European Commission

Science for Environment Policy

THEMATIC ISSUE:

Environmental Policy Targets

October 2012
Issue 34

Environment

Contents

EDITORIAL

Environmental Policy Targets: Striving for Green Growth in the EU

Natural resources in the form of materials, water and land are essential for all life on earth, for producing energy and for regulating the climate. But accelerated economic growth and consumption in recent decades have overexploited the ecosystems that provide these vital goods and services. The most pressing global environmental challenges we face today, including climate change, desertification, biodiversity loss and soil erosion, all stem from our excessive use of natural resources, which is approaching unsustainable levels in many parts of the world.

For the past few decades, progress in both developed and developing countries has been strictly linked to economic growth, measured in terms of Gross Domestic Product (GDP). However, the concept of sustainability, coined at the IUCN World Conservation Strategy in 1980[1] and extended at the UN Earth Summit in 1992[2], has become a cornerstone of forward-looking development policy in the EU and worldwide. Sustainable development recognises the need to use global natural resources in a way that allows the well-being and prosperity of the present generation around the globe without compromising that of future generations.

To reach the goal of environmental sustainability, a major tool for policymakers is the quantification of resource use and the formulation of targets, which combine scientific and political criteria to identify sustainable levels of resource use. In 2011, the EU adopted the 'Roadmap to a Resource Efficient Europe'[3], which includes a number of possible milestones to 2020 for using resources, including land, fisheries, water and food waste, as well as for sectors that underpin our economy, such as consumption, construction, energy, and transport. These milestones, alongside agreed policy targets in the above areas, contribute to the ultimate goal of achieving a 'green economy', in which economic development is decoupled from material use *in absolute terms*. This means that GDP can increase even though material consumption is falling. To achieve this in the EU-27, all Member States must significantly improve the *efficiency* with which we use resources as well as reducing the absolute amount of resource use.

Recent discussions on sustainability surrounding Rio+20[4] have brought renewed attention to the question of how to monitor progress towards sustainable resource use and efficiency. The 2011 EU Roadmap set out a vision for a comprehensive set of Resource Efficiency Indicators (REI) to be presented to European policymakers in 2013. Such indicators will show how well a given EU Member State is performing in terms of resource efficiency as well identifying 'best practices' in other countries.

However, developing solid indicators for the core categories of resource use, such as materials, water, land and carbon, and setting corresponding targets is non-trivial. The timing of this special issue is motivated by the imminent launch of the EU's 7th Environmental Action Programme[5] (7th EAP), which has sought the input of experts to discuss the main scientific concepts behind resource use and the challenges for measuring and improving global resource efficiency. The first article entitled **'How do targets and indicators improve sustainability?'** describes the evolution of the concept of sustainability and the tools available to measure progress towards it. The EU '20-20-20' policy, which is the flagship policy under the EU Climate and Energy Package[6], is one of few examples to date of how scientific targets can be successfully turned into policy actions.

Striving for resource use efficiency means not only reducing our use of carbon-intensive fossil fuels to bring down greenhouse gas (GHG) emissions, but also increasing the efficiency with which we use minerals, biomass, land and water. The article **'Resource efficiency targets need fine-tuning'** summarises a study carried out for DG Environment, assessing how effective current targets and indicators for resource efficiency are and how they could be further improved. Setting targets for land use is particularly problematic as they need to take into account the increased demand in energy derived from biomass required to meet the EU's binding target of sourcing 10% of road transport fuels from renewable sources by the end of the decade.

Alongside highlighting a specific use of targets in policy design, that of sustainable farming, **'Sustainable agriculture assessments need more clarity'** discusses some of the challenges faced by policymakers in developing targets that encompass both scientific and political concerns, can be interpreted easily and consistently, and are flexible enough to apply to countries with different characteristics and levels of development.

The international dimension of environmental target setting is highlighted in **'Indicators reveal 'hidden' trade of materials'**, which explores the relevance of trade in monitoring global patterns of resource use. Industrialised nations can appear to reduce their own resource use by outsourcing material-intensive stages of manufacturing products to other countries. Not only does this give a false impression of national resource use performance, but also shifts the environmental burden to countries less able to deal with the negative consequences of depleted resources.

Although often defined separately, targets for different environmental policy areas are inextricably linked. For example, setting targets for mitigating climate change has significant implications for the structure of energy use in the EU up to 2050, as discussed in **'Policy targets dominate over efficiency for predicting future energy use'**. The sixth and final article, **'Regional targets are key to meeting EU climate commitments'**, explores another dimension of EU climate protection policy. Although industrial emissions are regulated at EU level via the Emissions Trading Scheme (ETS), meeting nationally binding targets in the construction, agriculture, transport and waste sectors is largely the jurisdiction of regional authorities, which may be underprepared for such a task.

Policy targets, and associated indicators, are a vital part of addressing the need and exploring the options for rapid action in order to tackle the long-term challenge of sustainability in Europe. But progress towards environmental sustainability can only be measured and monitored in a reliable way if robust data, indicators and tools are available.

Through the forthcoming 7th EAP and its predecessor, the 6th EAP[7], the EU should pursue its commitment to not only developing ambitious targets for sustainability, but also to their continuous improvement through rigorous evaluation of the successes, challenges and new issues faced along the way.

Dr Stefan Giljum
Head of Sustainable Resource Use, Sustainable Europe Research Institute (SERI)

Stephan Lutter
Deputy-Head of Sustainable Resource Use, Sustainable Europe Research Institute (SERI)

1 *World Conservation Strategy (IUCN, UNEP, WWF; 1980). See: http://data.iucn.org/dbtw-wpd/edocs/WCS-004.pdf*
2. *United Nations Conference on Environment and Development (UNCED; 1992). See: http://www.un.org/geninfo/bp/enviro.html*
3. *EU COM(2011) 571 'The Roadmap to a Resource Efficient Europe'. Available to download from: http://ec.europa.eu/environment/resource_efficiency/about/roadmap/index_en.htm*
4. *United Nations Conference on Sustainable Development (Rio +20). See: http://www.uncsd2012.org/*
5. *Towards a new Environment Action Programme. See: http://ec.europa.eu/environment/newprg/7eap.htm*
6. *EU Climate and Energy Package. See: http://ec.europa.eu/clima/policies/package/index_en.htm*
7. *The 6th Environment Action Programme of the European Community 2002-2012. See: http://ec.europa.eu/environment/newprg/index.htm*

Contact: svatava.janouskova@czp.cuni.cz
Theme(s): Climate change and energy, Sustainable development and policy assessment

How do targets and indicators improve sustainability?

Sustainable development aims to improve quality of life without compromising the well-being of future generations. A new study highlights the challenges of setting environmental sustainability goals and cites the EU Climate and Energy policy package, with its '20-20-20' targets, as a model example.

"Environmental sustainability means maintaining and improving natural ecosystems so that they can provide essential goods and services for human life."

The concept of sustainable development has evolved around three pillars: economic, social and environmental sustainability. Economic sustainability has traditionally been based on economic growth, but the recent global economic crisis brought this view sharply into question. Social sustainability is rather difficult to define, partly because it is not clear what the different elements of social sustainability should be, for example, equality between people, regions or countries; or the ability to enjoy good health.

Environmental sustainability means maintaining and improving the quality of natural ecosystems so that they can provide essential goods and services for human life, such as clean water and food, as well as conserving biodiversity and regulating the climate. The notion of environmental sustainability has evolved from a general definition to specific criteria that can be used to assess how far human development is pushing the biological and physical limits of our natural environment.

Objectives to prevent the quality of ecosystems from surpassing critical threshold levels, beyond which the benefits to humans fall to unacceptable levels, are often set as policy targets, for example, reducing deforestation, halting biodiversity loss, mitigating and adapting to climate change and improving sanitation. But to be effective, targets must be specific and linked to relevant sustainability indicators. Indicators provide current information about the health of the environment and allow the 'distance' to the target to be measured, for example, percentage of forested area, proportion of species threatened with extinction, CO_2 emissions and proportion of population with access to clean water.

The study highlights the EU '20-20-20' policy[1] as a successful example of applying sustainability targets and indicators. Its objective is to achieve a 20% reduction in greenhouse gas (GHG) emissions by 2020 (compared with 1990 levels) while achieving a 20% increase in energy efficiency and ensuring that a 20% share of energy consumption comes from renewable sources. The EU's progress towards achieving these targets is expressed as annual emissions relative to 1990 levels, which enables analysts to identify trends over time.

Despite political pressure on one side and growing scientific consensus on the other, few other examples of indicators exist worldwide that directly link environmental quality to specific targets, particularly for reducing global resource use (e.g. fossil fuels, metal ores, minerals and biomass). The study highlights some of the challenges in doing so, such as the compromise between scientific, political, local and global definitions of sustainability; choice of reference points; and accounting for different rates of development worldwide.

Source: Moldan, B., Janoušková, S., Hák, T. (2012). How to understand and measure environmental sustainability: Indicators and targets. *Ecological Indicators.* 17: 4–13. DOI:10.1016/j.ecolind.2011.04.033.

1 The EU Climate and Energy package. See: http://ec.europa.eu/clima/policies/package/index_en.htm

Contact: shailendra.mudgal@biois.com
Theme(s): Resource efficiency, Sustainable development and policy assessment

Resource efficiency targets need fine-tuning

A number of EU policy targets and indicators exist to improve the efficiency of natural resource use. A new report produced for the European Commission concludes that although indicators of resource use need improvement, they are still a valuable policy tool to monitor progress towards sustainable material, energy, water and land use.

"Key to establishing appropriate targets is the fact that those in one policy area are inextricably linked to those in other areas".

The concept of 'resource efficiency' combines ongoing economic development with less resource use and minimisation of environmental impacts. Robust indicators are necessary to set appropriate targets for resource efficiency and to measure progress towards meeting them.

The report, which reviewed resource efficiency targets in EU Member States and several other countries, proposes a new indicator framework for resource use and the associated environmental impact in four categories: materials, energy (and climate), water and land use.

The EU is on track to meet its GHG emissions target for 2020 of a 20% reduction compared to 1990 levels. When considered alongside the longer-term target of an 80% reduction in GHG emissions by 2050, there is a strong need to switch from fossil fuels to renewable energy sources. Initially, the main source will be biomass but other renewable energy technologies will establish themselves over the next few decades.

Key to establishing appropriate target levels is the fact that targets in one area are linked to other resource use targets. The report describes this interlinking network of resource use related indicators as a 'basket of indicators'.

For example, targets for material consumption and land use need to incorporate the required increase in energy obtained from biomass. The report proposes an approach based on HANPP (Human Appropriation of Net Primary Production), which is a measure of biomass removed from land. However, HANPP varies with the intensity of land use, meaning that any potential EU-27 target of stabilising average HANPP at 50% should not be applied equally to individual Member States. Countries with less favourable conditions for intensive land use (e.g. Sweden, Finland and Slovenia) should maintain low levels of HANPP, whereas countries with more productive land and intensive agricultural production (e.g. the Netherlands, Hungary, Denmark and the Czech Republic) should be allowed to exceed 50%.

Targets for water use face a number of methodological difficulties, such as a lack of accurate data on water use at river basin level, but the Commission is currently developing appropriate indicators and underlying datasets for this.

The report makes several recommendations for how to develop and strengthen indicators of resource use and related environmental impacts, especially for ecosystems and biodiversity. It stresses the need to incorporate resource use embodied in international trade, which is material used in the manufacture of products that are then exported abroad. This indirect consumption has to be taken into consideration in order to comprehensively evaluate a country's resource consumption.

Source: BIO Intelligence Service, Institute for Social Ecology and Sustainable Europe Research Institute (2012) Assessment of resource efficiency indicators and targets. *Final report prepared for European Commission, DG Environment.* Available at: http://ec.europa.eu/environment/resource_efficiency/news/up-to-date_news/5072012_en.htm

Contact: hayo.vanderwerf@rennes.inra.fr
Theme(s): Agriculture, Sustainable development and policy assessment

Sustainable agriculture assessments need greater clarity

A new study has revealed the diversity in terminology and choice of indicators across eight major frameworks used to assess the environmental impacts of agriculture. The researchers call for further work to quantify and express uncertainty surrounding chosen reference values.

"The absolute value of an indicator tells us little about environmental impact. What is important is the distance between the indicator value and a reference value".

Many efforts have been made to evaluate the environmental impact of farming and nearly all of them make use of indicators. The absolute value of an indicator tells us little about environmental impact. What is important is the distance between the indicator value and a reference value, but how is this reference value identified?

Researchers analysed eight methods typically used to assess agricultural sustainability and suggested ways to improve their use and relevance. All the selected methods, which include the Ecological Footprint (EF) and the European Analytical Framework for the Development of Local Agri-Environmental Programmes (AEMBAC), use established indicators of sustainability and feature in published case studies.

Six of the eight methods identify decision-makers as their target users, whereas the remaining two methods are 'grass-root' types, aimed at local farming or activist organisations. Four methods assess sustainability in environmental, social and economic terms, whilst the other four focus on environmental sustainability only. Each method uses different terminology to describe the end target of sustainability, for example, 'threshold', 'fair earthshare', 'critical flow' and 'sustainability standard'. As such, the study suggests using the generic term 'reference value' to represent the goal of sustainability.

The study suggests making a further distinction between different types of reference values. A 'normative' reference value refers to a previously defined value, such as an emission reduction of 20% by 2020, whereas a 'relative' reference value refers to a similar or ideal system. Normative targets can be even further divided into those that describe desirable conditions and those that describe threshold limits, which represent the condition of a natural resource beyond which the quality is unacceptable.

As a further complication, some studies distinguish between 'science-based' and 'policy-based' targets. Science-based targets use reference values based on objective science-based considerations using experimental data, models or expert opinion. Policy-based targets are more influenced by costs or political feasibility.

In the majority of the methods, the reference values are defined at a local level and so provide a means to introduce site specificity into assessments. For those methods that use both scientific and policy-based sources, the study suggests that a clearer distinction should be made. Policy-based reference values are usually a compromise based on both science and societal considerations and, as such, are less stringent than science-based reference values. By making clear what type of reference values are in use, sustainability assessments will be more transparent to stakeholders and allow for more meaningful and robust comparisons.

Source: Acosta-Alba, I. & van der Werf, H.M.G (2011) The Use of Reference Values in Indicator-Based Methods for the Environmental Assessment of Agricultural Systems. *Sustainability* 3:424-442 doi: 10.3390/su3020424. This study is free to view at: www.mdpi.com/2071-1050/3/2/424

Contact: martin.bruckner@seri.at
Theme(s): Resource efficiency, Sustainable development and policy assessment

Indicators reveal 'hidden' trade of materials

With ever-increasing global consumption, the impacts of resource depletion, land use change and pollution are being felt worldwide. A new study reveals how international trade is shifting the environmental burden from the consuming nation to other parts of the world, and calls for changes in the way national material use is accounted for.

"About a quarter of materials extracted and consumed globally between 1995 and 2005 were directly or indirectly traded across international borders".

In Europe, using natural resources sustainably is central to the European Commission's goal of a secure, equitable and resource-efficient future[1]. Using a technique called material flow analysis (MFA) and a multiregional model based on OECD data, the new study calculated, for the first time, trading patterns for 53 countries between 1995 and 2005. The analysis covered four main categories: biomass; fossil fuels; metals and industrial minerals; and construction minerals.

The results revealed a significant increase in global extraction of raw materials between 1995 and 2005: up 24% from 46.4 to 57.4 billion tonnes. Extraction of materials grew the most in emerging and developing countries and the largest increase was for metals and industrial minerals, up by 36%.

In addition to the actual materials contained in a traded product, indirect material flows accumulate along the production chain, from extraction through to manufacturing and transportation. Such material flows are referred to as 'materials embodied in trade'. Associated with the increase in material extraction between 1995 and 2005 was an almost 50% increase in materials embodied in trade, growing from 10.1 to 14.9 billion tonnes. This implies that about a quarter of materials extracted and consumed globally were directly or indirectly traded across international borders.

The researchers compared two different indicators of resource use: the 'raw material consumption' (RMC) indicator (as used above), which accounts for materials directly consumed (extracted domestically or imported) as well as indirectly consumed via imported products, and the 'domestic material consumption' (DMC) indicator, currently used in EU and OECD policies, which only accounts for material directly consumed not indirectly consumed through imported products.

The results show that the difference between RMC and DMC can be up to 200%. Compared with RMC, DMC *underestimated* the amount of raw materials consumed in most wealthier OECD countries, including most of Europe, the US and Japan, and *overestimated* raw material consumption in less developed countries that export heavily.

Continuing to base assessments of resource use on DMC rather than RMC could seriously misrepresent global trends. Using DMC allows industrialised nations to meet reduction targets by shifting more of the production process and associated environmental burden elsewhere, rather than reducing their demand for material-intensive products. To successfully improve sustainability at a global scale, targets and indicators of national resource use need to take embodied trade into account, the study concludes.

Source: Bruckner, M., Giljum, S., Lutz, C., Svenja Wiebe, K. (2012). Materials embodied in international trade – Global material extraction and consumption between 1995 and 2005. *Global Environmental Change*. DOI.org/10.1016/j.gloenvcha.2012.03.011.

1 *See: A resource-efficient Europe – Flagship initiative of the Europe 2020 Strategy http://ec.europa.eu/resource-efficient-europe/ and The European Commission's Online Resource Efficiency Platform. http://ec.europa.eu/environment/resource_efficiency/index_en.htm*

Contact: markus.blesl@ier.uni-stuttgart.de
Theme(s): Climate change and energy, Sustainable development and policy assessment

Policy targets dominate over efficiency for predicting future energy use

Specific policy targets for nuclear energy, CO_2 emission reductions and energy security will have a greater influence on future energy use than the availability of energy efficient technologies, concludes a recent study.

"To keep global warming below 2°C, the EU-27 need to reduce CO_2 emissions by 71% by 2050".

To keep global warming below 2°C, the EU-27 needs to reduce CO_2 emissions by 71% by 2050. Using a model developed for the European NEEDS project[1], the study analysed the outcome of five different policy scenarios designed to meet this target. The simplest 'climate protection' scenario achieved the required 71% reduction in GHG emissions by 2050 as well as the EU goal of a 20% reduction in emissions and a 20% share of renewables by 2020. The other four scenarios took into account additional concerns, such as energy security and a change in the nuclear policy.

Each of the five policy scenarios was compared to a reference 'business-as-usual' (BAU) scenario in which no specific policy targets were set. The only impact on energy use was via improvements in the energy efficiency of available technology.

In the BAU scenario, emissions rose by 24% by 2050, far exceeding the target value. Under the climate protection scenario, energy consumption in the household and commercial sectors in 2050 was similar to present values and 12.7% less than in the BAU scenario, which saw a rise of 26%. These and other results imply that relying on energy efficiency measures alone will fall far short of the 2050 goal and that specific policy targets are required.

Emission reductions in the climate protection scenario were mainly achieved through fuel switching to renewable energy sources and support to carbon capture and storage (CCS). However, to reduce dependency on natural gas and oil imports, further development is needed in the production of second-generation biofuels, new carbon capture and storage (CCS) technology, fuel cells and battery-operated electric vehicles.

By comparing the different policy scenarios, the study considered the impact on different sectors of policy design and target setting. Under the climate protection scenario, the GHG reduction was higher than the EU target for 2020 in sectors covered by the Emission Trading Scheme (29% instead of 21%) but lower in the exempt sectors, such as steel, cement and chemicals (6% instead of 10%). However, under a different policy scenario in which oil and gas imports were restricted as well as CO_2 emissions, non-ETS sectors showed more favourable GHG reductions (22%) because end users were forced to turn to renewable energy sooner, while ETS sectors contributed less with a 16% GHG reduction.

The impact of different timescales is also important. While the climate protection scenario was the cheapest up to the year 2020, enhanced nuclear energy combined with CO_2 emission reductions and a limit on imports was the most cost-effective scenario up to 2050.

Source: Blesl, M., Kober, T., Bruchof, D. & Kuder, R. (2010) Effects of climate and energy policy related measures and targets on the future structure of the European energy system in 2020 and beyond. *Energy Policy.* 38:6278-6292. Doi: 10.1016/j.enpol.2010.06.018.

1. *NEEDS (New Energy Externalities Development for Sustainability) was supported by the European Commission under the Sixth Framework Programme. See: www.needs-project.org*

Contact: karl.steininger@uni-graz.at
Theme(s): Climate change and energy, Sustainable development and policy assessment

Regional targets are key to meeting EU climate commitments

Regional governments lack the support required to meet EU-wide targets for greenhouse gas (GHG) emission reductions in the building, transportation, agriculture and waste sectors, according to a new study. The researchers outline a five-step process to help regional governments develop indicators and policy measures to help ensure national targets are met.

"Although most European regions have developed a climate action plan, few explicitly define targets, specific policy actions or associated costs".

The EU is committed by law to reducing its GHG emissions by 20% below 1990 levels by 2020[1]. Established in 2005, the flagship Emissions Trading Scheme (ETS)[2] was designed to limit industrial emissions. However, the building, transportation, agriculture and waste sectors are exempt from the ETS. Emissions in these sectors are influenced mainly by policies at the regional and local levels, but such policies must be sufficient to meet binding national targets.

Although most European regions have developed a climate action plan, few explicitly define targets, specific policy actions or associated costs. In 2010, the Austrian region of Styria successfully set regional targets to reduce non-ETS sector emissions, which are responsible for nearly half (45%) of GHG emissions in the region. Using Styria as a model case study, the new study presents a five-step strategy to help regional policymakers across Europe develop action plans consistent with their own national targets.

The five steps for regional policymakers and stakeholders are as follows:

1) Set a regional climate target based on the national emission reduction target.
2) Calculate maximum acceptable emission targets for specific sectors and define a set of appropriate indicators.
3) Monitor selected indicators and establish appropriate policy responses, investment costs and operational costs via scientific and stakeholder input.
4) Develop a plan for implementation of policy measures and seek approval from the regional government.
5) Annually monitor progress towards targets and fine-tune if necessary.

The study provides a detailed plan for how to address each step, with case study examples. For example, in the building sector, the biggest potential for reducing emissions is through refurbishing existing buildings to make them more energy efficient. To reach the targets laid down in the action plan, calculations show that the refurbishment rate will have to increase from 1% to 3% and remain constant for 20 years.

The presented approach is flexible, can be tailored to any European region and protects against unrealistic expectations, say the researchers. The key is the extensive stakeholder participation, which involves scientific, administrative and local communities, ensuring feasible targets correspond to local conditions and resource efficiency, and are closely linked to public resistance and political interests. This multi-stakeholder, quantitative approach encourages participant commitment, thus helping regional governments fulfil their contribution to the 20-20-20 targets while putting themselves on the path towards a low carbon society in the long term (up to 2050).

Source: Wolkinger, B. Steininger, K.W., Damm, A., *et al.* (2012). Implementing Europe's climate targets at the regional level. *Climate Policy*. 12(6), 667–689. DOI: 10.1080/14693062.2012.669096.

1. See: http://ec.europa.eu/clima/policies/package/index_en.htm
2. See: http://ec.europa.eu/clima/policies/ets/index_en.htm

A selection of articles on Policy Targets from Science for Environment Policy's News Alert

Energy Performance Buildings Directive: comparing Member State performance (20 September 2012)
A method has been developed to compare how EU Member States have implemented the Energy Performance Buildings Directive. It suggests that implementation varies widely across Europe but that the Czech Republic, Finland, Portugal and Slovakia have kept to the Directive's aims and guidelines most closely, based on data available in 2009.

New approach to developing scenarios for future of low carbon cities (17 May 2012)
A new study has explored how cities can create a low carbon future by presenting an approach to stakeholder engagement that develops scenarios of an ideal city. Rather than projecting towards a low carbon target for the future, the study suggests that 'backcasting' to the present day from these scenarios may provide a useful goal-orientated approach to environmental planning in cities.

What next for effective emission and air quality targets? (29 March 2012)
European policies have eliminated the most visible and harmful effects of air pollution, but current rates of emissions still pose a threat to the environment and to human health. A new study has assessed the policy scope to make further environmental improvements by applying the GAINS (Greenhouse gas-Air pollution Interactions and Synergies) model.

Photovoltaic supply falls short of solar power targets (26 January 2012)
Europe could struggle to meet the target set by the renewable energy sector of 25% of electricity produced by solar energy by 2040 because the supply of materials, including rare metals, needed to produce photovoltaics (PV) is unlikely to meet demand. Production rates need to be drastically improved, according to a new study.

Waste control to boost GHG reduction targets (17 November 2011)
Greenhouse gas (GHG) emissions from municipal waste in Europe could be reduced by 62 million tonnes, or 1.23% of total emissions in 2008, by 2020 if the diversion targets of the EU Landfill Directive are fully met, according to a recent report. This could be largely achieved through reducing methane emissions from landfill and increased recycling levels.

Resource productivity as sustainability indicator may need developing (26 May 2011)
Resource productivity has become a popular indicator of environmental sustainability. However, new research has demonstrated that it is influenced by national income and its current use tends to support a simultaneous growth in economic productivity and resource consumption. In order to shape policy effectively, the study suggests that targets should directly emphasise resource consumption and emissions.

To view any of these articles in full, please visit: *http://ec.europa.eu/environment/integration/research/newsalert/index_en.htm*, and search according to article publication date.

To receive articles like these in the free weekly News Alert, please email your subscription request to: **sfep@uwe.ac.uk**

Policy targets: suggested further reading

European Community (2005) *Policy Review on Decoupling: Development of indicators to assess decoupling of economic development and environmental pressure in the EU-25 and AC-3 countries.* http://ec.europa.eu/environment/natres/pdf/fin_rep_natres.pdf

Howarth, R.W. *et al.* (2009). *Rapid assessment on biofuels and environment: overview and key findings.* Pages 1-13 in R.W. Howarth and S. Bringezu (eds), Biofuels: Environmental Consequences and Interactions with Changing Land Use. Proceedings of the Scientific Committee on Problems of the Environment (SCOPE) International Biofuels Project Rapid Assessment, 22-25 September 2008, Gummersbach Germany. Cornell University, Ithaca NY, USA. http://cip.cornell.edu/DPubS?Service=UI&version=1.0&verb=Display&page=record&handle=scope/1245782000

Dittrich, M. *et al.* (2012). *Green economies around the world? Implications of resource use for development and the environment.* Vienna:SERI www.seri.at/green-economies

OECD (2010) *Setting and Using Targets for Sustainable Materials Management: Opportunities and Challenges.* Paris: OECD. www.oecd.org/dataoecd/15/33/46096831.pdf

About Science for Environment Policy

Science for Environment Policy is a free news and information service from the European Commission's Directorate-General Environment, which provides the latest environmental policy-relevant research findings.

Thematic Issues are a special feature of the service, which focus on research findings in key policy areas with expert commentary from a guest editor. Science for Environment Policy also provides:

- **News Alert** A weekly email which presents accessible summaries of key studies across a range of environmental topics.
- **Future Briefs** Policy briefs which explore the evidence around emerging environmental issues.
- **In-depth Reports** Reports which take a comprehensive look at the latest science for key policy topics.
- **Research Repository** Online database of policy relevant environmental research results.

For more information: http://ec.europa.eu/environment/integration/research/newsalert/index_en.htm

Subscribe to the News Alert

Keep up-to-date with the latest quality environmental research for evidence-based policy by subscribing to Science for Environment Policy's free weekly News Alert.

Send your subscription request to: sfep@uwe.ac.uk or sign up online at: http://ec.europa.eu/environment/integration/research/newsalert/index_en.htm

Science for Environment Policy is edited by the Science Communication Unit, the University of the West of England (UWE), Bristol.

Email: **sfep.editorial@uwe.ac.uk**