target *A recent study estimated that although the share of organic food has increased considerably over the past decade, market shares still remain low across Europe[101]. Denmark and Austria are the only EU Member States with market shares higher than 5%.*	No target proposed	NA	- Yes, informs of the availability of healthy and sustainable food - Organic food production is not always considered the most resource efficient due to lower yields	Eurostat tracks production of organic animal products (Certified production of organic animal products [food_pd_dmorg)]), but data is reported by a limited number of Member States and a figure is not available at the EU-27 level.	Yes, the indicator would probably accepted by most.	Yes - By Member State - By food category
14.2 The uptake or demand of healthy and sustainable food and drink products by citizens and public authorities							
14.2.a Percentage of the value and number of catering public procurement contracts that include GPP criteria *[policy response indicator]*	In 2008, the European Commission set an indicative target that, by 2010, 50% of all public tendering procedures should be green in the EU	By 2020, 100% of the value of public procurement contracts include Green Public Procurement (GPP) EU core criteria by 2020	Ambitious The UK demonstrated it is possible to reach 75%, but this could potentially be 100%.	Good indicator of public authorities driving demand for resource efficient products and services	Yes, but based on surveys from public authorities *Used by iGG*	Yes, the indicator would probably accepted by most.	Yes - By Member State - By product category
14.3 Sustainable production methods in the food chain							
14.3.a Human Appropriation of Net Primary Production (intensity of land use)	No existing target	By 2020, HANPP in regions with high suitability for intensive cropland should not exceed	Feasible	- HANPP is a measure for land use intensity and can inform on pressures on biodiversity - It is difficult to set a	- Indicator under development - Only pilot data for selected countries are available from academic groups	Methodology still needs to be developed and accepted by stakeholders	Yes - By agro-ecologic zone

[101] SIPPO (2011) The Organic Market in Europe. Overview and Market Access Information. Research Institute of Organic Agriculture with the support of the Swiss Import Promotion Programme SIPPO

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
		75%		level as some productive land can have high levels of HANPP	Same as: **12.1.e The resulting intensity of land use (%): Human Appropriation of Net Primary Production**		
14.3.b Development in global GHG, acidification emissions, ground ozone precursor emissions and global material use per capita activated by European expenditure on food and drink	There are overall GHG emission targets at EU level, but none that specifically address food and drink	No target proposed	NA	Yes, relates to the environmental impact of the food chain	Using various data sources, are not available on an annual basis *Used by EEA SCP.* *Alternative available indicators:* - Greenhouse gas emissions from agriculture [aei_pr_ghg] - Generation of hazardous waste [tsdpc250], - Emissions of sulphur oxides (SOx) [tsdpc260], - Emissions of nitrogen oxides (NOx) [tsdpc270], - Emissions of non-methane volatile organic compounds (NMVOC) [tsdpc280] - Emissions of ammonia (NH_3) [tsdpc290]). - JRC 'life cycle based basket-of-products'	- Unsure whether all stakeholders accept the calculation methodology	

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
14.3.c Gross nutrient balance	No existing target, but varies EU Directives, e.g. the Nitrates Directive, the Water Framework Directive, etc. *According to EEA, nutrient surpluses are expected to be moderately reduced in 2020 (by 6%, 8% and 12% for N, P, K respectively)*[102]	In 2020, the N,P,K surpluses will be reduced compared with the baseline scenario by 25%, 70%, and 57%, respectively. *[based on EEA modelling]*	Feasible	- Informs of use and losses of N or P to the environment, and the sustainable use of soil N or P resources - Depends on many factors including climate conditions, soil type and soil characteristics, soil P and N saturation, management practices	For both nutrients, data are available by country through Eurostat[103,104], with various time series, between 1985 and 2009. *Used by OECD* Same as: **12.3.d Gross nutrient balance**	Yes, the indicator is accepted by most.	Yes - By Member State - By nutrient: nitrogen (N), phosphorus (P), phosphate (P_2O_5), potassium (K), potash (K_2O)
14.3.d Area under organic farming	No existing target *In 2010, 5% of EU agricultural land was farmed organically. Austria, Sweden, Estonia and the Czech Republic has more than 10%.*	By 2020, 10% of EU's agricultural land should be under organic management.	Feasible (100% increase)	- Relevant for biodiversity, but not necessarily resource efficiency of land (organic yields tend to be lower)	Data available from Eurostat Same as: **12.1.a Area under organic farming** Used by iGG and SDS. *Alternative*: Share of land under agri-environmental commitment (e.g. in the context of the CAP).	Yes, the indicator is accepted by most.	Yes - By Member State

[102] http://www.eea.europa.eu/data-and-maps/indicators/agri_fo3-gross-nutrient-balance-outlook/agri_fo3-gross-nutrient-balance-outlook

[103] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Nitrogen_balance_in_agriculture

[104] http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Phosphorus_balance_in_agriculture

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
14.3.e Use of pesticides and plant protection	No existing target, but the EU Thematic Strategy for Pesticides includes the Sustainable Use of Pesticides Directive.	By 2020, the use of pesticides (tonnes of active ingredient) should be reduced by 20% compared to 2010.	Feasible	Pesticides cause severe environmental impacts to the environment due to their toxicity. Relates to the "20% reduction in the food chain's resource inputs" part of the milestone	Data available from Eurostat but with many gaps. Latest data is 2008 (only four Member States): - Sales of plant protection products [food_in_apest1] - Sales of pesticides (tonnes of active ingredient) [aei_fm_salpest])	Yes, the indicator is accepted by most.	Yes - By Member State - By type of pesticide (e.g. fungicide, herbicide, insecticide, other)
14.3.f Use of greenhouses	No existing target *According to the latest data available, there is about 140,000 ha of crops grown under glass.*	No target proposed	NA	Informs of agriculture with high energy requirements	Data available from Eurostat but with many gaps: Area under glass [tag00010]	Yes, the indicator is accepted by most.	Yes - By Member State - By type of crop (fresh vegetables, permanent crops, etc.)
14.3.g Ecological Footprint of cropland, grazing and fishing (global hectare)	No existing target *The EU's Ecological Footprint in 2008 was estimated to be 4.7 global hectares per person:* - *Cropland: 1.13 gha/person* - *Grazing land: 0.34 gha/person* - *Fishing ground: 0.14 gha/person*	By 2020, EU's Ecological Footprint of cropland, grazing and fishing should be reduced by 20% compared to 2010.	Ambitious	- Includes imports and exports of food production - relates only to agriculture and fishing (not the entire food chain) and only carbon emissions (not other environmental categories)	Data provided by the Global Footprinting Network. Latest data is 2008. Not published every year.	- The Ecological Footprint is not accepted by all as it only focuses on CO_2 emissions	Yes - By Member State - By type of land

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
14.3.h Share of fish and shellfish populations within safe biological limits	Marine Strategy target *88% of Europe's fish stocks are being fished beyond their maximum sustainable yield and 30% are being fished beyond safe biological levels, which means that they may not be able to replenish.*	See target under **13.2.a Share of fish and shellfish populations within safe biological limits**					
14.3.i Water supplied to agriculture for irrigation purposes	No existing targets *Data is incomplete, but at least 25,000 million m^3 of water was used for irrigation purposes in the EU (corresponding to about 16% of total water supply).*	By 2020, water supplied to agriculture for irrigation purposes is reduced with 20% compared to 2010.	NA (Data not robust)	- Water used for irrigation is the main use of water for food production	Data is incomplete and unreliable	Yes, the indicator is accepted	Yes - By Member State - By source (public supply, self supply, other
14.3.j Actual Land Demand (Land Footprint) (ha) for EU food consumption	No existing target	By 2020, EU's actual land demand for EU food consumption should be reduced by 20% compared to 2010.	Ambitious	- Relates to the "20% reduction in the food chain's resource inputs" part of the milestone - The indicator is also relevant for EU's land use outside its boundaries	- Indicator under development - Only pilot data for selected countries are available from academic groups - Actual Land Demand is rather easy to compile, transparent, robust, comparable to economic accounts and indicators.	Methodology still needs to be developed	Yes - By Member State - By land category

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
					- data on built-up land is difficult to obtain on the global level and this indicator only accounts for EU impacts on foreign agricultural and forestry land *Indirect land use / embodied land for agricultural and forestry products proposed to be used in SBRE* *Alternative existing indicator: Ecological Footprint*		
14.4 The reduction of waste along the food chain with final consumers							
14.4.a Amount of food waste (based on waste statistics)	No existing target *Around 90 million tonnes of food waste are generated in the EU each year[105], of which:* - *Households: 37.7 Mt* - *Food services: 12.3 Mt* - *Retail services: 4.5 Mt*	By 2020, there is a 50% decrease in edible food waste in households, retailers and catering compared to 2010. *[taken directly from the Roadmap]*	Ambitious	The indicator does not distinguish between edible and inedible food waste	Eurostat collects data for "Animal and mixed food waste; vegetal wastes (W091_092)" generated by retailers, caterers and households and could be used as proxy for this milestone. Major limitations are: - it takes into account both edible and non-edible material and	No, the waste statistics are not sufficiently reliable to set targets.	Yes - By Member State - By sector

[105] Food waste from Manufacturing, Household and 'Other Sectors' for year 2006 based on food waste generation data from Eurostat.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
					- it does not account for catering and retailing sector. Data are available for years 2004, 2006, 2008 and 2010 although there are data gaps for some countries.		
14.4.b Amount of food waste (based on the difference between food supply and nutritional requirement)	No existing target *The average food supply per person in the EU is just over 3400 kcal/ capita/ day. EEA calculated average EU-27 dietary energy requirement for 2006-2008 to be 2537 kcal/capita/day*[106]. *It is estimated that 720 kcal/capita/day is edible food waste* [107]	By 2020, there is a 50% reduction in the difference between food supply made available and food required to provide healthy diets and a resource efficient food chain. *[taken directly from the Roadmap]*	Ambitious	The difference between available food supply and recommended daily requirements is either overconsumption or edible food waste	*Alternative indicator:* Food waste based on FAO food supply, which is gathered consistently. Measured in nutritional value (kcal) of food, this can indicate the amount of edible food made available on the market	Could potentially be accepted, but some stakeholders may be against the idea of setting an average nutritional requirement	Yes - By Member State - By food category - By nutritional energy supply (proteins, fats, carbohydrates)

[106] www.eea.europa.eu/data-and-maps/figures/development-in-total-calorie-intake/scp019_indicator_13.1_2012.xls

[107] Kummu et al. (2012) Lost food, wasted resources: Global food supply chain losses and their impacts on freshwater, cropland, and fertiliser use. Science of the Total Environment 438.

3.1.15 Milestone 15: Improving buildings

> ***Milestone 15**: By 2020, the renovation and construction of buildings and infrastructure will be made to high resource efficiency levels. The Life-cycle approach will be widely applied; all new buildings will be nearly zero-energy and highly material efficient, and policies for renovating the existing building stock will be in place so that it is cost-efficiently refurbished at a rate of 2% per year. 70% of non-hazardous construction and demolition waste will be recycled.*

The main elements of this milestone are:

- **15.1 Energy performance/resource efficiency of buildings**
  - 15.1.a Rate of nearly zero-energy new buildings
  - 15.1.b Energy consumption per m^2 for space heating
- **15.2 Rate of renovation**
  - 15.2.a Rate or refurbishment of buildings
- **15.3 Recycling of construction and demolition waste**
  - 15.3.a Rate of recycling of construction and demolition waste

It should also be made clear the distinction between the concepts "construction" and "building". Building refers to both the structure with roofs and walls that hosts homes, offices, etc., and the activity of erecting them. On the other hand, construction generally refers to the activity of creating non-building infrastructures, such as roads, structures, hydraulic works, etc.

No common definition has been found of high resource/material efficient buildings/infrastructure. In this milestone, we will distinguish between energy and other resources. Regarding resources other than energy, resource-efficient building can be understood as the activity *"where less material resources are needed to build homes and buildings of higher functionality"*[108]. This affects the construction and end-of-life phases of buildings and infrastructure, but the consumption of water during the use phase is also an aspect to be included within the definition of resource efficiency.

Therefore, a high resource-efficient building would be a building that throughout its life cycle needs low amounts of material resources and water for providing its functions. There exist some certification schemes for buildings that take into account materials and water use throughout the life cycle, such as LEED[109], BREEAM[110] or HQE[111]. These certifications are based on checklists with

[108] Cambridge Econometrics (2011) Sustainability Scenarios for a Resource Efficient Europe. Final report for the European Commission (DG Environment)

[109] https://new.usgbc.org/leed

[110] http://www.breeam.org/

[111] http://assohqe.org/hqe/

reference qualitative and quantitative criteria (e.g. Reduce potable water consumption for irrigation by 50% from a calculated midsummer baseline case or using the month with the highest irrigation demand[112]). A study carried out by DG JRC-IPTS proposed some ecolabel criteria for buildings on water use, waste management and hazardous materials[113].

A low-energy building can be defined as a building that has a better energy performance than the standard alternative/energy efficiency requirements for buildings.

The Energy Performance of Buildings Directive (EPBD) introduced the concept of nearly zero-energy building. The EPDB defines a nearly Zero-Energy Building as a *"building that has a very high energy performance […]. The nearly zero or very low amount of energy required should to a very significant extent be covered by energy from renewable sources, including renewable energy produced on-site or nearby."*

[112] LEED 2009 for new construction and major renovations

[113] DG JRC IPTS (2012) Development of European Ecolabel Criteria for Office Buildings. 3rd Technical Background report. Working Document

Table 3-15: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 15: Improving buildings							
15.1 Energy performance/resource efficiency of buildings							
15.1.a Rate of nearly zero-energy new buildings	Energy Performance of Buildings Directive (EPBD) *In 2009, around 20,000 low energy houses were built in Europe (most in Germany and Austria); this represents around 1% of the total building stock. For the same year, an average of 10% of detached and semi-detached houses built in Denmark and Estonia, about 15% in Poland and around 30% in Finland were very low-energy buildings . It is estimated that around 15% of the built attached houses and blocks of flats in Finland and 10% in Poland were low-energy construction.*	Member States shall ensure that by 2020, all new buildings are nearly zero-energy buildings; and after 31 December 2018, new buildings occupied and owned by public authorities are near zero-energy buildings. *[taken directly from the Roadmap, originally from the Energy Performance of Buildings Directive]*	Feasible	- The milestone mentions directly that all new buildings should be nearly zero-energy"	Indicator not developed at the time of writing, a proxy indicator can be proposed, such as the number of EU Member States with implemented zero energy targets in the internal legislation or building codes.	Indicator not developed	Yes - By Member State
15.1.b Energy consumption per m² for space heating	Energy Performance of Buildings Directive (EPBD)[114] (EPBD)	By 2020, all buildings should have an B rating of energy performance	Ambitious	- Relevant for tracking the energy performance of buildings, both new and	Data on the energy performance level of buildings is not available	The indicator would probably be accepted by	Potentially - By Member State - By type of

[114] Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings (Energy Performance of Buildings Directive (EPBD))

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	provides a labelling scheme. *The average consumption in the EU-27 in 2010 is around 127 kWh per m2, with an average decrease of 30% from 2000 to 2010.*[115] *VHK reports an average of 86 kWh per m² in the EU-25 in 2003*[116].	*[The Roadmap Analysis Part II proposed: Energy consumption per m² for space heating, per dwelling and for total housing stock alongside growth in m² of living space per capita based on ETC/SCP Indicator 16.1 for the EEA]*		renovated	at present. - based on ETC/SCP Indicator 16.1 for the EEA[117] The Odyssee MURE project[118] reports data for household consumption for space heating per m² from 2000 to 2010. *Proposed to be used in SBRE.* *Alternative:* *iGG proposes 'degree of penetration of energy efficient boilers'*	most	dwelling - Energy consumption per m²
15.2 Rate of renovation							
15.2.a Rate or refurbishment of buildings	The Energy Efficiency Directive: each Member State shall ensure that, as from 1 January 2014, 3 % of the total floor	By 2020, 2% of the building stock is renovated per year. *[taken directly from the Roadmap]* *The 'Renovate Europe' Campaign initiated by*	Ambitious – requires significant investment	- This indicator is not directly related to energy or resource efficiency of buildings but gives information of the renovation rate of the existing stock. - Assuming that renovation	- Indicator is currently not available - Data is lacking on the number and degree of refurbishments (e.g. deep renovation) - Definitions and	The indicator would potentially be accepted by most	Potentially - By Member State - By type of dwelling - By level of renovation

[115] http://www.odyssee-indicators.org/online-indicators/

[116] VHK (2011) MEErP methodology part 2 final.

[117] ETC/SCP (2011) Progress in Sustainable Consumption and Production in Europe. Indicator-based report

[118] http://www.odyssee-indicators.org/online-indicators/

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	area of heated and/or cooled buildings owned and occupied by its central government is renovated each year to meet at least the minimum energy performance requirements.[119] It is estimated that only about 1.2% of Europe's existing buildings are renovated each year. This corresponds to about 2.52 million buildings are renovated each year, but there is only limited knowledge about the nature and extent of these renovations[120]	*EuroACE (The European Alliance of Companies for Energy Efficiency in Buildings) is calling for an annual renovation rate of the EU building stock from the current rate of 1% to 3% by 2020 and to ensure that the aggregate result of those renovations leads to an 80% reduction of the energy demand of the building stock by 2050 as compared to 2005.*[121]		practices are energy- and resource-efficient, a high refurbishment rate would quickly reduce the consumption of energy and resources in the building sector.	indicators are needed		

[119] Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency , amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC.

[120] Fraunhofer ISI, ENERDATA, ISIS, Technical University of Vienna and Wuppertal Institute (2009) Study on the Energy Savings Potentials in EU Member States, Candidate Countries and EEA Countries. Commissioned by the European Commission, DG Energy and Transport

[121] http://www.renovate-europe.eu/

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
15.3 Recycling of construction and demolition waste							
15.3.a Rate of recycling of construction and demolition waste	The EU Waste Framework Directive[122] set a target of 70% for preparing for re-use, recycling and other material recovery for construction and demolition (C&D) waste by 2020. *A reuse, recycling and material recovery rate of 47% is estimated for the EU-27 in 2006*[123]	By 2020, 70% of non-hazardous C&D waste is recycled *[taken directly from the Roadmap, same as the Waste Framework Directive]*	Feasible	Mentioned directly in the milestone	Eurostat tracks waste generation and treatment but C&D waste is not reliable data Same as **3.2.a Recycling rates**	The indicator and definitions need to be agreed among stakeholders	Yes - By Member State - By type of waste (e.g. material) - By type of waste treatment

[122] Waste Framework Directive 2008/98/EC

[123] BIO Intelligence Service (2011) Study on management of construction and demolition waste in the EU. Prepared the European Commission, DG Environment

3.1.16 Milestone 16: Ensuring efficient mobility

Milestone 1: By 2020, overall efficiency in the transport sector will deliver greater value with optimal use of resources like raw materials, energy, and land, and reduced impacts on climate change, air pollution, noise, health, accidents, biodiversity and ecosystem degradation. Transport will use less and cleaner energy, better exploit a modern infrastructure and reduce its negative impact on the environment and key natural assets like water, land and ecosystems. There will be on average a 1% yearly reduction, beginning in 2012, in transport GHG emissions.

This milestone refers to two different environmental aspects of transport:

- **16.1 Efficiency of transport vehicles**
  - 16.1.a Average CO_2 emissions per km for new passenger cars
  - 16.1.b Total energy consumption/km driven as a proxy for energy efficiency in transport
  - 16.1.c Noise emissions
- **16.2 Efficiency of transport infrastructure**
  - 16.2.a Consumption of materials per km and passenger
  - 16.2.b Land take per km and passenger
  - 16.2.c Fatal accidents per km and passenger
- **16.3 The environmental impacts of transport**
  - 16.3.a GHG emissions in the transport sector
  - 16.3.b Pollutant emissions (NOx, VOC, PM) from the transport sector

Table 3-16: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 16: Ensuring efficient mobility							
16.1 Efficiency of transport vehicles							
16.1.a Average CO_2 emissions per km for new passenger cars	Under the EU Cars Regulation (EC 443/2009), the fleet average to be achieved by all new cars is 95 g/km by 2020. A revision of this regulation is planned in the coming years. *The 2015 and 2020 targets represent reductions of 18% and 40% respectively compared with the 2007 fleet average of 158.7 g/km.*	These targets are planned to be reviewed by end of 2014 in order to adapt them to the EU 2020 targets. *[proposed in the Roadmap Analysis Part II]*	Depends on how strict the targets are set.	- Yes, directly related to the objectives of the milestone	Yes Eurostat has available data until 2009. This indicator is defined as the average emissions of carbon dioxide per kilometre by new passenger cars sold in a given year. *A level 3 indicator of SDS* *Proposed to be used in SBRE*	Yes, the indicator is accepted by most stakeholders	Yes - By Member State
16.1.b Total energy consumption/km driven as a proxy for energy efficiency in transport	The EU Cars Regulation (EC 443/2009) sets targets for CO_2 emissions of passenger cars, which in terms of fuel consumption are equivalent to 4.1 litres of petrol per 100 km or 3.6 l of diesel per 100 km by 2020.	By 2020, fuel consumption of passenger cars are equivalent to 4.1 litres of petrol per 100 km or 3.6 l of diesel per 100 km *[proposed in the Roadmap Analysis Part II]*	Ambitious	- Yes, directly related to the objectives of the milestone	Yes Eurostat tracks both transport energy consumption and the number passenger kilometres travelled	Yes, , the indicator is accepted by most stakeholders	Yes - By Member State - By fuel type

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
16.1.c Noise emissions	The Sixth Environmental Action Programme (6EAP) sets the objective of *'substantially reducing the number of people regularly affected by long-term average levels of noise, in particular from traffic which, according to scientific studies, cause detrimental effects on human health, and preparing the next steps in the work with the (environmental) noise directive'.* Various directives set noise limits for road vehicles, tyres, trains and aircraft.	No target proposed, but stricter noise limits could be considered in the various noise related directives	Depends on how strict the targets are set.	- Relates to a part of the milestone	There is no official statistics on noise emissions in the transport sector, but noise levels can be measured according to test measurements		
16.2 Efficiency of transport infrastructure							
16.2.a Consumption of materials per km and passenger	No existing target	No target proposed	NA	- Relevant for non-energy related resource use in the transport sector	No official statistics		

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
16.2.b Land take per km and passenger	No existing target	No target proposed Related to **12.2.a The resulting land take**	NA	- Relevant for determining the transport sector's contribution to land take	No official statistics, but land cover data can be used to determined the causes of land change	Yes, the indicator will probably be accepted by most.	Yes - By Member State - By type of land area
16.2.c Fatal accidents per km and passenger	In the road safety action programme (RSAP) the Commission proposed to maintain the target of halving the number of road deaths in the EU between 2010 and 2020.[124] *The number of people killed in road accidents have constantly been falling. In 2009 there were 34,500 fatalities, a decrease of nearly 40% compared to a decade earlier.*	By 2020, the number of road deaths in the EU will be halved compared to 2010.	Feasible	- Accidents are mentioned as part of the milestone	The indicator is derived from the CARE (Community database on Accidents on the Roads in Europe) database. Good data availability until 2009. *Used by SDS*	Yes, the indicator is accepted	Yes - By Member State
16.3 The environmental impacts of transport							
16.3.a GHG emissions in the transport sector	Objectives for GHG emissions for transport have already been proposed in the Transport White Paper[125], which aims to	By 2050, GHG emissions from transport (incl. aviation and excl. maritime) should be reduced by 60% compared to 1990.	Ambitious *Despite increases in fuel efficiency, GHG emissions from transport have risen with 20% in the*	- Relevant to an important part of the milestone - Also related to air emissions	- Eurostat has available data from 1990 to 2010 [tsdtr410] *Used by SDS* *Proposed to be used in SBRE*	Yes, the indicator is accepted	Yes - By Member State - By transport form (road, rail, inland navigation and domestic aviation)

[124] http://europa.eu/legislation_summaries/transport/road_transport/tr0036_en.htm

[125] COM (2011) 144 final

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	reduce the GHG emissions in 60% by 2050. This objective is also detailed in more specific steps such as 1% reduction per year until 2030 and 5% reduction per year until 2050. *[taken directly from the Roadmap]*	By 2030, GHG emissions from transport (incl. aviation and excl. maritime) should be reduced by 10% compared to 1990. *[from the Roadmap for moving to a competitive low carbon economy in 2050]*	*period 1990 to 2010 due to an increase in volume of transport.*				
16.3.b Pollutant emissions (NO_x, VOC, PM, ozone) from the transport sector	Air Quality targets exist See 11.1 Air emissions	See targets proposed under 11.1 Air emissions *[proposed in the Annex 6 to the Roadmap]*	Feasible	- Relevant to an important part of the milestone on transport as well as air quality	- Available from EEA / Reporting under NECD) *PM and ozone emissions are part of SDS. Proposed to be used in SBRE* Related to: **11.1.b Emissions of nitrogen oxides (NO_x)** **11.1.c Emissions of non-methane volatile organic compounds (NMVOC)** **11.1.d Emissions of particulate matter (PM2.5)** **11.1.e Ozone emissions**	Yes, accepted by most	Yes - By Member State - By sector

3.1.17 Milestone 17: New pathways to action on resource efficiency

***Milestone 17**: By 2020 stakeholders at all levels will be mobilised to ensure that policy, financing, investment, research and innovation are coherent and mutually reinforcing. Ambitious resource efficiency targets and robust, timely indicators will guide public and private decision-makers in the transformation of the economy towards greater resource efficiency.*

This milestone aims to put together the efforts of policy makers, private companies, associations and other stakeholders to join their efforts on meeting the goals of the Roadmap to a Resource Efficient Europe. In order to attain this goal, the targets and indicators for resource efficiency should be completely developed and publicly available so that they can be used to guide public and private decisions. Furthermore, the involvement of stakeholders in the decision process should be assured.

- **17.1 Financing the transition towards resource efficiency**
  - 17.1.a Environmental Protection Expenditures (EPE)
  - 17.1.b Share of total budget spent on the environmental and resource efficiency measures
  - 17.1.c Share of total EU budget spent on the environmental and resource efficiency measures
  - 17.1.c EU eco-innovation expenditure
  - 17.1.d Capitalisation of 'Core' and 'broad' Sustainable and Responsible Investments (SRI) in Europe
  - 17.1.e Share of EIB loans dedicated to energy projects
- **17.2 Engaging stakeholders**
  - 17.2.a Level of citizens' confidence in EU institutions
  - 17.2.b Public awareness
  - 17.3.c Number of cities signing the Aalborg Commitments

Table 3-17: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 17: New pathways to action on resource efficiency							
17.1 Financing the transition towards resource efficiency							
17.1.a Environmental Protection Expenditures (EPE)	No existing target *OECD definition: Environmental protection (EP) activities include all purposeful activities directly aimed at the prevention, reduction and elimination of pollution or any other degradation of the environment resulting from the production process or from the use of goods and services.* *As a percentage of GDP the total EPE of the three main sectors increased by 0.2% points between 2002-2009, and reached 2.25% in 2009.*	By 2020, the share of GDP of total EPE reaches 5%.	Feasible, if the conditions are right.	Yes, directly related to the milestone	Eurostat has data on public/private environmental protection expenditure *Based on EEA SCP Indicator 24.1* *Used in iGG* Same as: - **7.2.e Expenditure on environmental protection**	Yes, the indicator is accepted by most	- By Member States - By type of actor (e.g. Public, Industry, Specialised producers) - By type of expenditure (e.g. Current expenditure, Investment)
17.1.b Share of total budget spent on the environmental and resource efficiency measures *[policy response indicator]*	No existing targets	No target proposed	NA	- Yes, directly related to the milestone and suggested as an indicator in the Roadmap Analysis Part II. - Environment related expenditure does not always include resource efficiency measures	Estimates of private and public spending on environmental and resource efficiency are not widely available, but could potentially be defined and reported. [indicator proposed in the Roadmap Analysis Part II] Similar to:	Depends on the methodology for the indicator and how it is defined	Yes - By Member States - By source of funds (e.g. business, government, etc.) - By type of environmental project/ resource efficiency objective (e.g. water and waste treat ment, renewal of

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
					- **4.3.a Public R&D expenditure related to resource efficiency/ eco-innovation** - **7.2.e Expenditure on environmental protection** - **7.2.f Funding for green infrastructure** - **8.6. a Financing biodiversity management** *Several variations used in iGG.*		contaminated sites, etc.)
17.1.c Share of total EU budget spent on the environmental and resource efficiency measures *[policy response indicator]*	Several EU funds are aimed at environmental and resource efficiency objectives, e.g. European Agricultural Fund for Rural Development (EAFRD), the Cohesion and Structural Funds, LIFE+ and the research and innovation programmes (e.g. FP7). *Between 2007 and 2013, the total amount of Structural and Cohesion Funds allocated to environmental programmes has doubled since the previous*	30% of the EU Regional Budget (i.e. cohesion policy budget) allocated to environment related expenditure. *[target proposed in the Roadmap Analysis Part II]*	Feasible	- Gives an idea of the EU funding for environmental initiatives within EU regional policy. However, does not provide more detailed information on resource-efficient specific projects - Environment related expenditure does not always include resource efficiency measures	Budget allocations could be tracked. Similar to: - **4.3.b EU R&D expenditure related to resource efficiency** - **4.3.c EU eco-innovation expenditure** - **7.2.e Expenditure on environmental protection** - **7.2.f Funding for green infrastructure** - **8.6. a Financing**	Yes, the indicator is accepted by most	EU level only - By type of environmental project/ resource efficiency objective - Direct or indirect investments (e.g. water and waste treatment, renewal of contaminated sites, etc.)

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	period to around €100 billion – 30% of the total.[126]				**biodiversity management**		
17.1.c EU eco-innovation expenditure *[policy response indicator]*	No existing target, but budget is agreed *For 2008-2013, about €200 million was allocated to projects under the Eco-Innovation initiative*	Under the next Programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises (COSME) for 2014 to 2020, at least €400 million are made available for eco-innovation projects.	Feasible (50% increase)	- Support to SMEs should reflect the priorities of Flagship Initiative for a Resource Efficient Europe	Yes, budget allocations are easy to track. Same as: **4.3.c EU eco-innovation expenditure**	Yes, the indicator is accepted by most	EU level only Perhaps by type of project/ market sector
17.1.d Capitalisation of 'Core' and 'broad' Sustainable and Responsible Investments (SRI) in Europe	No existing target *Total SRI assets under management in Europe have reached 5 trillion € as of December 2009. It has increased 87% between 2007 and 2009.*	By 2020, 100% increase SRI assets under management in Europe (compared to 2009 figures). *[indicator proposed in the Roadmap Analysis Part II]*	Feasible, if the conditions are right.	Yes – provides a picture of private sector investments in SRI issues. However, it is a broad indicator and does not measure only RE aspects.	Based on ETC/SCP Indicator 24.1 for the EEA (to be further developed).	Yes, the indicator would probably be accepted by most	By type of investor and SRI segment (core or broad)
17.1.e Share of EIB loans dedicated to	*In 2011, the EIB lent EUR 5.5 billion for projects in renewable energy and EUR 1.3 billion for projects in energy efficiency*	By 2020, an increase of 25% of EIB loans dedicated to	Feasible	Yes - specific targets related to greenhouse gas emissions, energy efficiency and renewable	Yes, budget allocations are easy to track.	Yes, the indicator is accepted by most	By type of project

[126] Share of biodiversity protection in Cohesion and Structural Funds. Total of EUR 5 241 million in 2008. Share of actual allocation of biodiversity protection projects:

- EUR 2 719 million for the "Promotion of biodiversity and nature protection" (52% of the total three programmes)
- EUR 1 146 million for the "protection of natural assets" (22% of the total three programmes)
- EUR 1 376 million for the "protection and development of natural heritage" (26% of the total three programmes)

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
energy projects	*(accounting for 60% of total budget – 11.5 billion – allocated for energy projects.)*	renewable energy and energy efficiency projects.		energy, are relevant for achieving the resource efficiency objectives.			
17.2 Engaging stakeholders							
17.2.a Level of citizens' confidence in EU institutions	No existing target *According to Eurobarometer surveys, the level of citizens confidence in the European Commission have fallen slightly from 50% in 2007 to 46% in 2009. There is more confidence in the European Parliament (50% in 2009), but less in the Council of the European Union (45% in 2009). Much of the decrease in trust may be attributed to the Euro crisis.*	By 2020, a majority of citizens in the EU should feel that they can generally trust the EU institutions (Council of the European Union, European Parliament and European Commission)	Feasible	Confidence in EU policy and actions will be important to achieve this milestone.	The Eurobarometer Survey has been conducted twice a year since 1973 to monitor the evolution of public opinion in the Member States. Trust is not precisely defined and could leave some room for interpretation to the interviewees. *Used in SDS*	Yes, the indicator is generally accepted	- By EU institution (Council of the European Union, European Parliament and European Commission) By Member State
17.2.b Public awareness	No existing target Suggested in Biodiversity Strategy In the 2012 Standard Eurobarometer survey EU under 5% of citizens thought that climate change or the environment were among the	No target proposed	NA	Awareness of environmental issues and sustainability will be important to achieve this milestone.	Surveyed in the standard Eurobarometer Survey *SEBI 26*	Yes, the indicator would probably be accepted by most	By main concern at EU level, national level and personal level

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	two most important issues facing the EU.[127] In the 2011 Special Eurobarometer survey, a large majority though that the EU, national governments, corporations as well as themselves could do more to use resource more efficiently[128].						
17.3.c Number of cities signing the Aalborg Commitments	No existing target At present 666 local authorities are full signatories of the Aalborg Commitments. An additional 56 have declared that they intend on signing.[129]	By 2020, all local authorities in the EU have signed the Aalborg Commitments	Feasible	The indicator is relevant to track the engagement of local communities and authorities, but might not be suitable to set a target.	Yes, the signatories are tracked on the Aalborg Commitments website *Part of EEA SCP*	Yes, the indicator would probably be accepted by most	By Member State

[127] Standard Eurobarometer 77 (2012) Public Opinion in the European Union. Spring 2012. Survey carried out by TNS Opinion & Social at the request of the European Commission, DG Communication.

[128] Special Eurobarometer 365 (2011) Attitudes of European citizens towards the environment. Survey carried out by TNS Opinion & Social at the request of the European Commission, DG Communication.

[129] List of Aalborg Commitments signatories available at: http://www.aalborgplus10.dk/default.aspx?m=2&i=308

3.1.18 Milestone 18: Supporting resource efficiency internationally

***Milestone 18**: By 2020 resource efficiency will be a shared objective of the international community, and progress will have been made towards it based on the approaches agreed in Rio.*

This milestone can be interpreted in two ways:

- **18.1 The EU's international efforts to achieving resource efficiency globally**
  - a) Amount or share of Official Development Assistance from the EU related to resource efficiency (or green growth)
  - b) Amount or share of Foreign Direct Investment from the EU related to resource efficiency (or green growth)
  - c) Amount of EU carbon credits obtained in a non-EU country
- **18.2 The international community's progress towards resource efficiency** (based on the proposal from the Stockholm Resilience Centre[130])
  - a) Atmospheric CO_2 concentration (parts per million by volume)
  - b) Rate of biodiversity loss
  - c) Amount of N_2 removed from the atmosphere for human use
  - d) Quantity of phosphorous flowing into the oceans
  - e) Stratospheric ozone depletion (concentration of ozone)
  - f) Ocean acidification – global mean saturation state of aragonite in surface water
  - g) Global freshwater use
  - h) Percentage of land cover converted to cropland

International cooperation will be essential to ensure that resource efficiency is fostered worldwide. In particular, the efficient management of resources will require exchanging skills, technologies and best practices.

- **Collaboration on resource efficiency is a part of a broad policy process on Sustainable Consumption and Production (SCP).** In 2002, the Johannesburg Plan of Implementation (JPoI) called on all stakeholders to "*encourage and promote the development of a 10-year framework of programmes (10YFP) in support of regional and national initiatives to*

[130] Rockstrom et al. (2009) Editorial, Earth's boundaries? Vol 461 September 2009, issue 461, 447-448. See also: www.stockholmresilience.org/ planetary-boundaries)

accelerate the shift towards SCP". The Marrakech Process, a bottom-up multi-stakeholder process launched in 2003 in order to respond to the call of the JPoI, identified needs and priorities at regional and national level to support the development of SCP strategies, including resource efficiency strategies.

- **Recently, international commitments towards resource efficiency have been made during the United Nations Conference on Sustainable Development held in Rio in June 2012 (Rio+20).** According to the Article 226 from the Rio+20 final document[131] and based on what was committed in the Johannesburg Plan of Implementation, the 10YFP program has been adopted and will increase awareness of the resource efficiency issue in the more general policy context of SCP[132]. Similarly, the final agreement from Rio+20 recognised the importance of improving resource efficiency within the green economy context. Joint efforts towards sustainable development and poverty eradication will be made by strengthening worldwide ability to manage natural resources with lower negative environmental impacts (Art. 60). Moreover, an agenda establishing Sustainable Development Goals should be established for the following years without reducing global efforts to the achievement of Millennium Development Goals. A few countries such as Colombia and several stakeholders (e.g. NGOs) have already suggested including resource efficiency goals within the list of Sustainable Development Goals. This was also envisioned by the Council of the European Union in March 2012[133].
- **Furthermore, commitments to improve resource efficiency in several sectors like energy, food or water were adopted by the international community**. For example, energy resources have been dealt within the Rio+20 conference during which the international community agreed on the "Sustainable Energy for All" initiative launched by the Secretary General of United Nations. The initiative is to focus on access to energy, renewable energies and energy efficiency (Art. 129). Commitments for water resource efficiency have been reaffirmed following the JPoI and the Millennium Declaration regarding "*halving by 2015 the proportion of people without access to safe drinking water and basic sanitation and the development of integrated water resource management and water efficiency plans, ensuring sustainable water use*"[134] (Art.120).
- **During the last decade, several bilateral agreements aimed at developing cooperation in technology transfer and trade were signed with the EU and non-EU countries**. Resource efficiency is included in some agreements like the ones between the European Commission and China. Indeed, the EC is driving forward cooperation with China on resource efficiency in areas such as smart grids, power generation and the building sector through ministerial-level dialogues, concrete research programs and expert-level cooperation. Bilateral agreements are also often made with developing

[131] https://rio20.un.org/sites/rio20.un.org/files/a-conf.216l-1_english.pdf.pdf

[132] http://www.unep.fr/scp/marrakech/10yfp.htm

[133] http://register.consilium.europa.eu/pdf/fr/12/st07/st07514.fr12.pdf

[134] "The future we want" report -UNCSD 2012-. https://rio20.un.org/sites/rio20.un.org/files/a-conf.216l-1_english.pdf.pdf

countries in order to help them through financial, technical and technological assistance, which aims at better implementing national policies and international commitments on resource efficiency.

Table 3-18: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 18: Supporting resource efficiency internationally							
18.1 The EU's international efforts to achieving resource efficiency globally							
18.1.a Amount or share of Official Development Assistance (ODA) from the EU related to resource efficiency (or green growth) *[policy response indicator]*	UN target of reaching a level of aid equivalent to 0.7% of a donor country's gross national income by 2015. *In 2008 the EU-27 average was 0.40 %. Only Sweden, Luxembourg, Denmark and the Netherlands reached or exceeded this goal in 2008.*	No new target proposed By 2015, the total Official Development Assistance from the EU and its Member States should be at least 0.7% of EU's combined gross national income.	Ambitious (given the current economic situation)	- If it was possible to determine the amount of ODA related to resource efficiency, it would be a good proxy EU's international support[135] - Linked with the EU's contribution to the Millennium Development Goals[136]	- Eurostat tracks total ODA. - The OECD's Development Assistance Committee (DAC) has established a comprehensive system for measuring aid targeting the objectives of the Rio Conventions (e.g. biodiversity, climate change mitigation, desertification), environment and renewable energy. - Difficult to identify the environmental purpose of ODA, but some standards exist from the OECD. *Used in SDS.* *Proposed in OECDs green growth indicators.*	Yes, the indicator is accepted by most	Yes - By Member State / country or world region - By sector (e.g. humanitarian aid, budget support, production, social infrastructure, economic infrastructure, etc.)

[135] OECD (2011) Towards green growth, monitoring progress.

[136] European Commission (2010) EU Contribution to the Millennium Development Goals. Some key results from European Commission Programmes.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
18.1.b Amount or share of Foreign Direct Investment (FDI) from the EU related to resource efficiency (or green growth)	No existing target *Outward (total) FDI flows:* *2009: €316.5 billion* *2010: €145.6 billion* *2011: €369.9 billion*	No target proposed	NA	- If it was possible to determine the amount of FDI related to resource efficiency, it would be a good proxy for private investment and technology transfer. [137]	- Eurostat tracks total FDI flows. - Difficult to identify the environmental purpose of a FDI flow, but some standards exist from the OECD. *Used in SDS.* *Proposed in OECDs green growth indicators.*	Yes, the indicator is accepted by most	Yes - By Member State / country or world region - By outward/ inward flows - By economic activity - By type of investment (equity capital, loans and reinvested earnings)
18.1.c Trading value of EU carbon credits obtained in a non-EU country	No existing target	No target proposed	NA	- Carbon trading mechanism can help developing countries to reduce their greenhouse gas emissions and help EU companies achieve GHG reductions in a cost-effective way.	The UNEP-RISO CDM project database contains no statistical data on value of investments or price of certified emissions reductions (CERs). Alternatively the investment flows associated with CDM projects could be monitored, but there is no standard methodology to provide a comprehensive measurable indicator without a risk of double-counting private flows	Yes, the indicator is accepted by most	Yes - By country/ region as buyers/ sellers - By value - By amount of CO_2-eq. - By type of transaction (e.g. project, spot and secondary Kyoto offsets, allowance markets) - By type of project (e.g. renewable energy, HFCs, energy efficiency, etc.)

[137] OECD (20) Towards green growth, monitoring progress. http://www.oecd.org/greengrowth/48224574.pdf

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
18.2 The international community's progress towards resource efficiency **(Planetary boundary limits proposed by Stockholm Resilience Centre[138])**							
18.2.a Atmospheric CO_2 concentration (parts per million by volume)	EU targets for GHG emissions for 2020 (-20% compared to 1990 by 2020, -30% if conditions are right) and proposal for 80-95% reduction (compared to 1990) by 2050. The international community has agreed that global warming should be kept below 2°C compared to the temperature in pre-industrial times. That means a temperature increase of no more than 1.2°C above today's level. *The current level is 387 ppm by volume.*	Atmospheric carbon dioxide concentration (parts per million by volume) < 350 *[as proposed by the Stockholm Resilience Centre]*	Ambitious	- Yes, good indicator to support the international commitment	Yes, tracked by the Mauna Loa Observatory, which is part of the National Oceanic and Atmospheric Administration (NOAA) in the USA[139] *An alternative indicator is global surface average temperature, which is part of SDS.*	Yes, the indicator is accepted by most	Only global concentration
18.2.b Rate of biodiversity loss	Aichi Biodiversity Target 5[140]:	Maintain the EU Biodiversity	Ambitious	Relevant for the Biodiversity Milestone	See indicators under the Biodiversity Milestone		

[138] Rockstrom et al. (2009) Editorial, Earth's boundaries? Vol 461 September 2009, issue 461, 447-448. See also: www.stockholmresilience.org/ planetary-boundaries)

[139] http://co2now.org/Know-CO2/CO2-Monitoring/

[140] Convention on biological diversity: http://www.cbd.int/sp/targets/

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
	By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced. *The fossil record shows that the background extinction rate for marine life is 0.1–1 extinctions per million species per year; for mammals it is 0.2–0.5 extinctions per million species per year16. Today, the rate of extinction of species is estimated to be 100 to 1,000 times more than what could be considered natural.*	Strategy targets. See Milestone 8 for more on biodiversity indicators.					
18.2.c Amount of N_2 removed from the atmosphere for human use	**Related to 12.3.d Gross nutrient balance** *The current global level is 121 million tonnes/year.*	By 2050, limit the global amount of N_2 removed from the atmosphere for human use to 35 millions of tonnes/year *[as proposed by the Stockholm Resilience Centre]*	Ambitious (70% decrease)	- Related to many environmental impacts including eutrophication and loss of biodiversity in rivers, lakes and seas. Related to **12.3.d Gross nutrient balance / 14.3.c Gross nutrient balance**	The indicator could potentially be tracked, but reliable data is not currently available	Yes, the indicator would probably be accepted by most.	- By country or region - By source of N2

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
18.2.d Quantity of phosphorous flowing into the oceans	No existing target *The current global level is 8.5–9.5 million tonnes/year.*	Limit quantity of phosphorus flowing into the oceans to 11 millions of tonnes/year *[as proposed by the Stockholm Resilience Centre]*	Feasible (the current global level is under the proposed planetary boundary)	- Related to marine biodiversity loss in oceans Related to **12.3.d Gross nutrient balance / 14.3.c Gross nutrient balance**	The indicator could potentially be tracked, but reliable data is not currently available	Yes, the indicator would probably be accepted by most.	- By country or region - By ocean
18.2.e Stratospheric ozone depletion (concentration of ozone)	1987 Montreal Protocol *The current global level is 283 Dobson units. The ozone layer is recovering due to a ban of CFCs. By 2010 the EU had reduced its consumption of the main ozone-depleting substances to zero, 10 years ahead of its obligation under the Montreal Protocol*	By 2020, limit the concentration of ozone to 276 Dobson units. *[as proposed by the Stockholm Resilience Centre]*	Feasible (the current level is thought to be within the planetary boundaries)	- Relevant for human health	There is a worldwide network of monitoring stations that monitor this indicator.	Yes, the indicator is accepted by most	
18.2.f Ocean acidification (global mean saturation state of aragonite in surface water)	No existing target *The current global level is.*2.90.	By 2020, limit the global mean saturation state of aragonite in surface water to 2.75. *[as proposed by the Stockholm Resilience Centre]*	Feasible (the current level is thought to be within the planetary boundaries)	- Related to climate change - Relevant for the health of marine ecosystems	Tracked by IPCC	Yes, the indicator is accepted by most	

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
18.2.g Global freshwater use	One of the UN Millennium Development Goals is to halve, by 2015, the proportion of the population without sustainable access to safe drinking water and basic sanitation. *The current level of human freshwater consumption is 2,600 km^3 per year*	Limit consumption of freshwater by humans to 4,000 km^3 per year *[as proposed by the Stockholm Resilience Centre]*	Feasible	- The availability of freshwater is critical on a local scale and not a global scale. - It would be better to balance water availability with demand	Global, regional and national water data is currently incomplete and unreliable	Yes, the indicator is accepted by most, but probably not to establish a target	
18.2.h Percentage of land cover converted to cropland	Currently 11.7% of global land has been converted to cropland	Limit percentage of global land cover converted to cropland to 15%. *[as proposed by the Stockholm Resilience Centre]*	Feasible (the current level is thought to be within the planetary boundaries)	- Relevant to achieve a global agreement on land use and land use change to avoid deforestation and degradation of natural ecosystems	Global data is incomplete, but could be gathered by satellite images.	Yes, the indicator is accepted by most, but probably not to use to establish a target	

3.1.19 Milestone 19: Improving the delivery of benefits from EU environmental measures

***Milestone 19**: By 2020 the benefits from EU environmental legislation will be fully delivered.*

There are many benefits from EU environmental legislation, including[141]:

- Improving the state of the environment
- Contributing to green growth
- Contributing to healthier lifestyles and increased well-being

The milestone could be tracked using indicators/proxies for:

- **19.1 The benefits of environmental legislation**
  - 19.1.a Improving the state of the environment
  - 19.1.b Avoided health expenditure due to cleaner air
  - 19.1.c Avoided work days lost due to air pollution
  - 19.1.d Number of green jobs created
  - 19.1.e Value of ecosystem services
  - 19.1.f Future costs, if resource efficiency targets not met
- **19.2 Compliance to EU environmental legislation**
  - 19.2.a Transposition of Community law
  - 19.2.b Expenditure of environmental protection
  - 19.2.c Infringements of EU environmental legislation
  - 19.2.d Waste legislation
  - 19.2.e Biodiversity Strategy
  - 19.2.f Freshwater (River Basin Management Plans)
  - 19.2.g Fisheries
  - 19.2.h Air quality

The environmental *acquis* sets up a wide range of instruments, including minimum standards, prohibitions and restrictions, economic instruments, sensitive area designations, plans and programmes, and public participation and information provisions.

[141] European Commission (2012) Improving the delivery of benefits from EU environment measures: building confidence through better knowledge and responsiveness. COM(2012) 95.

However, EU environmental legislation faces the challenge of being applied in many different national, sometimes cross-border contexts. Currently, EU environmental legislation is not implemented equally and fully in all Member States, which represents a high cost for society in terms of undelivered environmental, health, social and economic benefits. According to European Commission (2011), insufficient implementation of the environmental *acquis* would entail a social cost of 200-300 billion euros per year.

To measure progress in implementation of the environmental *acquis*, the definition of environmental implementation gap from European Commission (2011) could be used. It includes:

- The gap between current legally binding targets and the current level of implementation; and
- The gap between agreed future targets and the current level of implementation.

At sector level, the gap can be measured thanks to existing targets. For example:

- In the waste sector, there are gaps related to waste recycling and waste prevention; or
- Regarding biodiversity, the 2010 and 2020 targets of putting an end to biodiversity losses have not been achieved.

Table 3-19: Overview of possible quantified targets that could be proposed for the milestones in the Resource Efficiency Roadmap

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
MILESTONE 19: Improving the delivery of benefits from EU environmental measures							
19.1 The benefits of environmental legislation							
19.1.a Improving the state of the environment	The Sixth Environmental Action Plan (6EAP) covered the period 2002 to 2011. EU environmental policy is part of the Europe 2020 Strategy.[142]	No specific target proposed	NA	- No single indicator to cover all environmental issues	Related to: **7.1.c Number and share of ecosystems and their services in the EU that have been mapped and assessed**		
19.1.b Avoided health expenditure due to cleaner air	The Sixth Environmental Action Plan (6EAP) *The World Health Organization (WHO) estimates the environmental burden of disease in the pan-European region at between 15 and 20 % of total deaths, and 18 to 20 % of disability-adjusted life years (DALYs)*[143]	No specific target proposed	NA	- Relevant for understanding the health benefits of environmental legislation	While there are estimates for the impact of environmental factors on human health, they are not robust or reliable. Related to air quality milestone		
19.1.c Avoided work days lost due to air pollution	See 19.1.b Avoided health expenditure due to cleaner air	No specific target proposed	NA	- Relevant for understanding the health benefits of environmental	Estimates are not reliable as there are issues with the assessment		

[142] European Commission (2011) The Sixth Community Environment Action Programme. Final Assessment. COM(2011) 531 final.

[143] EEA (2010) The European Environment. State and Outlook 2010.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
				legislation	methodologies. Related to air quality milestone Alternative indicator to **19.1.b Avoided health expenditure due to cleaner air**		
19.1.d Number of green jobs created	Europe's 2020 Strategy for smart, sustainable and inclusive growth aims to increase employment in the EU *About 2.7 million people worked in the EU-27 eco-industry in 2008 which represented 0.8% of the total workforce. Using a broader definition, some 19 million jobs in Europe are related to the environment, which represents some 5% of the total working population*[144].	By 2020, the number of green jobs should be double of 2010.	Ambitious	- Relevant to determine the employment benefits of resource efficiency and environmental legislation, but maybe not relevant to set a target	There is currently no clear definition or method to determine the number of green jobs. The number of jobs in the eco-industries can be determined from data available in Eurostat, but this is only a fraction of green jobs. iGG includes *Share of environment related employment* *OECD uses Employment in the environmental goods and services (EGS) sector. An indicator on Green Entrepreneurship is also proposed.*		

[144] Ecorys (2012) The number of Jobs dependent on the Environment and Resource Efficiency improvements. Commissioned by the European Commission, DG Environment.

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
19.1.e Value of ecosystem services	See milestone on Ecosystems				Same as: **7.1.d Total value of ecosystem services in the EU**		
19.1.f Future costs, if resource efficiency targets not met	No existing target	No target proposed.	NA		It is possible to assess the costs, but the results would not be robust or reliable.		
19.2 Compliance to EU environmental legislation							
19.2.a Transposition of Community law	In theory, all EU legislation should be adopted and implemented in all Member States. In 2009, the EU average for transposition of EU law related to environment, health and consumer protection was 98.5%.	By 2020, all Member States should comply to all EU environmental legislation.	Feasible	- The indicator is directly related to compliance to EU legislation	Data readily available from Eurostat (2007 – 2009). The indicator measures the progress in the notification by Member States to the European Commission of the national measures for the transposition of directives in all sectors. It is calculated as the percentage of directives for which measures of enactment have been notified among the total number of directives applicable on the reference date. *Used in SDS* *Similar to:* - **3.4.a Compliance to**	Yes, the indicator is accepted by most	- By Member State - By policy area

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
					EU waste legislation - **9.1.a Number (or share) of RBMPs adopted** - **13.1.a The number of Member States that have developed a Marine Strategy**		
19.2.b Expenditure of environmental protection	No specific target, besides the EU Biodiversity Strategy	See **17.1.a Environmental Protection Expenditures (EPE)**			Same as: **7.2.e / 17.1.a Environmental Protection Expenditures (EPE)**		
19.2.c Infringements of EU environmental legislation	Infringement cases can cover cases of different natures, including not only the failure to transpose or to notify the transposition of EU directives, but also the lack of conformity of a national law with the rules of the EC Treaty, or a regulation. The indicator also covers cases where the consistent administrative practice of a Member State authority is not in conformity with Community law. In 2011, there were 73 new infringement cases, a steady decrease since 2007, where there were 212 new infringement cases.	No target proposed.	NA	The indicator is directly related to compliance to EU legislation	Data readily available from Eurostat (2007 – 2011). This indicator measures the total number of new actions brought before the European Court of Justice for failure of a Member State to fulfil its obligations. *Used in SDS and iGG*	Yes, the indicator is accepted by most	- By Member State

Possible indicators	Existing target / *Current progress*	Potential target	Attainable	Relevant	Measurable	Acceptable	Disaggregation
19.2.d Waste legislation	Waste Framework Directive	See **3.4.a Compliance to EU waste legislation**			Same as: **3.4.a Compliance to EU waste legislation**		
19.2.e Biodiversity Strategy	Biodiversity Strategy Marine Strategy	See targets proposed under the **Milestones 7 and 8 for ecosystems and biodiversity**			For marine related same as: **13.1.a The number of Member States that have developed a Marine Strategy**		
19.2.f Freshwater (River Basin Management Plans)	Water Framework Directive	See **9.1.a Number (or share) of RBMPs adopted**			Same as: **9.1.a Number (or share) of RBMPs adopted**		
19.2.g Fisheries	Marine Strategy	See **13.1.a The number of Member States that have developed a Marine Strategy**			Same as: **13.1.a The number of Member States that have developed a Marine Strategy**		
19.2.h Air quality	Air Quality Directive	See targets under **11.2 Air quality**					

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