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On the Progress of the Thematic Strategy on the Sustainable Use of Natural Resources

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1. INTRODUCTION

On 21 December 2005 the Commission adopted its Communication "Thematic Strategy on the Sustainable Use of Natural Resources"¹ (hereafter referred to as the Resource Strategy) in response to the growing evidence that the intensive use of world's resources is putting increasing pressure on the planet, and that the current patterns of resource use are threatening our future prosperity. This document is a progress report on the implementation of that Strategy. The lessons learnt from this analysis have been fed in to the new Roadmap for a Resource Efficient Europe, that is published at the same time.

The need to address the challenge of the unsustainable use of natural resources, within and outside of the EU, had been recognised before in several high level policy documents. The Sixth Environment Action Programme² included the sustainable use and management of resources as one of the priority areas for action and foresaw the development of a *thematic strategy on natural resources*. The Lisbon Strategy³ and the EU Sustainable Development Strategy⁴ reiterated the need for more efficient use of resources to ensure sustainable growth in the future.

The Resource Strategy defined the broad meaning of natural resources as encompassing all raw materials including minerals, biomass and biological resources; environmental media such as air, water and soil; flow resources such as wind, geothermal, tidal and solar energy; and space (land). The Strategy recognised that the environmental impacts of resource use are distributed along the value chains of those resources, often occurring far from where these resources are finally consumed. Therefore the Resource Strategy emphasised the need to take into account the life-cycle and global perspective when tackling unsustainable use of natural resources.

The overall objective of the Resource Strategy was to reduce the negative environmental impacts generated by the use of natural resources in a growing economy. This is a dual objective which requires: (1) to decouple the use of a resource from its driver (that is, economic growth), thus improving resource productivity and; (2) to decouple the environmental impacts from their related resource use, also expressed as resource specific impacts. For renewable resources this also means staying below the threshold of over-exploitation. The achievement of this dual objective would mean improving eco-efficiency, or resource efficiency.

In order to reach this overall objective, the Resource Strategy set the following operational objectives:

- improving our understanding and knowledge of European resource use, its negative environmental impact and significance in the EU and globally;
- developing tools to monitor and report progress in the EU, Member States and economic sectors;

¹ COM(2005) 670.

² Decision 1600/2002/EC

³ http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/ec/00100-r1.en0.htm

⁴ COM(2001) 264

- promoting the application of strategic approaches and processes both in economic sectors and in the Member States and encourage them to develop related plans and programmes, and;
- raising awareness among stakeholders and citizens of the significant negative environmental impact of resource use.

The Resource Strategy aimed at enabling knowledge of resource use in the economy to be brought together quicker and more easily. This would facilitate the identification of the most serious environmental impacts and the measures to mitigate them. It called for a strengthening of the resource use dimension in existing policies as well as for the development of new initiatives to integrate life cycle thinking in policy formulation, setting the time horizon for this process in 25 years. The Resource Strategy explicitly avoided setting quantitative targets as the level of knowledge and data available at the time was not sufficient to develop suitable indicators and targets.

This report will evaluate to what extent the objectives of the Resource Strategies have been met so far: Firstly, it will analyse how the strategic approach, objectives and principles of the Strategy were integrated into policies at EU, Member State and at international levels. Secondly, it will evaluate the status in the implementation of the specific actions proposed in the Strategy. Finally the report will provide recommendations for further action.

The concept of sustainable use of natural resources attained a new level of strategic importance recently. Resource efficiency was recognised as critical for further economic development in the EU and became a focus of one of the seven flagship initiatives within the **Europe 2020 Strategy**⁵. This Strategy aims to support the shift towards a resource efficient and low-carbon economy and decouple economic growth from resource and energy use. It stresses how resource efficiency will prevent environmental degradation, biodiversity loss and unsustainable use of resources. The communication **A resource-efficient Europe – Flagship initiative under the Europe 2020 Strategy**⁶ sets out a framework to ensure that policies in all relevant areas produce results on resource efficiency, with the actions set out in the **Roadmap for a Resource Efficient Europe**. It explains how the focus on resource efficiency in policy making is both a necessity and an opportunity for the EU. It argues that coordinated action across a wide range of policy areas is necessary because of potential synergies and trade offs and that the action has to be taken now due to long lead-times for systemic changes. It also emphasises the need for a move towards resource efficient consumption. This paper, which is effectively an analysis on the Thematic Strategy on the Sustainable Use of Natural Resources, has been used to inform the Roadmap.

2. PROGRESS IN THE INTEGRATION OF THE RESOURCE STRATEGY'S APPROACH AND OBJECTIVES INTO OTHER POLICIES

With its 25 years time horizon and its broad approach, the Resource Strategy aimed to ensure that relevant sectoral policies encourage sustainable use of natural resources. The strategy is set as a framework, which lays down principles and concepts to be integrated in or strengthened in existing policies and used as guidance for emerging and future initiatives.

⁵ COM(2010) 2020

⁶ COM(2011) 21

Six years after its adoption, the Resource Strategy's objectives and concepts⁷ are embedded in many policy initiatives. These initiatives within the EU include transversal ones but also cover specific resources and sectors, and both demand and supply aspects. Examples of this are given in annex II, together with interesting initiatives outside the EU.

It can be concluded that the objectives and concepts presented for the first time in the Resource Strategy back in 2005 have later on been referred to in EU policies, however these rarely deal with the full set of concepts proposed by the Resource Strategy. Even though resource efficiency and decoupling are mentioned as such, it is often with only the competitiveness aspect in mind while less attention is given to the related environmental impacts. Moreover, although the Resource Strategy highlights the importance of the international dimension, the increasing import of resources and their related environmental impacts outside Europe was not sufficiently addressed in EU policies.

3. STATE OF IMPLEMENTATION OF THE SPECIFIC INITIATIVES INCLUDED IN THE RESOURCE STRATEGY

3.1. TO DEVELOP A DATA CENTRE ON NATURAL RESOURCES

The Resource Strategy called to set up "a Data Centre for policy-makers to enhance and improve the knowledge base on resource use and its environmental impacts". Information is often not readily accessible in a usable form for policymakers and a central service is needed to act as an "information hub" bringing together all available, relevant information, to monitor and analyse it and to provide policy-relevant information to decision makers.

From the launch of the Resource Strategy, it was decided that ESTAT would act as the Data Centre for natural resources, jointly with the Data Centres for products and waste, covering the whole life-cycle⁸, in collaboration with DG Environment, the Joint Research Centre (JRC) and the European Environment Agency (EEA).

The main achievements to date are the following

- (1) Improved information flow and increasing cooperation between the different partners of the Data Centre;
- (2) Pulling together existing basic data on the use of natural resources and its associated environmental pressures including socio-economic driving factors and providing access to this information to the public, through a web-based information system⁹. The general purpose is to provide access to existing basic data at Eurostat and external international institutions such as OECD, IEA, FAO and EEA.

⁷ Sustainable use of natural resources, decoupling, eco-efficiency, life cycle thinking

⁸ Through a collaboration agreement of three Services of the European Commission (DG ENV, DG ESTAT, DG JRC) and the European Environment Agency (EEA), in total ten Data Centres were established, as follows: EEA acts as Data Centre for air, climate change, water, biodiversity and land use; JRC acts as Data Centre for soil and forestry; ESTAT (unit "Environmental Statistics and Accounts") acts as the Data Centre for waste, natural resources and products

⁹ http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Environmental_Data_Centre_on_Natural_Resources_and_Products

- (3) The "information hub"¹⁰, a network of internal and external experts and institutes providing answers on specific, policy relevant question to key users like DG Environment and other EU bodies on a short term basis;
- (4) A clear framework for indicators' development, encompassing different environmental impacts at various stages over the life-cycle (see 3.2. in this report on "To develop indicators for measuring progress"). The Resource Strategy moreover implied an extra policy demand for the provision of life cycle assessment data and methodology and, hence, further pushed for the development of Life Cycle Assessment data, originally conceived as an output of the Integrated Product Policy initiative. A database was developed and established by JRC and is supporting ongoing work at the Data Centre on indicator development.

Despite the above mentioned progress, the translation of knowledge development into policy information can be further improved, as can the knowledge on environmental impacts throughout the life-cycle.

3.2. TO DEVELOP INDICATORS FOR MEASURING PROGRESS

The Resource Strategy expressed the aim of having a headline indicator for environmental impacts that could be compared with GDP. Such an indicator should measure the decoupling of environmental impacts from economic growth. Further indicators are needed to measure progress in achieving the Resource Strategy's operational objectives, to steer the focus on those resources whose uses cause the most significant environmental impacts, and to enable the possibility of setting quantitative targets.

Measuring specific resource streams is in principle not difficult but measuring environmental impact is complex. Work is ongoing by DG Environment¹¹, Eurostat, JRC¹² and EEA¹³ but this has not yet resulted in a recommended set of headline indicators. In general, a major challenge is to translate a large set of data into one single value for environmental pressure or impact and no indicator so far appears to be the ideal decoupling indicator. The assessments have in particular been focusing on the Environmentally-weighted Material Consumption and the Ecological Footprint (see further on Annex III) but also on the potential of complementing these two with Human Appropriation of Net Primary Production and Land and Ecosystem Accounts in a very small indicator set.

At present, there are two streams of ongoing development work. One is exploring a set of consumption based – footprint like – indicators on land, materials, water and carbon/energy. This highlights the most important areas of resource efficiency and it points to the dependency of EU economy on directly and indirectly imported resources. Data sets are however not yet complete. An on-going study on the Assessment of resource efficiency indicators and targets¹⁴ is investigating the feasibility of various options and should be ready to present results early 2012.

¹⁰ <http://www.eu-smr.eu/infohub/>

¹¹ <http://ec.europa.eu/environment/natres/studies.htm>; In particular: <http://ec.europa.eu/environment/natres/pdf/footprint.pdf>.

¹² In particular the development of "Life Cycle Thinking and Assessment" (<http://lct.jrc.ec.europa.eu/assessment>), by the JRC in close coordination with ESTAT.

¹³ <http://www.eea.europa.eu/themes>

¹⁴ <http://resource-indicators.eu-smr.eu/>

The other line of work, also consumption based, is conducted by JRC, which is working to establish aggregated indicators on 8 to 10 environmental impact categories based on life cycle analysis data for the full production and consumption chains. The coherent framework of indicators includes eco-efficiency/decoupling indicators, basket of products indicators and waste management indicators. This work should deliver first pilot results by the end of 2011. Such indicators can be related to GDP or to the value added of a given sector and, thereby, can provide an indication on eco-efficiency, as requested by the Resource Strategy.

3.3. TO DEVELOP EU APPROACHES AND STRUCTURES FOR RESOURCE EFFICIENCY

The Resource Strategy foresaw to set up a High-Level Forum to facilitate the development of national measures by identifying actions to promote, exchange best practices and to provide assistance to Member States. As a preliminary phase, the Resource Strategy recommended Member States to develop their own measures and programmes to achieve a sustainable use of natural resources.

Very few countries take an integrated approach and have a dedicated strategic policy document for resource efficiency. Instead, some broad economy-wide types of strategies or action plans commonly include references to resource efficiency and sustainable material management taking different forms such as, for example: national sustainable development strategies, national environmental strategies/action plans, sustainable consumption and production action plans, raw materials plans and strategies, strategies and plans related to climate change and economic reform programmes. It rarely features in national industrial competitiveness policies.

Strategic objectives for resource efficiency tend to be fairly general, often referring to sustainable use of natural resources, improving energy or resource efficiency, increasing waste prevention and recycling, reducing the use of energy and water but also improving water quality and protecting biodiversity. There are few examples of absolute targets of resources used, however some aim at increasing resource/material productivity with a certain factor. Only Sweden has strategic objectives related to reducing the global environmental impacts of national consumption but the Netherlands has objectives reflecting the environmental impact embodied in trade. There is a general lack of concrete targets, which makes progress monitoring difficult in the long term. Existing ones are most common in the areas of waste, energy, GHG emissions, water use and land use for organic farming. Many of those are driven by EU requirements but also local conditions can act as drivers. Linked to this, indicators in place mainly deal with material use, waste, energy use, water and land use. Indicators taking into account pressures embedded in imported goods are rare and no country seem to have indicators on the environmental impacts from resource use.

More specifically, the energy and waste management/recycling sectors take the sustainable material management/ resource efficiency aspects more systematically into account in their policies. The public sector (in the context of Green Public Procurement), building and construction, water management, transport and food are other policy/consumption areas in which resource efficiency often features and have objectives or even targets set in several Member States. These objectives aim in most cases at improving technological efficiency rather than addressing consumption by managing demand.

Several Member States have deployed awareness raising initiatives to promote a more sustainable use of resources. However, setting up and implementing policies is a much more challenging task and experiences at Member State level often show that there is no clear

definition or understanding of the resource concept and it is sometimes reduced to materials only. Varying ministries are often involved without any coordinated work and, as a consequence, frameworks for national action tend to be dispersed, with overlapping and unclear responsibilities.

The EEA has recently conducted a survey of resource efficiency policies in EEA members and cooperating countries. Preliminary, the analysis concludes that Member states have a need to know how to best integrate resource efficiency into other policies, on policy implementation and effectiveness evaluation, how to work with strategic objectives, setting targets and measuring progress and how to use market based instruments in order to give the right price signals. Such instruments or measures are being used in certain countries, which often have positive experiences to share. After an initial period in growing understanding and starting implementation, the Commission considers that the moment is ripe for the establishment of the High-Level Forum foreseen in the Strategy. Among other tasks, the High Level Forum should provide assistance to Member States, by identifying actions to promote the exchange best practices and facilitating the development of further national measures. Annex I to this report presents a summary of important initiatives at Member State level.

3.4. INTERNATIONAL PANEL FOR SUSTAINABLE RESOURCE MANAGEMENT

The “Resource Panel”¹⁵ was set up in 2007 under the auspices of the United Nations Environment Programme (UNEP) to provide authoritative and independent advice to decision makers globally, as called for by the Resource Strategy.

Its members ¹⁶are recognised, leading experts in their field with good geographic coverage and discipline balance. The expansion of the panel, to include even more countries, is an ongoing process. The Panel is supervised by a Steering Committee, which covers more than 20 countries and organisations coming from both the developed and developing world. The European Commission is a major contributor to the Panel and co-chairs its Steering Committee.

The Panel conducts policy relevant assessments, focussing on areas with significant environmental impact but at the same time with possibilities for substantial improvements. It has so far finalised and published five reports, *"Assessing the environmental impact of consumption and production – Priority products and materials"*¹⁷, *"Assessing Biofuels"*, *"Metal stocks in society"*, *"Decoupling the use of natural resources and environmental impacts from economic activity: Scoping the challenges"* and *"Recycling rates of metals: A status report"*. To measure the impact of the Panel's work, it will suffice to say that the first report has been down-loaded over half a million times already since its publication in June 2010.

A recent independent evaluation of the Panel's work with the first three reports concluded that the reports were outstanding, have been produced in an independent way and are highly policy relevant. The evaluation however also expressed an important concern, that of the necessity to better translate the reports into policy relevant outcomes such as policy measures. Outputs of the Panel's work must be more widely used as policy recommendations, be better disseminated and with a stronger involvement of governments and other stakeholders. The

¹⁵ [http://www.unep.fr/scp/rpanel/ http:-NaturalResources.pdf](http://www.unep.fr/scp/rpanel/http:-NaturalResources.pdf)

¹⁶ <http://www.unep.fr/scp/rpanel/members.htm>

¹⁷ <http://www.uneptie.org/scp/publications/details.asp?id=WEB/0165/PA>

Commission will use its steering role in the Panel to implement this recommendation and to further enhance the policy relevance of the Panel's work, in particular, the set of recommendations drawn up in its different reports. It needs to be assessed if the endorsement of reports by Member States¹⁸ would be desirable.

The foundation is clearly laid for important assessment reports that will be valuable for the future development of policy in EU and beyond. In future, the Panel will not only look at relevant resources as such but also take the perspective of the services or functions that the resource use delivers. Topics to be addressed during 2012 and 2013 will include "Decoupling (Technology and Policy)", "Metals" (covering a wide range of aspects such as environmental impact of metals over the life cycle, geological stock, recycling opportunities and technologies, demand scenarios and policy options), "Water Efficiency", "Sustainable management of land and soil resources", "Low-carbon technologies and their impact on environment and resource use", "Translocation of environmental impacts through Trade" and "Decoupling in urbanization".

4. RECOMMENDATIONS FOR FURTHER ACTION

The trends in the natural resource use show that the use of resources remains intensive and it continues to cause global environmental pressures that undermine the basic supportive functions of the environment. Despite certain achievements in resource productivity and reduction of resource specific environmental impacts within the EU, there is clearly a need for continuous improvement in both these aspects of resource efficiency. The rationale for a strategic guidance at EU level remains.

The continuous need for a comprehensive and strategic approach is supported further by the fact that many resources used and consumed in Europe come from third countries and have significant amount of embedded impacts affecting the resource base and the environment in those countries. These indirect impacts of the domestic resource use, the dependency of the EU on imported resources and growing competition for available resources make the need for an effective resource efficiency policy more important than ever.

The analysis of policies related to resource use at EU and Member State level showed that the policy responses driven by the Resource Strategy had been fragmented and incoherent. Only a few countries have a dedicated strategic document on resources. Resource related policies had often limited scope and focused on a particular resource, usually waste. Policies sometimes lacked clear objectives and effective measures to increase resource productivity or address the associated environmental impacts. Market based instruments were not considered or used to their full potential. It could be concluded that the Resource Strategy should be complemented by a more detailed guidance from the Commission that would facilitate the development of comprehensive and effective policies both at EU and Member State level.

This need was recognised by the EU 2020 Strategy and the flagship initiative "A Resource-Efficient Europe" which sets out a framework for future policies related to resource efficiency. The initiative emphasised the economic dimension and the need to build synergies in order to create new opportunities for economic growth while reducing resource use. It identified the main resources and policy areas where resource efficiency needs to be integrated. It also

¹⁸ Such as is the case for the Intergovernmental Panel on Climate Change and the Intergovernmental Platform on Biodiversity and Ecosystem Services.

foresees a mix of policy instruments including market based instruments, stimulation of innovation and addressing the consumer demand. In line with the Resource Strategy the flagship initiative also recognises the need to further build the knowledge on the resource use and associated environmental impacts as well as on an effective policy response. Global aspects and the need to deepen international cooperation on resource efficiency are recognised as well.

The flagship initiative is followed up with the "Roadmap for a Resource Efficient Europe", published alongside this document. It paves the way to specific delivering initiatives such as those included in Annex 1 of the flagship and others that may follow in 2012 and beyond, the Roadmap proposes actions aimed at increased resource productivity and reduction of environmental impacts.

The EU Resource Efficiency policy as defined in the three policy documents mentioned above – The EU 2020 Strategy, the flagship initiative "A Resource-Efficient Europe" and the Roadmap for a Resource-Efficient Europe - provide a comprehensive strategic framework for sustainable use of natural resources for the EU and for Member States. This policy will supersede the Resource Strategy. There will be no added value in maintaining a parallel strategic track on the same policy subject.

The Roadmap for a Resource Efficient Europe, which this document complements, as well as the implementing actions which will follow, has taken into account the following lessons learned from the implementation of the Resource Strategy:

- General integration of the main concepts of the resource strategy into public policies should be fostered, in transversal and sector specific policies;
- The role of national policies should be further enhanced. Some Member States have exemplary measures in place but many are still lagging behind. Sharing of best practice will be essential. A High-Level Forum or similar structure could facilitate this process.
- The reports prepared by the Resource Panel should be more widely used as policy recommendations and should see a stronger involvement of governments and other stakeholders.
- Quantitative targets should be set once data and indicators could back up such a process. Setting targets on resource use or related environmental impacts is a complex matter and there are few examples of this on national level.
- The use of market-based instruments in managing natural resources is particularly important in order to give correct price signals to economic operators.
- Priority resources should be identified and addressed by specific and more detailed action programmes.
- The risks of scarcity of natural resources (including bottlenecks of availability and inhibiting price increases) should be investigated. It should be analysed how this can influence the objectives and possible implementation measures of future policies related to resources.

- Investment in further research is necessary, e.g. on the links between resource use and environmental impact and on the resource use outside of the EU driven by consumption in Europe.

ANNEX I

INITIATIVES IN MEMBER STATES LINKED WITH THE SUSTAINABLE MANAGEMENT OF NATURAL RESOURCES

1. INTRODUCTION

The Resource Strategy recommends the member states to develop their own measures and programmes to achieve a sustainable use of natural resources. The responsibility is however left with Member States, to take the strategy's key concepts into account, when developing their national resource policies.

Member States employ different kinds of initiatives in order to achieve these objectives such as strategies, programmes, road maps and market based instruments and a sample is presented below. The measures either cover natural resources in general or focus on a specific individual or group of resources and they may moreover target specific stages of the life cycle. Depending on the aimed resources and life cycle stages, various sectors can be targeted. The various initiatives moreover focus on different economic agents, such as consumers, citizens, producers and SMEs, and can aim at changes from the micro to the macro scale.

Below follows a presentation of some interesting examples of member states initiatives on various levels. In many cases, the initiatives are too recent to be able to properly assess their impact at this stage. This is in no way an exhaustive list but serves to illustrate the varying kinds of approaches taken across the EU.

2. NATIONAL SECTIONS

Austria

The country has experienced relative decoupling during the period 1990 to 2007 but with continuing increasing domestic material input. The strong growth of imports makes estimations of related hidden or indirect material flows a very important topic.

In order to deal with these issues, the country is developing a national resource efficiency action plan, which aims to achieve an absolute decoupling of economic growth from resource use and environmental impacts. The plan considers equally the reduction of environmental impacts and the reduction of primary resource consumption including the potential for efficiency gains over the whole life cycle in a systematic way.

The basic idea is to gain good knowledge on the existing initiatives and develop good contacts with the stakeholders involved. It is clear that several initiatives already exist which address certain potentials for efficiency improvements on different stages of the life cycle and the task of the action plan is partly to give these a common direction and guidance for becoming mutually supportive and at the same time coordinate relevant stakeholders. New measures have also been suggested such as strategies on the level of enterprises, support of eco-efficient innovative technologies, communication of efficient technologies, techniques and use and improvement of indicators and data.

The aim is to see total resource consumption decreasing in absolute in the long term and the resource productivity increasing by a factor 4. Domestic Material Input by material category, per GDP and per capita but also Raw Material Consumption expressed as Raw Material Equivalent are used as progress indicators.

Denmark

Denmark is set to gradually see a tax reform come into force 2010-2019, which reforms or establishes environmental and energy taxes with the specific aim of changing behaviour towards less resource use by increasing the relative cost of resource intensive products, technologies, energies and habits.

Industries from all sectors will be affected and so will households but the increase in taxes on energy by about 15% will obviously mainly impact energy-intensive sectors. This tax is differentiated between space heating and energy used in production processes and it is balanced according to the energy content in different fuels. The tax, which is effective for diffuse polluting sources, is used in parallel with the EU emission trading scheme, which in turn is adapted to a relatively small number of polluters generating high levels of pollution. The instruments thus complement each other and considerations will be given to avoid double-taxation. Households using fossil fuels for heating will also be affected. A green check will be provided to households in order to mitigate a negative short-term impact, instead aiming at a neutral one. In the long term, on the contrary, as they adapt their behaviour in terms of energy consumption and turn to more energy-efficient technologies and while still enjoying the green check, households may well benefit from the scheme. In addition to this, households will benefit from the global shift of taxation burden from labour to energy as the tax reform aims at reducing the marginal income tax for all people active on the labour market.

It has been shown previously that energy taxes have not managed to have an important impact on the transport sector. In the coming reform, this sector will instead be targeted by a specific set of taxes including road pricing for lorries, tax on vans depending on fuel consumption standards, tax on company cars etc, all with the intention of promoting a shift towards more sustainable and low-carbon transportation modes. Moreover, the 50% rise of the waste water tax targeting phosphorus and nitrogen gives incentives to discharge less polluted water. Regarding waste, several changes are foreseen.

The main difficulty as regards the implementation of the reform as seen from the business is the potential impact on the country's economic competitiveness. Taxation is however likely to reduce the overall consumption bills and, thus, the production costs, but the timing for this may obviously depend on the sector and the respective potential technology lock-ins. It should be mentioned that even though all member states have energy taxes, only a few have CO₂ taxes. Sweden and Finland introduced this jointly with Denmark in the early 90s and Slovenia now has a similar tax.

There are no direct targets on resource use but the ones to be used are linked to greenhouse gas emissions, to recycling and landfill and to the reduction of discharge of phosphorus and nitrogen in water. Indicators are closely linked to these, such as fossil fuel domestic consumption, waste generation and water consumption and quality.

Estonia

Estonia has adopted several policy documents governing mineral resource extraction, which provides the rules and principles for the exploration, protection and use of the minerals, with the purpose of ensuring an economically efficient and environmentally sound use of the earth's crust.

There is a range of instruments to foster better extraction practices as e.g. minimum standards for extraction permits, mining land rent, minimum standards and periods of restoration time for disturbed land, national annual extraction quotas and taxes, standardised environmental impact assessments and extraction volumes reporting. Quantitative targets are being used, such as the reuse of construction demolition waste from 40% in 2008 to 60% in 2020. Specific targets and linked indicators are linked to rate of consent from local authorities allowing extraction activities, reduction in breaches of extraction regulation due to new control system, rate of regular inspection of mining sites, increased rate of reuse of various by-products from extraction of natural resources and of construction demolition waste and reduction of waste material from processing slate gravel. Initiatives are too recent to be consistently assessed but they are overall considered as successful even though certain guidance is still thought to be too vague.

Finland

The 2009 Natural Resource Strategy presents a vision for Finland for 2030 and it promotes the concept of using resources in an intelligent way by aiming at four key strategic goals; becoming a thriving bio-economy generating high added value, utilising and recycles material flows effectively, regional resources generating both national added value and local well-being and, finally, taking initiatives and leading the way in related topics. While the level of domestic resource usage has been stable during the last years, the volume of imported materials is increasing rapidly.

The strategy takes a long term and holistic approach of the use and conservation of natural resources and it does so for a range of resources (however climate change and water footprint are probably the most important environmental impacts for the strategy) and across sector borders. It seeks to involve all industrial as well as social sectors. This together with the fact that it integrates resources efficiency with business opportunities makes it a quite unique initiative in Europe even if it is still too early to properly assess its efficiency and impact. It however gives future orientation on a range of topics including e.g. enhanced control of the material cycle, product-centred resource efficiency and the interaction between rural areas and growth centres.

As already mentioned, its implementation follows a work plan, with a step wise iterative process working against strategic goals, which are being reviewed periodically. A set of development projects (e.g. the development of expertise on the reserves and characteristics of various types of biomaterials, the establishment of biorefineries and the development of calculation methods and measures to express the use of natural resources and material flows) are implemented to translate the strategy's principles into concrete actions. The targets presented are mostly related to municipal waste.

Germany

Since 2002, Germany is pursuing the target of doubling the raw abiotic material productivity from 1994 to 2020 (the amount of abiotic primary material used to produce one unit of GDP). The Ministry of Environment strengthens this even further in their 2008 Resource Efficiency

Strategy, by promoting the factor 4 (quadrupling the resource productivity) beyond 2020. This is a rare attempt in the EU to set quantified targets regarding overall resource use. Based on these ambitious targets, policy processes as well as practical initiatives are structured. All industrial sectors including final consumers and public purchasers are targeted, but with special focus on steel, copper, housing, construction and environmental technologies industries.

Fact-finding studies and a dialogue process have been implemented, and other tools have been proposed such as strengthening of existing as well as new limit values for products and technologies, strengthening of reporting and labelling requirements, stronger take back obligations and minimum recycling quota, green public purchasing, determination of resource efficiency potentials in core branches and development of integrated strategies, analyses of resource use and related environmental impacts by branches, material systems and functions.

The overall raw material productivity in Germany increased with 35% from 1994 to 2007 and, thus, progress remains to be made to reach the 2020 target. The needed progress becomes even more evident if taking into account the larger hidden flows, or the "backpacks", of the increasingly imported finished and semi-finished products. Studies attempting to take these into consideration result in strikingly lower material productivity. Whatever method used, it is still too early to separate any impact from the strategy from the general trend. E.g., the recent increase in price volatility of imported metals has resulted in a higher awareness of the scarcity of raw materials and this also drives resource efficiency regardless of the strategy.

A major part of the ongoing work is the development of a number of local initiatives in different *Länder*. One of them is the Efficient Agentur set up in North Rhine Westphalia, which has developed a tool box with a range of consulting service, aiming at helping SMEs improving their resource efficiency through their production processes, avoiding waste and hazardous emissions with instant results (as opposed to "just" comply with environmental legislation). One of the tools is the so called PIUS-check, an auditing system, which allows analysing the relevant material flows, comparing the efficiency of current production technology with best available technologies and to conclude recommendations for improvements. Part of the costs of this service is covered by the national clean production programme. Since the beginning of the programme in 2000, more than 500 PIUS-checks have been conducted (more than 4% of all SMEs in industrial production) with a substantial amount of measures with a pay-back time shorter than two years were identified. In about 70% of the PIUS-checks, the suggested measures include implementation of new production equipment and in the remaining 30% organisational changes. The progress indicators used are typically total production cost, raw material cost, energy consumption, water consumption greenhouse-gas emissions. The companies are assisted in applying for financial support to implement the proposed measures. The available funding schemes are an important driver for the SMEs to adopt cleaner production methods and more than 40% of the audited SMEs did so. It is estimated that, for every euro invested, 2.4 Euros were saved.

The Agentur actively approaches companies that may benefit from the PIUS-check but in about half of the cases the contact was initiated by the companies themselves.

This programme has been particularly successful in assisting SME with adopting clean production processes and to create greener products faster, especially in the metal processing and finishing sectors as well as in the food processing industry. A major success factor is the clear communication of transparent quantification of costs and potential savings linked to resource use, on the company level, as opposed to presenting macroeconomic figures. Success

can however also be attributed to the good cooperation between industries, industry associations, regional government and national institutions as well as the mix of consulting, information, dissemination networking and organisational and financial support.

The Netherlands

In the Netherlands, with the experience of increasing use of biomass and the expected continuing increase in order to achieve the Dutch target regarding share of renewable sources in the 2020 final energy consumption, imports of biomass are becoming increasingly important. In order to achieve the national objective of 23% of biomass in the energy mix by 2030, as much as 60-80% of bio-based material would have to be imported. The net reduction in greenhouse gas emissions is however questioned in case land-use for biomass is associated with clearing forest, with conversion of peat land as well as with high fossil energy inputs for machinery, fertilisers and other agrochemicals. The use of biomass must thus meet certain sustainability criteria in order not to shift the environmental burden to other resources or other places, the latter being of particular importance with increasing imports.

The Netherlands Standardisation Institute is developing standards to ensure the sustainable production of biomass along the whole chain, with the aim to help companies as well as consumers adopting more sustainable consumption patterns. The instrument builds on voluntary commitments by companies involved in the production, processing use of biomass and it sets out specific criteria based on minimum requirements for sustainable biomass production. Linked to this is a certification system where audits are to be performed in order to verify that applicants meet the sustainability criteria regarding greenhouse gas emissions, competition with food or other local application, biodiversity, environment, prosperity and well-being. The measure is not yet in place but is thought to provide for a transversal and systemic approach that considers potential impacts of biomass production and use on a large range of natural resources and the standards are likely to be adopted at a larger scale in the upcoming policies on natural resources management. On the more practical side, the flexibility of the certification, especially the provisions for small-holders, enables most of the companies to get involved in the initiative. The approach will however most likely run into various difficulties which will need to be worked on to overcome. The main threat is probably the difficulty to estimate the complex and interlinked real impacts on natural resources along the whole chain but, likewise, the impacts of the biomass competition with food demand and other land uses will pose problems in the actual use of the criteria.

Once these problems have been overcome, there do not seem to be major obstacles in transferring this tool to other member states or even to the EU level, other than adapting the criteria to the specific national contexts.

Portugal

Portugal adopted a law establishing the organised waste market in 2009. The aim is to set up various online waste transaction platforms which are meant to bring together all producers of non-hazardous waste and material consumers which comply with the terms in the Waste Framework Directive. The aim is to enhance the recovery of materials and thereby prolonging their life cycle, cutting the demand for raw materials and promoting industrial symbiosis. The platforms are to be managed by private entities. There are no identified targets, while the broad aim obviously is to reach the targets set out in the EU Waste Framework Directive. No indicators to monitor progress are suggested.

Similar types of instruments have already been introduced in e.g. UK, France and Italy and also at a regional level in some member states. The implementation of such a tool at the EU level should not encounter major difficulties as the legal framework already exists even though there are significant differences in interpretation among member states. In particular, the up scaling of the waste market for specific waste streams to the EU level could be considered as the national markets might not be large enough to make the establishment of a market worthwhile.

Sweden

Another tax targeting behaviour is already in place in Sweden, where the carbon dioxide tax has resulted in a significant reduction of the fossil fuel consumption. This is in particular the result of the adoption of more resource efficient technologies. The tax was initially introduced in 1991 (jointly with Denmark and Finland) and has been progressively tightened since then with the last modifications in 2009. Sweden has used an explicit strategy of a global shift of taxation from labour to energy; however tax revenues are not labelled for a specific use. In this case, it is the release of emissions which is taxed and, hence, the measure primarily addresses the environmental impact of resource use even though in practice it also contributes to reduce the actual consumption of resources. There is no specific target for the CO₂ tax, which is one of several tools to reduce negative impact on the climate. The overall target for the share of renewable energy is 50% by 2020 and in the transport sector 10%. Moreover, between 2008 and 2020, the energy intensity should reduce with 20%. The aim is to see a reduction of emissions by 40% between 1990 and 2020. The tax is used in parallel with other market based instruments such as the certificates for electricity produced from renewable energy sources introduced in 2003 and the EU emission trading scheme. Other existing market based instruments could be tightened if considered necessary.

Changes in the Swedish energy and carbon dioxide taxation are considered to have had a great effect on emissions. Estimates indicate that emissions of CO₂ in 2000 were at least 5000 k tonnes lower than what they would have been without changes in the 1990s. The tax is however not the only contributor to reduced emissions. Between 2001 and 2006, a Green taxation shift was carried out worth slightly over SEK 17 billion. Legislation and economic instruments in the waste management sector as well as support for local climate work by investment support have contributed substantially, together with the green electricity certificates system.

ANNEX II

EXAMPLES OF IMPLEMENTING THE OBJECTIVE AND CONCEPTS OF A SUSTAINABLE USE OF NATURAL RESOURCES IN POLICIES

1. EXAMPLES OF INITIATIVE IN THE EU

The EU **Sustainable Development Strategy**¹⁹ already presented operational objectives related to improved resource efficiency, environmental impacts, respecting regeneration capacity of renewable natural resources, applying the concept of life-cycle thinking and promoting reuse and recycling.

The **Sustainable Consumption and Production/Sustainable Industrial Policy (SCP/SIP) Action Plan**²⁰ proposes concrete actions to foster the sustainable use of natural resources, including actions on improved resource efficiency. As part of the Action Plan, the European Commission is examining the feasibility of including resource efficiency in implementing measures of the **Eco-design for the energy-using products Directive**²¹. This could concern for instance increased use of recycled materials/products, improved recyclability and durability of products and less use of "critical" materials or materials with high environmental impacts. The Action Plan moreover seeks to strengthen and extend the EU **Eco-label Regulation**²² and the **Energy label Directive**²³ as well as the use of **Green Public Procurement**.

The new **Waste Framework Directive**²⁴ builds further on both **Thematic Strategies** on the Sustainable Use of Natural Resources and on the Prevention and Recycling of Waste²⁵. It makes several elements legally binding, notably the requirement for waste policy to consider the whole life-cycle of materials in waste policy development. The report on the implementation of the Thematic Strategy²⁶ includes recommendations to better 'target' waste streams incorporating materials having "a negative environmental and health impact over their entire life cycle". The report also identifies the main efforts accomplished to "use waste as resource". Recycling rates are increasing in the European Union with significant differences between Member States performances

The **Climate and Energy Package**²⁷ sets out how to cost-effectively cut greenhouse gas emissions in absolute terms, within the ETS and outside its scope and, hence, bring about absolute decoupling of emissions from growth. Linked to the target of increased renewable energy use in transport and the importance that biofuels will play in the transport area, sustainability criteria including greenhouse gas performance, biodiversity and certain types of

¹⁹ COM(2007) 642

²⁰ COM(2008) 397

²¹ Directive 2009/125/EC

²² Regulation (EC) No 66/2010

²³ Directive 2010/30/EU

²⁴ Directive 2008/98/EC

²⁵ COM(2005) 666

²⁶ COM(2011) 13

²⁷ COM(2008) 30

land use changes are proposed. The package furthermore creates pressure to improve energy efficiency which is addressed directly in the **Energy Efficiency Action Plan**²⁸.

EU policies on air quality and air emissions, such as the **National Emission Ceilings for Certain Atmospheric Pollutants**²⁹ and **Ambient Air Quality and Cleaner Air for Europe**³⁰, have been a major driver for reducing the impacts of natural resources. By reducing air pollution from industry, e.g., the sustainable use of resources has been promoted and significant reductions in air pollution over the past years have been achieved irrespective of the economic growth in the affected sectors. EU air quality and emission control measures are a major driver for eco-innovation and green growth.

The **Recycling Lead Market**³¹ initiative aims at encouraging demand for products with recycled materials that provide a life-cycle environmental benefit. The **Bio-based Products Lead Market**³² aims to promote the development of sustainable products from renewable raw materials, e.g. bio-based chemicals and plastic and has seen developments in the areas of methodology for the sustainability assessment of bio-based products as well as of standardisation of methodologies.

In 2008, the Commission launched The **Raw Materials Initiative**³³, which established an integrated strategy to respond to the different challenges related to access to non-energy and non-agricultural raw materials. The initiative is based on three pillars: ensuring a level playing field in access to resources in third countries; fostering sustainable supply of raw materials from European sources and boosting resource efficiency and promoting recycling. A follow-up Communication was adopted earlier this year, which presents actions aimed at meeting the EU's future raw material supply needs. The underlying idea of the communication is however access to material and the related competitiveness aspect

The Resource Strategy also explicitly refers to the integrated impact assessments for a thorough consideration of economic, social and environmental issues and for the application of life-cycle thinking. The approach presented in the European Commission **Guidelines on Impact Assessment**³⁴ is built on these general concepts and it requires the consideration of the interactions between natural resources.

The **Communication on water scarcity and droughts in the European Union**³⁵ aims at ensuring sustainable water availability. It calls for policies to ensure that human activities do not contribute to the pressure on scarce water resources and it stresses the need to adapt economic activities to the level of water available locally. It points out how priority should be given to water savings and water efficiency measures. Only if the functioning of the water cycle is fully considered, will water quantity issues be efficiently addressed. It recommends

²⁸ COM(2006) 545

²⁹ Directive 2001/81/EC

³⁰ Directive 2008/50/EC

³¹ COM(2007) 860,

http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/recycling/index_en.htm

³² COM (2007) 860;

http://ec.europa.eu/enterprise/policies/innovation/policy/lead-market-initiative/biobased-products/index_en.htm

³³ COM(2008) 699

³⁴ SEC(2009) 92

³⁵ COM(2007) 414

integrating further water issues into all sectoral policies to ensure coherence across policy areas.

Sectoral policies offer opportunities to foster diffusion and further integration of the different concepts. Appropriate examples in this respect are the transport and agricultural sectors, which both cover a range of resources. **Transport** policy³⁶ focuses largely on energy use and air emission reductions but does not seem to fully acknowledge the importance of the impacts related to the land use when developing transport infrastructure. The concept of decoupling is not referred to as such but is reflected by the recognition of the need to ensure mitigation of adverse environmental impacts. The optimisation of transport systems accounting for impacts of the different transport modes shows an underlying life cycle thinking while eco-efficiency is present in the form of energy efficiency.

Agricultural policy³⁷ takes into account a wide range of affected resources, and the efficient use of water, soil, land and biotic resources is an obvious precondition for a more sustainable agricultural sector. Decoupling is again not referred to directly but is reflected in the move towards reduced environmental impacts. There is no specific mentioning of a life cycle approach but the necessity to develop more integrated policies, taking into account resource and environmental concerns, is recognized. As an example of a resource specific policy highly relevant to the agricultural sector, the **Soil Thematic Strategy**³⁸ aims at preventing further soil degradation while ensuring a sustainable use.

The **6th and 7th Research Framework Programmes**³⁹ have been funding a number of research projects aiming at supporting the implementation of resource policies, notably in the areas of Life Cycle Assessment methodology improvement, eco-design, industrial ecology, waste prevention, recycling, bio-refineries and sustainable consumption.

2. EXAMPLES OF INITIATIVES OUTSIDE THE EU

Outside Europe, Japan appears to have realised that its high dependency on raw materials, combined with the significant environmental problems linked to the shortage of final disposal sites, made it necessary to apply sustainable materials management. The 3R initiative⁴⁰, with a set of laws and action plans, provides a core legislative framework based on life cycle thinking and the integration of resource, waste and product policies which has resulted in Japan today being a leading example of absolute decoupling between economic growth and material use.

Largely inspired by Japanese and previous European experiences, the Chinese Circular Economy Promotion Law from 2008⁴¹ aims at developing this paradigm across sectors and resources through a core strategic framework, with the purpose of simultaneously raising resource utilisation rates, managing waste, protecting and improving environment, and achieving sustainable development. The design of a core legislative framework as a basis for

³⁶ COM(2006) 314

³⁷ COM(2008) 306

³⁸ COM(2006) 231.

³⁹ <http://cordis.europa.eu/fp6/dc/index.cfm?fuseaction=UserSite.FP6HomePage>

http://cordis.europa.eu/fp7/home_en.html

⁴⁰ <http://www.env.go.jp/recycle/3r/en/approach.html>

⁴¹ http://www.fdi.gov.cn/pub/FDI_EN/Laws/law_en_info.jsp?docid=97504

future environmental legislation is remarkable in comparison with many countries that confine to non-binding guidelines or strategic documents.

ANNEX III

EXAMPLES OF INDICATORS MEASURING ENVIRONMENTAL IMPACT

- Environmentally-weighted Material Consumption (EMC) attempts to combine information on mass flow with life cycle assessment. Focusing on pressures, however, it can only provide a proxy for related impacts. Moreover, aggregation and the necessary weighting of the pressure categories need further development and possible addition of pressure categories such as biodiversity loss is needed.
- Ecological Footprint, (EF), combines information from use of renewable material with CO₂ emissions and land use and it aims at calculating how much biologically productive land and sea area is required to provide the resources consumed and to absorb the waste generated by a human population. It has reached high visibility and calculations are carried out for all countries in the world, in time series since 1961. Despite its very comprehensive benchmark - land area – which results in a good communicative tool, there are several methodological weaknesses such as its limited scope which excludes certain key environmental impacts and the tool is widely disputed by a good part of the scientific and statistical communities for its analytical power.