



D7.3: Research note: Outcomes of the workshops on policy processes and decision making – identifying needs for sustainability indicators

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The Institute for European Environmental Policy (IEEP) is an independent not-for-profit institute. Based in London and Brussels, the Institute's major focus is the development, implementation and evaluation of EU policies of environmental significance, including agriculture, biodiversity, climate and energy, fisheries, governance, industrial pollution, eco-innovation, regional development, resource efficiency, sustainable consumption and production, transport and waste. IEEP also produces the 'Manual of European Environmental Policy'. Website: http://www.ieep.eu.

Executive Summary

In the context of the IN-STREAM project, three workshops were organised in the course of 2011 to present and discuss preliminary results with relevant stakeholders in different European cities. Each of the events was structured around one of the three storylines developed in the context of the project: biodiversity, resource efficiency and green growth.

The first workshop focused on the use of sustainability indicators for biodiversity policy, and took place in Brussels on the 8th and 9th of February 2011; it was carried out jointly with a workshop of the Footprint indicators organised in the context of the OPEN:EU (One Planet Economy Europe) FP7 project.

The second workshop centred on the use of sustainability indicators for resource efficiency policy, and took place in Prague on the 7th of April 2011.

The third workshop focused on the use of sustainability indicators for green growth, and took place in Berlin in July 2011.

The key aims of these events were to:

- Introduce the IN-STREAM project and its objectives;
- Present useful findings and approaches of interest for policy makers, indicators users and researchers;
- Share views and experiences on how sustainability indicators have been used and should be used in the future for policy making; and
- Contribute to the sharing of information and increased use of sustainability indicators.

the project. There was a general recognition that the IN-STREAM analysis of the use of indicators in various policy areas and at different phases of the policy cycle resulted in valuable insights. The work approach, structured around the three storylines, was also appreciated.

It was noted that the policy areas investigated are closely interlinked with each other. The linkages and commonalities between them makes a whole range of issues very relevant across all the three storylines (e.g. land-use), pointing to the need for sustainability indicators to account for cross-policies impacts.

Across all the storylines, strong support for the development of indicators supporting a lifecycle perspective emerged. It was also stressed that indicators should help provide insights into the pressures of human activities and consumption outside European boundaries. There was a large consensus that the use of policy-specific indicators (e.g. biodiversity indicators, climate change indicators etc.) should be streamlined across different policies to ensure a more holistic and integrated approach towards environmental issues. The importance of understanding the scale at which indicators can /should be used (national-regional-local) and the different stakeholders groups that would benefit from using them was highlighted.

It was noted that, given the wealth of indicators on offer, efforts should focus on identifying and assessing the indicators which are most promising and that can help improve how we 'measure to manage'. The choice of indicators, it was noted, should also be driven by a clear understanding of the questions they should help answer.

The role of environmental accounting frameworks such as the SEEA should also be given due attention, as they can support indicator development by making data available, and have therefore the potential for being a game changer in the 'Beyond GDP' process.

In this regard, the issues of data availability, timeliness and robustness of information were also mentioned several times in the course of the workshops. The case was made for further harmonisation and improvement of data collection methods in order to strengthen the use of indicators.

In the course of the workshops it was highlighted that the type of analysis the In-Stream engaged in is increasingly on demand, reflecting an increasing interest in sustainability indicators and in their application to policy making. This follows from the recognition that today's environmental challenges are so broad that they require economy-wide solutions. The progressive mainstreaming of environmental policy into other policy areas contributes to the transformation our society and the economy, a fact which increases the demand for orientation and macro-aggregate level analysis.

This report includes the proceedings of the three workshops. Further information on the events, including the power point presentations given, is available on the project website http://www.in-stream.eu/events.html. The useful feedback received from the participants has also been taken into account in IN-STREAM deliverables D7.2 and D7.4.

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Introduction

I.I The aim of this report

This research note presents the proceedings of three workshops that were organised in the course of the IN-STREAM project.

The first workshop focused on the use of sustainability indicators for biodiversity policy, and took place in Brussels on the 8th and 9th of February 2011; it was carried out jointly with a workshop of the Footprint indicators organised in the context of the OPEN:EU (One Planet Economy Europe)¹ FP7 project.

The second workshop centred on the use of sustainability indicators for resource efficiency policy, and took place in Prague on the 7th of April 2011.

The third workshop focused on the use of sustainability indicators for green growth, and took place in Berlin in July 2011.

This report includes the minutes of the three workshops. The minutes, together with the presentations given at the workshops, are also available on the IN-STREAM website: <u>http://www.in-stream.eu/events.html</u>

The useful feedback provided by the participants in the course of these events have been taken into account, to the extent possible, in the research note D7.2 ('Opportunities for a better use of indicators in policy-making: emerging needs and policy recommendations') and in the consolidated report D 7.4.

I.2 Structure

This research note is structured as follow:

Chapter 2 provides the minutes of the first IN-STREAM workshop on biodiversity policy;

¹ OPEN:EU is a 2 year collaborative research project exploring the question of how the EU can become a One Planet Economy by 2050. It is funded through the European Commission Directorate General for Research under Grant Agreement No. 227065. Further information is available online at <u>www.oneplaneteconomynetwork.org</u>. The OPEN:EU team is comprised of: WWF-UK; Global Footprint Network (GFN); Stockholm Environment Institute (SEI); University of Twente; NTNU (University of Trondheim); Sustainable Europe Research Institute (SERI); Institute for European Environmental Policy (IEEP), University of Twente.

Chapter 3 includes the minutes of the second IN-STREAM workshop on resource efficiency;

Chapter 4 presents the minutes the third IN-STREAM workshop on green growth.

2 First IN-STREAM Workshop - Sustainability Indicators for biodiversity

Report on the Workshop of 8-9 February 2011 in Brussels (Belgium).

Minutes authors: Samuela Bassi, Leonardo Mazza, Doreen Fedrigo (IEEP, London/Brussels) and Holger Gerdes (Ecologic Institute, Berlin)

How can our progress towards sustainable development be measured? Which sustainability indicators are most needed and which tools are currently being developed in the OPEN:EU and IN-STREAM projects to help in decision making? These were the core questions behind this joint workshop event organised in the context of two FP7 projects: OPEN:EU (One Planet Economy Network: Europe) and IN-STREAM (INtegrating MainSTREAM Economic Indicators with Sustainable Development Objectives). The two workshops held back-to-back brought together experts and policy makers to discuss a number of innovative sustainability indicators and provided a platform for the sharing of experiences and best practices in the use of these tools.

The first workshop presented preliminary results of the **OPEN:EU** project, with a focus on the Footprint Family of indicators (i.e. the Ecological, Carbon and Water Footprints). Its main objective was to gather stakeholders' and experts' feedback on the EUREAPA tool being developed by the project and its link to the policy cycle.

The second day focused on the **IN-STREAM** project, providing key insights and preliminary outcomes of its qualitative and quantitative analyses, linking economic indicators with measures of sustainability and well-being. This was the first in a series of workshops dedicated to specific policy areas, taking place in different European cities. This first event focused in particular on the use of indicators for biodiversity policy and growth.

The minutes and presentations of the workshop are available at the respective project websites:

OPEN:EU <u>http://www.oneplaneteconomynetwork.org/news/open-workshop-brussels.html</u>

IN-STREAM http://www.in-stream.eu/events.html

This chapter includes only the minutes of the IN-STREAM session, which took place on the second day of the event (9 February 2011)

2.1 Opening Presentations

Lucas Porsch – Presentation and Introduction to the IN-STREAM Project

Lucas Porsch's (Ecologic) opening presentation provided the participants with some background and insights into the In-Stream project's main objectives and preliminary results. LP explained that the In-Stream project was conceived as a scientific successor of the 2007 *Beyond GDP* conference and investigates further the relevance of and needs for different indicators in policy-making processes. LP outlined the main objectives of the project, such as the evaluation of different indicators and how they can contribute to the *Beyond GDP* process, the further identification of institutional needs and opportunities - especially for composite indicators, and an investigation of impacts on a range of mainstream economic indicator of efforts to reach different sustainability targets. Specific policy areas which the projects will inform include biodiversity, resource efficiency, green growth and innovation.

After providing a brief insight into the organisation of the In-Stream project, he presented a few examples of preliminary results produced under different work packages, including the ongoing work on the use of indicators in the policy cycle of different policy areas (work package 7 led by IEEP), the results of the correlation analysis between GDP and environmental/sustainability and social indicators (carried out by Bath University under work package 5), the qualitative (RACER & SWOT) analysis of a number of selected indicators including Common Bird Index, Favourable Conservation Status, Marine Trophic Index and Red List index (carried out by IEEP and Ecologic under WP2), and the work on impacts of sustainability targets and strategies on competitiveness (carried out by ZEW).

Finally, Lucas pointed to other elements of the In-stream projects of particular relevance for stakeholders willing to be further engaged in the project, such as the project's website, the upcoming workshops and final conference, and the IN-STREAM newsletter.

Thefullpresentationisavailablehere:http://www.in-stream.eu/download/01_Lucas_Porsch_INSTREAM_Introduction.pdf

Discussion

The first issue raised during the discussions related to the need to clarify the relation between ecosystems' health/resilience indicators and the valuation of ecosystem services. Without establishing such a relation, it was argued, it will be difficult to factor the value of biodiversity into impact assessments. In a context of ever shorter policy-cycles there is a need for indicators which show the decline of the quality of our ecosystems, which is likely to lead to a further decline of essential services provided by ecosystems in the long term. This may require new indicators, different from the indicators traditionally used for nature/biodiversity conservation.

It was also stressed that spatial aspects tend to be neglected, such as the effect of the Common Agriculture Policy (CAP) on biodiversity worldwide.

Several participants highlighted that many pressures affecting ecosystem quality come from outside environmental/biodiversity policy. Indicators need to establish a link between biodiversity and the sectors which threaten biodiversity. A participant underlined the need to develop indicators which support a more efficient use of resources, especially in those sectors which have the highest pressures on biodiversity such as the extractive industries and agriculture - in order to manage environmental impacts throughout the life cycle of these resources and reduce the demand for those materials.

A participant highlighted the role for composite indicators, to inform both biodiversity policy and other sector policies.

Finally, a member of the IN-STREAM steering committee welcomed the approach of structuring the IN-STREAM presentation along the 3 storylines, and stressed the importance of focusing on resource efficiency (especially mining and agriculture impacts), biodiversity (and the need for taking it into account in other policies), and green growth (including the in light of the latest OECD and UNEP initiatives and of the findings of Rio+20).

Samuela Bassi – Overview and objectives of the day: the storylines and the focus of this first workshop

Samuela Bassi (IEEP) presented the structure and the objectives of the day. She briefly outlined the three storylines along which the IN-STREAM work is presented, i.e. biodiversity, green growth and resource efficiency. With regard to the objectives, Samuela pointed out that this workshop was dedicated to the biodiversity storyline and would therefore focus on biodiversity indicators and their link to a range of different policies. The main aims of the day were to present the In-Stream approach and findings, share views and experiences on how sustainability indicators have been and could be better used, and increase awareness and uptake of sustainability indicators.

Thefullpresentationisavailablehere:http://www.in-stream.eu/download/02_Samuela_Bassi_%20Workshop_Introduction.pdf

Discussion

One of the participants noted that climate change policy is also very much related to the biodiversity storyline. The project team clarified that there are several areas of overlap between the storylines, and that the division of policies across each storyline was only a tool to present the information. Links across policies will be noted whenever possible.

One of the participants stressed the importance of taking into account the global context beyond the European Union dimension, and suggested to take into account the global

framework of sustainability in the final message conveyed by the project. The team clarified that the focus of the project is at EU level. However global implications can be highlighted when possible.

2.2 Part I – Overview of the qualitative and quantitative results of the project

Holger Gerdes – Sustainability indicators and their link with policy making

Holger Gerdes (Ecologic) presented the preliminary results of the qualitative evaluation of indicators undertaken under work package 2. He outlined the approach chosen to evaluate those indicators (e.g. filters and criteria applied), the use of the RACER methodology ('relevance, acceptability, credibility, easy to monitor, robustness') and presented one example of analysis on the potentially disappeared fraction (PDF) indicator. Finally, Holger announced that the results would be published in March/April.

 The
 full
 presentation
 is
 available
 here:
 http://www.in

 stream.eu/download/03_Holger_Gerdes_Qualitative_Analysis.pdf
 Analysis.pdf
 Instrumentary
 Instrumentary

Benjamin Görlach – Overview of the quantitative results of the project – the use of sustainability indicators in economic modelling

Benjamin Görlach (Ecologic - in place of Francesco Bosello of FEEM) presented some of the quantitative results of the project. He explained that the main objective of the quantitative work was to establish quantitative links between environmental/sustainability targets and macro-economic indicators such as GDP, thus trying to emulate the power of economic models in informing on the impact of an economic policy decision on GDP. The rational behind this exercise was to improve the integration of sustainable development topics in existing economic modelling frameworks. Benjamin presented the results of the current strand of work focused on the carbon prices and impact on competitiveness, aiming to assess how the introduction of a carbon price signal can affect different sectors of the economy. He announced that some results on the issue of sustainability measures in agriculture and competitiveness would soon be produced. With regard to the effects of carbon prices on competitiveness, the findings suggested that the carbon price does matter and can affect several sectors, especially the carbon intensive industries. The model allowed to quantify the trade-offs between GHG reduction and competitiveness, and to get a more balanced picture of the impacts of the carbon price on the economy as a whole. The possibility of including water and food security issues is currently being investigated. The inclusion of the social dimension might prove difficult.

Thefullpresentationisavailablehere:http://www.in-stream.eu/download/04_Francesco_Bosello_Quantitative_Analysis.pdf

Discussion

With regard to the links between climate change targets and growth, a participant pointed to the importance of better indicators for GHG emissions for regions and municipalities. He suggested more work should be done to provide local authorities with a methodology to measure their GHG emissions, which would also allow distinguishing important and exported emissions and would take into account GHG other than CO2. The team agreed on the importance of the regional/local dimension. The project is also undertaking some regional analysis (undertaken by ZEW in Germany). A major obstacle to further analysis at regional and/or municipal scales, however, is the absence of good quality and timely data.

Others noted that the use of sustainability indicators/criteria in policy making at regional/local level could also inform the allocation of structural funds, including to climate change mitigation projects. This was thought to potentially compensate for the pressure from infrastructure/building sector lobbies for the building of large scale infrastructure such as roads, which may further lock regional economies and urban areas in a carbon intensive development path.

Other participants agreed that the regional dimension is important with regard to climate change and that the data/set of indicators available should be improved. However, it was observed, this is not something which could be done in the context of the In-Stream project, as this will require guidance at EU level. It was suggested that European bodies (such as the European Environmental Agency and its European Topic Centre on Air and Climate Change) might need to look into the issue of improving visibility for GHG emissions at municipal level by tailoring their methodology to local settings.

The use of sustainability indicators by countries/regions could also be useful to compare results with EU assessments, as a tool to assess one's performance compared to the EU average.

Another participant suggested that the impacts of carbon prices on competitiveness, in light of the EU 2050 climate change targets, should be taken into account. The team clarified that the project focus in on 2020 targets. Estimates up to 2050 would be difficult as they would have to consider transformative changes which are difficult to forecast and account for in a model. The main aim of the analysis, however, is not to provide future predictions, but rather to show how different models of carbon pricing affect different parts of the economy.

Wolf Mueller – The use of indicators for ecosystem and health effects

Wolf Mueller (University of Stuttgart) presented how integrated impact assessments can be used to assess the environmental performance of technologies and policies, and showed how that has been applied for health effects from air pollution. The main characteristics of the assessments were presented, such as integration across sources, pollutants, impacts, environmental media, scales etc. It was noted that the relation between pressures and

effects is in general non linear, that effects depend on time and site of the activity, and that the assessment focuses on impacts/damage, not of pressures. Wolf also explained that a bottom-up approach is needed for the assessment and presented the so called 'impact pathway approach' which was developed in the ExternE project series. The approach takes into account all site specific characteristics and applies models for estimating the dispersion and chemical transformation of pollutants. Resulting concentration changes of pollutants across Europe can then be related to impacts on human health and the environment. All spatial levels from local to hemispheric and global are assessed. The approach excludes from the analysis those alternatives that pose higher health risk on individuals or exceed sustainability targets as weighting of impacts is only possible for small risks. An indicator for human health impacts (DALY) was also presented, as well as an indicator for biodiversity impacts (PDF). The performance of such indicators based on EEA emission data showed a decrease in impacts. These indicators will be further discussed and applied within the IN-STREAM project.

Thefullpresentationisavailablehere:http://www.in-stream.eu/download/05_Wolf_Mueller_Ecosystems.pdf

Discussion

A participant suggested to illustrate the link of this analysis with the storyline with a graph showing the cost per responsible sector. He also stressed the importance of taking a forward looking perspective beyond 2030. This will enable to capture the effect of ageing, and also the effect of biodiversity policy beyond the 'low-hanging fruits'. The team confirmed that data by sector are indeed available, and the possibility of taking into account future effects will be explored.

It was also noted that the use of sustainability indicators will be relevant also for the current revision of the Air Thematic Strategy. Nevertheless, health indicators may give a misleading impression that more ambitious targets are not needed, as exposure of populations to some air pollutants has indeed fallen. This will not adequately reflect the impacts of air pollution on biodiversity, which are still very damaging. Nitrogen deposition for example is a high threat to biodiversity, and is reaching a tipping point, since nitrogen does not decrease but accumulate. A nitrogen footprint would be useful, and indicators for other pollutants should also be explored. It will be important to take this into account in the results of the IN-STREAM project.

A member of the OPEN EU team noted that a nitrogen footprint is being developed by the University of Virginia. (Further exploration of this issue, however, falls outside the scope of the IN-STREAM project).

With regard to the sensitivity of using DALY values, it was noted that the use of values for life is quite common in economic literature and the team should not shy away from assessing the cost of environmental degradation in terms of the economic value of lives lost. Another participant pointed out that a cautious approach needs to be taken to the valuation of the

cost of life – especially where the cost of life in developing countries and developed countries is being compared.

With regard to morbidity, it was suggested that it would be of interest to look into the labour productivity impacts. Avoided health expenditures are also a powerful message for policy makers. In the area of air quality, economic arguments are quite strong and should be used to influence policy. With regard to the terrorist risk taken into account in the model, it was suggested that besides nuclear risk, the study should include other aspects such as dams, chemical plants, water supply systems/networks of gas & oil pipes, which are vulnerable too. However, Wolf noted, all of these so-called Damocles risks (low probability, high damage risk) are excluded from the analysis. Attacks on nuclear power plants were only chosen as an example.

It was also noted that, beside air pollution, other causes of health problems should be taken into account, such as the presence of chemicals in water.

The team noted that it will explore the possibility of including the effects on labour productivity, although it is yet unclear if this could be done in this project given budget constraints. The impact on pesticides, although interesting, unfortunately falls beyond the work planned for the INSTREAM study. We also underlined the difficulty of providing a value of life when death occurs after a long period of time (e.g. due to pollution), compared to death occurring immediately (e.g. due to accidents) was pointed out.

Other issues addressed in the discussions included the usefulness of indicators to link the loss of biodiversity with the loss of ecosystem services, such as atmospheric cleansing, and the need to provide aggregated results at European level, as sometimes the effects of air pollution are perceived far away from where the pollution has been emitted.

2.3 Part II – The use of sustainability indicators in policymaking: focus on policies relevant for biodiversity

Leonardo Mazza, Jana Polakova, Patrick ten Brink, Keti Medarova, and Doreen Fedrigo

A joint presentation from the Institute for European Environmental Policy (IEEP) provided an insight into the approach used for the qualitative analysis in the IN-STREAM project. IEEP also presented a number of preliminary results on the use of sustainability indicators in policy areas of relevance to nature and biodiversity.

Thefullpresentationisavailablehere:http://www.in-stream.eu/download/06_IEEP_Sustainability_Indicators.pdf

Leonardo Mazza (IEEP) outlined the objectives of the qualitative analysis, and in particular of the stakeholder consultation. These included the identification of opportunities to improve the use of indicators in policy-making, and of the need for additional/alternative indicators in view of current policy priorities. Leonardo further presented the approach for collecting information on indicators used across relevant policy areas, including the common framework used – i.e. the policy-cycle (see figure below). He also outlined the range of indicators selected and the questionnaire design used for collecting information from stakeholders.

Figure 1 The Policy Cycle



Leonardo's introduction was followed by a range of presentations on several policy areas investigated in the ongoing work. Each presentation provided illustrations of policy cycles for the different policy areas, pointing out opportunities for using indicators in the different phases of each policy area's policy-cycles.

Jana Polakova (IEEP) provided an insight into the current use of sustainability indicators in Agricultural Policy – in particular to measure the delivery towards the objectives of the CAP Pillar 2. She briefly presented the Common Monitoring and Evaluation Framework of Rural Development 2007-2013 and the suite of indicators that it comprises. The policy cycle for agriculture policy is shown in the figure below:

Figure 2 The Policy Cycle for agriculture policy



Patrick ten Brink (IEEP) (building also on input from his IEEP colleague, Indrani Lutchman) focused on Fisheries Policy, in particular in relation to the specific delivery mechanisms of the European Fisheries policy. He briefly presented the sustainability targets which can be pursued through the use of indicators in this policy area and briefly presented sustainability and biodiversity indicators (e.g. Marine Trophic Index, Average size of fish etc.) which have been used. Patrick stressed the importance of thresholds and response indicators in fisheries policy and suggested how they may be used. The policy cycle and key indicators for fishery policy is shown in the figure below:



Figure 3 The Policy Cycle and key indicators for fishery policy

Keti Medarova (IEEP) focused on the EU Cohesion Policy, providing some background on the policy's primary objectives and key indicators to determine eligibility for funding and measure progress towards targets/ reporting. The proposed environmental 'core' indicators for 2007-2013 Cohesion Policy were presented. Keti noted these were primarily output indicators, and stressed that impacts/results indicators were neglected. In particular, indicators on biodiversity or resource use were not covered. Keti also presented a few examples of good practice of indicators used in some countries and regions, as well as future challenges and opportunities. The policy cycle for cohesion policy is shown in the figure below:

Figure 4 The Policy Cycle for cohesion policy



Doreen Fedrigo (IEEP) focused on resource efficiency and identified the related policies where indicators can have a major role to play, namely in the resource strategy and waste policy, but also in a theoretical EU biomass policy. Focusing on the theoretical biomass policy, she also provided an illustration of the ways in which sustainability targets/ aims can be supported by indicators. She briefly presented some of the key areas of applications for indicators, such as material flow analysis, sustainability criteria/ product requirements and land use and land use change, providing a few examples (e.g. CEN technical standards on sustainability criteria). The policy cycle and key indicators for resource efficiency policy is shown in the figure below:



Figure 5 The Policy Cycle and key indicators for resource efficiency policy

Sonja Gantioler – Biodiversity and Ecosystem Service Indicators

Sonja Gantioler's (IEEP) presentation focused on the use of biodiversity and ecosystem service indicators in biodiversity policy. She provided an overview of the different uses which can be made of biodiversity indicators in relation to biodiversity policy (i.e. measure, synthesises and communicate) and explained how recent developments, including the CBD 2010 biodiversity baseline and headline targets, call for the use of biodiversity indicators, baskets and composite indices and briefly presented a range of biodiversity indicators such as the Red List Index, the Common Bird Index and the Favourable Conservation Status and a number of SEBI indicators. She also provided an insight into potential indicators for ecosystem services for provisioning, regulating and cultural services, highlighting some of the challenges linked to them due to early stages in identification and development.

Thefullpresentationisavailablehere:http://www.in-stream.eu/download/07_Sonja_Gantioler_Biodiversity_Indicators.pdf

Discussion

The policy cycle approach was generally appreciated by the participants.

Some stressed the importance of land use indicators, an important issue common to several policy areas.

A participant suggested to link the analysis to interesting stories and key issues, such as (but not only) land use. Another highlighted the importance of ensuring the link with current policies, in order to gain the attention of governments and policy makers. The relationship with the media is also important, although it should be taken into account that media interest in indicators is usually of short duration. Indicators of performances and prices were considered powerful tool to communicate a message.

A participant stressed the importance of using indicators that can be linked to each other, in order to provide messages in different directions/policy areas. It was suggested to use a basket of indicators that are able to tell a story and that are linked to EU and national level interests.

2.4 Part III – Brainstorming sessions on potential and barriers for biodiversity related indicators in policy-making -Presentation of the key outcomes

During the breakout session, the participants were divided in 3 groups, each discussing the use of biodiversity indicators in one policy area among: biodiversity, resource efficiency and green growth

Each group was requested to associate biodiversity/ecosystem indicators with the different steps of the policy cycle of the policy area they were focusing on. To do so, they were asked to select between 5 and 10 biodiversity/ecosystem services indicators (including but not only from a list provided) which are particularly useful for policy-making in this field, and associate them with the most relevant step(s) in the policy cycle. Furthermore, for each of them they had to briefly justify: why the indicator was particularly valuable, why it was placed at the specific stage(s) of the cycle, how the indicator should/could be used, and if the indicator was easy to communicate – i.e. if suitable to be taken up by media.

The groups were also asked to discuss which specific policy issue (e.g. legislation, Strategies, Action Plans etc.) were more amenable to take on board biodiversity indicators, what were the main obstacles/limitations/gaps for using biodiversity indicators in the policy area of their focus and, if time allowed, if they knew of any biodiversity/ecosystem indicator currently not readily available for use in their area and why.

Sonja Gantioler – Biodiversity & ESS indicators in biodiversity policy

In the policy cycle exercise, the group located the majority of indicators under the phase 'policy recognition', with a focus on 'monitoring and reporting'. Only few indicators were

located on the solution and analysis phase. It was noted that the design of the SEBI indicators might be a reason for this bias, as the focus of SEBI is on state and pressure indicators, while response indicators are little represented. It turned out that ecosystem service indicators were missing throughout the policy cycle. In this context, the group noted that initiatives such as IPBES have just started and hence have not had an impact on the further development of related indicators yet. It was discussed whether indicators should be more linked to consumer behaviour. A suggestion was to focus on analyses of prices in relation to scarcity (taking substitutes into account) as a potential indicator that would be usable for policy recommendations.

With regard to where policy instruments can help to foster the application of indicators, it was stated that the European Commission puts priority on effort-based indicators. Indicators should thus be able to tackle the link between action and results. In this context, both trade-off and synergies should be measured. As for specific policy instruments, it was noted that, at the EU level, the mandatory Impact Assessment (IA) provides an opportunity for the application of indicators - although not all policies are subject to an IA, e.g. the current CAP reform. The group stated that the impact of EU trade policies on (global) biodiversity is not yet sufficiently recognised; indicators could be developed to fill this gap (e.g. % of illegal logged timber in imports). Also, Green Infrastructure was stated as a field where indicators could help to monitor impacts.

As for the existing gaps in the use of indicators, the group mentioned again the EU trade policy as being a 'black box', meaning that its impacts (e.g. on biodiversity) are largely unknown. In this context, it was stated that indicators may not be able to identify *specific* impacts, but that they could help to communicate that there is *an* impact. When it comes to the private sector, it was noted that indicators could be used to measure sustainability of businesses; voluntary self-declaration could be a potential policy instrument in this context. The IUCN Barometer of Life was mentioned as a potential indicator that is particularly suitable for communication (rather than for measuring) and that could be applied in the EU. In general, the group stated that one single biodiversity indicator cannot do the whole job. A set of highly aggregated and very specific indicators is needed to inform policy and the broader public effectively.

With regard to IN-STREAM, it was stated that the value added of the project will be on the question of how biodiversity indicators can be integrated with other policy areas; the respective storylines (biodiversity, resource efficiency, green accounting) should therefore be integrated. Suitable Indicators could be identified/applied to form this common storyline (e.g., indicator on land use). In the end, IN-STREAM should be able to a) show decision-makers how the huge amount of (indicator) information can be used, and b) serve as an instrument to help the wider public understanding what is going on. In the respect, IN-STREAM should identify which indicators are relevant for which stakeholders.

Doreen Fedrigo – Biodiversity & ESS indicators in resource use policy: focus on biomass

As resource efficiency policy is still relatively undeveloped, a theoretical policy area was selected for discussion. Biomass policy was chosen as it links very well with the other story lines, particularly on the issues of biodiversity and climate change. Initial discussion identified the potential approach taken to such a policy, that is, based on domestic production, imports and exports, a limit on uses of biomass would need to be set, using a hierarchy of uses (food, materials, and lastly energy) as a guide for setting limits and eventually developing policy responses addressing these.

Given the theoretical nature of the policy, and the relative lack of knowledge of current consumption levels and impacts, many of the indicators chosen were higher level ones such as the ecological footprint, EMC, HANPP, etc. There was therefore a higher concentration of indicators selected for the early stages of the policy cycle – notably in the problem recognition and exploration phases. Another area of high concentration was in the final stages of the cycle, on monitoring, performance and review.

During discussion, it was identified that as the indicators used were focusing on biodiversity, this resulted in a distorted focus relating to impacts. Indeed, land use and water were identified as being of particular relevance as well. Therefore the selection of indicators going forward in the project would need to be considered.

Another set of indicators missing in the list were those related to economics, for example on levels of funding, on FDI, subsidies and prices of materials. It was felt that some indicator development would be needed for some of these. Social indicators were also missing.

A suggestion was made that it could be a good learning exercise to select an indicator to focus on to follow its use throughout the policy cycle and at the different multi-governance levels.

Benjamin Görlach – Biodiversity & ESS indicators in climate policy

As green growth is potentially a very wide area, the group focused on climate change policy only, due to time limitations. A distinction between adaptation and mitigation policies was first made, as the indicators used and their scope in these two areas can be different.

For adaptation policy, it was noted that an indicator for habitat/species vulnerability due to climate change will be crucial, and should be used in the early stages of the policy cycle.

For mitigation policy, it was noted that it will be important to understand how policies interact with biodiversity, using indicators that can inform on the main threats to biodiversity that can be exerted by a policy (e.g. biofuels). These should be relatively 'rapid' indicators, i.e. able to

inform on short term impacts. The team was unsure if such indicators are currently available, as climate change has typically very long-term effects.

Among the key biodiversity indicators of relevance for climate policy, the team indicated: Impact of climate on birds (being the one where the link between biodiversity and climate change is more explicit), Ecological Footprint, Status of Protected Areas, PDF, Red List, and others (see figure below). The team also suggested some new indicators beside those provided for the breakout session, namely: Land footprint, Water footprint, Mediterranean water stress and an indicator able to assess the carbon impact of farm's products.

Figure 6 Key indicators for climate change policy and their position in the policy cycle (results from the working group)



Broad indicators like land and water, although not perfect, could be useful as they are quickly available. It was also noted that, in some cases, projections could be more useful than actual figures.

As for the position on the policy cycle, it was noted that the indicators proposed mostly concentrate at the earlier stages of the process, and less at policy performance stages.

It was pointed out that suitable indicators for policy implementation were almost missing from the indicator list provided for the breakout session. It was unclear if this depended on the fact that biodiversity policy instruments were not yet linked to the climate change policy agenda and/or were not considered part of the solution. In general, the team observed that policy decisions need to clarify why it is important to link policy to biodiversity, and how they will affect the economy. A wider set of indicators is needed to inform decisions.

With regard to communication, the team thought that the impact of climate change on birds would be an easy indicator to communicate. Other well known indicators such as the Ecological Footprint, although relatively popular, are more general and hence less suited to communicate strictly on the link between climate policy and biodiversity.

2.5 Closing of the day

Patrick ten Brink – Wrap-up

Patrick ten Brink noted that most participants acknowledged the added value of the project approach of providing a characterisation of the use of indicators in the different policy cycles and in different parts of the policy cycle. For the policy areas explored by the project, a robust picture of current strengths and weaknesses in integrating the use of indicators in policy making will be produced. Given the wealth of indicators on offer, effort should be focused on identifying ad assessing the indicators which are most promising and can offer a way forward to improve how we 'measure to manage'. The role of indicator frameworks such as the SEEA should also be investigated given its potential for being a 'game changer' in the 'GDP and Beyond' developments.

The discussion throughout the day also highlighted the importance of understanding the scale at which indicators can /should be used (national-regional) and the different stakeholders group that can benefit from using them. The need to take a global perspective with regard to the measurement of pressures on the natural environment was also stressed.

There was also a general endorsement of the idea of focusing the project's outcomes around the three storylines proposed. While each specific story line, and within them the specific policy areas, has merit in receiving specific attention, linkages and commonalities between them should also be explored and stressed – such as, for instance, the issue of land, which is relevant for all the three areas.

The aim of the policy analysis within the IN-STREAM project, concluded Patrick, will be to characterise the use of indicators in policy cycles, structure the results along the storyline narratives, highlight strengths and weaknesses of different approaches, and identify the most promising indicators to improve the sustainability of policy making.

Lucas Porsch – Update on the next steps of the project and workshops to come

Lucas Porsch briefly summarised the next steps and deliverables of the project. He explained that further work would be carried out as part of the quantitative analysis, and that

this part would be finalised soon. Several deliverables are to be published within the next two months and will be accessible through the project's website (<u>http://www.in-stream.eu/docs.html</u>)

The qualitative analysis will continue, with a range of additional interviews taking place as part of the stakeholders' consultation on the use of economic, environmental and social indicators in different policy areas. Three case studies are to be prepared, focusing on interesting approaches on the use of indicators in three different countries. This work will lead to a report providing conclusions and recommendations on the use of indicators in a range of policy areas. A number of workshops will be organised within the next months: a workshop in Prague on 7 April with a focus on resource efficiency, and a workshop in Berlin on 7 July with a focus on Green Growth. A final workshop will take place in Brussels in September. This last workshop will be the opportunity to summarise the analysis, present best practices, point to opportunities for mutual learning across countries/experiences and present and discuss the recommendations.

The	full	presentation	is	available	here:	http://www.in-
stream.eu/	/download/	08_Samuela_Bassi	_Next_	<u>Steps.pdf</u>		

Discussion

A participant noted the potential for IN-STREAM to inform policy making, in particular the upcoming decisions on the biodiversity agenda and the resource efficiency debate in June this year, and well as the policies related to the green economy. The gap between climate indicators and biodiversity indicators was perceived as particularly important and should be addressed

To inform policy-making it would be very valuable to link the three storylines, since these issues are interlinked and pursuing objectives in each one of these policy areas in isolation might undermine success in all three of them. This is illustrated for instance by the recent attacks on the biofuels targets. These tensions need to be reconciled by ensuring common policy action.

A participant proposed to strengthen the link with water indicators in the resource efficiency storyline, e.g. by including the water footprint. This could also offer an opportunity to link the IN-STREAM and OPEN EU projects. A joint analysis of a mismatch in the way decisions are taken and the way ecosystems work could offer an entry point to connect both projects.

It was also suggested that the issue of technology and innovation should be taken into account in the IN-STREAM analysis, as this is an area of interest to Dg Research and to several policy areas. The Green Growth workshop should offer the opportunity to look more into these issues and their relationship with indicators.

Outcome of the day

Several useful insights and information were gathered at this event. With the valuable feedback received so far, the IN-STREAM team will now be able to:

- Refine the biodiversity storyline to reflect the feedback on the indicators most suited to inform policy-making in various policy areas.
- Ensure a better link across the three storylines, highlighting overlaps and synergies in the use of sustainability indicators across them, and the importance of overcoming the isolation of policies in decision making
- Explore possibilities to further link the IN-STREAM and OPEN:EU project
- Strengthen and update the overall qualitative analysis in light of the comments and suggestions received

The team is also looking forward to further comments, ideas and suggestions from participants on IN-STREAM indicators and the policy cycles.

3 Second IN-STREAM Workshop - Energy and Resource Efficiency: Modelling, Analysis, Indicators

Report on the IN-STREAM Workshop of 7 April 2011 in Prague (Czech Republic)

Minutes authors: Leonardo Mazza, Samuela Bassi (IEEP, London/Brussels) and Thibaud Henin (Ecologic Institute, Berlin)

How can our progress towards sustainable development be measured in the area of resource and energy efficiency? Which sustainability indicators are most needed and which indicators are currently being investigated in the IN-STREAM projects to help in decision making relating to resource use? These were the core questions behind this workshop event organised in the context of the FP7 IN-STREAM project.

The workshop brought together experts and policy makers to discuss a number of innovative sustainability indicators in the area of resource and energy efficiency and provided a platform for the sharing of experiences and best practices in the use of indicators in this policy area.

The day also provided some preliminary outcomes of the qualitative and quantitative analyses undertaken in the IN-STREAM study, and on possible ways to link economic indicators with measures of sustainability and well-being.

This was the second of a series of workshops dedicated to the use of sustainability indicators in specific policy areas. While the first workshop focused in particular on the use of indicators for biodiversity policy and growth, this second event was focused on energy and resource efficiency. A third workshop on green economy will take place in Berlin on 7 July.

This chapter includes the minutes of the workshop. The minutes and presentations are also available on the <u>project's website</u>.

3.1 Part I – Measuring Sustainability with indicators

Chair: Bedřich Moldan – Welcome

The workshop was opened by Bedřich Moldan's (Charles University Environment Centre). He pointed out that, when he acted as the Chairman of the UN Commission on Sustainable Development, the institution identified the need for further work on aggregate indicators and on the link between indicators and the different dimensions of sustainable development. Since then, in the past ten years such work has been carried out only in part. This project

therefore can positively contribute to advancing in this important field, including in the fast evolving area of resource and energy efficiency.

Samuela Bassi – In-Stream Project Overview & Storylines and Goal of the Prague Workshop

Samuela Bassi (IEEP) presented the outline of the day and provided a short general introduction to the project's purpose and objectives. Samuela briefly explained that the project's findings have been structured around three storylines, in order to facilitate communication: biodiversity, resource efficiency and green growth. She clarified that this workshop's focus was on the resource efficiency storyline. She further illustrated the main aim of this workshop, namely to present and discuss the preliminary results of the project in the area of resource and energy efficiency. She highlighted that this workshop was also meant to show how the project's results can be relevant for Central and Eastern European countries.

Samuela briefly introduced the day's agenda: while the morning was meant to focus on measuring sustainability through the use of indicators (FEEM, IIASA), the afternoon was to be dedicated both to quantitative assessments as well as the project's qualitative work. Samuela finally introduced the project's next steps, in particular the upcoming publications of the quantitative and qualitative analysis on the project's website. Samuela also pointed to the project's two remaining workshops taking place in Berlin on July 7 and Brussels in September 2011.

The full presentation is available <u>here</u>.

Lucas Porsch – In-Stream Overview

After pointing out that far more information is available on the project's website, Lucas Porsch (Ecologic Institute) illustrated the project's overall objectives in more detail, explaining the policy-relevance of the study and the use of the policy-cycle to illustrate the project's main contribution more concretely. He also stressed the project's added value in attempting to bridge the gap between sustainability indicators and mainstream economic indicators, for example by its investigation of the economic impacts of sustainability targets. Lucas clarified that the project would come up with recommendations on how to work with indicators and introduced the project's different focal points (qualitative assessment, quantitative assessment, qualitative/quantitative linking, and integrated assessment) and presented the project team and responsibilities. He explained how data are used in the different stages of the policy-cycle, such as objective definition, problem identification, modelling of impacts or measuring success. He finally emphasized that the project should result in producing policy-relevant and timely results. Lucas invited the workshop participants to remain involved in the project, either by participating in one of the upcoming workshops or registering to the newsletter and visiting the website.

The full presentation is available here.

Francesco Bosello - Compounding Sustainability in a Single Measure. The Role of Energy-related Indicators (originally agenda item labelled 'The role of energy efficiency in determining the overall performance of the composite sustainability indicator')

Francesco Bosello (Fondazione Eni Enrico Mattei - FEEM) pointed out that building composite indicators/ Index of sustainability is a very controversial issue, probably one of the most difficult within In-Stream. Indeed, while one of the project's aims is to discuss the present use of indicators, the project also aims to devise new ways in which indicators could be used in the future. Francesco pointed out that policy-makers, such as the European Commission, are frequently using economic modelling tools, many of them for ex-post analysis. This prompted the project team to investigate the possibility of producing a model to study sustainability also ex-ante, and capable of producing projections. The team has therefore been working on constructing a composite indicator and testing whether it could tell something different than a simpler indicator such as GDP.

The model used is a general equilibrium model (ICES – Intertemporal Computable Equilibrium System) which replicates market exchanges in a given year. Taking 2001 as a baseline year, it uses a 2020 'reference scenario' and shows what happens to the economic development of 40 countries and 17 economic sectors. The data generated by the model allows for the computation of selected sustainability indicators and the composite index. The composite indicator builds on a core set of 23 indicators selected at the beginning of the project. Different weights are attributed to each of them (weighted average). The weighting is based on expert judgement on how each indicator is able to provide information on the economic, environmental and social dimension of sustainability, and takes into account redundancies and synergies across them (combination of performances).

The final index allows ranking countries. A list of top 10 and bottom 10 counties has been produced. Top countries include Sweden, Switzerland and Austria. The bottom of the list includes countries/Regions such as India and North Africa. In the ranking, '1' corresponds to sustainability. Even the best country, Sweden, is 30 per cent away (FSI of 0.68) from the best possible performance.

A key finding is that the different dimensions of sustainability are not substitutable. The countries with the highest composite indicator score are also those which perform relatively well in all the dimensions of sustainability. Countries with a low score generally underperform in at least one dimension. It is therefore not possible to compensate bad performance in one dimension through good performance in another. Francesco also illustrated in what way the qualitative weighting associated with the different indicators can slightly influence the outcomes. A sensitivity analysis revealed that countries in the top and bottom positions were mostly the same, while some different ranking for the central positions was possible. Overall, the results were considered sufficiently robust.

The full presentation is available <u>here</u>.

Ferenc Toth- Resource and energy efficiency indicators: Exploring linkages in CEE

Ferenc Toth (International Institute for Applied Systems Analysis - IIASA) presented the results of the statistical analysis which were carried out as part of the project. IIASA's task in particular was to analyse the links between the In-Stream indicators and selected beyond-GDP indicators. Ferenc's presentation focused on the analysis related to resource and energy efficiency indicators. These included energy intensity, freight transport, GHG emissions and government expenditure on R&D (GERD) per capita. Distinguishing EU-15 countries from CEE countries, IIASA looked into the correlations of these four indicators with mainstream economic indicators such as household income, employment rate, etc.

A key finding is that energy intensity appears to be mostly negatively correlated with per capita GDP, as well as with employment rate and labour productivity per capita. Energy intensity is instead strongly positively correlated with GHG emissions in most countries. In some cases, patterns are unclear, such as in the case of business investment and energy intensity. In EEC, a large share of business and government investment seems to lower the energy intensity indicator.

Correlations and interactions between In-Stream indicators and Beyond–GDP indicators were also assessed. Ferenc showed examples of the relation between GDP per capita and some of the beyond-GDP indices. It was evident that GDP fails to fully explain the environmental sustainability index (ESI). The 'stress' component of ESI seems to decline with GDP, supporting the Kuznets curve theory. The social sustainability index (SSI) seems to be positively related to GDP, but GDP is missing some of the resource components of this index. The positive relation is stronger when all the components of SSI are taken into account.

The analysis also looked into correlations of economic indicators with land use intensity and water abstraction, showing for example a strong correlation between fertiliser use and productivity per hectare, e.g. in the Netherlands and in Belgium. It also emerged that CEE countries have a less intense use of fertilisers compared to western countries. A similar analysis was conducted for water abstraction. The analysis shows that abstraction is declining in most countries.

Overall the statistical analysis confirms a range of well-known relations, such as that economic growth leads to improved energy efficiency, but that resource use increases with wealth. Currently, resource use efficiency in CEE countries is below EU 15 average, both in total and per capita. The challenge is therefore to find a technological development path for those countries that increases resource efficiency and avoids the increasing resource use per capita.

The full presentation is available <u>here</u>.

Discussion

In relation to FEEM's composite indicator and the weighting of the individual indicators aggregated, a participant questioned the fact that economic indicators appear to have been given lower weights than environmental and social indicators, affecting the results. The participant suggested that weights could have been different had experts from developing countries been consulted.

Francesco agreed with the comment and pointed out that the weighting exercise was carried out twice with two different groups of experts. it was pointed out that the weights attached to each pillar of sustainable development (economic, social, environmental) was quite similar, thus reflecting a quite balanced picture. Weights can also be tailored to politicians' preferences and policy priorities. Therefore, while a composite indicator is necessarily rather subjective, what ultimately matters is that there is transparency on the weighting procedure and methodology chosen.

Asked why India scored quite highly in the social component while at the same time having a relatively low GDP per capita, Francesco explained that this could be due to the choice of indicators included in the 'social' component, reflecting issues such as population growth, food expenditure and education expenditure/GDP. In these areas, India performs quite well. Other indicators, such as democracy, were not suitable for the CGE model, so the choice of the indicators was also driven by practicality/methodological feasibility.

With regard to IIASA's statistical analysis, a participant asked whether a standard or partial correlation had been used, pointing out that a partial correlation analysis can lead to more accurate results. Ferenc clarified that a very simple correlation exercise had been done for the purpose of this presentation, but that more advanced statistical techniques have been applied to other parts of the work.

3.2 Part II – Analysing efficiency on sector and macro level

Chair: Francesco Bosello (Fondazione Eni Enrico Mattei)

Klaus Rennings – Resource efficiency and competitiveness – an empirical analysis using German innovation data

Klaus Rennings (Centre For European Economic Research, Mannheim) presented the results of a study focused on eco-innovation instruments and on resource efficiency and competitiveness, commissioned by the German Government in 2007. The work investigated a number of environmental technologies with high market potential, including energy production and storage, energy efficiency, resource and material efficiency, sustainable mobility, recycling etc..

Klaus explained that the main motivation behind this stream of research was the assumption that there is a large potential for win-win (environmental and economic gains) from investments in resource efficiency. This is linked to the Porter Hypothesis, which postulates that there are positive competitiveness effects from environmental regulation, as regulation can lead to eco-innovation which in turn leads to increased competitiveness. The focus of the work was the investigation of the link between eco-innovation and competitiveness, i.e. the so-called 'strong' Porter hypothesis.

The analysis focused on energy and material costs, as energy and resource efficiency innovation was expected to lead to the most positive competitiveness effects. Klaus explained the methodology used. Using data from a 2005 German survey, innovating firms where compared to similar firms which did not significantly reduce the use of material and energy. This 'matching' approach showed that companies which are highly energy and resource efficient (i.e. 'Energy and Resource Efficiency Innovators (EREIs)') have higher sales than those which did not undertake any innovation. EREIs are more productive (sales per employee are approximately 15 per cent higher), have more innovative partners and are generally very R&D intensive.

Findings for the Czech Republic show that the sectors more advanced on energy and resource efficiency are textiles, IT/computers and machinery.

Finally, it was observed that data from the 2005 Community Innovation Survey (CIS) are now available for the whole Europe, therefore this exercise could be carried out for the EU27.Such an exercise would appear of particular interest in the context of the development of a future European Resource Policy and would help make the case for ambitious policies in this field.

The full presentation is available <u>here</u>.

Sebastian Voigt – Innovations in Energy Efficient Technologies – The Case of Clean Coal Technologies

Sebastian Voigt (Centre for European Economic Research (ZEW) pointed out that 70 per cent of electricity generation is from fossil fuels today. Hence, innovation is crucial in this field if GHG emissions targets are to be met. His presentation focused on the potential for integrated gasification combined cycle (IGCC) and carbon Capture and storage (CCS) technologies and identified triggers for innovation by looking at trends in patent data.

After providing some background information on the technologies, Sebastian presented the economic analysis He highlighted that the major shortcoming of using R&D expenditure as an indicator for innovation is that it does not provide any information on the level of success of that expenditure, therefore patent data were used instead as a measure of innovative activities. Patent data, however, also have potential shortcoming, such as the fact that not each patented invention leads automatically to innovation. The analysis focused on IGCC

and CCS patent activity between 1975 and 2005, and looked at the variables which influence patents of those specific technologies - such as energy-related R&D expenditures.

The results showed the significance of R&D expenditures and of Kyoto specifications for CCS and aggregate IGCC + CCS innovation. A peak in CCS patents was recorded in 1998, following the adoption of the Kyoto Protocol, while IGCC was not affected. The results seemed to suggest that the Kyoto Protocol led mostly to innovations related to renewable energy sources and CSS.

Overall, the empirical analysis showed interrelations between patents of all technology types and coal combustion R&D, and identified a clear impact of the Kyoto Protocol on CCS technology.

Future work will look at the effect of policy stringency before and after Kyoto (depending on data availability), take into account technology-specific R&D and examine knowledge transfers. To the extent innovation is seen as an indicator of sustainability, patents can also be seen as a measure of sustainability.

The full presentation is available <u>here</u>.

Discussion

In the discussions which followed the two presentations, a participant asked whether the Kyoto protocol had a negative influence on IGCC. Sebastian clarified that IGCC is a very radical innovation for which a strong incentive is needed, while CCS technologies can be seen as an incremental innovation. It is therefore possible that the Kyoto Protocol has only given marginal incentive to invest in clean coal technologies.

It was also noted that the fact that the Kyoto Protocol seems to have had an impact on CCS technology is a very interesting result, as the effectiveness of Protocol has often been questioned. Establishing the links between the protocol and CCS, however, is probably quite a difficult, since CCS was not explicitly recognised by the Kyoto Mechanism.

Participants also further discussed the relationship between innovation and company results. The question whether researchers were able to control for reverse causality was raised. Klaus answered that the Porter hypothesis actually does not only go in one direction, and that a firm that is quite well managed overall can also be expected to be well managed in the area of resource and energy efficiency. Of course, the role that third factors (e.g. general quality of the management) can play is important, but no meaningful statistical results have been produced so far when attempting to better understand this relationship.

Fusako Tsuchimoto –Linking Economic Performances to the Environmental and Social Sustainability, the decomposition approach and econometric analysis

Fusako Tsuchimoto (Charles University Environment Centre, Prague) presented the results of an investigation of the driving factors of emission changes in the Czech Republic, in view of testing the Environmental Kuznets Curve (EKC), which postulates a negative relationship between per capita income (PCY) and emission level of pollutants. The analysis focused on a set of air pollutants (SO2, NOx, PM, VOC and CO), produced by 60 industrial sectors in the Czech Republic after 1995. The analysis found that the EKC hypothesis is corroborated for some pollutants. The level of emissions of SO2, for example, shows EKC pattern at sectoral level. Air investments appear to have negative effects on the emission of air pollutants, and the effects are particularly strong in the manufacturing sector. However, it was not possible to identify through which channel the investments affected such emissions. A statistical decomposition was therefore conducted to identify these driving forces.

The main finding was that the reduction primarily occurred when the emission limits set by the EU regulation became binding, between1995-2000. The decline of emissions was mostly related to a change in emission intensity. Further analysis revealed that such change in emission intensity was primarily influenced by end of pipe abatement technologies. Such an analysis showed that the driver of reducing the emissions were therefore technological investments on end of pipe technology. Further econometric analysis will be conducted in the future, focusing on different sets of variables.

The full presentation is available <u>here</u>.

Jaroslav Sixta – Updated Supply and Use Tables – Revision 2011

Jaroslav Sixta (Czech Statistical Office, Prague) explained how the Czech national data/accounts and input output tables will change in the near future. The changes will affect time series between 1995 and 2010. The revision will be based on SNA 2008 and ESA 2010. Jaroslav explained that, while symmetric input-output tables have been provided since 1995, the current classification of products and industries was introduced in 2008 and that the new classification for input output tables could be expected to be introduced in September/October 2011. He also announced that in 2014 there will be a further revision in the whole Europe because of the change of national accounting standards, especially with regard to research and development data.

Jaroslav described the key features of the changes to be introduced in September/October 2011. The main differences in the classification will include: a decrease in the categories of goods and an increase in the service categories (e.g. new categories for water, sewage, waste collection, remediation services will be created), a change in the logic of the classification (services will be separated from production), and changes in trade categories (e.g. wholesale, retail). Also new and more detailed categories will be available for energy

and resources data (e.g. hard coal, lignite etc.). The changes will be discussed with some data users before the final publication.

The full presentation is available <u>here</u>.

Discussion

Regarding the presentation on the factors behind emission changes, a workshop participant explained that, in a similar study, the intensity effect appeared to be dependent on the level of detail of the system analysed. It was found that, when a large number of sectors are considered, the intensity effect nearly disappears and the composition effect becomes dominant. It was therefore decided to join the two effects in to further decompose scale effect. Fusako clarified that in the In-stream analysis disaggregation was conducted at sector level, but no significant differences were found.

Another participant asked for which pollutants an EKC relation was identified and whether consideration was given to including cubic terms in the equation. Fusako explained that, beside SOx, the correlation is less obvious for the other pollutants. With regard to the inclusion of a cubic term, she agreed there might be added value in doing this.

In response to a question relating to the use of the term 'negative' to describe some of the correlations, Fusako clarified that this was to be understood in the statistical sense rather than a value judgement. She also clarified while for some pollutants such as CO2, the transport sector is of crucial importance. This sector, however, could not be taken into account in this work because data were not sufficiently disagreed.

3.3 Part III – Interlinkages and Policy Evaluation

Chair: Lucas Porsch (Ecologic Institute)

Tomas Hak – Results INDI-LINK Project: Indicator based evaluation of interlinkages between different SD objectives

Tomas Hak (Charles University Environment Center) presented the findings of the FP-6 INDI-LINK project (Indicator-based evaluation of interlinkages between different sustainable development objectives), a project which looked into a range of issues of relevance to the In-Stream project. Tomas explained that the political context was quite specific at the time: the Lisbon Strategy revision was still due and there was a big discussion between structural indicators and sustainability indicators; beyond GDP process had just been initiated and the Sen-Fitoussi Commission report was being prepared.

Tomas explained that the primary drivers behind the project were the recognition that European Institutions and bodies require constant improvement of the measurements they use and the lack of methodological approaches to assess interlinkages between the indicators. The INDI-LINK project therefore had as primary objectives the further improvement of selected sustainable development indicators and the identification of emerging policy fields; the assessment of interlinkages between different priorities of EU sustainable development (SD) policies (past and future); and the deriving of conclusions for EU SD policies and the implementation of the EU SD Strategy (SDS).

The project's work packages included the development of SD indicators (WP 1), the assessment of interlinkages and policy conclusions. In WP 1 indicators such as the biodiversity index, child wellbeing, Environmentally weighted Material Consumption (EMC), Green Public Procurement (GPP), unmet healthcare spending needs and others were selected. A list of 17 indicators for the emerging policy fields was also identified, including: appropriation of ecosystem services, infectious diseases spread through global travel and trade, fossil energy embodied in national consumption and others. WP 2 focused on the assessment of interlinkages. Its main goal was to present a methodological framework for interlinkage assessment and to conduct analysis of these interlinkages between the different SD dimensions.

The deliverables of the project can be downloaded from the INDI-LINK webpage: <u>http://www.indi-link.net/</u>.

The full presentation is available <u>here</u>.

Milan Scasny – Residential energy efficiency and consumption: economic, environmental and social aspects

Milan Scasny (Charles University Environment Center) presentation focused on the issue of household behaviour and consumption. Milan provided an illustration of the share of residential energy consumption/expenditures. He pointed out that the main reason why it is not easy to draw conclusions with regard to energy saving potential is that nobody demands energy (and fuels) per se: energy demand is a derived demand and energy is combined with durable goods to produce service. Milan summarised the result from a survey on residential energy efficiency to highlight some of the determinants of energy-savings in households. He underlined the difficulty to obtain and analyse energy-saving behaviour data.

One of the findings was that the price of energy actually was not one of the primary stated motivation for energy conservation measures by households. The price of investment in reduction measures appeared a more important determinant. Other key factors were the availability of energy efficiency products and the clarity of labels.

The work also investigated the use of some energy saving behaviours (i.e. ensuring the washing machine/ dishwasher is fully loaded, turning off appliances not used, turning off

lights when leaving a room, switching off stand-by modes, cutting down on heating/AC). The research also confirmed that background characteristics of people (e.g. wealth, education etc.) are not strongly correlated to behaviour, while environmental concerns are.

The analysis further revealed that, on average, fuel expenditures and consumption are rather stable across time. However, emission from transport are increasing, likely due to the increased number of cars per household, the increase in engine size and the purchase of second hand cars. The study further investigate the relation between households characteristics and the probability of owning cars, and the effect of fuel taxes – which appeared to be regressive.

Some of the policy recommendations included that wealthy people should be more targeted for behavioural changes. Tenants should also be targeted because they are less likely to invest into energy efficient durables.

The full presentation is available <u>here</u>.

Samuela Bassi & Leonardo Mazza – Sustainability indicators for resource efficiency policy

Samuela presented an overview of the qualitative approach used in INSTREAM. She explained that the aim was to analyse a set of indicators, identify the policy implications for their use, draw lessons from some case studies, investigate the issue of the uptake of sustainable indicators in the press, discuss results with stakeholders and draw some useful conclusions and recommendations. The work focused on a set of environmental, social and economic indicators selected by the team. An example of analysis undertaken for three resource efficiency relevant indicators (energy intensity, GHG and waste disposal) was provided.

Leonardo provided an overview of the policy cycle analysis undertaken, and its relevance in the context of resource efficiency. Leonardo presented the policy areas investigated (biodiversity, agriculture, fisheries, resource efficiency, waste, climate change, cohesion policy and energy efficiency), the framework of the policy cycle and the questionnaire approach used to collect feedback from policy makers. He then presented some preliminary findings on the use of environmental and sustainability indicators in the context of resource efficiency policy. He illustrated a range of higher tier strategic orientations (EU Flagship initiative, Resource Efficient Europe Roadmap 2050), as well as horizontal and sectoral policies, in which resource efficiency indicators and targets would be particularly useful. He then presented the main findings on the use of resource efficiency indicators at present. The consultation with policy makers revealed that data is a real constraint, but progress in formalising data collection at EU level has allowed relying on Domestic Material Consumption (DMC) and material flow analysis. Promising indicators worth further development included Environmentally Weighted Material Consumption (EMC), Raw Material Consumption (RMC), Total Material Consumption (TMC) and (at least for some resource

categories) Total Material Requirement (TMR). Some attempt to set targets in the area of resource efficiency in Germany and Finland were briefly presented. Leonardo suggested that future opportunities for developing new sustainability indicators in the area of resource efficiency may be offered by the regulation on EU Environmental and economic accounts, the new accounts proposed by the European Parliament, and the increasing need for policy relevance criteria. As for the actual use of indicators, several are available/have been used in the earlier stages of the policy cycle (e.g. problem recognition/identification), but far less in later stages (e.g. monitoring) – see Figure 1 below.

Leonardo concluded with a range of policy recommendations, including the following:

- more work should be carried out on resource/ecological thresholds, which should be the yardstick for setting targets/limits;
- the Environmentally Weighted Material Consumption indicator should be developed further, while already taking measures on identified priority materials;
- the macro-monitoring of resource use should move from domestic material consumption (DMC) to raw material consumption (RMC) and in a second step consider total material consumption (TMC) and total material requirement (TMR), at least for selected material categories where more robust data could be available;
- further work on product life-cycle associated indicators is needed (e.g. Raw Material Equivalents);
- targeted policies on specific resources may require special indicators;
- the role of the Index for Environmental Pressures in monitoring resource efficiency policy should be considered; the ultimately objective should be to take a multi-criteria approach rather than deal with impacts in isolation.

The full presentation is available <u>here</u>.

Figure 7 Environmental and Sustainability indicators used in the context of resource efficiency



Discussion

With regard to the presentation on residential energy efficiency and consumption, the participants noted that, when assessing how consumer behaviour needs to change, one should fist consider their environmental effects and how costly different measures would be. Another participant stressed that the survey primarily showed which energy saving actions households takes least frequently, but the analysis should provide clearer guidance on how this should be addressed.

With regard to the presentation on environmental and sustainability indicators in resource efficiency policy, a participant noted that some of the data used for material flow analysis is not extremely robust and cited the example of waste production, which is based on surveys. Another participant suggested that, as long as we are not confident with the data used for DMC, it will be too early to envisage an indicator as complex as TMR. He mentioned an analysis which had estimated the degree of uncertainty of DMC to lie at about 10 per cent while for TMR it had been estimated at 50 per cent. Leonardo responded that it is true that robustness of the data has not so far been sufficiently emphasised and, while common

methodologies for data collection have been published by OECD and Eurostat, it would be beneficial to investigate whether data collection methods could be further harmonised and improved. Leonardo agreed that efforts in the medium term should focus on relaxing the heavy reliance of TMC on the DMC indicator. In addition, in the long term other indicators may become available, and TMR may be used for example only for specific material categories (e.g. rare metals).

3.4 Closing of the day

Lucas thanked all the speakers and the participants for the interesting presentations and discussions throughout the day. He pointed out that all the presentations will be made available online in the In-stream website and encouraged interested participants to get in touch with presenters to let share their views on the research outcomes presented, to ensure the future analysis and recommendations can be further improved.

4 Third IN-STREAM Workshop - Green Growth and Green innovation

Report on the IN-STREAM Workshop of 7 July 2011 in Berlin (Germany)

Minutes authors: Samuela Bassi, Leonardo Mazza (IEEP, London/Brussels), Thibaud Henin (Ecologic Institute, Berlin) and Elisa Portale (FEEM, Venice/Milan)

This workshop organised in the context of the FP7 project IN-STREAM had the aim of gathering experts' and policy makers' feedback on a number of innovative sustainability indicators and to provide a platform for the sharing of experiences and best practices in the use of these tools.

The workshop focused on providing key insights and preliminary outcomes of the qualitative and quantitative analyses conducted in IN-STREAM, linking economic indicators with measures of sustainability and well-being. This was the third of a series of workshops dedicated to specific policy areas and that took place in different European cities. This event focused in particular on the use of indicators for green growth and green innovation policy.

This chapter presents the minutes of the workshop. The minutes and presentations are available in the <u>project's website</u>.

4.1 Opening presentations

Andreas Kraemer (Ecologic Institute) – Opening speech

Andreas Kraemer welcomed the participants to the workshop. He stressed the importance of sustainability indicators, emphasising the role of IN-STREAM in the context of other related initiatives, like the German Enquete-Commission 'Growth, Wealth, Quality of Life – Paths to sustainable economic management and societal progress in the social market economy²', the European Commission's 'Beyond GDP' and the OECD's Istanbul Declaration. In this context, he emphasized the added value of national processes such as the German Enquete-Commission which can have a significant impact on the policy and business communities. In addition, the publication of all the research carried out allows the general public to partake in the debate and can stimulate further harmonisation of sustainability indicators in the EU and beyond.

² Enquete-Kommission "Wachstum, Wohlstand, Lebensqualität - Wege zu nachhaltigem Wirtschaften und gesellschaftlichem Fortschritt in der Sozialen Marktwirtschaft",

URL: www.bundestag.de/bundestag/ausschuesse17/gremien/enquete/wachstum/index.jsp

Samuela Bassi (Institute for European Environmental Policy, IEEP) - Overview and objectives of the day: the storylines and the outline of the day.

Samuela Bassi presented the workshops aims and structure. Among its objectives, the workshop intended to show some preliminary findings of the IN-STREAM project and share views and experiences on the use of sustainability indicators with the participants. The three storylines covered by the project, i.e. biodiversity, green growth and resource efficiency, were outlined. This workshop was dedicated to the 'green growth' storyline, focusing on sustainable economic growth and its link to different EU policies, especially on climate, energy and cohesion funds. The upcoming IN-STREAM publications were announced, together with the final project conference, which will take place in Brussels on 27-28 September 2011.

The full presentation is available <u>here</u>.

Lucas Porsch (Ecologic Institute) – Presentation and Introduction to the IN-STREAM Project

Lucas Porsch's opening presentation provided an overview of the In-Stream projects. The main objectives of the project were outlined, including the evaluation of different indicators and how they can contribute to the *Beyond GDP* process, the further identification of institutional needs and opportunities - especially for composite indicators - and an investigation of the impacts of reaching sustainability targets on a range of indicators.

He also stressed the project's added value in attempting to bridge the gap between sustainability indicators and mainstream economic indicators, for example by its investigation of the economic impacts of sustainability targets. Lucas clarified that the project would come up with recommendations on how to work with indicators and introduced the project's different focal points (qualitative assessment, quantitative assessment, qualitative/quantitative linking, and integrated assessment) and presented the project team and responsibilities. He explained how data are used in the different stages of the policycycle, such as objective definition, problem identification, modelling of impacts or measuring success. He finally emphasised that the project should result in producing policy-relevant and timely results. Lucas invited the workshop participants to remain involved in the project, either by participating in the upcoming IN-STREAM final conference in Brussels or registering to the newsletter and visiting the website.

The full presentation is available <u>here</u>.

4.2 Part I – The role of sustainability indicators on green growth

Francesco Bosello (Fondazione Eni Enrico Mattei, FEEM) Constructing a robust indicator set for sustainable growth? The quantitative analysis of IN-STREAM

Francesco Bosello highlighted that the quantitative analysis carried out under IN-STREAM was vast, and covered by various Work Packages. Its key aims were to identify links between mainstream and sustainability indicators, analyse the EU path towards sustainability, and propose new ways to use sustainability indicators. In particular, the project developed quantitative tools to analyse sustainability. It was stressed that, despite their limitations, economic models are useful as they can help assess the sustainability of policies *ex-ante* (instead of the more widespread *ex-post* approach), they are internally consistent and allow to conduct analysis in a controlled environment. Furthermore, under IN-STREAM, a composite indicator for sustainability was built and its properties tested.

A general equilibrium model (ICES) was used, including several countries and industrial sectors, and representing inter-linkages across markets. The model allowed the comparison of a business as usual scenario (BAU) with a mitigation policy scenario, where a 20 per cent CO2 emission reduction was achieved by 2020. A list of 21 economic, environmental and social indicators selected by the project partners and compatible with the model was used to assess the effect of the policy. The indicators were also aggregated to obtain a composite indicator. The weights of each of them were chosen on the basis of experts' judgements. These can also be updated by accessing an <u>online survey</u>.

The composite indicator allowed researchers to rank countries according to their level of sustainability before and after policy implementation. Overall, the composite indicator showed a low correlation with GDP, and could therefore be considered as 'alternative' to mainstream economic indicators. In the BAU scenario, the top most sustainable countries included only developed countries (the best being Sweden), while the bottom of the list included mostly developing countries, but also Bulgaria and Portugal. It was noted that, by changing the weighting of the single indicators, the ranking would change. In the mitigation policy scenario, the overall level of sustainability of EU countries increased. In particular, the economic and environmental dimensions of the indicator improved, while the social dimension slightly decreased. Interestingly, in the countries outside the EU, the level of environmental sustainability improved, while the economic and social dimension decreased, revealing some negative feedback of EU policy.

Overall, it could be concluded that mathematical tools are useful for the analysis of sustainability, that composite indicators can add additional information, but that criteria for aggregation and weighting needs to be very transparent. The models are typically weakened by a certain level of subjectivity and uncertainty.

The full presentation is available here.

Klaus Rennings (Zentrum für Europäische Wirtschaftsforschung, ZEW) - Eco-Innovation Policies: Concepts, Best Practices and Monitoring

Klaus Renning's presentation focused on eco-innovation best practices and ways to monitor innovations uptake. The example of the German master plan on eco-innovation was described in more detail. Its aim was to strengthen Germany leadership position and develop innovation markets. Target setting, it was noted, is particularly important for effective eco-innovation strategies, as they provide investors with a reliable framework.

Three theoretical concepts of eco-innovation were illustrated. The first, building on neoclassical economics, stresses the importance of eco-innovation to correct for market failures. The second, building on evolutionary economics, focuses on the role of eco-innovation in the transformation from unsustainable to sustainable systems. The third relies on industrial ecology theory, life cycle approaches and material flows accounting, and focuses on the problems of industrial metabolism, like the need to make material flows sustainable.

Monitoring of eco-innovation can be done by using surveys, patent analysis and other tools. No formal monitoring was carried out at EU level before 2010. Lately a EU eco-innovation observatory has been set up, aiming to provide yearly data and carry out thematic and sectoral studies. Research in this area revealed that, in the EU, eco-innovation is largely regulation driven. However, market expansion, cost reduction and improving brand image are also drivers of eco-innovation. The impact of innovation on employment at firm level was considered small, although slightly positive. The level of technology diffusion varies greatly across countries, depending on national/regional regulation.

Among its key conclusions, the INSTREAM study revealed that eco-innovation is very segmented across the EU, is strongly driven by regulation and can be complementary to environmental policy.

The full presentation is available <u>here</u>.

Discussion

Asked how quickly the proposed mathematical tools can deliver policy forecasts, Francesco noted that information feeding into a model is often readily available. There is, however, a need to get policy makers and scientists more acquainted to the tools. He further stressed that indicators can be powerful communication devices.

Francesco also clarified that a general equilibrium model was used in IN-STREAM since this appears to be the approach most used by policy makers.

Regarding the links between the IN-STREAM composite indicators and the Yale Environmental Performance Indicator (EPI), it was clarified that the two have some similarities, but the main difference consists in the use of a model in the IN-STREAM approach, which allows forecasting. It was also noted that one of the aim of IN-STREAM is to find innovative ways of using sustainability indicators, rather than create new ones.

Regarding the binary relationship among the indicators selected for the composite indicator, Francesco clarified that this was reflected in the weighting process. When there was no interaction among indicators, they were aggregated as a simple weighted sum. When interaction was significant, interaction terms were added.

A participant noted that, frequently, statistical offices apply backward analysis, and recognised the value of the IN-STREAM approach in allowing for forecasting. It was also noted that there is an increasing tendency in moving away from single indicators towards

dashboards of indicators. Synthetic indexes, however, can have a stronger communication power (e.g. the OECD recently launched its 'Better Life Index'). If composite indicators are used, it is crucial to make their construction clear and transparent.

Victoria Alexeeva-Talebi (Zentrum für Europäische Wirtschaftsforschung, ZEW) -Unilateral climate policy and competitiveness: Differential emission pricing from a sectoral, regional and global perspective

Victoria presented the results of ZEW's research, which investigated potential tensions between the EU's climate change targets (the '20-20-20' package) and the targets set out in the Lisbon Strategy. More specifically, the question is whether achieving the climate change targets may come at the expense of competitiveness.

She explained that the first stage in the research was to clarify the concept of competitiveness, in order to identify appropriate indicators. The analysis focused on two dimensions which are key to competitiveness: the 'ability to sell' and the 'ability to earn'. She stressed the importance of distinguishing between competitiveness determinants and competitiveness indicators. Competitiveness indicators were selected at the sectoral level. These could be measured alongside two dimensions: international trade performance, and profitability performance.

She pointed out that, using the Computable General Equilibrium (CGE) model, they calculated a competitiveness indicator for each sector and each region using the data on bilateral trade (exports and imports). While the initial intention was to link a competitiveness indicator to a welfare measure, it was soon realised that this is possible only to a limited extent.

One of the key findings from their policy simulation was that, if tax differentiation is applied, possible trade-offs in the economy needs to be accounted for. Differentiation can in fact come at the expense of certain industries, and can result in non-negligible welfare losses in the EU. This does not mean, however, that it should not be applied, as it can for instance help addressing carbon leakage concerns. Overall, it can be considered a 'second best' option.

The full presentation is available <u>here</u>.

Discussion

Asked about the novelty of this exercise, Victoria noted that it was the first time sustainability indicators were used within this framework. While past research had frequently a narrower sector focus, the IN-STREAM work on competitiveness looked at the whole economy. The methodology also offered a sound theoretical background, and provided a link to welfare measurements.

Regarding whether the estimates on energy intensive industries took into account potential technological improvements and energy efficiency, Victoria clarified that technological

changes were exogenous in the model, while the focus was rather on how trade flows react to different tax levels. Should technological innovation be internalised, the impacts on these industries' competitiveness could be lower.

Victoria also clarified that indicators were considered consistent (i.e. resulting in comparable results) when they reflected the same (positive or negative) effect on competitiveness, although some had different orders of magnitude. Part of the reason is that some of them used different reference points for the relative dimension on competitiveness (i.e. competitive relative to whom?). She further noted that competitiveness is not an absolute measure, but it is relative to other firms' performance.

A participant also observed that the message that tax differentiation could lead to non negligible welfare losses could discourage policy makers to apply them. It was hence clarified that this was the case only in a 'first best' scenario. In the real world, the presence of a number of inefficiencies – like carbon leakage- makes second best options preferable – such as the introduction of tax differentials.

A participant highlighted the issue of bargaining in international negotiations, where economic analysis has an important role to play. He stressed the importance of distributional differences across sectors and income groups (distributive impacts) when considering the consequences of a carbon tax. Victoria clarified that the model only looked at unilateral emission reductions, but that it allowed for further disaggregation across income groups.

Francesco highlighted that the workshop's presentations only allowed for illustrating part of the IN-STREAM results, and that further work on a range of other issues was also carried out, such as on the implications of sustainability policies on health, food prices and production. He pointed out that one of the main messages is that one needs a multi-criteria analysis: economic tools are important but there are also other investigation methods.

Veronika Wille (University of Stuttgart) - Assessment of greenhouse gas emissions

Veronika Wille presented an overview of indicators on greenhouse gas emissions, distance to target, costs distance to target and climate change damage costs, while highlighting the methodological challenges, future developments and advantages and disadvantages of the different approaches.

In the overview of gases with global warming potential (GWP), Veronika noted that work on measuring all processes leading to a change in radiative forcing is in planning stages and that GWP measurements for non-GHG substances (i.e. OC, SO2) were based on preliminary estimates. Despite the higher GWP of other gases, CO_2 remains the most relevant due to the significantly higher quantity of emissions. Veronika showed the different scenarios possible, based on the HEIMTSA Common Case Study, comparing business as usual to the 2°C 450 ppm goals in terms of million ton CO_2 equivalent, for the years 2005, 2020, 2030 and 2050. Another indicator used was the 'distance to target' which compares actual emissions with a 'sustainable emission pathway', that is a path for European GHG emissions leading to a reduction of ca. 71 per cent of EU GHG emissions in 2050 compared to a 1990

baseline. This indicator was calculated by comparing the emissions of the sustainable emission path with actual emissions. Alternatively one can add the differences to the accumulated differences of past years and then compare cumulated emissions. Here the point of time of emissions is not considered.

The 'costs distance to target' indicator was based on the indicator distance (of emissions) to target, where the annual costs for reducing the emissions values to the target value is estimated. This is calculated using partial equilibrium models (energy, agriculture). The final indicator presented was 'total damage costs', which shows the monetized damage caused by the greenhouse gases emitted in a year. It was created by calculating total damage costs of emissions by multiplying marginal damage costs with emissions (e.g. EU29) from all sectors in CO_2 equivalents. The inclusion of equity weighting can significantly affect the distribution.

Veronika presented some of the advantages and disadvantages of each indicators: 1. The Greenhouse gas emissions indicator is easy to calculate and well understood, but has limited comparability; 2. The distance to target indicator provides a visible distance to sustainable path, however is based on models and cannot be aggregated; 3. The costs distance to target indicator has good compatibility and can be aggregated, however, costs are based on assumptions; 4. The damage costs indicator provides compatibility, and is an aggregated measure for damages which is able to provide a worldwide emission path. However, uncertainty remains if all damages are included. There is need for further development of the indicators in this field.

The full presentation is available <u>here</u>.

Discussion

A participant commented that the damage costs indicator should use an equity weighted procedure in order to justify mitigation costs. He noted that 2°C is a precautionary target, not based on cost benefit analysis, and that it includes high uncertainty. Asked whether there were any ideas on what the costs will lead to, and who would have to pay, Veronika answered that this was not the purpose of the indicators – these only show the amount of external costs. How to internalise them is a policy decision. A discussion on the methodological aspects of the indicator ensued, focusing on the comparability between countries and on whether innovation was factored in. An example of avoidance costs in solar production changing drastically over the past five years was given. Another participant stated that costs for energy conversion and development have been analysed, through trends and technical examination in order to better predict changes in costs.

Furthermore, it was commented that the value of exploring historical data may be limited as there has been an increase in volatility, making it difficult to extrapolate climate trends – damages have been increasing and become harder to predict. Veronika clarified that the models include measures for storms and extreme weather events. The discussion then shifted towards uncertainty in the models, the difficulty in calculating probability, and the rationale for using a precautionary principle when setting targets.

It was further noted that climate change targets and have changed significantly over the past ten years, adding some uncertainty to the model. The results of the model are also highly dependent on economic variables such as discount rates and on whether equity concerns are taken into account.

Leonardo Mazza and Samuela Bassi (Institute for European Environmental Policy, IEEP) - The use of indicators in the policy cycle and introduction to the brainstorming session

Leonardo Mazza presented an overview of the qualitative analysis carried out by IEEP in the IN-STREAM project. He explained that the aim was to analyse a set of indicators, identify the policy implications for their use, draw lessons from some case studies, investigate the issue of the uptake of sustainable indicators in the press, discuss results with stakeholders and draw some useful conclusions and recommendations. The work focused on a set of environmental, social and economic indicators selected by the team.

Leonardo first introduced the policy cycle, outlining the characterised each one of the ten distinct phases in the cycle, and explaining how indicators may typically provide information relevant for decision-makers at the different stages of the decision-making process. Leonardo provided an overview of the policy cycle analysis undertaken, and its relevance in the context of green growth. He briefly introduced the policy areas investigated (climate change, energy efficiency, cohesion policy) and illustrated how the policy cycle had been adapted to better reflect the specificities of policy areas such as energy efficiency and cohesion policy.

Leonardo concluded his presentation providing a few insights of the findings of the qualitative work for green growth relevant policy areas. He highlighted, for example, that GDP, employment and competitiveness are the top three most influential indicators used in Cohesion Policy, according to experts in the field, and that there has so far been a heavy focus on 'output' indicators rather than outcome indicators. With regard to energy efficiency, there appears to be a need to improve the explanatory power of energy intensity indicators by increasing the sectoral detail. In the area of climate change, it was recommended to use data on GHG emissions by different sectors for targeting priority industries.

Samuela Bassi introduced the brainstorming session. The participants were requested to join one of three groups focusing on three different policy areas related to green growth: emission trading, cohesion policy and energy efficiency in buildings. Each group were to identify key sustainability indicators and position them in the policy cycle. For each indicators selected, they had to indicate why it was chosen, at which stage(s) of the cycle it should be adopted, how it should be used and how suitable it is to be taken up by media. Furthermore, the participants were requested to discuss the obstacles/limitations/gaps for using sustainability (green growth) indicators in the group's policy area, and which sustainability (green growth) indicators are not currently available for use/did not reach their full potential.

The full presentation is available <u>here</u>.

Discussion

Leonardo was asked whether the number of indicators varied over time and if there was information on changes of availability and methodology. He replied that the indicators examined were all currently available, though some are not robust and face criticisms. The historical non-availability was not investigated, however it was noted that progression in indicator design reflect stages. In some cases, the indicators have been tested by comparing previous predictions made to actual levels. Some indicators are trendy and 'come and go', it is difficult to foresee future needs.

A participant questioned the choice of policy cycle used in the presentation, who decided the stages and whether policy makers were purposefully considering the stages while formulating policy. Leonardo explained that the policy cycle is a framework for analysis, rather than a fixed model, and that even unconsciously, policy makers follow a similar path. The purpose of the task was to respond to policy maker's needs, and the policy cycle has been used in order to highlight where demand is and where gaps exist. Samuela explained that the stages of the policy cycle and indicators were chosen based on stakeholder consultation – through the IN STREAM network and workshops. The focus has not been on promoting policy maker's use of the policy cycle, but on using indicators. The policy cycle is a tool, an instrument for discussion, as recommended by the TEEB report. Another participant pointed out that different cultures and contexts lead to different policy cycles – that as a footnote it should be indicated that it is flexible. It is a tool for analysis, not a checklist.

4.3 Part II – Brainstorming session: the use of sustainability indicators in green growth related policies

During the breakout session, the participants were divided in three groups, each discussing the use of sustainability indicators in three green-growth related policies: emission trading, cohesion policy and energy efficiency in buildings.

The participants were asked to select between 5 and 10 indicators (including but not only from a list provided) which were considered particularly useful, and associate them with the most relevant step(s) in the policy cycle of the policy under discussion. Furthermore, for each indicator the groups had to briefly justify: why the indicator was particularly valuable, why it was placed at the specific stage(s) of the cycle, how the indicator should/could be used, and if the indicator was easy to communicate – i.e. if suitable to be taken up by media.

The groups were also asked to discuss what the main obstacles/limitations/gaps for using sustainability indicators in the policy area of their focus were, and if they knew of any indicator currently not readily available for use in these areas.

Holger Gerdes (Ecologic Institute) – Report from the Emission Trading group

The group identified a broad range of indicators that could potentially be useful in the context of the EU emissions trading scheme (EU-ETS). The focus was on indicators that could help to address problems that emerged in the first two phases of the ETS, e.g. its limited effectiveness due to the low market price of CO_2 credits, and the relatively high administrative burden with the associated transaction costs.

The large majority of the identified indicators was placed in the policy monitoring and evaluation stages of the policy cycle, while less indicators were associated with the policy determination and implementation stages and only a few were associated with the policy description and dissemination stages. The indicator that was considered to be most useful in various stages of the policy cycle was CO_2 emissions. By means of this indicator – which the group defined as a headline indicator in the context of the EU-ETS – the fulfilment of CO_2 emissions targets can be monitored.

In addition, the group identified a dashboard of seven other indicators that could be useful in the context of the EU-ETS:

- CO₂ price to monitor how the instrument is performing
- effects on energy demand to monitor a potential shift towards alternative energy sources
- reduction in fossil fuel consumption in the transport sector to monitor environmental improvements in the transport sector
- effects on land-use and natural resources (natural capital, adjusted net savings) to monitor potential implications of an increased cultivation of energy crops
- innovation at the company level to monitor the effects of higher carbon prices on production patterns
- stakeholder acceptance of the policy instrument to monitor the social discourse related to the instrument
- distribution of revenues to increase transparency of the instrument

Samuela Bassi (Institute for European Environmental Policy, IEEP) – Report from the Cohesion Policy group

The group's discussion focused on the Cohesion funds' strategic policy (e.g. the decisions related to the eligibility of EU regions to funding) and programme framework (e.g. the setting of objectives, targets, priorities at national and regional level) rather than on the use of indicators at project level. This reflected the approach followed in the IN-STREAM analysis.

The policy cycle adapted to cohesion policies is show in the figure below.

Figure 8 Cohesion policy cycle



A wide range of suggestions of sustainability indicators for cohesion policy was put forward by the group for the use at different stages of the policy cycle, revealing how multifaceted the issue is. It was noted that the list provided for the brainstorm lacked business indicators. These were considered particularly important to portray competitiveness, eco-innovation, jobcreation related to cohesion policy, and were therefore included at several stages of the cycle.

Only few environmental indicators were selected. These were considered less 'appealing' for financial decisions, but it was recognised that they could be more useful for high-level national policy than at regional/local level. It was also suggested that environmental indicators could be most relevant at the implementation stage, e.g. to select implementation options (projects) with the least environmental impacts. An overview of the indicators proposed by the group for each policy stage is shown in the table below.

Delivery instrument	Indicators considered relevant				
Policy framework	Genuine savings; Diversity of land use and economic structure;				
(Problem recognition;	Share of 'innovative' enterprises in a region; Inequality of income				
identification of possible	Education; Adjusted GDP per capita; Human Development Index				
solutions)	(HDI); Energy intensity per unit of GDP; Depopulation				
Programming	Social Capital; Resilience networks; Number of 'knowledge;				
(Identifying solutions;	partnerships' ; HDI; Sectoral unemployment				
selecting policy options)					
Implementation (Design	Social capital; Most potential for environmental indicators is the				
and selection of project	implementation phase; Share of 'innovative' enterprises in a region				
options)					
Monitoring and	Adjusted net savings; All resource use indicators; Job creation				
reporting	Entrepreneurship and spin-off; Talent and skills; Number of accepted				
	patents; Execution (use of funds); Share of 'innovative' enterprises in				
	a region				
Evaluation	Inequality Index/Evaluation, GINI Coefficient; Net payments;				

Table 1 Indicators for cohesion policy

DALY/PDF;	R&D/Entrepreneurial	initiatives;	Share	of	'innovative'
enterprises i	n a region				

Among the limitations and gaps in the use of sustainability indicators for cohesion policy, the group highlighted the need to explore opinions at local levels. It was also noted how the allocation of funds is often a highly political decision. The importance of using indicators that are understandable by the finance and business sector was emphasised. The group observed that these stakeholders often see the environment as a burden, and the use of appropriate indicators should enable showing the opportunities related to sustainability (e.g. job creation). It was also suggested that a 'package' of indicators – i.e. a mix of economic/social/environment dimensions – should be provided to decision makers.

With regard to communicability, it was noted that indicators should be easily quotable. Climate change indicators appeared to convey a potentially powerful message (e.g. the economic implications of natural hazards induced by climate change). Job creation was also seen as a very topical indicator. It was observed that the message is stronger when indicators are well known and understood (e.g. ecological footprint). Overall, the clarity of indicators was considered very important for effective communication.

Finally, the group concluded that most of the indicators discussed are not yet fully used/understood in cohesion policy. Social indicators (e.g. well-being) were considered important, but were perceived as currently still lacking robustness and being prone to subjective assessment. Their use could increase in the future once methodologies are further developed. The issue of comparability across countries was also raised: different countries may use different indicators and definitions, and benchmarking may not yet be possible. The group agreed that the use of sustainability indicators and the awareness of their importance should increase. There are signs of increased interest in sustainability measures by EU funding institutions (e.g. DG Regio), and therefore there may be potential for further indicators adoption.

Lucas Porsch (Ecologic Institute) – Report from the Energy Efficiency in Building group

The group's discussion focused on the Energy efficiency in building policy. The building sector is a significant contributor to climate change as it consumes approximately 37 per cent of global energy supply and it is responsible for 32 per cent of all CO_2 emissions in 2004 (IPCC 2004). Energy efficiency in buildings is relevant for the three sustainability dimensions, and particularly the social one.

The EU commission's new Energy Efficiency Directive³ establishes a legal obligation to achieve energy efficiency in the public building through renovation of existing buildings with

³ "EU Energy Efficiency Directive MEMO/11/440, 22 June 2011" <u>http://europa.eu/rapid/pressReleasesAction.do?reference=MEMO/11/440&format=HTML&aged=0&language=EN &guiLanguage=en</u>

the clear aim to save energy. Policies are most implemented for public building in the environmental dimension in order to reduce the GHG emissions coming from the inefficient use of energy. In the Directive there is no target for social and economic aspects explicitly related to the building sector.

Beside this, the group emphasised the importance of the household side and of the social aspects connected to energy efficiency in building and in particular in view of relevant issues such as energy poverty, the rise of fuel prices and the housing market. Furthermore, the group highlighted the problems connected to the enormous amount of new buildings needed in the world and the consequences on sustainability. It was noticed that energy efficiency is a long term problem with long term investment cycle and therefore not very attractive for policy makers. Moreover, energy efficiency standards are higher in new buildings while in old buildings energy improvements are less significant.

Several indicators were considered for the policy cycle. Most of them were related to social and economic aspects, but just because the environmental indicators were considered already the most explicative and most common used in the policy assessment. The following table presents the key indicators which were considered in the cycle, covering all dimensions. Most of those indicators are applicable to all phases of the cycle and the group found a very high level of overlap in most of them.

Delivery instrument	Indicators considered relevant per phase of the policy cycle
Policy framework	Fuel poverty by area and district; Numbers of new building needed; Share of
(Problem recognition;	emissions from building over total emissions; Energy leakage indicators;
identification of	Changes in comfort - rebound effect; Net present value of investment in
possible solutions)	different building; Distribution of costs; Housing cost; Price of fuel; energy
	security connected to energy import; Change in health, biodiversity and GHG
	emission
Programming	Energy consumed in building operation of existing building (government,
(Identifying solutions;	school, army, shops etc.); Geographical location of building to reduce the need
selecting policy	of consumption; Activity indicators (investment, appliances); Fossil fuel vs.
options)	renewable use connected to well being of person; Green Job creation
Implementation	Number of civil engineers registered as low carbon efficiency skills;
(Design and selection	Certification for best material; Investment in energy efficiency in building % of
of project options)	expenses and government intervention - evaluation effort; % of housing
	investment in energy efficiency per capita; Impact on housing cost; Investment
	in RD in material and energy efficiency design
Monitoring and	GHG emission originated in a m ² ; Average performance in terms of energy
reporting	used for m ² ; stock of energy saved every year per m ² ; amount of energy
	produced with renewable sources; Monitoring housing market; Share of
	housing cost on GDP; Monitoring investment in RD
Evaluation	Number building rated as energy efficient

Table 2 Indicators for energy efficiency in buildings

Among the limitations and gaps in the use of sustainability indicators for energy efficiency in building policy, the group highlighted the need to enhance transparency in the evaluation aspects. It was noted that a building rated as 'efficient' does not always take into account the

technology has been used, the amount of renewable energy produced and the impact on overall dimension of sustainability including social aspect as, for example, the cost of housing and the energy poverty measurement. Another limitation regards social indicators and in particular social targets that should be provided.

It was also noted how all those indicators can give very important direction to policy makers in order to establish environmental and technological requirements to guarantee a comfortable surrounding condition and limited energy consumption.

Finally, it was observed that the list of potential sustainability indicators is vast, and all those connected to sustainability and social aspects should be more enclosed in the energy efficiency building policy.

Discussion

The participants observed that the list of potential sustainability indicators is vast, and the choice of the most suitable ones depends on the questions they need to address.

As some processes are highly political, it is important that the indicators chosen are quotable. In some cases they may not be driven by information but by rhetorical strength.

It was suggested that the project should look also at how useful indicators have been in the past, and in what cases they were not used for political reasons. It was also noted that the choice of weak versus strong sustainability may be difficult to capture though the use of indicators

4.4 Closing of the day

Benjamin Görlach (Ecologic Institute) - Wrap-up

Benjamin Görlach underlined that the IN-STREAM key objective has been to find linkages across indicators and to better understand where indicators can be used to illustrate trade-offs between the different dimensions of sustainable development. This responds to an inherent characteristic of decision-making: policy decisions are full of such trade-offs and a number of multiple objectives need to be achieved at the same time. While there is more agreement on the use of sustainability indicators on climate/carbon policies, given the existence of clear environmental targets, other policy areas remain more controversial, and several types of indicators may be needed.

In its attempt to identify the links between indicators and trade-offs, IN-STREAM explored the link between social and environmental dimensions. In some cases the relation appeared to be positive (win-win effects, such as the creation of green jobs), but in some cases the relation can be negative (e.g. carbon leakages can lead to de-industrialization and job losses). The study revealed that both relations are not very strong, as the social dimension appears to be relatively neutral to environmental policy.

The ability of the IN-STREAM models to provide forward looking analysis can be considered particularly innovative. This can counter-balance the limitations of statistical approaches which tend to look backwards and cannot tell much about where we are going. The use of models opens up a whole new dimension. Mathematical models are therefore important for simulations and forecasting. However, their limits should be taken into account, such as scope limitations and misspecifications – built on data and assumptions, a model can only give the answer that it is designed to give.

Overall, it was noted that this type of analysis is increasingly on demand, reflecting an increasing interest in sustainability indicators and in their application to policy making. Today's environmental challenges are so broad that they require economy-wide solutions. Furthermore, environmental policy is increasingly mainstreamed into other policy areas, contributing to the transformation of society and the economy. There is a rising need for orientation and macro-aggregate level analysis on demand. Green growth is clearly a key element in this cross cutting process, and the type of analysis carried out in the IN-STREAM project will make an increasing contribution to the elaboration of useful answers.