



INtegrating MainSTREAM Economic Indicators with Sustainable Development Objectives

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WP4: Data on key sustainability targets

D 4.1: Internal report: Full set of baseline indicators

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1. Introduction

Within the IN-STREAM project, the aim of WP4 (Data on key sustainability targets) is to define the set of sustainability indicators evaluated in the quantitative assessments performed by the IN-STREAM modelling teams in WP5 (Costs of reaching sustainability targets) and WP6 (Costs of sustainability--general equilibrium analysis). This quantitative analysis will complement the qualitative assessments of WP2 (Review existing measures in an EU context) and the assessments undertaken in WP3 (Relate existing measures of sustainability to economic performance).

Deliverable 4.1 presents this set based on the interim findings of Work Packages 2 and 3 as well as input from the consortium.

Targets for each indicator are also proposed.

Section 2 introduces the indicator list, Section 3 proposes targets for each of these indicators as stated in official policy documents or, where this is not available, soundly deduced from the scientific or policy literature.

2. Indicator selection

Table 1 reports the list of 21 indicators proposed for quantitative analysis within the IN-STREAM project.

The IN-STREAM project team selected these indicators from the Lisbon Strategy shortlist indicators, the wider list of EUROSTAT structural indicators to assess the EU Sustainable Development Strategy and a further integrating indicator list proposed during internal discussions within the IN-STREAM research team. This set of IN-STREAM indicators identifies those indicators that the IN-STREAM research consortium considers particularly important in providing insights on the connections among the economic, environmental and social objectives of sustainable development. Accordingly, these are the indicators on which IN-STREAM will focus its investigative efforts.

The selection of these indicators has been based on the following criteria established in the overall IN-STREAM scoping exercise(see Best et al. (2009)):

- **Relevance to EU policy** – each indicator is relevant to the policy needs of the EU. In doing so precedence has been given especially to those indicators of the Lisbon Agenda, the renewed SDS, or (to a lesser extent) the Maastricht criteria.
- **Bridging of SD/econ divide** – each indicator identifies a clear link with a specific dimension of sustainability and with important sustainable development issues.

- **Feasibility of analysis** – each indicator matches the capabilities of the IN-STREAM project partners. For the quantitative analyses, this includes the ability to incorporate indicators/approaches in the models used by the project team.

A particular effort has been made to keeping the list manageable, limiting the number of indicators included to a number that is feasible to evaluate with available project resources and to those indicators considered most informative on sustainability. It is also important to clarify that:

(a) the list is NOT an exhaustive list of the indicators evaluated in the full IN-STREAM project. IN-STREAM will report and analyse additional indicators in WP2 and WP3 (see Best et al. 2009);

(b) not all IN-STREAM modelling exercises will report on *all* the indicators proposed in the list. Rather, IN-STREAM's modelling work *as a whole* will provide a picture on the present and future evolution of these indicators individually and as "ensembles". A final comprehensive assessment on the use and ability of these indicators to improve our measurements of sustainability will be provided within WP7 (Institutional engagement and policy implications) and WP8 (Integrated findings and recommendations).

Table 1: Indicator set—IN-STREAM quantitative analyses

SD Dimension	Domain	Indicator included within IN-STREAM quantitative analysis	“Corresponding” Indicator/s Within the Lisbon Strategy Shortlist (LS) or the EU Sustainable Development Strategy (SDS)
Economic	Production/ income	1. GDP (In its various forms: total, per capita, growth rates etc)	GDP per capita in PPP (LS/SDS)
		2. Household income (In its various forms: total, per capita, growth rates etc)	Net National Income (SDS)
	Work force	3. Employment/Unemployment (Various indicators can be used to measure distortions in the labour markets: see right)	People living in jobless households (SDS); long-term unemployment rate (LS/SDS); employment rate of older workers (LS/SDS)
		4. Labour productivity	Dispersion of regional employment rates (LS/SDS)
	Wealth	5. Value of fixed capital (see also 8.)	Labour productivity (LS/SDS)
	Government debt	6. General government debt	No corresponding indicator
	Reforms and competitiveness	7. Comparative price levels (and other indicators of economic convergence and international competitiveness like various versions of 7b Revealed Comparative Advantage)	General government debt (SDS)
		8. Net investment in fixed capital	Comparative price levels (LS)
	Environmental	Efficiency	9. Energy Intensity of GDP (of the economy)
Pollution/waste (Non GHG)		10. Direct external costs from pollution 11. Disability Adjusted Life Years (To be coupled as more informative with growth rates from different NON GHG pollutants)	Energy intensity of GDP (of the economy) (LS/SDS)
Biodiversity		12. Potentially Disappeared Fraction	Healthy life years and life expectancy at birth, by gender (SDS)
Climate change		13. GHG emissions (In their various forms: e.g.: level, growth rates etc.) 14. GHG intensity of GDP	Common Bird Index (SDS)
Natural capital		15. Adjusted Net Savings	GHG emissions (LS/SDS)
Transport		16. Volume of freight transport relative to GDP	No corresponding indicator
Environmental policy evaluation		17. Cost to target	Volume of freight transport relative to GDP (LS/SDS)
Social	Equity	18. Inequality index (primarily Gini coefficient applied to GDP and Income)	No corresponding indicator
	Education (*)	19. Various: (Educational attainment/drop-out rate (connections to immigration); employment rate by highest level of education attained; early school	Inequality of income distribution (SDS)
			Youth education attainment level by gender (LS); Persons with low educational attainment, by age group (SDS); Employment rate, by highest level of education attained (SDS); early

		<i>leavers).</i>	school leavers (SDS)
	Research/innovation	20. Gross Domestic Expenditure on R&D	Gross Domestic Expenditure on R&D (LS); Total R&D expenditure (SDS)
	Poverty (*)	21. At risk-of-poverty rate after social transfers	At risk-of-poverty rate after social transfers (LS/SDS)

(*) Quantitative assessments within IN-STREAM will be able to provide information on the performance of educational and poverty indicators even though not expressed exactly as defined under 19 and 21 in the table.

The following text outlines the reasoning behind the inclusion of each indicator within the quantitative analysis portion of the IN-STREAM project.

1. GDP. Notwithstanding many criticisms, dating back to Kuznets (1934) and more recently flagged by initiatives like the Beyond GDP Conference (2009) and the work by the Stiglitz Commission (2009), GDP is still one of the main indicators of economic performance and part of composite indicators like the UN Human Development Index. It is also the first structural indicator proposed by the Lisbon Strategy in its 14-indicator shortlist. Thus its inclusion in the IN-STREAM core indicator list is natural. It will also serve as a reference to test the capability of other indicators, be they single, aggregate or composite, to bring additional informative capacity on sustainability.
2. Household income. GDP has many shortcomings in measuring sustainability, nonetheless, before using complex alternative sustainable development indicators, other standard measures of economic performances are available that are closer to the broader concept of “welfare”. The Stiglitz Commission (2009) for instance emphasises the need to bring out the household perspective, which is most pertinent for considerations of living standards and as well as distributions of income and wealth. Net national income is also one of the indicator list used to measure the renewed EU Sustainable Development Strategy. Accordingly IN-STREAM flanks GDP with household income.
3. Employment/unemployment. Labour market conditions are key indicators of the “healthy state” of a society that go beyond the purely economic dimension. Monitoring labour market conditions, especially involuntary unemployment, is important for the many economic and social implications and the explicit and implicit societal costs involved. Long-term structural unemployment is a major concern for European economies, as has been stressed by the 1993 Delors White Paper on “Growth, Competitiveness and Employment”. Increasing employment rates is at the heart of the Lisbon Strategy and labour market indicators are proposed to monitor the EU Sustainable Development Strategy.
4. Labour productivity. Labour productivity can change when 1) labour is combined with “more” or an “improved quality” of capital or technology; 2) labour is organised in a different and more efficient mix with capital or technology; or 3) the quality of the labour force itself changes (e.g. it can become more educated or experienced). A change in labour productivity is thus a general index of the “efficient use of the labour force”; its improvement is a basic factor for the long-term development of welfare in an economy and general economic

growth. It is important both for increasing employment and improving competitiveness, which are the key targets in the renewed Lisbon Strategy. Accordingly, labour productivity is one of the 14 structural indicators proposed by the Lisbon Strategy indicator shortlist and by the EU Sustainable Development Strategy indicator set. In addition, it is also one of the key exogenous variables determining long term dynamics in the IN-STREAM modelling exercises.

5. Value of Fixed Capital. Capital is a key production factor and is produced through investment. Consequently, capital formation is vital for future production, and investments are important for economic growth. Business investment is one of the 14 indicators of the Lisbon Strategy shortlist; IN-STREAM will consider more generally all kinds of capital. See also points 8 and 15 below.
6. General government debt. This indicator is part of the set proposed within the framework of the EU Sustainable Development Strategy (but not part of the “Lisbon Shortlist”). It is the key indicator of the government sector’s financial position. Its recognised importance is demonstrated by the fact that it is one of the key indicators “shaping” the Treaty on European Union (Maastricht 1992). This treaty sets specific targets for government debt and, if these are exceeded, activates an “Excessive Deficit Procedure” (EDP). The indicator provides an immediate picture of the “self-sustainability” of a country’s economic performances, which is an important qualification of overall sustainability results. Government debt is highly comparable among countries and easily obtained from statistical sources.
7. Comparative price level. This indicator is part of the Lisbon Strategy shortlist. Changes in countries’ price differentials and their consequences on terms of trade are both cause and effect of 7b changes in competitiveness of interconnected economic systems. Competitiveness concerns linked to trade and, more recently, to environmental policies are prominent in national and international policy debate.
8. Net investment in fixed capital. See point 5 above.
9. Energy intensity of GDP. This indicator is typically used to capture the energy efficiency performance of an economic system and indirectly its dependence on energy sources and its environmental performance. Improving energy efficiency is vital to the fulfilment of the EU's Lisbon objectives and more generally to the achievement of sustainable growth. It is one of the shortlist indicators of the Lisbon Strategy and of the EU Sustainable Development Strategy indicator set. It is also easily measurable within IN-STREAM modelling exercises.
10. External cost of pollution. Changes in emissions/concentrations of different pollutants per se are insufficient to provide a fully informative picture of environmental quality changes. Those should be conveniently “weighted” by the toxicity associated with each particular substance. A first indication of this can be provided by quantifying the external cost of pollution (i.e. measuring the damage imposed by one or more pollutants on all the affected individuals). The concept embeds two components: that of damage, which obviously accounts for different noxious potentials, and that of “un-priced” burden imposed on a group of affected individuals not directly involved in the production/consumption activity originating the pollution. All calculations of external costs are difficult, prone to uncertainty and open to criticisms, however recent EU projects belonging to the EXTERNE research initiative like

NEEDS (FP6 project) or CASES (FP6 project) quantified such externalities. This available information will be used within IN-STREAM to add this important dimension to the analysis of sustainability.

11. Disability Adjusted Life Years (DALY). The inclusion of this indicator is motivated by the same reasoning developed under 10 above. DALY primarily emphasises the health dimension and thus can represent more directly changes in quality of life. Stressing health impacts is also advocated by the Stiglitz Commission and the Beyond GDP conference.
12. Potentially Disappeared Fraction. Impacts on biodiversity induced by climate change and more in general by anthropogenic pressures are likely to be one of the major concerns for modern societies already in the near future (IPCC AR4 2007). At the same time impacts on biodiversity are among the most difficult to be assessed in physical and even more in economic terms. Nonetheless, the IN-STREAM research team maintains it is crucial to include some indicators of human pressures on ecosystems as part of environmental sustainability. Potentially Disappeared Fraction is a straightforward measure of this that could be coupled with other indicators which are readily available like Human Appropriation of Net Primary Resources (HANPP) or more in general the Land and Ecosystem Accounting (LEAC) Methodology.
13. Greenhouse Gas Emissions. These are the main established indicators measuring the “climate-change performance” of an economic system; they have an intrinsic paramount policy relevance of being the target for climate change mitigation policies, be they established (like that implied by the ongoing Kyoto Protocol) or debated (like those discussed for the post Kyoto process see e.g. CEC (2007)). They are proposed as key indicators to be monitored both by the Lisbon Strategy and the EU Sustainable Development Strategy. If examined in per-capita terms, per unit of GDP or of sectoral production/value added they can offer also important distributional insights on climate change costs and benefits. Thus they are considered a key indicator to be included in the IN-STREAM list.
14. Greenhouse Gas Intensity of GDP. The motivations for the inclusion are the same as those of point 13. above.
15. Adjusted Net Savings. Originally introduced by Pearce and Atkinson (1993) and theoretically and empirically founded by Hamilton and Clemens (1999), also known as Genuine Savings (GS), this is a sustainability indicator building on the concept of green national accounts. GS measure the “true” rate of savings in an economy after taking into account investments in human capital, depletion of natural resources and damage caused by pollution. They thus offer insights on the role of and pressure on natural capital. Positive per capita net savings are an indicator of “weak sustainability”. According to the IN-STREAM research group they are a useful complement to the structural indicator set of the Lisbon Strategy which does not include this measure.
16. Volume of freight transport to GDP. Economic growth will often result in the increased transport of goods, and more transport has an effect on the environment. The issue is that of

decoupling development and volume of freight transport. This is a dimension, related to that of de-materialization, that the IN-STREAM research group considers important to cover.

17. Cost to targets. The possibility to measure the cost of achieving a given sustainability target, especially in the environmental domain, is considered an important piece of information for the IN-STREAM research group and is identified as a central component of the IN-STREAM quantitative methodologies in the project's description of work. Within IN-STREAM, different modelling approaches can provide this kind of data. The informative capacity of this indicator and the practical methodologies for its assessment will thus be tested.
18. Inequality index(es). A reasonable or acceptable fairness in the distribution of wealth or income is considered an important feature of social sustainability. The indicators listed within the EU SDS thus include the Gini coefficient measured on households' income. Also the 2009 Stiglitz Commission recommended "add[ing] information about income and wealth distribution to data on the average evolution of income and wealth" as a means of overcoming some of the deficiencies of GDP in measuring living standards. The IN-STREAM research team considers the inclusion of at least one measure of inequality as fundamental information on social sustainability.
19. Education. Both the Lisbon Strategy and the EU SDS propose indicators on educational attainment as important measures of innovation capacity; educational attainment is both a cause and an effect of economic development and as a necessary, but not sufficient condition for sustainability. The Stiglitz Commission also includes improved education as one element leading to improvements in quality of life. The IN-STREAM research team considers information on educational attainment as a key indicator because of its economic, social and policy relevance.
20. Gross Domestic Expenditure on R&D. Research and development (R&D) is a key factor for growth in a knowledge-based economy and consequently at the heart of the Lisbon Strategy.
21. At risk of poverty rate after social transfers. The at-risk-of-poverty rate after social transfers is an indicator of poverty. It measures the share of persons with a disposable income below the risk-of-poverty threshold, i.e., 60% of the national median disposable income after social transfers. Consequently, the indicator says more about the income distribution and relative poverty within a country than among countries. Comparability among countries is limited because only a relative threshold is used, there being no common absolute one. However it is one of the 14 indicators belonging to the Lisbon Strategy shortlist and goes into the direction traced by the Stiglitz Commission to "add information about income and wealth distribution to data on the average evolution of income and wealth". IN-STREAM research groups consider poverty indicators as important measures of social sustainability.

3. Targets for the proposed indicators

Table 2 contains targets for the proposed indicator set. The indicator sequence in Table 2 is different from that in Table 1 in order to emphasize which indicators belong to the Lisbon and/or to the EU Sustainable Development Strategy, and which are additions to them, derived by internal debate within the IN-STREAM research group. The identified targets will constitute the reference against which sustainability performances of different EU economic systems through sustainability development indicators can be measured. They will inform the modeling exercises.

In some cases, targets are explicitly defined as clear policy objectives within different EU strategies (e.g. GHG emission reductions as part of the EU Kyoto and post-Kyoto commitments); in some other, they are inferred from the policy and scientific literature/debate. Table 2 reports also concise comments to contextualize the stated target and the source for consultation.

After the table, an extended explanatory section provides further details.

Table 2: Targets for IN-STREAM core indicator set

IN-STREAM Indicator common to the Lisbon Strategy	Target	Comments/references
General Economic Background		
1. GDP	Lisbon Agenda sets target of about 3% annual economic growth	Source: http://www.etuc.org/a/652
4. Labour productivity	No specific target established in policy. Increases are good	Source: http://ec.europa.eu/growthandjobs/pdf/COM2005_024_en.pdf http://www.efta.int/content/publications/bulletins/StatsIndicatorsWEB.pdf
6. General government debt	Maastricht Criteria include these government-debt targets: Deficit should not exceed 3% of GDP and debt should not exceed 60% of GDP.	http://ec.europa.eu/economy_finance/the_euro/joining_euro9413_en.htm
Employment		
3. Employment/Unemployment (various)	The Lisbon Strategy targets an employment rate for women of over 60% and an overall employment rate of 70% by 2010	Source: http://www.etuc.org/a/652 http://europa.eu/legislation_summaries/employment_and_social_policy/community_employment_policies/c11319_en.htm
	The Lisbon Strategy targets an employment rate of 50% among older workers	Source: http://www.etuc.org/a/652 http://ec.europa.eu/growthandjobs/pdf/COM2005_024_en.pdf
Innovation and Research		
19. Youth education attainment level by gender	The Lisbon Agenda targets an attainment level of upper secondary education of 85% in the EU by 2010.	In 2004, the EU youth education attainment level was 76%, exactly the same as in 2000. Source: http://www.efta.int/content/publications/bulletins/StatsIndicatorsWEB.pdf
20. Gross domestic R&D expenditure over GDP	The Barcelona European Council set a target of 3% of GDP by 2010.	Source: http://ec.europa.eu/growthandjobs/pdf/SEC2005_160_en.pdf

		http://www.efta.int/content/publications/bulletins/StatsIndicatorsWEB.pdf
Economic Reform		
7. Comparative price levels of final consumption by private households including indirect taxes	No specific target	<p>Through more efficient and integrated markets initiating more competition and trade, the price levels in EU countries are expected to converge; a lower dispersion is considered good.</p> <p>Source: http://www.efta.int/content/publications/bulletins/StatsIndicatorsWEB.pdf</p>
8. Net investment in fixed capital	No specific target	<p>An increase of business investment over GDP is considered good because capital is a key production factor and is produced through investment. Consequently, capital formation is vital for future production, and investments are important for economic growth.</p> <p>Source: http://www.efta.int/content/publications/bulletins/StatsIndicatorsWEB.pdf</p>
Social Cohesion		
21. At risk-of-poverty rate after social transfers	Target: Reducing the at-risk-of-poverty rate	<p>This indicator is defined as the share of persons with an equivalised disposable income below the at-risk-of-poverty threshold, which is set at 60% of the national median disposable income (after social transfers). This indicator is broken down by gender, by age and by household type.</p> <p>Source: http://epp.eurostat.ec.europa.eu/cache/ITY_SDDS/EN/tsdsc100_base.htm</p>
3. Employment/Unemployment (long term unemployment rate)	No specific target but a set of specific support measures for the unemployed are defined: - that every unemployed person is offered a new start before reaching 6 months of unemployment in the case of young people and 12 months in the case of adults in the form of training, retraining, work practices, a job or other employability measure, combined where appropriate with on-going job search assistance;	<p>In the context of the European Employment Strategy, important targets and benchmarks were agreed in 2003</p> <p>Source: "Approaches of Public Employment Services (PES) to Long Term Unemployment" by European Commission, Employment, Social Affairs and Equal Opportunities DG Employment, Lisbon Strategy, International Affairs Employment Services, Mobility – Brussels 2006. Communication from the Commission to the Council, the European Parliament, the Economic and Social Committee and the Committee of the Regions - The future of the European</p>

		Employment Strategy (EES): "A strategy for full employment and better jobs for all" (see Annex for targets) http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=COMfinal&an_doc=2003&nu_doc=6
18. Inequality index (e.g. Gini)	No specific target. Movement toward zero is desired (a Gini index of zero represents no inequality and one represents the maximum possible degree of inequality),	Source: http://esl.jrc.it/envind/un_meths/UN_ME015.htm
Environment		
13. Greenhouse gas emissions	<ul style="list-style-type: none"> The EU has agreed to an 8% reduction in the emissions of its greenhouse gases by 2008-2012, compared to the base year 1990 Reduction by 20% in 2020 	Source: (% target mentioned in http://www.efta.int/content/publications/bulletins/StatsIndicatorsWEB.pdf ; 20% target mentioned in Communication "20 20 by 2020", http://ec.europa.eu/commission_brosso/president/pdf/COM2008_030_en.pdf
9. Energy intensity of the economy	<p>Decrease energy consumption in 2020 to 20% below projected 2020 levels</p> <p>Alternatively: the indicative target for final energy consumption intensity in the European Union, set in 1998, is a 1% annual improvement in the intensity of final energy consumption. The Directive on energy end-use efficiency and energy services calls for each Member State to use 1% less energy per year than in the previous year through increased energy efficiency, which, it is hoped, will lead to annual energy savings of around 6% by 2012.</p>	Source: 20% efficiency target mentioned in Citizen's Summary of the EU Climate and Energy Package http://ec.europa.eu/climateaction/docs/climate-energy_summary_en.pdf http://www.unece.org/env/europe/monitoring/Belgrade/CRP1.Indicators.En%20edited.MK..pdf and http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:114:0064:0064:EN:PDF
16. Volume of freight transport relative to GDP	The general objective is to decouple transport growth significantly from growth in GDP by bringing about a shift in transport use from road to rail, water and public passenger transport. Target: share of road transport in 2010 is no greater than in 1998.	<p>The objective of decoupling freight transport demand from GDP was first mentioned in the Transport & Environment (T&E) integration strategy that was adopted by the Council of ministers in Helsinki (1999).</p> <p>In the review of the T&E integration strategy in 2001 and 2002, the Council reaffirmed the objective of reducing the link between the growth of transport and GDP.</p> <p>In the Sixth Community Environmental Action Programme, decoupling of economic growth and transport demand is named as one of the key objectives in order to deal with climate change and to alleviate health impacts from transport in urban areas.</p> <p>In the White Paper on the Common Transport Policy (CTP) "European Transport Policy for 2010: Time to Decide", the Commission proposes a number of measures aimed at the modal shift.</p>

		Source: http://ims.eionet.europa.eu/IMS/ISpecs/ISpecification20041007132316/full_spec
Additional indicators proposed by IN-STREAM	Target	Comments/references
General Economic Background		
2. Household Income	No target. Increased household incomes are considered desirable (and equity issues should also be taken into account).	
Environment		
10. External costs of various pollutants	There are not specific targets for external costs of pollution, although a non-increasing or declining trend can be considered positive.	
11. Disability Adjusted Life Years	There are not specific EU targets for DALYs, although a non-increasing or declining trend can be considered positive.	
12 . Potentially Disappeared Fraction (coupled with Land and Ecosystem Accounting Methodologies and Human Appropriation of Net Primary Productivity)	No specific target for this indicator, but the EU has been committed since 2001 to halting the loss of biodiversity and decreasing human pressure on the environment by 2010	Source: http://www.eeb.org/activities/sustainable_development/eeb-indicators-rome-09-25-03.pdf and http://www.euractiv.com/en/environment/halting-biodiversity-loss-2010-eu-action-plan/article-157424
14. GHG intensity of GDP	No target under EU policy. A benchmark could be set using two existing targets (desired Lisbon economic growth of 3% yearly (Indicator 1 in this table) and 20% reduction in GHG emissions by 2020 (indicator 13 in this table))	An intensity target seeks to achieve a particular emissions rate, or level of performance, rather than a specific level of emissions. Intensity targets (or rate-based targets) on greenhouse gas emissions can sometimes be a better option for some countries than absolute targets in setting climate policy. Intensity targets (or rate-based targets) on greenhouse gas emissions, despite often being dismissed as ineffective or deceptive, can sometimes be a better option for some countries than absolute targets in setting climate policy. Source: http://pdf.wri.org/target_intensity.pdf
15. Adjusted net savings	No targets, they should not decline over time	Negative adjusted net saving rates imply that total wealth is in decline; policies leading to persistently negative adjusted net savings are not sustainable. Source: http://web.worldbank.org/WBSITE/E

		XTERNAL/TOPICS/ENVIRONMEN T/EXTEEI/0,,contentMDK:20502388 ~menuPK:1187778~pagePK:14895 6~piPK:216618~theSitePK:408050. 00.html
17. Cost to target	No target in EU policy.	Cost to target shows the monetary cost of reaching a policy objective (in this context, the indicator targets shown in this table.

Indicator targets description

1. GDP - Since March 2000, the EU has formulated its policies in line with the objectives of the Lisbon Strategy, which sets a framework for action until 2010. The Lisbon Strategy aims specifically for economic as well as social and environmental renewal. The Lisbon Strategy seeks to increase European competitiveness by investing in a knowledge-based and highly productive society. The Union “set itself a new strategic goal for the next decade: to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion.” For this reason, an annual economic growth target of around 3% has been set.

4. Labour productivity There are no specific targets for this indicator. Labour productivity per person employed is a frequently used indicator for productivity and it is measured by GDP in purchasing power standards per person employed relative to the EU. One main objection to this indicator is that it does not take into account the structure of employment and therefore does not reflect for instance part-time or standard working hours. Consequently, labour productivity per hour worked could be a better indicator in the sense that it reflects the actual hours spent on production.

6. General government debt – This indicator is one of the four “euro convergence criteria” (also known as the **Maastricht criteria**). These criteria are based on Article 121(1) of the European Community Treaty. The target for this indicator is the following:

Government debt: The ratio of gross government debt to GDP must not exceed 60% at the end of the preceding fiscal year. Even if the target cannot be achieved due to the specific conditions, the ratio must have sufficiently diminished and must be approaching the reference value at a satisfactory pace.

3. Employment/Unemployment – The future of the European Employment Strategy (EES) "A strategy for full employment and better jobs for all" by the Commission of the European Communities (2003) presents an outline for the new employment strategy and suggestions for possible new targets. One of the three objectives is: **full employment** by raising the employment rate overall (70% in 2010 on average for the EU), for women (60%) and for older workers (50% in 2010).

19. Youth education attainment level by gender - this indicator is defined as the share of young people between 20-24 years having attained at least upper secondary education level of the total population of the same age group. A target has been set to reach an attainment level of 85% in the EU by 2010. In all countries with available data, apart from the Czech Republic, where the level does not differ by sex, more young women than young men had completed upper secondary education. For the EU, 80.3% of the young women had attained this level of education versus 74.7% of the men in 2005.

20. Gross domestic expenditure on R&D over GDP - The Barcelona European Council has set a distinct target to increase the intensity of R&D to 3% by 2010. In 2005, the EU expenditure on R&D was 1.85%. Only 2 of the EU Member States – Finland and Sweden – already reached levels of R&D above 3%. Switzerland and Iceland had among the highest R&D intensities slightly below 3%. Norway's R&D intensity was still below the EU's in 2005, and had even decreased a little compared with 2000.

7. Comparative price levels - The price level index is measured in relation to the EU average (EU = 100). A country is relatively more expensive or cheaper than the EU average if the index is higher or lower than 100. Through more efficient and integrated markets initiating more competition and trade, the price levels in the countries ought to converge.

8. Net investment in fixed capital - There is no target for this indicator. Some interesting comparisons: Estonia had the highest share of private sector business investment with 27.9% of GDP in 2005 whilst Sweden had the lowest level with 14.2%. In Iceland and Switzerland, business investments as a share of GDP were higher – around 18% for both countries – than the EU at 17% in 2005. Business investments in Norway were relatively low in 2005, i.e., around 16% of GDP..

21. At risk-of-poverty rate after social transfers - The at-risk-of-poverty rate after social transfers is an indicator of poverty. This indicator measures the share of persons with a disposable income below the risk-of-poverty threshold, i.e., 60% of the national median disposable income after social transfers. One of the EU's main policy objectives is to fight poverty and reduce social exclusion. The Lisbon targets focus not only on growth and competitiveness but also on social cohesion, but there is no specific target for the indicator.

3. Employment/Unemployment (long term unemployment rate) - In the context of the European Employment Strategy, important targets and benchmarks were agreed in 2003:

- that every unemployed person is offered a new start before reaching 6 months of unemployment in the case of young people and 12 months in the case of adults in the form of training, retraining, work practices, a job or other employability measure, combined where appropriate with on-going job search assistance;
- that 25 % of long-term unemployed should participate by 2010 in an active measure in the form of training, retraining, work practice, or other employability measure, with the aim of achieving the average of the three most advanced Member States.
- that jobseekers throughout the EU are able to consult all job vacancies advertised through Member States' employment services.

3. Employment/Unemployment (Dispersion of regional employment rates) - In order to increase employment and ensure social cohesion, it is important to reduce regional imbalances in employment, as described in the previous indicator. The dispersion of regional employment rates is zero when the employment rates in all regions are identical. If the differences among the regions increase, so will the indicator. The dispersion of employment rates in 2005 was rather substantial across Europe, and by far highest in Italy. At the other end of the scale was Norway with the lowest dispersion rate.

18. Inequality index (e.g. Gini) - A dimensionless index scaled to vary from a minimum of zero to a maximum of one; zero representing no inequality and one representing the maximum possible degree of inequality. No specific targets are established for this indicator, but movement toward zero in every country is considered desirable.

13. Greenhouse gas emissions - The EU has agreed to an 8% reduction in the emissions of its greenhouse gases by 2008-2012, compared to the base year 1990. Furthermore, reductions for each of the EU15 countries have been agreed under the EU Burden Sharing Agreement, which allows

some countries to increase emissions, provided these are offset by reductions in other Member States.

Furthermore, the EU's 20/20/20 Energy Efficiency Policy binds targets on greenhouse gas emissions reductions (-20%)

9. Energy intensity of the economy – The “Guidelines for the application of environmental indicators in Eastern Europe, Caucasus and Central Asia” by the Economic Commission of the European Union (2007) states that the indicative target for final energy consumption intensity in the European Union, set in 1998, is a 1% annual improvement in the intensity of final energy consumption. According to the Directive on energy end-use efficiency and energy services, each Member State should each year save 1% more energy than in the previous year through increased energy efficiency, which, it is hoped, will lead to annual energy savings of around 6% by 2012.

Furthermore, according to the EU's 20/20/20 Energy Efficiency Policy, the target is a 20% reduction in the Union's primary energy consumption in 2020.

16. Volume of freight transport relative to GDP - The general goal is to decouple transport growth significantly from growth in GDP in order to reduce congestion and other negative side effects of transport and bring about a shift in transport use from road to rail, water and public passenger transport so that the share of road transport in 2010 is no greater than in 1998. The first target is proposed in “A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development” (COM, 2001) and the other one is from White Paper on the Common Transport – “European transport policy for 2010: time to decide” (COM, 2001), all by the European Commission.

2. Household Income – No specific target for this indicator.

5. Value of fixed capital – No specific target for this indicator; see point 8 above.

10. External cost of different pollution - No specific target for this indicator. There are indeed targets for waste production i.e.: Stabilization of waste production at the level reached in 2008 by 2012. The EU Parliament in 2007 also introduced binding targets for re-use and recycling. By 2020, 50% of municipal solid waste and 70% of waste from construction, demolition, industry and manufacturing must be re-used or recycled.

11. Disability Adjusted Life Years - There are no specific targets for these, although a non increasing or declining trend can be considered positive. In Menken M et al (2000) Japanese life expectancy statistics are used as the standard for measuring premature death, as the Japanese have the longest life expectancies. So it's possible to target this indicator using Japanese average age.

12. Potentially Disappeared Fraction - No target for this particular indicator. But regarding to biodiversity, in the sense of genetic and habitat variety, at the Gothenburg Summit in June 2001, EU launched the EU Biodiversity Strategy asking for a halt to both habitat decline and the extinction of species in the EU by 2010.

14. GHG intensity of GDP – A report by WRI (World Resource Institute) “Target: Intensity - An Analysis of Greenhouse Gas Inventory Targets” selects various GHG Intensity Targets adopted by governments, firms, and industry bodies in the worldwide effort to address climate change. Among all these, the only one that can be used as target for European countries is the target adopted by United Kingdom Climate Change Levy Agreements (CCLA)(2002). The target is 4.5% to 59% below historical levels by 2010 (average of 12% below 2000) and the scope are firms and industrial facilities.

15. Adjusted net savings - No targets, but generally there should not be a decline over time. As World Bank remarks, negative rates of adjusted net saving imply that total wealth is in decline; policies leading to persistently negative adjusted net savings are policies for unsustainability.

17. Cost to target – No specific target can be established for this indicator. The assessment of whether the cost to reach a target is reasonable depends on comparing these costs to the benefits of reaching that target.

4. Conclusions

This internal report proposes the list of sustainability indicators that the IN-STREAM project team will investigate in the quantitative analyses (WP5 and WP6). The list tries to identify those indicators that are informative regarding the “road to sustainability” of the EU and quantifiable within the IN-STREAM modelling exercises. Suitable targets for these indicators are also proposed, where possible.

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6. Appendix

Table A1 identifies which research team will include particular indicators in its assessment. Table A2 describes some targets that can be used as references for those indicators not belonging to the IN-STREAM set as defined above, but anyway within the modelling capacity of IN-STREAM model set. As such they can be a “natural” part of the IN-STREAM modelling exercises.

Table A1: IN-STREAM indicators and modelling teams

SD Dimension	Domain	Indicator proposed by IN-STREAM	CUEC	FEEM	UBATH	USTUTT	ZEW
Economic	Production/income	1. GDP (In Its various form: total, per capita, growth rates etc)		✓			✓
		2. Household income (In Its various form: total, per capita, growth rates etc)		✓			✓
	Work force	3. Employment/Unemployment (Various indicators can be used to measure distortions in the labour markets: see right)		✓ Labour demand			✓ Lab. Demand
		4. Labour productivity		✓ (Exogenous)			✓ (Exogenous)
	Wealth	5. Value of built capital (see also 8.)		✓			✓
	Government debt	6. General government debt		✓			✓
	Reforms and competitiveness	7. Comparative price levels (and other indicators of economic convergence and international competitiveness like various versions of 7b Revealed Comparative Advantage)		✓			✓
		8. Net investment in fixed capital		✓			✓
Environmental	Efficiency	9. Energy Intensity of GDP		✓			
	Pollution/waste (Non GHG)	10. Direct external costs from pollution 11. Disability Adjusted Life Years (To be coupled as more informative with growth rates from different NON	✓			✓	

		GHG pollutants)					
	Biodiversity	12. Potentially Disappeared Fraction (coupled with Land and Ecosystem Accounting Methodologies and Human Appropriation of Net Primary Productivity)				✓	
	Climate change	13. GHG emissions (In their various forms: e.g.: level, growth rates etc.) 14. GHG intensity of GDP		✓		✓	
	Natural capital	15. Adjusted Net Savings	✓				
	Transport	16. Volume of freight transport relative to GDP		✓			✓
	Environmental policy evaluation	17. Cost to target	✓	✓	✓	✓	✓
Social	Equity	18. Inequality index (primarily Gini coefficient applied to GDP and Income)	✓				
	Education	19. Various: (Educational attainment/drop-out rate (connections to immigration); employment rate by highest level of education attained; early school leavers).			✓		
	Research/innovation	20. Gross Domestic Expenditure on R&D		✓			
	Poverty	21. At risk-of-poverty rate after social transfers			✓		

Table A2: Targets for indicators within the modelling capacity of IN-STREAM quantitative modelling teams (non exhaustive), NOT part of the IN-STREAM indicator set

Indicator name	Target	Comments/references
Economic		
Consumption/ GDP share	No specific target	
Energy dependence: Energy imports/en. Consumption	No specific target, but its reduction is strategic. (see also below target for renewable energy)	Source: The Strategic Energy Review – http://www.energy.eu/news/Europes_Energy_Future_The_New_Industrial_Revolution.pdf
Environmental		
Per capita GHG emissions	A per capita emission level broadly consistent with a reduction of the 20% by 2020 is 2 tons per person per year.	Source: http://www.japanfs.org/en/_view/index/n-2.html http://www.scribd.com/doc/12793049/Economic-Recovery-and-Regulating-Greenhouse-Gas-GHG-Emissions
Carbon intensity (CO ₂ emissions/energy consumption)	No specific target	There are no targets for this indicator, but its value has to be decreasing in the future because of increasing of renewable energy and decreasing of CO ₂ emissions. "Targets" are implicitly defined by GHG reduction and renewable energy policies.
Water use/total renewable water resources	No specific target	The concept of water stress is relatively simple: According to the World Business Council for Sustainable Development, it applies to situations where there is not enough water for all uses, whether agricultural, industrial or domestic. Defining thresholds for stress in terms of available water per capita is more complex, however, entailing assumptions about water use and its efficiency. Nevertheless, it has been proposed that when annual per capita renewable freshwater availability is less than 1,700 cubic meters, countries begin to experience periodic or regular water stress. Below 1,000 cubic meters, water scarcity begins to hamper economic development and human health and well-being. Source: Falkenmark and Lindh 1976, quoted in UNEP/WMO. "Climate Change 2001: Working Group II: Impacts, Adaptation and Vulnerability". UNEP. http://www.grida.no/climate/ipcc_tar/wg2/180.htm . Retrieved on 2009-02-03. Water scarcity occurs when the amount withdrawn is so great that water supplies are no longer adequate to satisfy all human or ecosystem requirements. "High water stress" (40% or more water withdrawal as a percentage of total available) already exists in some countries of North Africa and the Middle East. This will spread to more countries, including India and South Africa over the next 20 years. By 2025, the USA and several countries in

		Europe are expected to have reached "medium-high water stress", i.e. water withdrawal at 20-40% of total volume of water resources available Source: http://www.epha.org/a/697
Renewable share on overall energy use	20% share of renewable energy in the overall energy mix by 2020	Source: An Energy Policy for Europe - Com(2007) 1 final" "Limiting Global Climate Change to 2 Degrees Celsius – The Way Ahead for 2020 and Beyond - COM(2007) 2 final"
Social		
Population growth rate	No specific target	A population growing at just 1% a year (UK population is growing at 0.7% a year) will double in 70 years; and a population growing at 2% a year will double every 35 years. Rapid population decline, however, can result in population ageing at a speed which would be economically unsustainable. Optimal Population Trust suggested the following target for the UK: to achieve a gradual decrease from 60.5 million to 53 million by 2050 => annual decrease of 0.3% a year from 2006 to 2050. Source: http://www.optimumpopulation.org/opt.projection.html
Per capita energy use	No specific target	Source: From p. 286 of " <i>Sustainable energy: choosing among options</i> " Jefferson W. Tester, Elisabeth M. Drake, Michael J. Driscoll, Michael W. Golay, William A. Peters "Thring (1998) estimates that the lower limit of energy consumption per capita is 0.3-0.5 TOE, and the upper limits is 1.0 - 1.5 toe per capita per year. Present energy consumption in the US is 6 toe, in Europe is 3 toe and well below 1 in the developing countries"
Food share on primary consumption	No specific target	This is something more related to developing countries.
Public expenditure on education over GDP	No specific target; as a broad indication, a general target referenced, but not sanctioned by international conventions or agreements, suggests that countries should devote at least 5% of GDP to education.	The conclusions of the Brussels European Council in October 2003 called for giving "particular emphasis on developing human capital through higher investment in education and research". Currently, the OECD average in public expenditure on education as a percentage of GDP is around 5%. Source: OECD data, Education and Training. http://esl.jrc.it/envind/un_meths/UN_ME031.htm
Social security expenditure over GDP	No specific target, however this has to be "sustainable" in the longer term.	At European level, pensions represent almost 11% of GDP. The slowdown of the European population is coupled with the increase of life expectancy. The two trends strongly affect the demographic structure of European countries, determining the increase of the share of older people in the total population. The ageing of the population is widely considered as the major threat for the sustainability of European pension systems. Projections estimate that the old-age dependency ratio, i.e. the ratio of people aged 60 and over to the working age population, will increase constantly, from 37 in 1995 to 51 in

		<p>2020 to 72 in 2050.</p> <p>Source: “Shaping the Societal Bill: past and future trends in education, pensions and healthcare expenditure” by R. Busse, G. Wurzburg, M. Zappacosta in Futures 35 (2003) 7–24</p>
<p>Health expenditure over GDP</p>	<p>No specific target: as a broad indication at least 5% of the Gross National Product should be spent on health</p>	<p>Source: http://ec.europa.eu/health/ph_information/indicators/docs/healthy_ageing_en.pdf http://esl.jrc.it/envind/un_meths/UN_ME043.htm Global Strategy for Health for all by the Year 2000. Geneva, WHO, 1981.</p>