EFORWOOD
Tools for Sustainability Impact Assessment

Draft FWC indicator set: Detailed review of existing sustainability indicator concepts and sustainability indicator sets of relevance for the FWC, review of potential indicators for selection and their assessment

Ewald Rametsteiner, Helga Pülzl and Esa Puustjärvi

EFI Technical Report 37, 2011

Draft FWC indicator set: Detailed review of existing sustainability indicator concepts and sustainability indicator sets of relevance for the FWC, review of potential indicators for selection and their assessment

Ewald Rametsteiner, Helga Pülzl and Esa Puustjärvi

Publisher: European Forest Institute
Torikatu 34, FI-80100 Joensuu, Finland
Email: publications@efi.int
http://www.efi.int

Editor-in-Chief: Risto Päivinen

Preface

This report is a deliverable from the EU FP6 Integrated Project EFORWOOD – Tools for Sustainability Impact Assessment of the Forestry-Wood Chain. The main objective of EFORWOOD was to develop a tool for Sustainability Impact Assessment (SIA) of Forestry-Wood Chains (FWC) at various scales of geographic area and time perspective. A FWC is determined by economic, ecological, technical, political and social factors, and consists of a number of interconnected processes, from forest regeneration to the end-of-life scenarios of wood-based products. EFORWOOD produced, as an output, a tool, which allows for analysis of sustainability impacts of existing and future FWCs.

The European Forest Institute (EFI) kindly offered the EFORWOOD project consortium to publish relevant deliverables from the project in EFI Technical Reports. The reports published here are project deliverables/results produced over time during the fifty-two months (2005–2010) project period. The reports have not always been subject to a thorough review process and many of them are in the process of, or will be reworked into journal articles, etc. for publication elsewhere. Some of them are just published as a "front-page", the reason being that they might contain restricted information. In case you are interested in one of these reports you may contact the corresponding organisation highlighted on the cover page.

Uppsala in November 2010

Kaj Rosén
EFORWOOD coordinator
The Forestry Research Institute of Sweden (Skogforsk)
Uppsala Science Park
SE-751 83 Uppsala
E-mail: firstname.lastname@skogforsk.se

EFORWOOD

Sustainability Impact Assessment of the Forestry - Wood Chain

Project no. 518128

EFORWOOD

Tools for Sustainability Impact Assessment

Instrument: IP

Thematic Priority: 6.3 Global Change and Ecosystems

Deliverable/Milestone reference number and title

D1.1.1 Draft FWC indicator set: Detailed review of existing sustainability indicator concepts and sustainability indicator sets of relevance for the FWC, review of potential indicators for selection and their assessment

Due date of deliverable: 31 October 2006
Actual submission date: 25 October 2006

Start date of project: 011105
Duration: 4 years

Organisation name of lead contractor for this deliverable:
University of Natural Resources and Applied Life Sciences, Vienna (BOKU)

Revision [draft 2]

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	PP
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

D1.1.1 Draft FWC indicator set: Detailed review of existing sustainability indicator concepts and sustainability indicator sets of relevance for the FWC, review of potential indicators for selection and their assessment

AUTHORS:

EWALD RAMETSTEINER
Institute of Forest, Environmental and Natural Resource Policy, Austria
University of Natural Resources and Applied Life Sciences, Vienna – BOKU

HELGA PÜLZL
Institute of Forest, Environmental and Natural Resource Policy, Austria
University of Natural Resources and Applied Life Sciences, Vienna – BOKU

ESA, PUUSTJÄRVI
Savcor Indufor Oy, Finland

WP 1.1. EFORWOOD Indicator development

Date: 25 October 2006 (revision 1)

Abstract:

The present document gives a short overview of the development of the EFORWOOD Indicator set. The report gives a definition of indicators and an overview of existing sustainability models. Thereafter it reviews already existing indicator sets that have been found relevant for the development of the EFORWOOD indicator set. The development of the EFORWOOD indicator draft sets is then precisely described. Firstly main criteria of selection for the EFORWOOD indicator set are set out and secondly the methodical approach to the development of the EFORWOOD indicator set is outlined.
Finally the current EFORWOOD Draft set is being presented: An overview about its main structure and its content is given. The EFORWOOD indicator set includes on the one side indicators that refer to the whole Forestry Wood Chain and on the other side it comprises of indicators that refer to individual Modules of the EFORWOOD project. The EFORWOOD FWC Indicators as well as the specific indicators are grouped according to the economic, social and environmental dimension of sustainability. The draft set 4 can be found in the annex of the present report.

Key words: indicator, reference indicator set, draft EFORWOOD indicator set, lead indicator, sustainability impact assessment, sustainability

ACRONYMS

CBA	Cost-Benefit-Analysis
CSD	Commission on Sustainable Development
CSR	Corporate Social Responsibility
EFORWOOD FWC SI	EFORWOOD Forestry Wood Chain sustainability indicators
FWC	Forestry Wood Chain
FWC-SI	Forestry Wood Chain sustainable indicators
GDP	Gross Domestic Product
IDRC	International Development Research Centre
IUCN	World Conservation Union
M	Module
MCA	Multi Criteria Analysis
MCPFE	Ministerial Conference on the Protection of Forests in Europe
OECD	Organisation for Economic Co-operation and Development
PAIS	European Union Rural Indicators
SDI-Eurostat	Sustainable Development Indicators of the European Union
SIA	Sustainability Impact Assessment
SIN	Sustainable indicator
ToSIA	Tool for the Sustainability Impact Assessment
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environmental Programme
WCED	World Commission of Environment and Development
WP	Work Package
WWF	World Life Fund for Nature

FIGURES

TABLES

CONTENT OF THE REPORT

1 INTRODUCTION

The EFORWOOD project aims at developing a tool for the Sustainability Impact Assessment (SIA) for the whole Forestry Wood Chain (FWC) that addresses various geographical scales and time perspectives (see EFORWOOD, 2005). In this regard sustainability indicators need to be defined that are valid for the whole FWC. Indicators are closely related to goals and objectives set for the activities whose impact is being examined. Therefore, the key criterion for selecting EFORWOOD indicators is their ability to capture the impacts of the FWC on sustainability. The concept of sustainability itself is broad and still under development, but to ensure compatibility with existing concepts, full advantage is taken of experience that has been accumulated when developing other sustainable indicator sets in Europe and globally. EFORWOOD indicators are central to the Project scope. The Fig. 1 shows the relevance and the centrality of indicators for the EFORWOOD project.

Fig. 1. Relevance of Indicators to EFORWOOD

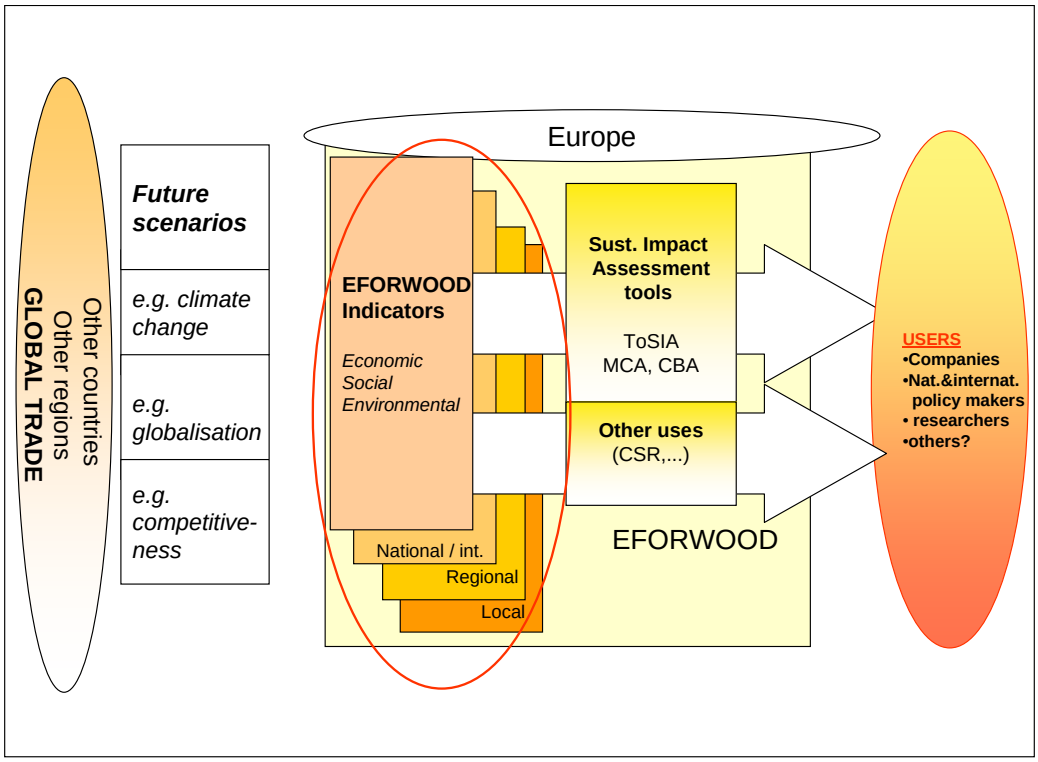


Chart explains the centrality of indicators in the EFORWOOD project

Source: own illustration (abbreviations used: ToSIA - Tool for the Sustainability Impact Assessment, MCA- Multi Criteria Analysis, CBA- Cost-Benefit-Analysis, CSR- Corporate Social Responsibility)

The EFORWOOD Forestry Wood Chain sustainability indicators (EFORWOOD FWC SI) need to cover on the one side economic, social and environmental dimensions and on the other side they need to respond to national and international as well as regional and local needs within the FWC. However, indicators developed within the EFORWOOD context are used for the sustainability impact assessment and in its related tools (e.g. ToSIA – Tool for Sustainability Impact Assessment, MCA – Multi-Criteria-Analysis and the CBA – Cost Benefit Analysis); in the future they can also be used for corporate social responsibility reports (CSR).

The development of the EFORWOOD indicator set needs to be based on its ability to respond to users needs (see Fig. 1). Different users groups[1] are appealed to by the indicator set as currently no other sustainability indicator set is referring to the whole FWC. Among those that may be regarded potential users as suggested by Fig. 1 are stakeholders, companies, associations as well as governments and international organisations. Users of EFORWOOD indicator set may e.g. apply those indicators in quantitative impact assessments, but may also refer to them in social responsibility reports or in meeting international report requirements. In this regard the development of the EFORWOOD indicators has to be fully based on already existing indicator sets.

A central aim of the EFORWOOD integrated project, however, is to develop a quantitative model for the impact assessment. This Tool for the Sustainability Impact Assessment (ToSIA) represents the most important deliverable of the EFORWOOD project. In the description of work of the EFORWOOD project ToSIA is characterised as:

> "…a dynamic FWC pathway analysis model. ToSIA will simulate FWCs as chains of value-adding production processes, which are studied and described in more detail in Modules 2-5. […] ToSIA aims to encompass the majority of them. Different versions of ToSIA will be developed, in ToSIA+E an integrated impact assessment of the sustainability of the FWC in terms of Cost-Benefit Analysis and Multi-criteria Analysis will be possible. In the former, indicators are converted to commensurable monetary values as far as appropriate. In the latter multi-criteria decision-making approaches and the valuation of the indicators, stakeholders' views will be taken into account. A user-friendly, web-based version, ToSIA-U, will also be developed, including a menu-surface and context-help allowing fast learning and application of the tool. A demonstration package of ToSIA-U with selected case study data and policy scenarios will be made available on the internet and it will also be used and disseminated in stakeholder training courses" (EFORWOOD, 2005: 21-22).

ToSIA may for instance be used to project the impacts of banning or restricting the size of clear cuttings or setting limits for the amount of toxic waste released by the industries. The user may also wish to use ToSIA to study the impacts of external trends such as a change in the concentration of greenhouse gases in the atmosphere. Besides the quantitative assessment, qualitative analysis that applies the indicators may also play a role within EFORWOOD. The indicator set will need to meet those requirements.

The present report gives a short overview of the development of the EFORWOOD indicator set that is based on already existing European and international indicator sets. Four draft versions (Set 1, Set 2, Set 3, and Set 4) have been developed until now (October 2006). The last two versions referred mainly to a set of Lead + Indicators and whole chain indicators that are relevant to the FWC as a whole. A list of the current EFORWOOD indicators (in its revised version 4) can be found in the annex of the present document.

2 MAIN OBJEVTIVE OF THE REPORT

The main objective of the present report recalls objective 1 and task 1 of Work package 1.1 (Module1) of the EFORWOOD project (see EFORWOOD 2005: 36).

> **"Objective 1 of WP.1.1** (M1) asks to
>
> (i) define a set of policy-relevant, coherent and internationally compatible FWC sustainability indicators that is able to assess the sustainability of the FWC, adapts it based on the results of their trial application in EFORWOOD and develops a FWC

[1] Besides ToSIA users (the development of ToSIA is a central aim of EFORWOOD).

sustainability indicator set to be used as the international reference set for the forest sector.

Task 1 of WP 1.1 (M1) FWC Sustainability Indicators for SIA

The FWC Sustainability Indicator (SIN) set will be developed on the basis of a review and analysis of existing relevant SIN sets and in consultation with stakeholder panels through M0 and expert input from Modules 2-5. The establishment of a set of SIN to be used for EFORWOOD will be based on the environmental, social, and economic sustainability components. Selection of SI for EFORWOOD's ToSIA piloting, test chain phase will be made by the whole consortium, based on an evaluated set of existing and additional indicators developed by WP1.1."

The main objective of this report is therefore to present:

(1) a short definition of indicators and an overview of existing sustainability models
(2) a review of already existing indicator sets relevant for EFORWOOD
(3) a description of the development of the EFORWOOD indicator set
(4) the overall methodical approach in developing this EFORWOOD indicator set
(5) an EFORWOOD indicator set (in its updated version 4)

The central scope of the report is to inform about the development of the EFORWOOD indicator set and to present the updated indicator set (draft 4) that are based on already existing European and international sustainability indicator sets.

3 METHODOLOGY

The report is primarily based on literature and information that was kindly provided by the Module members (M1-M5) of the EFORWOOD project.

One stakeholder meeting was held at Kerkrade on 13th September to seek support on the indicators development with special regarding to the following questions:

- Have all relevant topics sufficiently been covered?
- Are data available for relevant indicators
- Are the definitions selected so far ok?

The results of the stakeholder panel were included in the further development of the EFORWOOD indicator set.

The report is based on the analysis of literature and policy documents with regard to sustainability indicators. It is based on previous reports (Rametsteiner, Pülzl, Puustjärvi 2006, Rametsteiner, Pülzl 2006) that are available on the EFORWOOD Portal (www.eforwood.com).

The development of the draft set of EFORWOOD FWC SI follows an iterative approach that is described in more detail in the chapter 6.2 of the current report.

4 SUSTAINABILITY AND INDICATORS

This chapter briefly defines '*sustainable development'* and draws the readers' attention to four sustainability models that are outlined below. Thereafter the term '*indicator'* is defined and six main indicator functions are shortly presented.

4.1 Defining Sustainability and Sustainability models

Public attention was concentrated at the term 'sustainable development' through the publication of the Brundtland Report 'Our Common Future' in the mid 1980ies. This report was written by a committee of experts of the World Commission of Environment and Development (WCED) headed by Gro Harlem Brundtland. It was endorsed at the 42nd General Assembly of the United Nations in autumn 1987.
The term '*sustainable development'* however was not originally formulated by the group of WCED experts of, but as Meadowcraft (2000: 385) and as some authors suggest (see Adams 1990; Dobson 1996; Lafferty 1999notes) a more radical environmental literature referred to it already in the 1970s. In 1980 the World Conservation Strategy issued by the World Conservation Union (IUCN), the United Nations Environmental Programme (UNEP) and World Life Fund for Nature (WWF) coined a concept called 'sustainable development' (Pülzl 2005). Public attention and legitimacy however was conferred to it by the Brundtland Report. This report was formulated by the WCED between 1983 and 1985.
Meadowcraft (2000: 370) draws attention to the fact that the report on the one side called for a need to give international priority to the development of the poor and to prevent irreversible environmental damage; on the other side the report distinguished between developing and developed countries with regard to their further development. In his words this means:

> "[…] For developing countries it [the Brundtland report] proposed 'a new era of growth', to address poverty and under-development; for the more industrialized states it envisaged an intensive effort to increase energy and materials efficiencies and to shied economic activity onto less environmentally-burdensome lines" (Meadowcraft 2000: 370).

The report defines '*sustainable development'* as follows:

> "Humanity has the ability to make development sustainable – to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. (…) thus, sustainable development can only be pursued if population size and growth are in harmony with the changing productive potential of the ecosystem. Yet in the end, sustainable development is not a fixed state of harmony, but rather a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development, and institutional change are made consistent with future as well as present needs." (Brundtland 1987: 8-9)

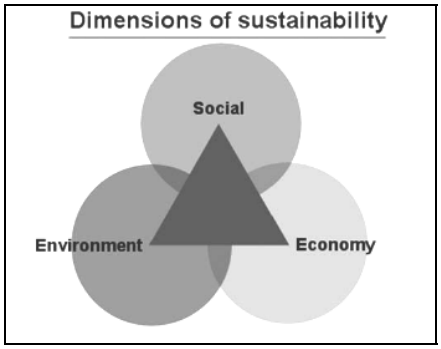
As has been stated previously the report was written by a committee and contains therefore inconsistencies and is sometimes even contradictory as compromises had been made. Noting that concerns and critics about the anthropocentric character of the content of the report have been raised on a continuous basis, it should be emphasised that sustainability as defined by the report in essence can be characterised as (Meadowcraft 2000: 371f):

- a normative idea (asks for a *better* life while meeting concerns of the poor and the future)
- inter-and intra-generational justice (see Dryzek 1997: 126)
- a way out of the economic growth versus environmental protection debate (economic and social development are seen as compatible with environmental protection needs)
- an appeal for Northern and Southern countries
- a 'bridging' concept between policies and interests

- a ‘progressive’ concept (development is seen as positive)
- referring to the idea of environmental limits (see Porter / Brown, 1991: 25ff)

Following Baker et al (1997:4) “*sustainability was linked to questions of power and the removal of disparities in economic and political relationships especially between North and South*”. Again borrowing from Meadowcraft (2000: 371) it needs to be emphasised that not a particular institution, practice or environment needs to be kept in order to achieve sustainable development, but a ‘process of improvement’ should be sustained. It needs to be added that the sustainable development concept is usually described by its three dimensions: economic, social and environmental dimensions (see Fig. 2).

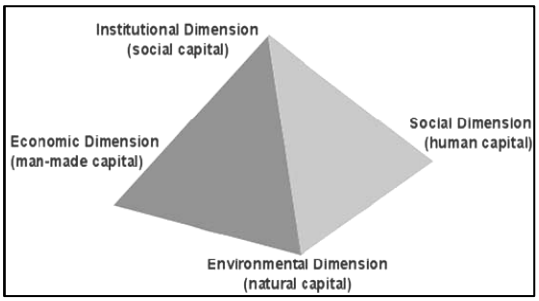
Fig. 2. Three pillar model of sustainability



Source: Keiner 2004: 381

Those three dimensions are used for the EFORWOOD indicator set. The indicators are grouped according to those three dimensions. However, it should be noted, that critical voices (see e.g. Jungkeit, Katz, Weber, Winterfeld 2002) complain about the missing political dimension of the three pillar model. In addition to these three dimensions ‘participatory means’ and the idea of ‘common but differentiated responsibilities’ are commonly highlighted with regard to achieving sustainability.
An other sustainability concept, presented by Spangenberg & Bonniot (1998) and Valentin & Spangenberg (1999) and based on the CSD 1995, adds a fourth (institutional) dimension to the triangular model presented above (see Fig. 3).

Fig. 3. Prism of Sustainable Development

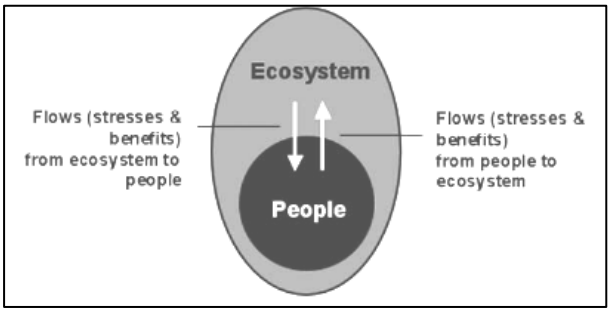


Source: Stenberg, 2001: 42 in Keiner 2004:382

Nonetheless Keiner (2004: 383) criticises that the environmental dimension is under-represented in the prism model; from his point of view the environmental dimension needs to be seen as precondition for human well-being.

A third sustainability concept that was originally produced by the International Union for the Conservation of Nature (IUCN) in 1994 was put forth by the International Development Research Centre (IDRC) in 1997 (Fig. 4).

Fig. 4. Egg of Sustainability (IUCN)

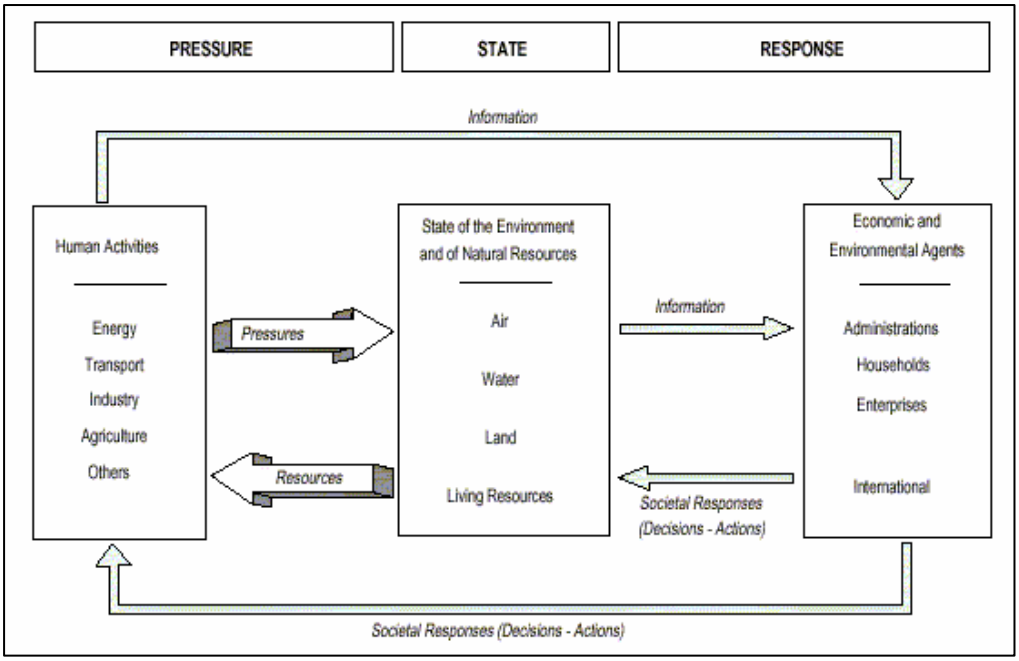


Source: International Development Research Centre 1997 in Keiner 2004: 384

The relationship between human beings (people) and the environmental dimension (eco-system) is visualised by the two circles. Both need to be balanced in order to achieve sustainability.

Different indicator frameworks have been used in the past in order to capture the significance of human-environmental relationship; among those is the Pressure-State-Response-Framework. The Organisation for Economic Co-operation and Development (OECD) (1993) for example gives an introduction to this framework (see Fig. 5).

Fig. 5. Pressure – State – Response – Framework



Source: Organisation for Economic Co-operation and Development, 1993: 10

On a general note, the Pressure-State-Response-Framework shows the human exertion of pressure on the environment which in return induces changes in the state of the environment and its natural resources. In this regard society needs to respond to those pressures as well as

those changes of the environmental state for example in the form of new legislation, policy programmes etc. In essence this framework presents a causal model, which gives the impression that a linear relationship between human pressures and environmental change can be ascertained. The framework on the other hand seems not to be aware of the potential effect of degraded environmental conditions on humans (Segnestam, 2002:7-8). Various successor frameworks are based on the idea put forward by this framework; those will not be discussed here in detail.

4.2 Defining 'indicators'

The idea of *sustainable development* was taken up by the United Nations Conference on Environment and Development (UNCED) held in Rio in June 1992. In its Agenda 21 countries agreed to develop sustainability indicators:

> "Indicators of sustainable development need to be developed to provide solid bases for decision-making at all levels and to contribute to the self-regulating sustainability of integrated environment and development systems" (Agenda 21, Chapter 40)

Sustainable development indicators should serve as instruments for measuring progress towards the reaching of the goal of sustainable development. Many definitions for indicators are available, none of which is authoritative. An indicator can be defined as:

> "A parameter, or a value derived from parameters, which points to / provides information about / describes the state of a phenomenon / environment / area with a significance extending beyond that directly associated with a parameter value." (OECD, 1993)

or as

> "[…[is a quantitative or qualitative parameter which can be assessed in relation to a criterion. It describes in an objectively verifiable and unambiguous way features of the ecosystem or the related social system, or it describes elements of prevailing policy and management conditions and human driven processes indicative of the state of the eco- and social system." (Tropenbos, 1997)

or as

> "They can translate physical and social science knowledge into manageable units of information that can facilitate the decision-making process. They can help to measure and calibrate progress towards sustainable development goals. They can provide an early warning, sounding the alarm in time to prevent economic, social and environmental damage. They are also important tools to communicate ideas, thoughts and values because as one authority said, "We measure what we value, and value what we measure." (Commission on Sustainable Development, 2001)

or as

> "An indicator is a means devised to reduce the large quantity of data down to its simplest form retaining essential meaning for the questions that are being asked of the data". (Ott, 1978)

or as

> „The indicators show changes over time for each criterion and demonstrate the progress made towards its specified objective". (Ministerial Conference on the Protection of Forests in Europe, 1998)

Linser (2001:21) identifies six main functions for indicators that are important for their application. Those functions are: "reporting, communication, forecasting, focusing, political control, and check for effectiveness" (see TABLE 1).
Indicators may be "descriptive / systemic, static / dynamic" (Linser 2001: 24). A descriptive indicator refers to a clearly defined phenomenon, while a systemic indicator addresses hidden

structures and interrelations. Static indicators measure data at a certain point in time (a 'snapshot'), while dynamic indicators measure data over a period of time.

Indicators may also have different reference levels. This means that on the one hand '*level*'-indicators measure average values at certain point in time – Linser (2001: 24) gives the example of the 'average forest area per capita in a country –, while on the other hand 'distribution'-indicators refer to the different range of values within various groups; e.g. share of export income earned from (forest) industry products.

TABLE 1. Six main functions of indictors

Function	Explanation
Reporting	One of the most frequently cited function of indicators is reporting. This means the description and diagnosis of the present situation in the sense of an inventory control without assessing the data. But indicators may also be applied to relevant data at different points in time to determine the changes in e.g. environmental quality (degradation or improvement) that have occurred over the period.
Communication	As the data-pyramid (figure 1) already showed indicators should not contribute to data-graveyards but mediate prepared empirical cognition or results. The provision of condensed information will improve clarity and make the communication about key issues, priorities, action strategies, and other complex circumstances much easier (reduction of complexity).
Forecasting	Indicators can also be used as instruments for the estimation of future trends and for the acquisition of information about possible problems occurring.
Focusing	Indicators can be an effective tool to focus the interest of target groups in the public, policy, administration, and media sectors to facts that so far have not been given adequate attention. The focusing on such neglected aspects creates the necessary basis for knowledge and shapes also the consciousness for a new regulation of social priorities and national politics.
Political control	'The primary purpose of indicators is to guide decision-makers in their actions, and to ensure that the impacts of their decisions are measured' (WWF and NEF 1994a: 1). Indicators (especially with reference values or threshold degrees) may assist politicians in decision-making, the determination of priorities, etc.
Check of effectiveness	Indicators are at the implementation and evaluation stage necessary in order to find out whether the policy is working and to measure progress towards the objectives set out in the strategy.

Source: Linser 2001: 21

The following chapter reviews the existing sustainability indicator sets and analyses their relevance for the development of EFORWOOD indicators.

5 REVIEW OF SUSTAINABILITY INDICATOR SETS RELEVANT TO EFORWOOD

Guidelines of the European Commission and four reference indicators sets have been selected as basis for the development of the EFORWOOD indicator set. Those are: the *Impact Assessment Guidelines* of the European Commission (European Commission 2005a), the *Sustainable Development Indicators for the European Union* presented by Eurostat (European Commission 2005b), the *Indicators of Sustainable Development* of the Commission for Sustainable Development of the United Nations (2006), the *Improved Pan-European Indicators for Sustainable Forest Management* of the Ministerial Conference on the Protection of Forests in Europe (2002) and the *European Union Rural Indicators* as suggested in the report of the PAIS project (LANDSIS, 2005). These indicator sets are shortly introduced and then compared to each other. They are mainly subdivided according to the three dimensions ('*economic, social and environmental*') that of sustainable development (see previous chapter).

5.1 Introduction and comparison of indicator sets relevant to EFORWOOD

The indicator sets (see Annex of the present report) are shortly introduced in the following paragraphs:

Impact Assessment Guidelines (SIA) are guidelines that support the European Commission personnel in evaluating new legal proposals. Those guidelines are to be used for assessing the economic, social and environmental impact of new policy proposals in advance. A list of in-depth questions that recall the sustainability dimensions is included. The majority of those questions are relevant to the forest sector and in this regard are relevant for the EFORWOOD Indicator set.

Sustainable Development Indicators of the European Union (SDI-Eurostat) present a comprehensive set of sustainability indicators for the European Union. Those are used for the evaluation of the implementation of the Sustainable Development Strategy of the Union (see Commission 2001). About half of the indicators are relevant to the forest sector and therefore relevant for the EFORWOOD Indicator set. It should be added that each indicator is backed up by data that could possibly be used for ToSIA.

Indicators of Sustainable Development of the Commission on Sustainable Development of the United Nations (CSD) are broadly formulated sustainability indicators that were agreed to at the international level. The indicators are limited in number and about half of the indicators are relevant to the forest sector and to EFORWOOD. In addition to the three dimensions of the sustainability pillar concept a fourth "institutional" dimension is included that may be used for the EFORWOOD Indicator set as well.

Improved Pan-European Indicators for Sustainable Forest Management of the Ministerial Conference on the Protection of Forests in Europe (MCPFE) is an international comprehensive and widely accepted set of indicators for the forest sector. Those are backed by comprehensive data reporting forms already agreed to and that could be easily used for EFORWOOD.

European Union Rural Indicators (PAIS) address particularly rural impacts. Specific indicators for the forest sector are relatively few, but a number of more general indicators are nonetheless relevant for the forest sector and in this regard relevant for EFORWOOD.

The impact assessment guidelines (SIA) and the four indicator sets (SDI-Eurostat, CSD, MCPFE and PAIS) have been compared to each other in TABLE 2 below. The themes explicitly named in the impact assessment guidelines (SIA) of the European Commission (2005) are used as reference for the other four sets.

TABLE 2. Comparison of sustainable indicator sets relevant to EFORWOOD

ECONOMIC	THEME (SIA)	SDI Eurostat	CSD	MCPFE	PAIS
Competitiveness, trade and investment flows	**x**	**x**	**x**	**x**	x
Competition in the internal market	**x**				
Operating costs and conduct of business	**X**				
Administrative costs on businesses	**X**				
Property rights	**X**				**x**
Innovation and research	**X**				**x**
Consumers and households	**X**				
Specific regions or sectors	**X**				
Third countries and international relations	**X**				
Public authorities	**X**				
The macroeconomic environment	**X**				
ENVIRONMENTAL	**THEME (SIA)**	**SDI Eurostat**	**CSD**	**MCPFE**	**PAIS**
Air quality	**X**	**x**	**x**	**x**	
Water quality and resources	**X**	**x**	**x**		
Soil quality and resources	**X**	**x**		**x**	
The climate	**X**	**x**	**x**	**x**	
Renewable and non-renewable resources	**X**	**x**			
Biodiversity, flora, fauna and landscapes	**X**	**x**	**x**	**x**	
Land use	**X**	**x**	**x**	**x**	x
Waste production / generation / recycling	**X**	**x**	**x**		
The likelihood or scale of environmental risks	**X**				
Mobility (transport modes) and the use of energy	**X**	**x**	**x**		
The environmental consequences of firms' activities	**X**				
Animal and plant health, food and feed safety	**x**				
SOCIAL	**THEME (SIA)**	**SDI Eurostat**	**CSD**	**MCPFE**	**PAIS**
Employment and labour markets	**x**	**x**		**x**	**x**
Standards and rights related to job quality	**x**				
Social inclusion and protection of particular groups	**x**	**x**	**x**		
Equality of treatment and opportunities, non-discrimination	**x**	x	**x**		
Private and family life, personal data	**x**				
Governance, participation, good administration, access to justice, media and ethics	**x**				
Public health and safety	**x**	**x**	**x**		
Crime terrorism and security	**x**				
Access to and effects on social protection, health and educational systems	**x**	**x**	**x**		

As can be seen in TABLE 2 **thirty-two topics** have been selected by the Impact Assessment Guidelines in order to describe 'sustainable development': 11 themes for the economic dimension, 12 themes for the environmental dimension and 9 themes for the social dimension. Not all are covered by all reference sets; some are covered better than others:

Within the economic dimension three topics are covered by more than one reference set, namely 'competitiveness, trade and investment flows; property rights; innovation and research'.

The environmental dimension is covered best by all five indicator sets. Several topics such as air, water and soil quality, as well as climate change, biodiversity, land use, waste and mobility are found relevant to sustainability by most of the reference sets. Only two topics, namely 'environmental consequences of firms' activities & animal and plant health, food and feed safety' are not covered by the other indicator sets so far. This might be due to their specificity.
The social dimension is covered less well by all reference sets; Eurostat-SDI and CSD include more social indicators than the other reference frameworks: 'employment and labour market; social inclusion and protection of particular groups as well as equality of treatment and opportunities, non-discrimination and public health and safety and access to service systems are the main themes addressed by most sets.

In addition to the cross reference of indicators sets it needs to be added that the sustainable indicator set of Eurostat and the CSD refer to other themes than the sustainable impact assessment guidelines do. All themes referred to by Eurostat and CSD are listed in TABLE 3. The SDI (Eurostat) themes are not grouped according to the three dimensions of the sustainability concept, but 10 priority themes have been selected. The CSD indicator set is again grouped according to the three dimensions of sustainability. In addition a forth dimension has been added to the set, the *institutional dimension*.

TABLE 3. Main themes of indicators sets [SDI (Eurostat) and CSD]

SDI (Eurostat)	
1: Economic Development	Investment
Sub-Themes	Competitiveness
	Employment
2: Poverty and Social Exclusions	Monetary poverty
Sub-Themes	Access to labour market
	Other aspects of social exclusion
3: Ageing society	Pensions adequacy
Sub-Themes	Demographic changes
	Public finance sustainability
4: Public Health	Human health protection and life styles
Sub-Themes	Food safety and quality
	Chemicals management
	Health risks due to environment conditions
5: Climate Change and Energy	Climate Change
Sub-Themes	Energy
6: Production and Consumption patterns	Eco-Efficiency
Sub-Themes	Consumption patterns
	Agriculture
	Corporate responsibility
7: Management of natural resources	Biodiversity
Sub-Themes	Marine Ecosystems
	Fresh Water Resources
	Land use
8: Transport	Transport Growth
Sub-Themes	Transport Prices
	Social and environmental impact of transport
9: Good Governance	Policy Coherence
Sub-Themes	Public Participation
10: Global Partnership	Globalisation of Trade
Sub-Themes	Financing for SD
	Resource management

CSD	
ECONOMIC Theme	**Sub-theme**
Economic Structure	Economic Performance
	Financial Status
Consumption and Production patterns	Material consumption
	Energy use
	Waste Generation and Management
	Transportation
SOCIAL Theme	**Sub-theme**
Equity	Poverty
	Gender Equality
Health	Nutritional Status
	Mortality
	Sanitation
	Drinking Water
	Healthcare Delivery
Education	Education Level
	Literacy
Housing	Living Conditions
Security	Crime
Population	Population Change
ENVIRONMENTAL Theme	**Sub-theme**
Atmosphere	Climate change
	Ozone Layer Depletion
	Air quality
Land	Agriculture
	Forests
	Desertification, Urbanisation
Oceans, Seas and Coasts	Coastal Zone
	Fisheries
Fresh Water	Water Quantity
	Water Quality
Biodiversity	Ecosystem
	Species
INSTITUTIONAL Theme	**Sub-theme**
Institutional Framework	Strategic implementation of SD
	International Cooperation
	Information Access
Institutional capacity	Communication Infrastructure
	Science and Technology
	Disaster Preparedness and Response

The comparison (see TABLE 3) showed that there is considerable disagreement with regard to the allocation of themes to the three dimensions of sustainability. For example: *employment* is included in the social dimension within SIA, while SDI (Eurostat) includes employment and labour productivity under the economic dimension. The CSD does not contain any reference to employment, besides that an indicator regarding the unemployment rate has been included under the social dimension. The MCPFE indicator set on the other hand identified employment and labour input as a socio-economic indicator.

The pan-European indicators for sustainable forest management (MCPFE) are not grouped according to the three dimensions of sustainability either, but the 35 quantitative indicators are grouped according to 6 criteria (see TABLE 4).

TABLE 4. Main themes of indicators sets [MCPFE and PAIS[2]]

MCPFE – quant. indicators

C1: maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles	1.1. Forest area 1.2. growing stock 1.3. Age structure and/or diameter distribution 1.4. carbon stock
C2: maintenance of forest ecosystem health and vitality	2.1. desposition of air pollutants 2.2. soil condition 2.3. defoiliation 2.4. forest damage
C 3: maintenance and encouragement of productive functions of forests	3.1. increment and fellings 3.2. roundwood 3.3. non-wood goods 3.4. services 3.5. forest under management plans
C4: maintenance, conservation and enhancement of biological diversity in forest ecosystem	4.1. tree species composition 4.2. regeneration 4.3. naturalness 4.4. introduced tree species 4.5. deadwood 4.6. genetic resources 4.7. landscape pattern 4.8. threatened forest species 4.9. protected forests
C5: maintenance and enhancement of protective functions in forest management (soil and water)	5.1. protective forests – soil, water, and other ecosystem functions 5.2. protective forests – infrastructure and managed natural resources
C6: maintenance of other socio-economic functions and conditions	6.1. forest holdings 6.2. contribution of forest sector to GDP 6.3. net revenue 6.4. expenditures for services 6.5. forest sector workforce 6.6. occupational safety and health 6.7. wood consumption 6.8. trade in wood 6.9. energy from wood resources 6.10. accessibility for recreation 6.11 cultural and spiritual values

PAIS – rural indicators

Population and migration	demography
	Population change
Social well-being	Service provision
	employment
	Quality of employment
	income
	Housing accessibility
Economic structure & performance (competitiveness)	enterprise
	Human capital
	Business infrastructure
Economic structure & performance (diversification of rural economies)	Sectoral shares
	Farm households
	Tourism & recreation
Economic structure & performance (addressing the primary sector)	agriculture
	forestry
	Fisheries, aquaculture & fish processing

The rural development indicators (PAIS) (see TABLE 4) address mainly the social well-being and economic structure and performance. The environmental dimension of sustainability is not covered by these indicators.

The next chapter proceeds with the description of the development of the EFORWOOD indicator set.

[2] Only some indicators that refer to the FWC and that have been found relevant for the EFORWOOD indicator development process and not the full set are being presented here.

6 DEVELOPMENT OF EFORWOOD INDICATOR SET

This chapter explains the development of the EFORWOOD indicator set. It discusses firstly the main criteria of selection for the EFORWOOD indicator set. Secondly, the methodical approach to the development of the EFORWOOD indicator set is outlined.

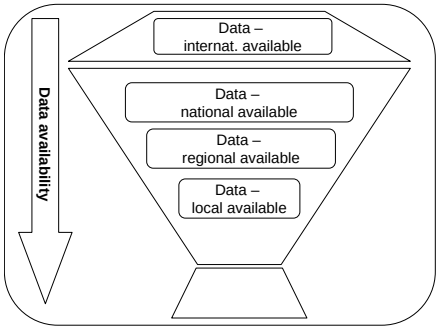
6.1 Criteria of selection for the EFORWOOD indicator set

Generally spoken the EFORWOOD indicator set aims at consistency with other sustainability indicator frameworks in Europe and globally. The consistency with already existing indicator sets helps guaranteeing its political acceptance. The EFORWOOD indicator set aims furthermore at providing a basis for international and inter-sectoral comparisons. Estimates confined only to the forest sector are of limited use for policy-makers at higher than sectoral levels therefore indicators selected need to be easy understandable and even people who are not experts for the Forestry Wood Chain should be able to grasp their meaning.

The proposed EFORWOOD indicator draft set(s) have been based on the following four criteria:

1. **Indicator relevance & scale**: In the first instance indicators need to provide relevant measures of sustainability. The relevance may differ depending on the scale on which the indicators are applied. The relevant scales include national and regional scales for the ToSIA application; in addition it was decided (see decision of the Board) that indicator values are collected at the process[3] level and therefore indicator need to be relevant also on the process level.
2. **Data availability & spatial scale**: The indicators selected for EFORWOOD need to benefit from adequate data availability within the appropriate spatial scale (see Fig. 6) and it needs to be based on already existing data in order to reduce costs to a minimum.

Fig. 6. Data availability & spatial scale



It should be added again, that indicator values are collected at the process level that have been predefined by the Modules M2-M5 and data need to be available on this scale.

3. **Technical feasibility & scale**: The indicators have been selected according to their practical applicability. These qualities may differ depending on the scale on which the indicators are applied (cf. above).
4. **Cost of indicator application**: The cost of indicator application (data collection) needs to be taken into account when selecting the EFORWOOD indicators and needs to be kept at low levels.

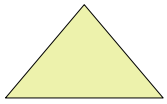
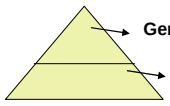
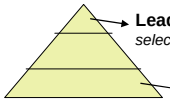
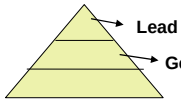
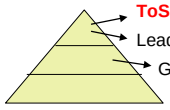
[3] A list of processes that have been defined by the Modules (M2-M5) is provided in the annex of the EFORWOOD FWC SI draft set 4 that is included in this report.

Several selection criteria served for the choice of EFORWOOD indicators. However it should be noted that theoretically founded and scientifically credible indicators may not accord with political relevance or international comparability. This does also mean that some indicators have been dropped during the development process.

6.2 Development of the EFORWOOD SI-FWC indicator list: overall methodical approach

Four draft versions of the EFORWOOD indicator set were distributed among EFORWOOD Modules. All draft indicator sets were mainly based on contributions and comments of the Modules M2, M3, M4 and M5. In addition members of Module M1 commented on the indicator sets. In December 2005 / January 2006 Modules M2-M5 of the EFORWOOD consortium were requested to provide a list of indicators as their first input to the work of Work package (WP) 1.1 of Module 1. The first draft set of EFORWOOD SI FWC (*draft* Set 1) was sent out in the beginning of February 2006 and the second draft set of EOFRWOOD SI FWC (*draft* Set 2) was sent out in the end of March 2006, while the third draft set of EFORWOOD SI FWC (*draft* Set 3) was made available in Mid July. In Mid May a Draft Lead+ Indicator Set was made available as well (see TABLE 5).

TABLE 5. General approach to the development of the EFORWOOD indicator set

	Draft Set 1 (Feb 2006)
 **General Forestry Wood Chain Indicators** **Module specific indicators**	Draft Set 2 (March 2006)
 **Lead + indicators** (contained lead indicators and *selected* general FWC indicators) *Module specific indicators (have not been included)*	Draft 'Lead + Indicator' Set (May 2006)
 **Lead + indicators** **General Forestry Wood Chain Indicators** *Module specific indicators (have not been included)*	Draft Set 3 (July 2006)
 **ToSIA indicators** Lead + indicators General Forestry Wood Chain Indicators *Module specific indicators (have not been included)*	Draft Set 4 (October 2006)

Generally speaking all sets aimed at:

1. consistency with the relevant existing (sector-specific and general frameworks) sustainability indicator sets with respect to themes and issues covered. The main attention was paid to consistency with European frameworks but selected frameworks at the global level were taken into account also.
2. distinguishing priority indicators (EFORWOOD whole chain indicators) that were meant to cover all main themes of the whole Forestry Wood Chain and indicators relevant to M2, M3, M4 and M5 (M2-M5 specific indicators) only. Quantitative and comparable data in related sectors or at national level are usually thought to be available.

3. at addressing all major sustainability impact dimensions, including indicator demands of multiple user groups including policy makers.

More specifically the development of the EFORWOOD indicator set followed several steps that will be outlined in the following paragraphs.

STEP 1:

The indicators, initially proposed by M2-M5 (before January 2006) had a slightly varied scope and approach with respect to the issues covered as well as the use of quantitative/qualitative indicators. Some of them draw on existing frameworks (e.g. sustainable development indicators of the European Union, MCPFE) others did not. Therefore some adjustment of wordings had to be done to make related indicators compatible with each other. This adjustment process attempted to harmonize indicators common to two or more sets and to categorize indicators according to the three sustainability dimensions (economic, social, and environmental) that are foreseen by the EFORWOOD Description of Work (2005:4):

> "*Environmental*: biodiversity, carbon sequestration, soil fertility, pollutants and wastes, water quality, energy efficiency in production, water use efficiency, change of natural resource stock and degree of recycling.
>
> *Social*: employment, consumers' requirements for and expectations of products and services, cultural values, recreational possibilities, rural development, human health and well being.
>
> *Economic*: competitiveness, value-adding, development of existing and new markets, real income, investment capital formation, cost-benefit, energy use and production." (EFORWOOD, 2005: 4)

STEP 2:

The *Draft* Set 1 (February 2006) was based on the following four principles:

1. The proposed indicator set aimed at benefiting from the availability of reference data enabling comparisons with related sectors (or national /global averages). Estimates confined to the forest sector are sometimes of limited use for policy-makers. Instead, policy-makers are in need of reference points to put the contribution / impact of the forest sector into perspective (e.g. GDP contribution from the forest sector compared to other sectors).
2. The proposed first set distinguished between '*impact*' indicators and '*input*' indicators. For instance, 'GDP contribution' is a typical impact indicator while 'productivity' would be an input indicator. Impact indicators provide estimates on achievement of high-level goals, i.e. on what the society and people *ultimately* want from the sector. Input indicators are usually 'proxies' for impact indicators; their achievement is assumed to indirectly reflect changes in impacts; For instance, increased productivity is not something that is valued in its own right but as a means to generate wealth, measured, *inter alia*, in terms of the sector's GDP contribution.
3. The reason why input indicators are monitored is that changes in indicator impact values are often slow to mature while those related to input indicators can be detected in the short term.
4. The indicator set aimed at reflecting the impacts of potential policy variables. Any potential objective that policy-makers may set for the sector should be paired to corresponding indicators in the EFORWOOD framework.

STEP 3:

The *Draft* Set 2 (End of March 2006) was based on the following four principles:

1. All indicators have been grouped according to main themes that have been found relevant for the Forestry Wood Chain; those themes present the underlying structure for the

'EFORWOOD whole chain indicators' as well as for the 'M2-M5 specific indicators', enabling easy comparison between indicators.

2. The distinction between impact/input indicators has been dropped due to complexity reasons. Most existing indicator sets include both impact and input indicators without making a clear distinction between them.
3. The second set included a reference file to allow for the traceability of proposals made by Modules M2-M5. Three background colours have been allocated to the three dimensions of sustainability and all Module inputs were made visible through the application of different colours.
4. Comments have been requested and new information from Module members regarding the relevance and data availability of / for proposed indicators. In addition new information was requested regarding the technical feasibility of the proposed indicators as well as information on the application cost of the proposed indicators. All comments should be provided with reference to scale.

STEP 4:

The *Draft* Lead + Indicator Set (Mid May 2006) was based on the following principles:

1. As the number of the proposed indicators of the EFORWOOD draft set 2 was quite large for potential user groups, the EFORWOOD consortium opted at the EFORWOOD week in Edinburgh (8-11th May 2006) to propose **'Lead + indicators'** (see IP Board decision on indicators below). The idea was to use this smaller set of indicators for a first test phase.

TABLE 6. IP Board decision on EFORWOOD indicators

"The IP Board approved the suggestion of WP1.1 on the following structure for further work with indicators (cf. also WP1.1 internal draft report on EFORWOOD Sustainability Indicators for the Forestry Wood Chain, May 2006, Appendix 1):

- Economic / Social / Environmental
- Themes – indicators - detailed description (including parameters, classifications)
- Lead – General FWC – module specific indicators

The IP Board agreed to the following tentative number of indicators to be used for enabling Modules to start their work (cf. the second draft on indicators):

- Lead indicators: approx. 6
- EFORWOOD Whole chain indicators: 26
- Module specific indicators: 53
  (M2: 34, M3: 21: M4: 22, M5: 22)

Regarding the spatial scale of indicators, it was agreed that ToSIA will focus on the regional / national level and the more local/enterprise level could be addressed by partial models in Modules 2-5. ER noted that the challenge is how to make Modules aware of the national/regional level while developing indicators.

2. Six '*lead indicators*' and eight important '*selected general forestry wood chain indicators*' had been chosen from the previous draft set 2 according to the three dimensions of sustainability. The Module specific indicators have not been included in this draft Set but will be again considered at a later stage.
3. The 14 indicators have been further refined and information has been updated; international data providers have been proposed, measurement units and especially reporting notes have been provided as far as possible; a first draft document of relevant definitions used by data collectors at the pan-European level has been prepared.
4. The idea of explicitly naming main themes relating to indicators has been dropped; however they still serve as main implicit guidance for the further refinements of the draft EFORWOOD indicator set.
5. Comments have been requested regarding the selection of the indicators' reporting notes and definitions.

STEP 5:

The *Draft* Set 3 (Mid July 2006) was based on the following principles:

1. The further refinement of the draft set 2 including the draft Lead + Indicator set according to already existing European and international statistics was at the centre of the

development of a draft Set 3. Therefore the updating of indicator sub-classes according to European statistics (mainly Eurostat, European Environmental Agency (EEA) and Organisation for Economic Co-operation and Development (OECD), and Ministerial Conference of the Protection of Forests in Europe (MCPFE)) was central to the development of draft Set 3

2. Indicator values will only be collected at the process (or in some cases at the module[4]) level; therefore all indicators refer to these two scales: process and module level.
3. Detailed information on current specifications used (within Europe and the international community) for the individual indicators have been included as far as possible. That supports the work of WP 1.2 with regard to the establishment of data collection protocols.
4. The development of the draft Set 3 was again based on the idea of the three dimensions of sustainability and the request for data availability when selecting the sub-classes of the individual indicators.
5. Individual requests regarding the further refinement of the indicators were made. The Module specific indicators have not been included in this set so far, but will be further developed at a later stage.
6. A definitions document has been provided that is based on already existing definitions used within Europe.

ToSIA selection process in September by Work Package 1.4. of EFORWOOD:

Not all of the indicators included in the draft set 3 will be used by each ToSIA tool. In this regard a short-list of indicators for which data collection started, was formulated by WP.1.4 (Schweinle, Welling, Lindner, Trasobares, Suominen 2006) in cooperation with WP1.1. This short list of indicators is based on the EFORWOOD FWC SI Draft Set 3.

The collection of indicator values at process level started for three test chains (one in Germany -Baden Württemberg, one in Spain - Iberia and one in Sweden) for which the first ToSIA application will be done. Some of the indicators such as e.g. Trade Balance or Forest area have not been found relevant for this first ToSIA application; nonetheless they remain in the overall set.

Again it needs to be stressed that the first ToSIA indicator list applies only to the Test Chain data collection. Several of the not included indicators will be considered at a later stage in the case studies.

Stakeholder meeting in Kerkrade - stakeholder comments to Set 3:

Generally it needs to be said that all stakeholders that were present at a Stakeholder meeting held in Kerkrade (the Netherlands) approved the general structure of the EFORWOOD indicator draft set. Although it was stressed that ‘data availability’ is an important criteria for the development of the EFORWOOD indicator set, stakeholders stressed the need for developing an ‘ideal list’ of indicators; they emphasised that it needs to be taken into account that data collection may well be decided upon at a later stage (by different users) if an indicator has been found relevant for the whole forestry wood chain and it should not be excluded from the list only because of this selection criteria.

The threefold distinction between economic, social and environmental indicators was generally welcomed by the stakeholders; although it needs to be added that some stakeholders pointed at the difficulties of allocating some of the indicators to the three dimensions of sustainability. It was further acknowledged that a balance between the three dimensions (economic, social, and environmental) should be aimed at. However achieving a balance between the three dimensions does not imply achieving an equal number of indicators for all

[4] By module level the Module M2-M5 of the EFORWOOD project are meant to provide an input.

three dimensions. (Specific comments received for individual indicators were included in the development of draft Set 4)

STEP 6:

The *Draft* Set 4 (Mid October 2006) is based on the following principles:

1. The further refinement of the Draft Set 3 according to comments received (including those from the Stakeholder meeting) remains at the centre of interest.
2. A distinction between indicators relevant to a multiple user group and indicators relevant to the ToSIA application[5] has been made. Not all indicators have been found relevant for the first ToSIA application that applies only to the Test Chain data collection within the EFORWOOD project.
3. Indicator values will only be collected at the process level; therefore all indicators found relevant for the first ToSIA application to the Test Chains are refer to at this scale.
4. The development of the draft Set 4 was again based on the idea of the three dimensions of sustainability and data availability when selecting the sub-classes of the individual indicators.
5. Some of the "proposed indicators" have been moved according to the comments received to the section "indicators under consideration"; some new indicators have been proposed and included to the list of "indicators under consideration".
6. Definitions used were further updated (see also separate definitions document).

Up-coming steps:

(1) The **final decision on the draft EFORWOOD set** will be taken by the **IP Board** in November 2006 in Lisbon.

(2) The **'Module specific indicators' are being delivered on 15th of December 2006.**

[5] A separate report prepared by WP1.4 in accordance with WP1.1 refers to 'Lead indicators' for which data are being currently collected. Not all indicators have been found relevant for the ToSIA application, e.g. for indicator "trade balance" no data are being collected.

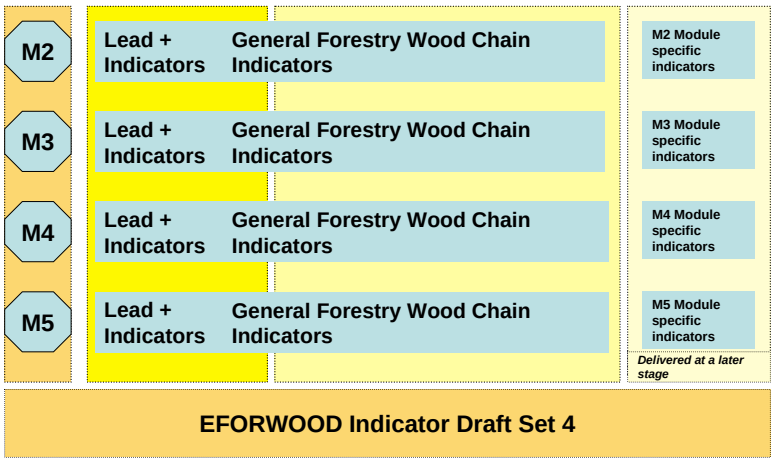
7 DESCRIPTION OF EFORWOOD FORESTRY WOOD CHAIN SUSTAINABILITY INDICATOR SET

The EFORWOOD indicator set is shortly presented in this chapter. An overview about its main structure and its content is given below. The EFORWOOD indicator set includes on the one side indicators that refer to the whole Forestry Wood Chain and on the other side it comprises of indicators that refer to individual Modules. The EFORWOOD FWC Indicators as well as the specific indicators are grouped according to the economic, social and environmental dimension of sustainability. Both will be shortly introduced in the following chapters.

7.1 Structure of the current Draft Set 4

The structure of the current draft Set 4 of the EFORWOOD SI FWC is displayed in Fig. 7. The draft Set 4 contains 'Lead+' Indicators (a smaller set of indicators relevant to the FWC as a whole) and 'Whole chain indicators' (a larger set of indicators relevant to the FWC as a whole). Module specific indicators' (specifically relevant for Modules M2, M3, M4, M5) are not included in this set and will be delivered at a later stage.

Fig. 7. EFORWOOD Draft Set 4



<u>The draft EFORWOOD Indicator Set is built on three different sets of indicators:</u>

1. 'Lead+' Indicators (a smaller set of indicators relevant to the FWC as a whole)
2. 'Whole chain indicators' (a larger set of indicators relevant to the FWC as a whole)
3. 'Module specific indicators' (specifically relevant for Modules M2, M3, M4, M5) – *delivered at a later stage*

<u>'Lead+' Indicators:</u>
The term 'lead indicators' was adopted "*by some countries and organizations to describe an SDI approach where short core sets of indicators closely linked to policy priorities are compiled*" (Pinter, Hardi, Bartelmus 2005:7). The number of lead indicators shall be considerably low and may link issues appealing to policy-makers as well as the general public to the selected sustainability indicators. Only recently the European Environmental Agency as

well as the United Kingdom published such core indicators. The rational behind adopting lead indicators lies in two aspects: they are easy to understand and help tracking progress for the achievement of policy goals.
It should be noted that the IP Board has decided to have a smaller number of indicators (14 Lead + indicators) to be chosen in order to start data collection. This smaller number of indicators (Lead+ indicators) should serve that purpose. Those indicators have been selected as from the comments received so far, some general agreement on their relevance to EFORWOOD could be noted. It was assumed that data are available. At this stage no distinction of importance between Lead indicators and general FWC indicators is being made.

Relationship between 'Lead +' Indicators and 'General Forestry Wood Chain Indicators'
The 'Lead +' indicators contain 6 Lead indicators and 8 'selected' indicators of the general forestry wood chain set. The latter (selected general forestry wood chain indicators) is indeed a subset of the wider list of general FWC indicators that had been proposed in draft Set 2. Therefore it has been labelled "selected indicators". The present fourth set of EFORWOOD SI FWC (draft Set 4) as well as the previous draft Set 3 contains again all general FWC indicators, meaning the Lead indicators, the 'selected' general FWC indicators and the 'rest' of the general FWC indicators (see draft Set 2 - indicator report prepared for the Edinburgh week). Currently all indicators are seen as directly and equally relevant.

Relationship between 'Lead' + indicators and 'Modules specific indicators':
There is no hierarchical structure between the 14 Lead + indicators (meaning the 6 Lead indicators and 8 'selected' Forestry Wood Chain Indicators) and the Module specific indicators. Currently all indicators are seen as directly and equally relevant.

7.2 Content of EFORWOOD Forestry Wood Chain sustainability indicator Set 4

The **eight indicators** of the EFORWOOD whole chain indicators with regard to the economic dimension of sustainability are: (1)[6] Value added and gross domestic product, (2) Production costs, (3) Trade balance, (4) Resources / material use, (5) Enterprise structure, (6) Investment and Research & Development, (7) Innovation, (8) Total production,
Those recall thematic priorities of the selected reference indicator sets that have been discussed in Chapter 5 of the present report. In addition *two more indicator*s: (26) compliance costs and (9) Revenue are under consideration to be included in the EFORWOOD FWC SI Set.

The **four social indicators** of the EFORWOOD whole chain indicators with regard to the social dimension of sustainability are: (10) Employment, (11) Wages and salaries, (12) Occupational safety and health, (13) Education and Training.
Again they recall thematic priorities of the selected reference sets discussed in Chapter 5 of the present report. *Four more indicators* are currently under consideration, namely (14) Quality of employment, (27) Governance and capacity building, (31) recreational use of forests, (32) consumer attitudes on forest management, forestry and forest products. They all recall inter alia the SIA questions.

The **ten environmental indicators** of the EFORWOOD whole chain indicators with regard to the environmental dimension of sustainability are: (15) Energy generation and use, (16) Greenhouse gas balance, (17) Transport, (18) Water, (19) Forest area and growing stock, (20)

[6] Numbers refer to the numbering of indicators in the fourth EFORWOOD draft indicator set.

Recycling and recovery, (21) Emissions to soil, water and air, (23) Tree species composition, (24) Corporate responsibility, (25) Generation of waste. In addition *one more indicator* namely '(29) use of hazardous chemicals', has been proposed.
In total 22 (+ 7 under consideration) indicators have been selected for the EFORWOOD whole chain indicator set.

7.3 EFORWOOD Forestry Wood Chain Module specific sustainability indicators

Besides the EFORWOOD whole chain indicators, Module specific indicators have been selected by the Draft Set2. Until now they have not been further refined. The Module specific indicators are not valid for the whole Forestry Wood Chain, but are specific to the individual Modules M2-M5. However those *specific M2-M5 indicators* recall currently the themes found relevant for the 'EFORWOOD whole chain indicators' and are structured according to these. Some of the indicators included in the Draft Set4 are still included in this set. The further refinement of these module specific indicators is needed and will be done until Mid December 2006.

The gap analysis below (see TABLE 7) shows that not all themes and indicators are found relevant for all Modules. The gap analysis shows furthermore that some further adjustment of wordings has to be done as not all Module indicators use the same wording; e.g. forest sector trade balance (M3) vs. trade (M4) vs. forest sector trade balance (M5).

TABLE 7. EFORWOOD specific indicators (relevant to M2-M5)

Theme	Indicators M2	Indicators M3	Indicators M4	Indicators M5
ECONOMIC PROPOSED INDICATORS				
competition	Forest Holdings	enterprise structure	enterprise structure	enterprise structure
competitiveness		Overheads including margin		
		Lead time (time necessary for production and/or deliver a specific product unit)		
		Productivity		
trade		forest sector trade balance	trade	forest sector trade balance
GDP & value added	GDP & value added	GDP & value added	Value added	GDP & value added
investment & innovation	investment & R&D	invested capital	innovation funding	investment & R&D
		R&D expenditure		
resources and material consumption	resources and material consumption		domestic material consumption	resources and material consumption
operation costs and conduct of business	production costs per unit and total		production cost per unit and total	production cost per unit and total
production of volume	total production of volume			
employment	employment rate in FWC	employment rate in FWC	employment rate in FWC	employment rate in FWC
revenue	revenue	revenue		revenue
ECONOMIC INDICATORS under CONSIDERATION				
	flexibility	*Return on investment*	*efficiency in use of capital goods*	*Turnover from innovation as % of total turnover*
	economic risk	*turnover form innovation as % of total turnover*	*return on investment*	*return on investment*
	economic value	*Income /contribution of regional economy*	*turnover form innovation as % of total turnover*	*average corporate tax?*
	social /health value		*subsidies + tax benefits*	*industry consolidation /share of SME*
	recreation		*subsidies for bio-energy, pulp and paper*	*Wood consumption*
	Eco-Tourism?			
PROPOSED SOCIAL INDICATORS				
employment	employment	employment	employment	employment
	quality of employment	quality of employment	quality of employment	quality of employment
			Training and Education	
	wages and salaries	wages and salaries, by type of skill and gender	wages and salaries	wages and salaries

public health and safety	occupational safety and health	Health and safety	occupational safety and health	occupational safety and health
???	Participation / decision making			
	education / learning			
	community capacity			
cultural and spiritual values	Cultural and spiritual values			
	informal leisure / recreation			
	organised leisure			
	historical reference			
				consumption patterns
				Corporate responsibility
SOCIAL INDICATORS under CONSIDERATION				
	Accessibility of recreation	*Possible participation of SME*		*Human Health protection and lifestyles*
	impact on tourism	*occupational safety and health (serious accidents at work)*		
	recreation / leisure	*Impacts of forest operations to inhabitants and tourists*		
	social inclusion / economic inclusion			
	physical health			
	regional economic development			
	crime / disorder			
	mental well-being			
	identity			
	aesthetics			
PROPOSED ENVIRONMENTAL INDICATORS				
water	water consumption	water consumption	water consumption	
		Water quality	Water quality	water quality
			emissions	
land use / soil	soil condition	Soil compaction		
climate / air	emissions	emissions		emissions
	Deposition of air pollutants			
	Defoliation			
	Forest damage			
energy	energy consumption		energy consumption	energy consumption
	share of renewable energy			share of renewable energy
share of green products		share of consumption of green products	share of consumption of green products	
waste / recycling / recovery			generation of waste	generation of waste
				recycling, recovery and reuse
biodiversity	biodiversity			
	Protected forests			
	Protective forests - soil, water and other ecosystem functions			
	Protective forests - infrastructure and managed natural resources			
	Tree species composition			
	deadwood			
	Landscape pattern			
transport		transport	transport	
products			Product characteristics	
			By- and co-products	
			Re-use / recycling	
				life time of products
ENVIRONMENTAL INDICATORS under CONSIDERATION				
	Genetic resources	*energy consumption*		*Functionality of wood based material products*
	Energy from wood resources	*wildlife and hunting*		*Wood safety and quality (solid wood - long term diseases caused by wood products substances)*
	water quality?	*damage??*		
	generation of waste			

About more or less <u>13 economic, 15 social and 25 environmental indicators</u> (total 43) have been proposed to serve as M2-M5 Module specific indicators. Again the total number of indicators selected for the Modules needs to be discussed and may be reduced to a lower number of 25 – 30 specific indicators. The Module specific indicators will still need more elaboration.

8 REFERENCES

Adams, W. M. (1990). Green development: Environment and sustainability in the third world. London: Routledge.

Agenda 21 (2006). Chapter 40 Information for Decision making. (in: http://earth-watch.unep.net/agenda21/40.ph)

Baker, S., Kousis, M., Richardson, D. Young, S. (1997). Introduction. The Theory and Practice of Sustainable Development in EU perspective. In: Baker et al. The Politics of Sustainable Development: Theory, Policy and Practice within the European Union, London: Routledge, 1-40.

Brundtland-Bericht (1987). Unsere gemeinsame Zukunft. Der Brundtland-Bericht der Welt-kommission für Umwelt und Entwicklung, eds. Von Hauff, V. Greven: Eggenkamp.

Commission for Sustainable Development (2006). Indicators of Sustainable Development. (http://www.un.org/esa/sustdev/natlinfo/indicators/isdms2001/table_4.htm).

Commission of the European Communities (2001). A Sustainable Europe for a Better World: A European Union Strategy for Sustainable Development. Communication from the European Commission, COM (2001) 264 final. (in: http://europa.eu.int/comm/-secretariat_general/impact/docs/com2001_0264en01.pdf).

Commission on Sustainable Development (2001). Indicators of Sustainable Development: Guidelines and Methodologies. (in: http://www.un.org/esa/sustdev/publications/indisd-mg2001.pdf).

Dobson, A. (1996). Environmental sustainabilities: An analysis and a typology. Environmental Politics 5:401–28.

Dryzek, J. S. (1997). The Politics of the Earth. Environmental Discourses. Oxford: Oxford University Press.

EFORWOOD (2005). Description of Work End October, Integrated Project, sixth Framework Programme, Priority 6.3. Globale change and Ecosystems.

European Commission (2005). Communication from Mr. Almunia to the Members of the Commission on Sustainable Development Indicators to monitor the implementation of the EU Sustainable Development Strategy. SEC (2005) 161 final.

European Commission (2005b). Sustainable Development Indicators for the European Union. Luxemburg: Eurostat.

Jungkeit, R., Katz, C., Weber, I., Winterfeld U.v. (2002). Natur-Wissenschaft-Nachhaltigkeit. Die Bedeutung ökologischer Wissenschaften im Nachhaltigkeitsdiskurs sowie deren Zusammenhang mit gesellschaftlichen Natur-und Geschlechtervorstellungen. In: BALZER;I.,WÄCHTER,M.(Hrsg.): sozial-ökologische Forschung. München: ökom. S. 475-494

Keiner, M. (2004). Re-emphasizing sustainable development – the concept of 'evolutionability'. On living chances, equity, and good heritage. Environment, Development and Sustainability 6: 379–392.

Lafferty, W. (1999). The pursuit of sustainable development—concepts, policies, and arenas. International Political Science Review 20:123–28.

Linser, S. (2001). Critical Analysis of the Basics for the Assessment of Sustainable Development by Indicators. Disseration, Univ. Freiburg.

MCPFE (1998). Ministerial Conference on the Protection of Forests in Europe: Recognising the multiple roles of forests. Lisbon June. Ministerial Conference on the Protection of Forests in Europe MCPFE, Vienna.

MCPFE (2003). Background information for improved pan-European indicators for sustainable forest management, Liaison Unit Vienna.

Meadowcraft, J. (2000). Sustainable Development: a New(ish) Idea for a New Century? Political Studies, Vol. 48, 370-387.

Ministerial Conference on the Protection of Forests in Europe (2002). Improved Pan-European Indicators for Sustainable Forest Management. MCPFE Expert Level Meeting 7-8 October 2002, Vienna, Austria.

OECD (1993). OECD Core set of indicators for environmental performance reviews. A synthesis report by the Group on the State of the Environment. Environment Monographs, No 83. Paris.

OECD (2006). Glossary of Statistical Terms (see: http://stats.oecd.org/glossary/)

Ott, W.R. (1978). Environmental indices: theory and practice. Ann Arbor Science, Michigan.

Pinter, L., Hardi, P., Bartelmus, P. (2005). Indicators of Sustainable Development: Proposals for a Way Forward. Discussion Paper prepared under a Consulting Agreement on behalf of the UN Division for Sustainable Development. (in: http://www.un.org/esa/sustdev/natlinfo/indicators/egmIndicators/crp2.pdf)

Porter, G., Brown, J.W. (1991). Global Environmental Politics. Boulder: Westview Press, 2nd edition.

Pülzl, H. (2005). Die Politik des Waldes. Governance der natürlichen Ressourcen bei den Vereinten Nationen. Dissertation, Univ. Wien.

Rametsteiner, E., Pülzl, H. (2006). Background Document for EFORWOOD Stakeholder meeting. Report presented at the Stakeholdermeeting, Abbey Rolduc, Kerkrade (13th September). See http://212.17.41.155/Eforwood/DesktopDefault.aspx?tabindex=0&tabid=1

Rametsteiner, E., Pülzl, H., Puustjärvi, E. (2006). EFORWOOD Sustainability Indicators for the Forestry Wood Chain. WP1.1. internal Draft report. Report presented at the EFORWOOD week, Edinburgh, (8-11th May). http://212.17.41.155/Eforwood/DesktopDefault.aspx?tabindex=0&tabid=1

Schweinle, J., Welling, J., Lindner, M., Trasobares, A. Suominen, T. (2006). EFORWOOD sustainability indicators in ToSIA: Adapting the Lead+ Indicators for the ToSIA prototype and considerations for the data collection. Discussion document. EFORWOOD project.

Segnestam, L. (2002). Indicators of Environment and Sustainable Development. Theories and Practical Experience. Environmental Economic Papers 89, World Bank.

Spangenberg, J., Bonniot, O. (1998). Sustainable indicators – a compass on the road towards sustainability, Wuppertal paper no. 81, Wuppertal.

Stenberg, J. (2001). Bridging gaps—Sustainable Development and local democracy processes. Gothenburg

The World Commission on Environment and Development (1987). Our Common Future. Oxford University Press.

UNECE, FAO, MCPFE (2006). Enquiry on the State of Forests and Sustainable Forest Management in Europe 2007. National data reporting forms on MCPFE indicators for sustainable forest management, United Nations, Geneva.

Valentin, A., Spangenberg, J. (1999). Indicators for sustainable communities. Paper presented at the International workshop 'Assessment methodologies for urban infrastructure', 20 to 21 November, Stockholm.

9 ANNEX 1: REFERENCE SETS RELEVANT TO EFORWOOD

9.1.1 SIA

Economic (11 themes)

	THEME (SIA)	QUESTIONS
Theme 1	**Competitiveness, trade and investment flows**	Does the option have an impact on the **competitive position of EU firms** in comparison with their non-EU rivals? Does it provoke **cross-boarder investment flows** (including relocation of economic activity?) Are the proposed **actions necessary to correct undesirable outcomes of market processes** in European markets?
Theme 2	**Competition in the internal market**	Does the option affect **EU competition policy** and the **functioning of the internal market**? For example, will it lead to a reduction in consumer choice, higher prices due to less competition, the creation of barriers for new suppliers and service providers, the facilitation of anti-competitive behaviour or emergence of monopolies, market segmentation, etc.?
Theme 3	**Operating costs and conduct of business**	Will it impose additional adjustment, compliance or transaction **costs on businesses**? Does the option affect the **cost or availability of essential inputs** (raw materials, machinery, labour, energy, etc.)? Does it affect **access to finance**? Does it impact on the **investment cycle**? Will it **entail the withdrawal of certain products** from the market? Is the **marketing** of products limited or prohibited? Will it entail **stricter regulation** of the conduct of a particular business? Will it directly lead to the **closing down of businesses**? Are some products or **business treated differently from others** in a comparable situation?
Theme 4	**Administrative costs on businesses**	Does the option impose **additional administrative requirements** on businesses or increase administrative complexity? Do the **costs** weigh in relative terms heavily on **SMEs** (Small and Medium Enterprises)?
Theme 5	**Property rights**	Are **property rights affected** (land, movable property, tangible/intangible assets)? Is acquisition, sale or use of property rights limited? Or will there be a complete loss of property?
Theme 6	**Innovation and research**	Does the option stimulate or hinder **research and development**? Does it facilitate the introduction and dissemination of **new production methods, technologies and products**? Does it **affect intellectual property rights** (patents, trademarks, copyright, other know-how rights)? Does it promote or **limit academic or industrial research?** Does it promote greater **resource efficiency**?
Theme 7	**Consumers and households**	Does the option affect **prices** consumer pay? Does it **impact on consumers' ability to benefit** from the internal market? Does it have an **impact on the quality and availability of the goods/services** they buy, and on consumer choice? (cF. in particular non-existing and incomplete markets – see Annex 2) Does it affect consumer **information and protection**? Does it have significant consequences for the **financial situation** of individuals / households, both immediately and in the long run? Does it affect the **economic protection of the family** and of children?
Theme	**Specific regions or**	Does the option have significant effects on certain **sectors**?

8	**sectors**	Will it have a specific impact on certain **regions**, for instance in terms of jobs created or lost? Does it have specific consequences for **SMEs**?
Theme 9	**Third countries and international relations**	Does the option affect **EU trade policy** and its international obligations, including in the WTO? Does it affect EU **foreign policy and EU/EC development policy**? Does the option **affect third countries** with which the EU has preferential trade arrangements? Does the option affect **developing, least developed and middle income countries**?
Theme 10	**Public authorities**	Does the option have **budgetary consequences for public authorities** at different levels of government, both immediately and in the long run? Does the option require significant **establishing new or restructuring existing public authorities**?
Theme 11	**The macroeconomic environment**	What are the overall **consequences** of the option for economic growth and employment? Does it contribute to **improving the conditions for investment** and for the proper functioning of markets? Does the option have direct or indirect **inflationary consequences**?

Environment (12 themes)

	THEME (SIA)	**QUESTIONS**
Theme 1	**Air quality**	Does the option have an effect in emissions of acidifying, eutrophying, photochemical or harmful **air pollutants** that might affect human health, damage crops or buildings or lead to deterioration in the environment (polluted soil or rivers etc.)?
Theme 2	**Water quality and resources**	Doest the option decrease or increase the **quality of quantity of freshwater or groundwater**? Does it raise or lower the quality of **waters in coastal and marine areas** (e.g. through discharges of sewage, nutrients, oil, heavy metals, and other pollutants)? Does it affect **drinking water resources**?
Theme 3	**Soil quality and resources**	Does the option affect the **acidification, contamination or salinity of soil, and soil erosion** rates? Does it lead to a **loss of available soil** (e.g. through building or constructing works) or increase the amount of usable soil (e.g. through land contamination)?
Theme 4	**The climate**	Does the option affect the **emissions** of ozone-depleting substances (CFCs, HCFCs, etc.) and greenhouse gases (e.g. carbon dioxide, methane, etc.) into the atmosphere?
Theme 5	**Renewable and non-renewable resources**	Does the option affect the **use of renewable resources** (freshwater, fist) more quickly than they can regenerate? Does it **reduce or increase use** of non-renewable resources (groundwater, minerals etc.)?
Theme 6	**Biodiversity, flora, fauna and landscapes**	Does the option **reduce the number of species/varieties/races** in any area (i.e. reduce biological diversity) or increase the range of species (e.g. by promoting conservation)? Does it affect **protected or endangered species or their habitats** or ecologically sensitive areas? Does it **split the landscape** into smaller areas or in other ways affect migration routes, ecological corridors or buffer zones? Does the option affect the **scenic value of protected landscape**?
Theme 7	**Land use**	Does the option have the effect on **bringing new areas of land** (greenfields) **into use** for the first time? Does it **affect land designated as sensitive for ecological reasons**? Does it lead to a **change in land use** (for example the divide between rural and urban or change in type of agriculture)?
Theme 8	**Waste production / generation / recycling**	Does the option affect **waste production** (solid, urban, agricultural, industrial, mining, radioactive or toxic waste) or how waste is **treated, disposed of or recycled**?
Theme 9	**The likelihood or scale of**	Does the option affect the likelihood or **prevention** of fire, explosions, breakdowns, accidents and accidental emissions? Does it affect the **risk** of unauthorised or unintentional dissemination of environmentally alien or **genetically modified organisms**?

	environmental risks	Does it increase or decrease the likelihood of **natural disasters**?
Theme 10	**Mobility (transport modes) and the use of energy**	Does the option increase or decrease **consumption of energy** and production of heat? Will it increase or decrease the **demand for transport** (passenger or freight) or influence its modal split? Does it increase or decrease **vehicle emissions**?
Theme 11	**The environmental consequences of firms' activities**	Does the option lead to **changes in natural resource inputs** required per output? Will it lead to production becoming more or less energy intensive? Does the option make environmentally **un/friendly goods and services cheaper** or more expensive through changes in taxation, certification, product, design rules, procurement rules etc.? Does the option **promote or restrict environmentally un/friendly goods and services** through changes in the rules on capital investments, loans, insurance services etc.? Will it lead to businesses becoming **more or less polluting** through changes in the way in which they operate?
Theme 12	**Animal and plant health, food and feed safety**	Does the option have an **impact on health of animals and plants**? Does the option affect **animal welfare** (i.e. humane treatment of animals)? Does the option affect the **safety of food and feed**?

Social (9 themes)

	THEME (SIA)	**QUESTIONS**
Theme 1	**Employment and labour markets**	Does the option facilitate **new job** creation? Does it lead directly to a **loss of jobs**? Does it have specific **negative consequences for particular professions**, groups of workers, or self-employed persons? Does it affect the **demand for labour**? Does it have an impact on the **functioning of the labour market**?
Theme 2	**Standards and rights related to job quality**	Does the option impact on **job quality**? Does the option affect **access to** workers or job-seekers to vocational or continuous **training**? Will it affect workers' **health, safety, and dignity**? Does the option directly or indirectly affect workers' **existing rights and obligations**, in particular as regard information and consultation within their undertaking and protection against dismissal? Does it affect the **protection of young people** at work? Does it directly or indirectly affect **employers' existing rights and obligations**? Does it bring about **minimum employment standards** across the EU? Does the option facilitate or restrict restructuring, adaptation to change and the use of **technological innovations** in the workplace?
Theme 3	**Social inclusion and protection of particular groups**	Does the option affect **access to labour market** or transitions into/out of the labour market? Does it lead directly or indirectly to greater **in/equality**? Does it affect equal **access to services and goods**? Does it affect **access** to placement services or to services of general economic interest? Does the option make the **public better informed** about a particular issue? Does the option **affect specific groups** of individuals, firms, localities, the most vulnerable, the most at risk to poverty, more than others?

		Does the option significantly **affect third country nationals**, children, women, disabled people, the unemployed, the elderly, political parties or civic organisations, churches, religious and non-confessional organisations, or ethnic, linguistic and religious minorities, asylum seekers?
Theme 4	**Equality of treatment and opportunities, non-discrimination**	Does the option affect **equal treatment** and equal opportunities for all? Does the option affect **gender equality**? Does the option entail any **different treatment of groups** or individuals directly on grounds of e.g. gender, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation? Or could it lead to indirect discrimination?
Theme 5	**Private and family life, personal data**	Does the option affect the **privacy of individuals** (including their home and communications) or their right to move freely within the EU? Does it **affect family life** or the legal, economic or social protection of the family? Does the option involve the **processing of personal data** or the concerned individual's right of access to personal data?
Theme 6	**Governance, participation, good administration, access to justice, media and ethics**	Does the option affect the **involvement of stakeholders** in issues of governance as provided for in the Treaty and the new governance approach? Are all actors and **stakeholders treated on an equal footing**, with due respect for their diversity? Does the option impact on cultural and linguistic diversity? Does it affect the **autonomy of the social partners** in the areas for which they are competent? Does it, for example, affect the right for collective bargaining at any level or the right tot take collective action? Does the implementation of the proposed measures affect **public institutions** and administrations, for example in regard to their responsibilities? Will the option **affect the individual's rights** and relations with the public administration? Does it affect the individual's **access to justice**? Does the option make the **public better informed** about a particular issue? Does it affect the public's access to information? Does the option affect the **media**, media pluralism and freedom of expression? Does the option raise (**bio)ethical issues** (cloning, use of human body or its parts for financial gain, genetic research/ testing, use of genetic information)?
Theme 7	**Public health and safety**	Does the option affect the **health and safety** of individuals /populations, including life expectancy, mortality and morbidity, through impacts on he socio-economic environment (e.g. working environment, income, education, occupation, nutrition)? Does the option increase or decrease the likelihood of **bioterrorism**? Does the option increase or decrease the likelihood of **health risks** due to substances harmful to the natural environment? Does it affect **health due to changes in the amount of noise or air, water or soil quality** in populated areas? Will it affect health due to changes of **energy use and/or waste disposal**? Does the option affect **lifestyle-related determinants** of health such as use of tobacco, alcohol, or physical activity? Are there specific effects on **particular risk groups** (determined by age, gender, disability, social group, mobility, region, etc.)?
Theme 8	**Crime terrorism and security**	Does the option improve or hinder **security, crime or terrorism**? Does the option affect the **criminal's** chance or detection or his/her potential gain from the crime? Is the option likely to increase the **number of criminal acts**? Does it affect **law enforcement capacity**? Will it have an impact on the balance between **security interests** and the **rights of suspects**? Does it affect the **rights of victims** of crime and witnesses?

Theme 9	**Access to and effects on social protection, health and educational systems**	Does the option have an **impact on services** in terms of their quality and access to them? Does it have an effect on the **education and mobility of workers** (health, education, etc.)? Does the option affect the **access of individuals** to public/private education or vocational and continuing training? Does it affect the **cross-border provision** of services, referrals across borders and co-operation in border regions? Does the option affect the **financing / organisation /access** to social, heath and education systems (including vocational training)? Does it affect **universities and academic freedom** / self-goverance?

9.1.2 SDI (Eurostat)

Theme 1: Economic Development

Sub-Themes	Level II	Level III
Investment	1. Investment as a % of GDP, by institutional sector	1. Real GDP Growth Rate
		2. GDP per Capita in Purchasing Power Standards
		3. Regional Breakdown of GDP per capita
		4. Total consumption expenditure as % of GDP
		5. Net national income as a % of GDP
		6. Inflation rate
		7. Net saving as % of GDP, by institutional sector
Competitiveness	2. Labour productivity per hour worked 3. international price competitiveness (real effective exchange rate)	8.Unit Labour costs growth, for total and industry
		9. life-long learning
		10. Turnover from innovation as a % of total turnover, by economic sector
		11. total R&D expenditure as a % of GDP
		12. Public expenditure on education as a % of GDP
Employment	4. Total employment rate	13. Total employment growth
		14. Total employment rate, by gender and by highest level of education attained
		15. total unemployment rate, by gender, by age group, and by highest level of education attained
		16. Regional breakdown of employment rate

Theme 2: Poverty and Social Exclusions

Sub-Themes	**Level II**	**Level III**
Monetary poverty	1.At-risk-of-poverty rate	1. At-risk-of-poverty rate, by gender, by age group, by highest level of education attained, and by household type
		2. Relative at-risk-of-poverty-gap
		3. Inequality of income distribution

		4. Poverty mobility (i.e.probabiltiy to enter or exit poverty
Access to labour market	2. Total long-term unemployment rate	5. Gender pay gap in adjusted form
		6. very long unemployment rate
		7. People living in jobless households, by age group
		8. at-risk-poverty rate after social transfer by most frequent activity
Other aspects of social exclusion	3. Early school leavers	9. Persons with low educational attainment, by age group
		10. Adequacy of housing conditions

Theme 3: Ageing society

Sub-Themes	**Level II**	**Level III**
Pensions adequacy	1. Projected theoretical replacement ratio (ration between income and after and prior to retirement	1. at-risk-poverty rate for persons aged 65 years and over
	1.a. Ratio of median household equivalised income of persons aged 65+ to median household equivalised income of persons aged <65	
Demographic changes	2. Life expectancy at age 65 by gender	2. Total fertility rate
		3. Net inwards migration, by main age groups
Public finance sustainability	3. General government consolidated gross debt as % of GDP	4. current *and projected public (and private)* pensions expenditure as % of GDP
		5. Total employment rate by age group
		6. Average exit age from the labour market
		7. Current *and projected* public expenditure on care of the elderly as % of GDP

Theme 4: Public Health

Sub-Themes	**Level II**	**Level III**
Human health protection and life styles	1. Percentage of overweight people *by age group*	1. Healthy life years at age 65 by gender
		2. Health care expenditure as % of GDP
	2. Resistance to antibiotics	3. Cancer incidence rate, by gender and by type
		4. Suicide death rate, by gender and by age group
		5. Percentage of present smokers, by gender and by age group
		6. Work with high level of job strain/stress
		7. Serious accidents at work
Food safety and quality	*3. Deaths due to infections food-borne diseases*	*8.Dioxins and PCBs in food and feed*
	3.a. Salmonellosis incidence rate in human beings	*9. Heavy metals and mercury in particular, in fish and shellfish*
		10. Pesticides residues in food
Chemicals management	*4. Index of apparent consumption of chemicals, by toxity class*	
	4.a. index of production of chemicals, by toxity class	

Health risks due to environment conditions	*5. Population exposure to air pollution by particular matter*	*11. Population exposure to air pollution by ozone*
		12. Proportion of population living in households considering that they suffer from noise and from pollution
		13. Monetary damage of air pollution ad % of GDP

Theme 5 Climate Change and Energy

Sub-Themes	Level II	Level III
Climate Change	1. GHG emissions by sector	1. CO2 intensity of energy consumption
		2. CO2 removed by sinks
Energy	2. Energy intensity of the economy 3. Final energy consumption by sector 4. Gross electricity generation by fuel used in power stations	3. share of renewable energy, by source
		4. Combined heat and power generation as % of gross electricity generation
		5. Energy intensity of manufacturing industry
		6. Consumption of biofuels, as a % of total fuel consumption in transport
		7. External costs of energy use
		8. Energy tax revenue at constant prices and energy consumption
		9. high level radioactive waste and spent nuclear fuel awaiting permanent disposal

Theme 6: Production and Consumption patterns

Sub-Themes	Level II	Level III
Eco-Efficiency	1. Emissions of acidifying substances and ozone precursors and GDP at constant prices, by source sector *2. Generation of waste by all economic activities and by households* 2.a. Municipal waste collected per capita	1. Components of Domestic Material Consumption
		2. Domestic Material Consumption, by material
		3. Municipal waste treatment, by type of treatment method
		4. Generation of hazardous waste, by economic activity
Consumption patterns	3. Electricity consumption per dwelling for lighting and domestic appliances *4. Green procurement*	5. Household number and size
		6. Meat consumption per capita
		7. Share of consumption of products with an EU or national eco-label
Agriculture	5. Share of area under EU agri-environmental support in total utilised agricultural area 6. Livestock density index	8. Nitrogen surplus
		9. Share of area occupied by organic farming in total utilised agricultural area
		10. Use of selected pesticides
Corporate responsibility	*7. Share of industrial production from enterprises with a formal sustainable management system* 7.a. Enterprises with an environmental management system (EMS)	*11. Ethical financing*
		12. Eco-label awards, by country and by product *gr*oup

Theme 7: Management of natural resources

Sub-Themes	Level II	Level III
Biodiversity	*1. Sufficiency of member states proposals for protected sites under the EU Habitats directive*	*1. Change in status of threatened and/or protected species*
Marine Ecosystems	*2. Trends in spawning biomass of selected fish stocks*	*2.Effective fishing capacity and quotas, by specific fisheries*
		2.a. Size of fishing fleet
		3. Structural support to fisheries and % allocated to promote env. friendly fishing practices
Fresh Water Resources	3. Ground water abstraction as % of available groundwater resources	4. Population connected to wastewater treatment systems
		5. Emissions of organic matter as biochemical oxygen demand to rivers
		6. Index of toxic chemical risk to aquatic environment
Land use	*4. Land use change, by category* 4a. built-up area as a % of total land area *5. Exceedance of critical loads of acidifying substances and nitrogen in sensitive natural areas*	*7. Percentage of total land area at risk of soil erosion*
		8. Percentage of total land area at risk at soil contamination
		9. Percentage of forest trees damaged by defoliation
		10. Fragmentation of habitats due to transport

Theme 8: Transport

Sub-Themes	Level II	Level III
Transport Growth	1. Car share of inland passenger transport 2. Road share of inland freight transport	1. Modal split of passenger transport
		2. Modal split of freight transport
		3. Volume of freight transport and GDP at constant prices
		4. Energy consumption by transport mode
		5. Access to public transport
Transport Prices	*3. External costs of transport activities*	6. Fright transport prices by mode
		7. Investment in transport infrastructure by mode
Social and environmental impact of transport	4. Emissions of air pollutants (particular matter and ozone precursors) from transport activities 5. Greenhouse gas emissions by transport activities, by mode	8. People killed in road accidents, by age group
		9. Emissions of NOx from road vehicles (petrol and diesel)

Theme 9: Good Governance

Sub-Themes	Level II	Level III
Policy Coherence	*1. Proportion of environmentally harmful subsidies* 2. Number of infringement cases brought in front of the Court of Justice, by policy area *3. Administrative cost imposed by legislation*	*1. Share of major proposals in the Commission's Legal and Work Programme for which an impact assessment has been undertaken* 2. Transposition of Community law, by policy area

Public Participation	4. Voter turnout in national parliamentary elections *5. Responses to EC Internet public consultations*	3. Voter turnout in EU parliamentary elections, by gender, by age group and by highest level of education attained
		4. E-government on-line availability
		5. E-government usage by individuals

Theme 10: Global Partnership

Sub-Themes	**Level II**	**Level III**
Globalisation of Trade	1. EU imports from developing countries (total and agricultural products) and agricultural budgetary support 2. Sales of selected fair-trade labelled products	1. Total EU imports from developing countries, by income group
		2. Total EU imports from developing countries, by group of products
Financing for SD	3. Bilateral ODA by category	3. Total EU financing for development, by type
		4. ODA and FDI to developing countries, by income group and geographical area
		5. Share of united ODA in total bilateral ODA commitments
		6. ODA per capita, in EU donors and in recipient countries
Resource management	4. EU imports of materials from developing countries, by group of products	*7. Contribution of the Clean Development Mechanism (CDM) to GHG emission reductions in developing countries*
		7.a. CO^2 emissions per capita in the EU and in developing countries

9.1.3 CSD

CSD: SOCIAL DIMENSION		
Theme	**Sub-theme**	**Indicator**
Equity	Poverty	Percent of Population Living below Poverty Line
		Gini Index of Income Inequality
		Unemployment Rate
	Gender Equality	Ratio of Average Female Wage to Male Wage
Health	Nutritional Status	Nutritional Status of Children
	Mortality	Mortality Rate Under 5 Years Old
		Life Expectancy at Birth
	Sanitation	Percent of Population with Adequate Sewage Disposal Facilities
	Drinking Water	Population with Access to Safe Drinking Water
	Healthcare Delivery	Percent of Population with Access to Primary Health Care Facilities
		Immunization Against Infectious Childhood Diseases
		Contraceptive Prevalence Rate
Education	Education Level	Children Reaching Grade 5 of Primary Education
		Adult Secondary Education Achievement Level
	Literacy	Adult Literacy Rate
Housing	Living Conditions	Floor Area per Person
Security	Crime	Number of Recorded Crimes per 100,000 Population
Population	Population Change	Population Growth Rate
		Population of Urban Formal and Informal Settlements

Only the forth indicator '*ratio of average female wage to male wage"* seems feasible for selection for the EFORWOOD project. For some themes such as 'education' relevant indicators for the EFORWOOD project may be developed.

CSD: ENVIRONMENTAL DIMENSION		
Theme	**Sub-theme**	**Indicator**
Atmosphere	Climate change	Emissions of greenhouse gases
	Ozone Layer Depletion	Consumption of Ozone Depleting Substances
	Air quality	Ambient Concentration of Air Pollutants in Urban Areas
Land	Agriculture	Arable and Permanent Crop Land Area
		Use of Fertilizers
		Use of Agricultural Pesticides
	Forests	Forest Area as a Percent of Land Area
		Wood Harvesting intensity
	Desertification, Urbanisation	Land affected by Desertification
		Area of Urban Formal and Informal Settlements
Oceans, Seas and Coasts	Coastal Zone	Algae Concentration in Coastal Waters
		Percent of Total Population living in Coastal Areas
	Fisheries	Annual Catch of Major Species
Fresh Water	Water Quantity	Annual Withdraw of Ground and Surface
		Water as a Percent of Total Available Water
	Water Quality	BOD in Water Bodies
		Concentration of Faecal Coliform in Freshwater
Biodiversity	Ecosystem	Area of Selected Key Ecosystems
		Protected Area as a % of total Area
	Species	Abundance of Selected Key Species

CSD: Economic DIMENSION		
Theme	**Sub-theme**	**Indicator**
Economic Structure	Economic Performance	GPD per Capita
		Investment Share in GDP
		Balance of Trade in Goods and Services

	Financial Status	Dept to GNP Ratio
		Total ODA Given or Received as a Percent of GNP
Consumption and Production patterns	Material consumption	Intensity of Material Use
	Energy use	Annual Energy Consumption per capita
		Share of Consumption of Renewable Energy Resources
		Intensity of Energy use
	Waste Generation and Management	Generation of Industrial and Municipal Solid Waste
		Generation of Hazardous Waste
		Management of Radioactive Waste
		Waste Recycling and Reuse
	Transportation	Distance Travelled per Capita by Mode of Transport

The indicator framework of the Commission on Sustainable Development (CSD) includes a further dimension in its framework, namely an institutional dimension that addresses the institutional framework as well as the institutional capacity for the implementation of sustainable development. Therein it asks e.g. for information access, the communication infrastructure, expenditure on research and disaster preparedness and response.

CSD: Institutional DIMENSION		
	Sub-theme	**Indicator**
Institutional Framework	Strategic implementation of SD	National Sustainable Development Strategy
	International Cooperation	Implementation of Ratified Global Agreements
	Information Access	Number of Internet Subscribers per 1000 Inhabitants
Institutional capacity	Communication Infrastructure	Main Telephone Lines per 1000 Inhabitants
	Science and Technology	Expenditure on Research and Development as a Percent of GDP
	Disaster Preparedness and Response	Economic and Human Loss Due to Natural Disasters

9.1.4 MCPFE

C1: maintenance and appropriate enhancement of forest resources and their contribution to global carbon cycles	1.1. Forest area 1.2. growing stock 1.3. Age structure and/or diameter distribution 1.4. carbon stock
C2: maintenance of forest ecosystem health and vitality	2.1. desposition of air pollutants 2.2. soil condition 2.3. defoiliation 2.4. forest damage
C 3: maintenance and encouragement of productive functions of forests	3.1. increment and fellings 3.2. roundwood 3.3. non-wood goods 3.4. services 3.5. forest under management plans
C4: maintenance, conservation and enhancement of biological diversity in forest ecosystem	4.1. tree species composition 4.2. regeneration 4.3. naturalness 4.4. introduced tree species 4.5. deadwood 4.6. genetic resources 4.7. landscape pattern 4.8. threatened forest species 4.9. protected forests
C5: maintenance and enhancement of protective functions in forest management (soil and water)	5.1. protective forests – soil, water, and other ecosystem functions 5.2. protective forests – infrastructure and managed natural resources
C6: maintenance of other socio-economic functions and conditions	6.1. forest holdings 6.2. contribution of forest sector to GDP 6.3. net revenue 6.4. expenditures for services 6.5. forest sector workforce 6.6. occupational safety and health 6.7. wood consumption 6.8. trade in wood 6.9. energy from wood resources 6.10. accessibility for recreation 6.11 cultural and spiritual values

EFORWOOD

Sustainability Impact Assessment of the Forestry - Wood Chain

Project no. 518128

EFORWOOD

Tools for Sustainability Impact Assessment

Instrument: IP

Thematic Priority: 6.3 Global Change and Ecosystems

ANNEX: FWC Indicator *draft* Set 4

Due date of deliverable: 31 October 2006

Actual submission date: 20 October 2006

Start date of project: 011105

Duration: 4 years

Organisation name of lead contractor for this deliverable:

University of Natural Resources and Applied Life Sciences, Vienna (BOKU)

Revision [draft 1]

Project co-funded by the European Commission within the Sixth Framework Programme		
Dissemination Level		
PU	Public	PP
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

<u>Annex to</u> D1.1.1 Draft FWC indicator set: Detailed review of existing SI concepts and SI indicator sets of relevance for the FWC, review of potential indicators for selection and their assessment

AUTHORS:

EWALD RAMETSTEINER
Institute of Forest, Environmental and Natural Resource Policy, Austria
University of Natural Resources and Applied Life Sciences, Vienna – BOKU

HELGA PÜLZL
Institute of Forest, Environmental and Natural Resource Policy, Austria
University of Natural Resources and Applied Life Sciences, Vienna – BOKU

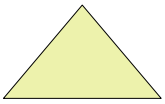
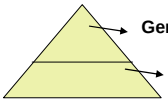
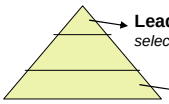
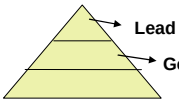
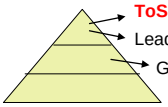
ESA, PUUSTJÄRVI
Savcor Indufor Oy, Finland

CONTENT

1 Introduction to the EFORWOOD Indicator Draft Set 4

The draft Set 4 of EFORWOOD Sustainability Indicator for the Forestry Wood chain (Set of EFORWOOD SI FWC) has been developed following an iterative process that is being outlined below. All draft indicator sets were mainly based on contributions and comments of the modules M2, M3, M4 and M5. In addition members of module M1 commented on the indicator sets. In December 2005 / January 2006 all modules (M2-M5) of the EFORWOOD consortium were requested to provide a list of indicators as their first input to the work of Work package (WP) 1.1 of Module 1. The first draft set of EFORWOOD SI FWC (*draft* Set 1) was sent out in the beginning of February 2006 and the second draft set of EOFRWOOD SI FWC (*draft* Set 2) was sent out in the end of March 2006, while the third draft set of EFORWOOD SI FWC (*draft* Set 3) was made available in Mid July. In Mid May a Draft Lead+ Indicator Set was made available as well (see TABLE 1).

TABLE 1. General approach to the development of the EFORWOOD indicator set

	Draft Set 1 (Feb 2006)
 **General Forestry Wood Chain Indicators** **Module specific indicators**	Draft Set 2 (March 2006)
 **Lead + indicators** (contained lead indicators and *selected* general FWC indicators) *Module specific indicators (have not been included)*	Draft 'Lead + Indicator' Set (May 2006)
 **Lead + indicators** **General Forestry Wood Chain Indicators** *Module specific indicators (have not been included)*	Draft Set 3 (July 2006)
 **ToSIA indicators** Lead + indicators General Forestry Wood Chain Indicators *Module specific indicators (have not been included)*	Draft Set 4 (October 2006)

The present **fourth draft set of EFORWOOD SI FWC *(*draft Set 4)** has been developed on the basis of all comments received: besides including the comments from EFORWOOD experts (received in the beginning of September) of modules M1, M2, M3, M4, M5 a number of comments have been received during the Stakeholder meeting in Kerkrade and have been integrated in this new fourth set.

The draft Set 4 (Mid October 2006) is based on the following principles:

1. The further refinement of the Draft Set 3 according to comments received (including those from the Stakeholder meeting) remains at the centre of interest.
2. A distinction between indicators relevant to a multiple user group and indicators relevant to the ToSIA application[1] has been made. Not all selected indicators have been found relevant for the first ToSIA application within the EFORWOOD project.

[1] A separate report prepared by WP1.4 in accordance with WP1.1 refers to 'Lead indicators' for which data are being currently collected. Not all indicators have been found relevant for the ToSIA application, e.g. for indicator "trade balance" no data are being collected.

3. The development of the draft Set 4 was again based on the idea of the three dimensions of sustainability and the request for data availability when selecting the sub-classes of the individual indicators.
4. Some of the "proposed indicators" have been moved according to the comments received to the section "indicators under consideration"; some new indicators have been proposed and included to the list of "indicators under consideration".
5. Definitions used were further updated (see also separate definitions document)

Upcoming STEP – your input is needed:

Again your contribution is needed for the further refinement of the draft set 4.

1) Proposed indicators (1-25):

The table (TABLE 2) below explains the structure followed when describing the individual indicators in the text.

It has been distinguished between indicators that are relevant for a multiple user group (General FWC sustainability indicators – frame & font green shaded) and indicators relevant for the first ToSIA application (EFORWOOD ToSIA – frame & font red shaded). For the EFORWOOD ToSIA indicators data collection has already started.

TABLE 2: Structure of indicator presentation (Indicator 1-25)

Full name of indicator (including subclasses):	Full name of the indicator does not necessarily equal the indicator short name, but gives more details *In some cases the full names has be updated*
General FWC sustainability indicator subclasses:	contains parameters for which data need to be collected for the total FWC and for sub-sectors; sub-sectors are defined according to the Classification of Economic Activities in the European Community (NACE).
Measurement units:	are given e.g. in tonnes, m^3, Euro, tonnes of carbon, km etc.); more measurement units might be named as indicators include subclasses related to different measurement units reference unit needs to be defined (t.b.d.)
Potential future data provider (international):	Potential future international data provider are listed
Potential future data provider (national):	Potential future national data provider are listed
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	Proposed ToSIA version on that has been provided by WP1.4. in September
Proposed ToSIA version 2:	Please note: original text provided by WP1.4. in September has been modified because of consistency reasons with set above October 2006
Measurement units:	Measurement units defined for ToSIA may not equal the measurement units of General FWC sustainability indicators defined above; However the reference unit (e.g. year) needs to be defined (t.b.d).
Data provider (regional - case studies):	Data collection is done for processes that have been defined within each Module (M2-M5); a provisional list of processes can be found in the annex of the present report
Comments:	Some additional comments for the data collection have been

	provided for some indicators
Comments by EFORWOOD experts to Indicator draft Set3	find here the comments of EFORWOOD experts from the modules
Comments by Stakeholders to Indicator draft Set3	find here the comments of the stakeholders (Stakeholder meeting)

2. Indicators under consideration:

Some of the proposed indicators have been moved to the indicators under consideration; we would like to get your views; Please vote on their inclusion or exclusion and comment (see table below).

Modules	include	exclude	Comments
M2			
M3			
M4			
M5			

3. Newly proposed indicators:

Some indicators have been newly proposed e.g. at the 1st Stakeholder meeting held in Kerkrade 2006. Please vote on the inclusion of indicators under consideration & provide comments (Table above is provided for the newly proposed indicators)

Please provide your comments until the **6th November 2006.**

Up-coming steps:

(1) The inclusion of your comments received until 7th of November in a new draft (draft 5)

(2) **final decision on the draft EFORWOOD set** will be taken by the **IP Board** in November 2006 in Lisbon.

(3) The **'module specific indicators' are being delivered at a later stage.**

2 Economic EFORWOOD indicators

2.1 Economic Lead + indicators

(1) Gross value added and gross domestic product

Full name of indicator (including subclasses):	Gross value added (GVA) at factor cost and Gross Domestic Product (GDP) contribution
General FWC sustainability indicator subclasses:	1.1. Gross value added at factor cost for: a) total FWC b) by sub-sector 1.2.Gross domestic product a) total FWC b) by sub-sector
Measurement units:	1.1.a + 1.1.b) in Euro (million) per reference unit (t.b.d.) 1.2.a + 1.2.b) in % of total per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat, UN World Bank
Potential future data provider (national):	National Statistics Office
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: *Proposed version 1: September 2006*	*LI1 Gross Value Added*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above October 2006:	1.1. Gross value added (at factor cost) by processes within each Module (M2-M5) **(LI1)**
Measurement units:	1.1.) in Euro (million) per reference unit (t.b.d)
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Comments:	The sub-class 'gross domestic product' is left out for the test chains; it is more suitable for application in case studies and in the European FWC
Comments by EFORWOOD experts to Indicator draft Set3	WP 1.4. Definition of gross domestic product? Does it mean the share of the domestic production? *WP 1.1. can be in € or share of regional production, as appropriate (or be deleted for ToSIA application) not all definitions have been included in the document.* WP 1.4. Is it possible to collect data on this by processes? *WP 1.1. could be if deemed important. It is not necessary to decide this now unilaterally from WP1.1, but after 3 more years there should be a collective understanding what is relevant and feasible* M3: definition of "Manufacturing sector" *(WP1.1. see NACE definitions in the annex of the document)* M3: is the following included: wood price (stumpage/mill gate), revenue, tax, value added (totals + per unit) i.e. difference between selling price of a product and cost of externally purchased materials and services (comp. "(3) Trade balance") *(WP1.1.still open;*

	dependent on indicator 9 revenue) M4: data availability on process level is poor M5: Limit to GVA. (GDP is a measure on societal level) Measure in Euro per process and functional unit (aggregation, percentage distribution, GDP impact etc could (hopefully) be calculated by Tosia). *WP.1.1 indicator limited for ToSIA application)*
Comments by Stakeholders to Indicator draft Set3	No specific comment

Key definitions:

Value added at factor cost: It can be calculated from turnover, plus capitalised production, plus other operating income, plus or minus the changes in stocks, minus the purchases of goods and services, minus other taxes on products which are linked to turnover but not deductible, minus the duties and taxes linked to production (OECD definition)

Gross value added (GVA) is defined as the value of all newly generated goods and services less the value of all goods and services consumed as intermediate consumption. The depreciation of fixed assets is not taken into account. Gross value added is compiled according to the industry that created it. (Eurostat definition)

(2) Production costs

Full name of indicator (including subclasses):	Cost of inputs of raw material, labour, energy, corporate tax, capital charge and transport costs
General FWC sustainability indicator subclasses:	2.1. Average cost in total FWC and by sub-sector for: a) raw material (classification of raw materials see annex) b) labour c) energy d) corporate tax e) capital charge f) transport
Measurement units:	2.1.a – 2.1.c & 2.1.e – 2.1.f) in Euro (million) per reference unit (t.b.d.) 2.1.d) % of turnover per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat
Potential future data provider (national):	National Statistics Office
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: *Proposed version 1: September 2006*	*LI2a Production cost of process inputs from the FWC [i.e. woody raw material of preceding FWC processes]* *LI 2b other production costs*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above October 2006:	2.1. Average cost by processes within each Module (M2-M5) classified by: a) raw materials from FWC [production cost of process inputs from the FWC i.e. Wood raw material preceding FWC processes] **(LI 2a)** b) other production costs [comprises of labour, energy corporate tax, capital charge and transport costs) **(LI2b)**
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Measurement units:	2.1.a – 2.1.b) in Euro (million) per reference unit (t.b.d)
Comments:	
Comments by EFORWOOD experts to Indicator draft Set3	WP 1.4. Better to use "Production costs" instead of "Production and transport costs; *(WP 1.1. indicator name has been changed)* WP 1.4. Only total cost is needed for TOSIA; With total costs we meant "all" costs aggregated, without subclasses. We need to ask for production costs specifically for input material from preceding process(es) which then need to be deducted from the overall costs. (*WP 1.1. included)* WP1.4.: Clarify the difference between "value" added and "cost". Is it profit for the person conducting the process? (*WP 1.1. added value= value of newly generated goods and services minus those consumed ones ; costs = Euro paid for products & services)* M3: concerning labour: "Only direct costs" doesn't tell the whole story. Indirect costs should be included, and that is what the

	employer actually pays. If there are different standards with respect o insurances and retirement funds so be it. *(WP1.1. still open)* M3 ad capital charge: Can we agree on amortization length and interest? Is "capital charge identical with amortisation? *(WP1.1. they are not identical)* M3: Type of energy seems more appropriate: it can mean basic sources (oil, coal, fuel) which are consumed in the industry or already converted energy (electricity, steam, …) which are directly used; (WP1.1. we do not distinguish anymore between types of energy) M4: b) labour – prices are publicly available, costs not c) energy – prices are publicly available, costs not d) corporate tax – not available e) capital charge – not available f) transport – A model should be used here, not "data points" *(WP1.1.needs to be standardised across modules e.g. in the training session, e.g. input prices could be used)* M5: limit to e.g. goods & services, labour and energy class. Maybe corporate tax (and capital charge) could be checked centrally on national level. *(WP1.1.* we limited categories for ToSIA application)
Comments by Stakeholders to Indicator draft Set3	No specific comment

Key definitions:

Corporate tax refers to a direct tax levied by various jurisdictions on the profits made by companies or associations.

Capital charge is the required, or minimum, rate of return necessary to compensate all the firm's investors, debt holders as well as shareholders, for the risk of the investment (OECD Definition)

Turnover comprises the totals invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied to third parties. Turnover includes all duties and taxes on the goods or services invoiced by the unit with the exception of the VAT invoiced by the unit vis-à-vis its customer and other similar deductible taxes directly linked to turnover. It also includes all other charges (transport, packaging, etc.) passed on to the customer, even if these charges are listed separately in the invoice. Reduction in prices, rebates and discounts as well as the value of returned packing must be deducted. Income classified as other operating income, financial income and extra-ordinary income in company accounts is excluded from turnover. Operating subsidies received from public authorities or the institutions of the European Union are also excluded. (Eurostat definition)

(3) Trade balance

Full name of indicator (including subclasses):	Imports and exports of wood and products derived from wood
General FWC sustainability indicator subclasses:	3.1. Imports of wood and products derived from wood in total FWC and by sub-sector classified by: a) volume b) value c) % of total volume consumed 3.2. Exports of wood and products derived from wood in total FWC and by sub-sector classified by: a) volume b) value c) % of total volume produced
Measurement units:	3.1.a and 3.2.a) ktonnes, kg, m³, etc. (depends on product unit) per reference unit (t.b.d.) 3.1.b and 3.2.b) Euro (million) (aggregated) per reference unit (t.b.d.) 3.1.c and 3.2.c) % of total volume consumed per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat UNECE/FAO
Potential future data provider (national):	National Statistics Office
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: ***Proposed version 1: September 2006***	*NOT INCLUDED*
Comments:	Trade balance cannot be analysed for Test Chains by the prototype ToSIA and will thus be excluded from data collection at this stage; Indicator will be included in ToSIA applications for regional and European FWCs.
Comments by EFORWOOD experts to Indicator draft Set3	WP 1.4.: Trade balance will need some more thought how to best incorporate into ToSIA. This is outside of the system boundaries of the analysed FWCs and thus differs somewhat from other indicators. But we acknowledge the importance of this indicator. We probably need to define for which processes we need to collect the trade data. Obviously, this indicator cannot be linked to every process. For example, there is no trade for any M2 process. This is mainly relevant for M4 and M5. (For M3 it is relevant if roundwood is exported from the EU. It could also be considered to include transport of imported wood from the border, although drawing the system boundary at the mill gate (M4) would be much simpler). Not relevant for Test Chains. (*WP 1.1.: Similar to GDP – if regional / territorial dimension is ever a topic; even in chains, imported wood /products can be important as these may be used for the production of e.g. the chairs only in the regional case studies we have the coverage of all major flows. In a Test Chain, we only study one sub-set of e.g. the Scots pine FWC in Northern Sweden. Inputs from outside the chain are not considered and other output products are not included either.)*

	Not easy to implement by processes, usually it is provided at the country level. Implementation by processes needs some more discussion. (*WP 1.1.: yes, calculate / base on expert judgment the values for processes (as for other indicators)?)* Probably it can only be implemented to selected processes of the chain. (*WP 1.1.: we agree)* M3: It seems to be difficult / impossible to link the Indicator "Trade balance" to M3-processes; it makes only sense on an aggregated (national) marco-economic level. (WP1.1. has currently not been included in ToSIA data collection) M5: Define intra/ extra EU. Not very relevant for test chains *(WP1.1. to be done)*
Comments by Stakeholders to Indicator draft Set3	No specific comment

The term "**product**" is used to cover both goods and services. (Oslo Manual, 3rd edition, OECD/ Eurostat 2005, p.32)

(4) Resource / material use

Full name of indicator (including subclasses):	Use of resources (including wood, recovered material, other, material)
General FWC sustainability indicator subclasses:	4.1. use of wood (see annex) in total FWC and by sub-sector classified by volume 4.2. use of recovered wood-based material in total FWC and by sub-sector classified by volume 4.3. use of other materials in total FWC and by sub-sector classified by volume (e.g. chemicals, non-wood forest products, etc.)
Measurement units (depending on the kind of raw materials):	4.1, 4.2, 4.3) ktonnes, m³, kg, etc. (depends on the unit) per reference unit (t.b.d.)
Potential future provider (international):	Eurostat (JQ annual data) UNECE / FAO CEPI
Potential future data provider (national):	National Statistics Office (?)
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	*LI4a Resources and material use (wood material from preceding FWC processes)* *LI4b Resources and material use (material from outside of the FWC)* *LI4c Resources and material use (recovered material)*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above October 2006:	4.1.) volume of wood material from preceding FWC processes (within the chain) **(LI 4a)** 4.2.) volume of recovered raw material **(LI 4c)** 4.3.) volume of material for outside of the FWC (not from within the chain) **(LI 4b)**
Measurement units:	4.1– 4.3) ktonnes, m³, kg, etc. (depends on the unit) per reference unit (t.b.d.)
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Comments:	No data will be collected for the 'value' of raw materials;
Comments by EFORWOOD experts to Indicator draft Set3	WP 1.4.:"b" category in "indicator subclasses" and "measurement units" might be interacting with indicators 1 and 2 (considering input materials). We should prevent double counting. *WP1.1.: true, b) value of resources and material use (includes recovered raw material) might be interacting with Indicator 1 and 2, but values are used for other purposes; it might be necessary to 'link' the data collection for those indicators* WP 1.5.: On the (4) Resource Uses, I tend to agree with M5 which points out that cost (value) of raw material is already and correctly so, included under the Production costs. This leaves the 'volume or amount' as the primary additional value. Which makes it look more like an Environmental indicator? *(WP1.1. we deleted value, but leave in the economic section)* M3: we think volume is appropriate for M3; quantity can be calculated fairly precise, value has to be estimated (standard or average market prices) *(WP1.1. included)* M4: What is the difference of indicator 2 a) and 4? Volume * value =

	cost *(WP1.1. we deleted value)* M5: Material type other (7) needs specification. Hard to get data. Further response will follow after data gathering process *(WP1.1. unclear comment)*
Comments by Stakeholders to Indicator draft Set3	CEPI: energy to be clearly mentioned (WP1.1. we have a separate energy indicator) FACE: not only value products (non-timber) but also services (recreational etc.) *(WP1.1. comment refers to Indicator 8 and has been included there)* CEPF: add services *(WP1.1. comment refers to Indicator 8 and has been included there)* MCPFE: information on growing stock, increment, removals to be added *(WP1.1. comment refers to indicator 19 –forest area and has to be included there)*
Request from WP1.1. to modules	Resources need to be categorised: each module (M2-M5) is kindly ask to provide input for their part of the chain

2.2 General Whole Chain Economic indicators

(5) Enterprise structure

Full name of indicator:	Number of enterprises and forest holdings classified by size classes including ownership of forest and other wooded land
General FWC sustainability indicator subclasses:	5.1. enterprises and forest holdings in total FWC and by sub-sector classified by: a) size classes i. enterprises: micro and small enterprise (0-49 employees), small and medium sized (50-249 employees), large enterprises (>250 employees) ii. forest holdings (≤500 ha), (≥ 500 ha) b) ownership categories for forest and other wooded land i. in public ownership ii. in private ownership iii. in other ownership
Measurement units:	5.1.a) absolute number per reference unit (t.b.d.) 5.1.b) absolute number per ha per reference unit (t.b.d.)
Potential future data provider (international):	UNECE/FAO
Potential future data provider (national):	National Statistics Office; Ministry of Forestry (reporting on the MCPFE indicators)
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	NOT INCLUDED
Comments:	
Comments by EFORWOOD experts to Indicator draft Set3	M3: The classification brackets might imply a separate computation round. Are they arbitrary chosen? Does the test case really need so many brackets concerning areas and number of employees? I suggest two classes, in any case not more than three. How are NUT areas (he statistical unit of the union) going to be treated in the material? Its aggregation? Official and agreeable class structure for definition of SMEs and smaller needed according to forest owners and operators; M3 requested such info from experts; should be available soon *(WP.1.1 included new size classes)* M5: too ambitious; aggregate plant& mill size to larger groups. Relevance for test chain? (*WP.1.1 included new size classes)*
Comments by Stakeholders to Indicator draft Set3	CEI-Bois: good but how to really do that? (*WP1.1. we don't know how close we come to the real number, but we try by expert judgements)* CEI-Bois: concerning the woodworking industry it is very difficult; full name – difficult to collect data on all those issue; number of holdings will be quite complicated; *(WP1.1. with the holdings we might have a definition problem; maybe holdings for forestry and enterprise for industry)* ENFE: we have to look at the impact of these processes in the wood

	chain etc *(WP1.1. we agree)*

Key definitions:

Micro-enterprises: have fewer than 10 occupied persons. A threshold of 2 million for the turnover and the balance-sheet total will be introduced. (Recommendation 2003/361/EC)

Small enterprises: have between 10 and 49 occupied persons. The turnover threshold and the balance-sheet total will be raised to 10 million. (Recommendation 2003/361/EC)

Medium-sized enterprises: have between 50 and 249 occupied persons. The turnover threshold will be raised to 50 million and the threshold for the balance-sheet total to 43 million. (Recommendation 2003/361/EC)

Forest holding: Area of forest under one owner (also woodlot); equivalent to a cultivated area in agriculture (http://english.forestindustries.fi/glossary/F.html)

(6) Investment and Research & Development

Full name of indicator:	Investment (gross fixed capital formation) and R& D expenditure
General FWC sustainability indicator subclasses:	6.1. Investment (gross fixed capital formation) in total FWC and by sub-sector classified by: total value of fixed assets (machinery and equipment, vehicles &, the value of land improvements, and buildings) 6.2. Research & Development expenditure in total FWC and by sub-sector classified by: total value of private and public expenditure:
Measurement units:	6.1 – 6.2) in Euro (million) per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat
Potential future data provider (national):	National Statistics Office (?)
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	NOT INCLUDED
Comments:	
Comments by EFORWOOD experts to Indicator draft Set3	M3: I think that this kind of data is very difficult to allocate on Module level. Especially with regard to processes *(WP.1.1 has not been included for ToSIA application so far)* M4: Difficult for data compilation; Important issue but impossible indicator *(WP.1.1 has not been included for ToSIA application so far)* M5: % of GDP should preferably be calculated by ToSIA *(WP1.1.has been deleted)*
Comments by Stakeholders to Indicator draft Set3	CEPI: R&D not only done by paper industry, but also by suppliers (machines, chemicals, etc.) and R&D institutes -> need to be taken into account *(Wp1.1. ok)*

Key definitions:

Business investment is defined as the gross fixed capital formation by the private sector. (Eurostat definition)

Gross fixed capital formation (GFCF) consists of resident producers' acquisitions, less disposals, of fixed assets during a given period plus certain additions to the value of non-produced assets realised by the productive activity of producer or institutional units. (Eurostat definition)

Fixed assets are defined in national accounts as non-financial produced assets that are used repeatedly or continuously in production for more than one year. Fixed assets include not only dwellings, buildings, structures, machinery and equipment but also cultivated assets such as livestock for breeding and vineyards. They also include intangible assets such as computer software and entertainment, literary or artistic originals. (Eurostat definition)

Non-produced assets are non-financial assets that come into existence other than through processes of production; they include both tangible assets and intangible assets and also include costs of ownership transfer on and major improvements to these assets. (Eurostat definition)

Gross domestic product (GDP) is the central aggregate of National Accounts. Since GFCF is an integral part of GDP (according to the expenditure approach), the numbers given are true shares.

They are intended to give an impression of the relative importance of investment as opposed to, for example, consumption. (Eurostat definition)

R&D expenditures include all expenditures for R&D performed within the business enterprise sector (BERD) on the national territory during a given period, regardless of the source of funds. R&D expenditure in BERD are shown as a percentage of GDP (R&D intensity). (Eurostat definition)

(7) Innovation

Full name of indicator:	New products and new technological processes
General FWC sustainability indicator subclasses:	7.1. New products in total FWC and by sub-sector classified by: a) goods (definitions see annex) b) services (definitions see annex) 7.2. New technological processes in total FWC and by sub-sector
Measurement units:	7.1.a –7.1.b & 7.2) total number per reference unit (t.b.d.) 7.1.a –7.1.b & 7.2) in % of turnover per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat - EU Innovation Survey
Potential future data provider (national):	National Statistics Office (?)
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	NOT INCLUDED
Comments:	
Comments by EFORWOOD experts to Indicator draft Set3	M3: no data available (*WP1.1. not included in the ToSIA application so far)* M4: Difficult for data compilation; Important issue but impossible indicator *(WP1.1. see comment above)* M5: Data difficulties *(WP1.1. see comment above)*
Comments by Stakeholders to Indicator draft Set3	CEPI: definition of a new product? Innovation in processes are important *(WP1.1. definition has been provided & innovation in processes has been included)* CEI-BOIS: production, innovation same importance as development of new products *(WP1.1. ok)*

Key definitions:

Innovation is the implementation of a new or significantly improved product (good and service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations. […] The minimum requirement for an innovation is that the product process, marketing method or organisation method must be new (or significantly improved) to the firm. This includes products, processes and methods that firms are the first to develop and those that have been adopted from other firms or organisations. (Oslo Manual, 3rd edition, OECD/Eurostat 2005, p.46)

Technological product and process (TPP) innovations comprise implemented technologically new products and processes and significant technological improvements in products and processes. A TPP innovation has been implemented if it has been introduced on the market (product innovation) or used within a production process (process innovation). TPP innovations involve a series of scientific, technological, organisational, financial and commercial activities. The TPP innovating firm is one that has implemented technologically new or significantly technologically improved products or processes during the period under review. (Oslo Manual, 3rd edition, OECD/Eurostat 2005, p.32)

The term "**product**" is used to cover both goods and services. (Oslo Manual, 3rd edition, OECD/ Eurostat 2005, p.32)

A **technologically new product** is a product whose technological characteristics or intended uses differ significantly from those of previously produced products. Such innovations can involve radically new technologies, can be based on combining existing technologies in new uses, or can be derived from the use of new knowledge. (Oslo Manual, 3rd edition, OECD/Eurostat 2005, p.32)

A **technologically improved product** is an existing product whose performance has been significantly enhanced or upgraded. A simple product may be improved (in terms of better performance or lower cost) through use of higher-performance components or materials, or a complex product which consists of a number of integrated technical sub-systems may be improved by partial changes to one of the sub-systems. (Oslo Manual, 3rd edition, OECD/Eurostat 2005, p.32)

Turnover comprises the totals invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied to third parties. Turnover includes all duties and taxes on the goods or services invoiced by the unit with the exception of the VAT invoiced by the unit vis-à-vis its customer and other similar deductible taxes directly linked to turnover. It also includes all other charges (transport, packaging, etc.) passed on to the customer, even if these charges are listed separately in the invoice. Reduction in prices, rebates and discounts as well as the value of returned packing must be deducted. Income classified as other operating income, financial income and extra-ordinary income in company accounts is excluded from turnover. Operating subsidies received from public authorities or the institutions of the European Union are also excluded. (Eurostat definition)

(8) Total production

Full name of indicator:	Production of goods and services
General FWC sustainability indicator subclasses:	8.1. Goods and services (classification see annex) in total FWC and by sub-sector classified by: a) volume b) value
Measurement units:	8.1.a) tonnes, kg, m³, etc. (depends on the product) per reference unit (t.b.d.) 8.1.b) Euro (in million) per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat UNECE FAO
Potential future data provider (national):	National Statistics Office
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	NOT INCLUDED
Comments	
Comments by EFORWOOD experts to Indicator draft Set3	M3: Production of products in total and in % of what? (*WP.1.1. has been modified)* M2: We were unclear whether this category included NTFP's. The text suggests that this indicator only concerns wood products but Annex 8.3 has a much wider range of products listed. My view would be that NTFP's and the other non-wood products are considered as module level indicators and not as WCIs, but it would be helpful if the main text was clearer in this respect *(WP.1.1. Yes, NFTP are included, see annex)* M5 products needs to be defined *(WP.1.1 see annex; list of possible products)*
Comments by Stakeholders to Indicator draft Set3	No specific comment

Key definitions:

Production is an activity carried out under the control and responsibility of an institutional unit that uses inputs of labour, capital and goods and services to produce goods and services. Production does not cover purely natural processes without any human involvement or direction, like the unmanaged growth of fish stocks in international waters (but fish farming is production). Production is an activity resulting in a product. It is used with reference to the whole range of economic activities. The term is not reserved for the agricultural, mining or manufacturing sectors. It is also used in relation to the service sector. More specific terms may be used to denote production: provision of services, processing, manufacturing, etc., depending on the branch of activity. Production may be measured in various ways either in physical terms or according to value. (Eurostat definition)

The term "**product**" is used to cover both goods and services. (Oslo Manual, 3rd edition, OECD/ Eurostat 2005, p.32)

(9) Revenue – moved to under consideration

3 Social EFORWOOD Indicators

3.1 Social Lead + indicators

(10) Employment

Full name of indicator (including subclasses):	Number of persons employed classified by gender, age class and education
General FWC sustainability indicator subclasses:	10.1. Persons employed in total FWC and by sub-sector classified by: a) gender categories i. male ii. female b) age classes i. <20 yr. ii. 20-50 yr. iii. >50 yr. c) educational categories (see European Social Survey) i. education up to 16 yr ii. education 17 – 19 yr iii. education still studying
Measurement units:	10.1.a – 10.1.c) absolute number (in full-time equivalents) per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat - Social Statistics - Community Labour Force Survey United Nations Industrial Development Organization (UNIDO) - for data for ISIC 20 and 21 (classification see annex)
Potential future data provider (national):	National Statistics Office;
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: ***Proposed version 1: September 2006***	*LI10a. Employment male* *LI10b Employment female* *LI10c Employment rural* *LI10d Employment urban*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above October 2006:	10. 1. Persons employed by processes within each Module (M2-M5) classified by gender categories i. male **(LI 10a)** ii. female **(LI 10b)**
Measurement units:	10.1.) persons in a specific year (in full-time equivalents)
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Comments:	No separation according to age classes is being done;
Comments by EFORWOOD	Wp1.4. As measurement units it is better to use person years (not all

experts to Indicator draft Set3	jobs are full-time) (*WP 1.1: ok, but counted in full-time equivalents)* WP1.4.Quite detailed data is required. The following level of importance could be established for collecting the data: (1) gender; (2) urban or rural areas; (3) age class (*WP1.1.: we deleted urban and rural areas, as it is difficult to define, where urban starts, and rural ends)* M3: We can be lucky if we get the total number of persons who work in the forestry sector, to get data with gender aspects or regional distribution is almost impossible. Reliable data are only available on an aggregated level, esp. only for big enterprises. SME data may not be available and must be estimated. Moreover we will have to agree on an example year (as it is with all indicators), e.g. 2005 *(WP1.1. correct for micro-SME it is difficult to collect data)*
Comments by Stakeholders to Indicator draft Set3	CEPI: ultimate goal? Gender? *(WP1.1. no)*

(11) Wages and salaries

Full name of indicator (including subclasses):	Wages and salaries (gross earnings) classified by gender and type of employment
General FWC sustainability indicator subclasses:	11.1. Wages and salaries in total FWC and by sub-sector classified by: a) gender categories i. male ii. female b) type of employment i. full-time employment ii. part-time employment
Measurement units:	11.1.a – 11.1.b) Euro (in millon) per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat (see Population and Social Conditions)
Potential future data provider (national)	National Statistics Office
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: ***Proposed version 1: September 2006***	*LI12a Wages and salaries male* *LI11b Wages and salaries female*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above October 2006:	11.1. Wages and salaries by processes within each Module (M2-M5) classified by gender category i. male **(LI 11a)** ii. female **(LI 11b)**
Measurement units:	11.1.a – 11.1.b) Euro (million)
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Comments:	For the category "type of employment" that is still rather unclear, is currently being left out for the data collection for the prototype of ToSIA
Comments by EFORWOOD experts to Indicator draft Set3	WP 1.4.: Indirect employment should be better defined. May be it would make more sense in indicator 10 *(WP.1.1 indirect employment has been cancelled)* M3: Wages and salaries can be divided in modules, but is it necessary for the test chain? Could be aggregated to M2/M3 value and possibly also aggregate for other modules. Skogforsk can provide data for M3 and M2. The comparison between female and male salaries is difficult to evaluate and is today an issue for political debate. Different perspectives gives different answers to the question, I suggest an average figure for man and woman together and representation in numbers for the sexes. If salaries should be reported allocated to sexes, IP must give guidance how such reporting should be made M5: Define indirect employment *(WP1.1.has been cancelled)*
Comments by Stakeholders to Indicator draft Set3:	ENFE: differentiation between modules and different actors are important! *(WP.1.1 ok)*

Key definitions:

Employees are all persons who a have a direct employment contract with the enterprise or local unit and receive remuneration, irrespective of the type of work performed or the number of hours worked. (Eurostat, http://europa.eu.int/estatref/info/sdds/en/earn/earn_ses_sm.htm)

Gross earnings cover remuneration in cash paid directly by the employer, before deductions of tax and social security contributions. (Eurostat, http://europa.eu.int/estatref/info/sdds/en/earn/earn_ses_sm.htm)

Full-time/part-time: This variable refers to the main job. The distinction between full-time and part-time work is based on a spontaneous response by the respondent (except in the Netherlands, Iceland and Norway were part-time is determined if the usual hours are fewer than 35 hours and full-time if the usual hours are 35 hours or more, and in Sweden where this criterion is applied to the self-employed. It is impossible to establish a more precise distinction between full-time and part-time employment, since working hours differ from one Member State to the next and from one branch of activity to the next. (Eurostat)

Gender pay gap is given as the difference between average gross hourly earnings of male paid employees and of female paid employees as a percentage of average gross hourly earnings of male paid employees. The population consists of all paid employees aged 16-64 that are 'at work 15+ hours per week'. (Eurostat definition)

(12) Occupational safety and health

Full name of indicator (including subclasses):	Frequency of occupational accidents and occupational diseases
General FWC sustainability indicator subclasses:	12.1. Occupational accidents in total FWC and by sub-sector classified by: a) non-fatal occupational accidents (= absence of work of more than 3 working days) b) fatal occupational accidents 12.2. Occupational diseases in total FWC and by sub-sector
Measurement units:	12.1.a) absolute numbers and in % per 1000 employees per reference unit (t.b.d.) 12.1.b) absolute numbers by 100 employees per reference unit (t.b.d.) 12.2. frequency of cases per number of persons exposed multiplied by number of years of exposure and in % per 1000 employees per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat - European Statistics on Accidents at Work (ESAW) - European Occupational Diseases Statistics (EODS) International Labour Organisation (ILO)
Potential future data provider (national):	National Statistics Office
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: ***Proposed version 1: September 2006***	*LI12a occupational accidents (non-fatal)* *LI12b Occupational accidents (fatal)* *LI12c Occupational diseases*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above October 2006:	12. 1. Occupational accidents and diseases by processes within each Module (M2-M5) classified by: a) non-fatal occupational accidents **(LI 12a)** b) fatal occupational accidents **(LI 12b)** 12.2. Occupational diseases by processes within each Module (M2-M5) **(LI 12c)**
Measurement units:	12.1.a) absolute numbers and in % per 1000 employees per reference unit (t.b.d.) 12.1.b) absolute numbers by 100 employees per reference unit (t.b.d.) 12.2.) frequency of cases per number of persons exposed multiplied by number of years of exposure and in % per 1000 employees per reference unit (t.b.d.)
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Comments	
Comments by EFORWOOD experts to Indicator draft Set3	M3: data from ERGOWOOD are being checked by ALUFR *(WP.1.1 unclear)* M5: Add “fatal diseases” in key definitions *(WP.1.1 not included, has it is not requested by the indicator)*

Comments by Stakeholders to Indicator draft Set3:	CEPI: definition of accidents *(WP 1.1. included, official def. of EU)* ENFE: define valid health and safety indictor *(WP.1.1 ok)* CEI-Bois: definition should be more precise (what are occupational diseases?) *(WP1.1. definition included)*

Key definitions:

Absence from work of more than 3 working days: ESAW considers only full working days of absence from work of the victim excluding the day of the accident. Consequently more than 2 days, means at least 4 days which implies only accidents with a resumption of work not before the fifth day after the day or the accident or later. (see http://ec.europa.eu/employment_social/publications/2002/-ke4202569_en.pdf9)

Fatal accident at work: accidents at work leading to the death of the victim within a year (after the day) of the accident. (see: http://ec.europa.eu/employment_social/publications/2002/ke4202569_-en.pdf)

Occupational disease is a case of disease recognised by the national authorities as being caused by a factor at work. (The EODS data collection covers two types of occupational diseases: a) An incident occupational disease is an occupational disease recognised for the first time as an occupational disease during the reference year. This excludes occupational diseases which had been recognised already earlier even if they became more severe during the reference year and were consequently recognised for a higher level of disability. B) A fatal occupational disease is a death recognised by the national authorities as due to an occupational disease during the reference year regardless of when the occupational disease had been recognised for the first time.) (see: European Occupational Diseases Statistics (EODS)

(13) Education and Training

Full name of indicator (including subclasses):	Education time and training expenditure per employee as % of turnover classified by gender
General FWC sustainability indicator subclasses:	13.1. Education time in total FWC, by sub-sector and by gender (male, female) 13.2. Training expenditure as % of turnover in total FWC, by sub-sector and by gender (male, female)
Measurement units:	13.1) years per person per reference unit (t.b.d.) 13.2) in % of turnover per reference unit (t.b.d.) 13.1 – 13.2) in Euro (in million) per person per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat (European Social Survey) Nations Education, Scientific and Cultural Organisation (UNESCO-UIS) Organisation for Economic Co-operation and Development (OECD)
Potential future data provider (national):	National Statistics Office;
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: ***Proposed version 1: September 2006***	*LI13a Education time per person-year working time in the process* *LI 13b Education expenditure per person-year working time in the process*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above October 2006:	13. 1. Education time by processes within each Module (M2-M5) **(LI 13a)** 13.2. Training expenditure by processes within each Module (M2-M5) **(LI 13b)**
Measurement units:	13.1.) per person-year working time per reference unit (t.b.d.) 13.2.) in Euro per person-year working time per reference unit (t.b.d.)
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Comments:	Sub-classes for the two categories are not so important for the prototype of ToSIA and therefore no data will be collected at this stage
Comments by EFORWOOD experts to Indicator draft Set3	WP 1.4. How data can be collected by processes? (*WP1.1. expert judgments).* Wp1.4. Is it really possible to find this data by age classes? (*WP1.1. you mean the educational categories?* (*Education up to 16yr*, *education 17-19 yr*, *education still studying) Why not? Education data are available from European Social Survey)* M3: no data available M5: Too detailed. Remove subclass b (education). Subclass b, may be more adequate for indicator 10 on *employment (WP.1.1 included)*
Comments by Stakeholders to Indicator draft Set3	No specific comment

Key description:

Turnover comprises the totals invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied to third parties. Turnover includes all duties and taxes on the goods or services invoiced by the unit with the exception of the VAT invoiced by the unit vis-à-vis its customer and other similar deductible taxes directly linked to turnover. It also includes all other charges (transport, packaging, etc.) passed on to the customer, even if these charges are listed separately in the invoice. Reduction in prices rebates and discounts as well as the value of returned packing must be deducted. Income classified as other operating income, financial income and extra-ordinary income in company accounts is excluded from turnover. Operating subsidies received from public authorities or the institutions of the European Union are also excluded. (Eurostat definition)

3.2 General Whole Chain Social indicators

(14) Quality of employment – moved to under consideration

4 Environmental EFORWOOD Indicators

4.1 Environmental Lead + indicators

(15) Energy generation and use

Full name of indicator (including subclasses):	Energy generation (from renewables) and energy use classified by origin including the share of self-sufficiency
General FWC sustainability indicator subclasses:	15.1. Energy generation from renewables in total FWC and by sub-sector classified by: a) origin i. wood used for energy taken directly from the forest (also small rotation forestry, trees outside the forest, such as orchards, hedges) ii. wood processing residues used for energy including wood and bark from sawmills, wood based panel mills, pulp and paper mills, furniture and secondary processing plants, lignin (from chemical pulping used for energy ("black liquors") etc. iii. 'post-consumer' wood energy derived from used palettes and boxes, demolition wood etc. b) type of energy generation i. electricity only ii. heat iii. combined heat and power (CHP) iv. other (biogas, biofuel) 15.2. Energy use in total FWC and by sub-sector classified by origin: i. renewables (same categories see above) ii. non-renewables (oil, gas, coal and others) 15.3. Share self-sufficiency in total FWC and by sub-sector
Measurement units:	15.1.a & 15.2) absolute numbers in energy terms (TJ) per reference unit (t.b.d.) 15.1.b – 15.3) in % of total energy use per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat - Energy Statistics - Joint Questionnaire of Eurostat and International Energy Agency (IEA part of OECD) UNECE /FAO
Potential future data provider (national)	?
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	*LI15a Energy generation (from process inputs)* *LI15b Energy generation (from other wood biomass)* *LI15c Energy use (renewable)* *LI15d Energy use (non-renewable)* *LI15e Energy use/share self-sufficiency*
Proposed ToSIA version 2: has been modified because of consistency reasons with set	15.1. Energy generation from renewables by processes within each Module (M2-M5) classified by origin: i. from residues from process – inputs (wood processing residues

above October 2006:	and lignin) **(LI 15a)** ii. from other wood biomass (from outside the studied process – forest residues, used wood pallets etc.) **(LI 15b)** 15.2. Energy use by processes within each Module (M2-M5) classified by origin: i. renewables **(LI 15c)** ii. non-renewables (oil, gas, coal and others) **(LI 15d)** 15.3. Share of self-sufficiency **(LI 15e)**
Measurement units:	15.1) absolute numbers in energy terms (TJ) per reference unit (t.b.d.) 15.2) absolute numbers in energy terms (TJ) per reference unit (t.b.d.) 15.3) in % of total energy use per reference unit (t.b.d.)
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Comments:	No data will currently be collected for the category "type of energy generation" For the category 'energy use' not further subdivision of the sub-classes 'renewables' and 'non-renewables' is made
Comments by EFORWOOD experts to Indicator draft Set3	WP1.4. wood from trees outside the forest – this seems to me input from outside of the FWC *(WP1.1.not from outside)* Wp1.4. others (hydro, solar, wind, non-wood based biofuels): how is this related to FWC? Makes sense for energy use, but for energy generation? *(WP.1.1 deleted)* WP1.4. Why include wind and solar power under energy generation? We understood that this indicator would document the generated energy in a given process (within the forest sector only). (*WP1.1 because energy is generated also within industrial processes)* WP 1.4.May be this indicator could be separated into "Energy use" and "Energy generation" (*WP1.1. w don't agree)* M5: Subclass a-b, too many subclasses (*WP1.1. ok, have been reduced)*
Comments by Stakeholders to Indicator draft Set3	CEPI: split needed to distinguish clearly biofuels *(WP1.1. included for energy generation)*

Key definitions:

Renewables energy sources are defined as renewable non-fossil energy sources: wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. (Eurostat definition)

Electricity produced from renewable energy sources comprises of the electricity generation from hydro plants (excluding pumping), wind, solar, geothermal and electricity from biomass/wastes. Biomass/wastes electricity comprises of electricity generated from wood/wood wastes and other solid wastes of renewable nature (straw, black liquor) burning, municipal solid waste incineration, biogas (incl. landfill, sewage, farm gas) and liquid biofuels. (EEA definition)

(16) Greenhouse gas balance

Full name of indicator (including subclasses):	Greenhouse gas balance including greenhouse gases uptake and emissions from energy use, industrial processes, waste as well as carbon sequestration in woody biomass, in soils of forest and harvested wood products
General FWC sustainability indicator subclasses:	16.1. Greenhouse gas emissions in total FWC and by sub-sector classified by: a) energy use (in non-industrial processes) b) industrial processes c) waste 16.2. Carbon sequestration in total FWC and by sub-sector on average for the reference year averaged over a period of 5 years classified by: a) living woody biomass above and below ground, dead wood and in soils of forest b) harvested wood products [as covered by the IPCC emission reporting guidelines (IPCC GPG 2006 GL] 16.3. Greenhouse gas balance in total FWC and by sub-sector
Measurement units:	16.1.a – 16.1.c, 16.2.a – 16.2.b, 16.3) all converted in 1000 tons of CO_2-equivalents per reference unit (t.b.d.)
Potential future data provider (international):	European Environment Agency / European Topic Centre on Air and Climate Change (EEA / ETC_ACC) Intergovernmental Panel on Climate Change (IPCC) ICP Forest (for carbon stock in soils (Level 1)) UNECE /FAO (for carbon stock in woody biomass)
Potential future data provider (national)	NFI (*Q from WP1.1. to Mr. Rasmussen what does NFI mean?)*
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: *Proposed version 1: September 2006*	*LI16a Total greenhouse gas emissions per process* *LI16b Carbon sequestration in wood biomass (above and below ground)* *LI16c Carbon sequestration in woody dead biomass (standing and living)* *LI16d Carbon sequestration in forest soils* *LI16e Carbon sequestration in harvested wood products*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above : October 2006:	16.1. Greenhouse gas emissions by processes within each Module (M2-M5) **(LI 16a)** 16.2. Carbon sequestration by processes within each Module (M2-M5) on average for the reference year averaged over a period of 5 years for: a) living woody biomass above and below ground, dead wood and in soils of forest **(LI16b + LI16c + LI16d)** b) harvested wood products **(LI16e)**
Measurement units:	16.1, 16.2.a – 16.2.b) all converted in 1000 tons of CO_2-equivalents per reference unit (t.b.d.)
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Comments:	-Greenhouse gas emission is been aggregated into one sub-class

	for ToSIA -Carbon sequestration sub-classes have been aggregated into three sub-classes -No data collection of data for the greenhouse gas balance is suggested as understood as result of emissions and sequestration
Comments by EFORWOOD experts to Indicator draft Set3	WP1.4. Many categories are considered, perhaps too detailed (*WP1.1. the categories recall the IPCC guidelines, but we reduced them)* WP1.4.Difficult to apply IPCC guidelines to the processes, refer to LCA experience*? (WP1.1. agree)* M3: Carbon stocks in forest soils is difficult and have not the same reliability as biomass data. Should be reflected if g and h is needed in the test case *(WP1.1. included in LI 16d)* M5: Time perspectives must be clarified. Is a newspaper a (short-term) carbon storage? *(WP1.1. IPCC on harvested wood products)* Rasmussen (1-6): (1) indicator should be called: greenhouse gases balance (CO_2, CH_4, N_2O would be the main gases considered.) (WP1.1. we stick to current title as it is not usually called greenhouse gases balance) Rasmussen (2) Full indicator name should be: Greenhouse gases balance including greenhouse gases uptake and emission from energy use, industrial processes, waste as well as carbon stocks in biomass, in soils of forest and other wooded land and harvested wood products *(WP1.1. wording has been adjusted)*: comment on "other wooded land": Are they included in forestry wood chain ? We suggest removing them for sake of simplicity and clarity. *(WP1.1. deleted)* Rasmussen (3) it should read carbon stocks (and not carbon sequestration) *(WP1.1. we agree, but now we changed the names of the subclasses and comment is not valid anymore)* Rasmussen (4) d) + e) double accounting *(WP1.1. has been deleted)*; delete h) + forest floor and other living plants must be included for exhausitivity *(WP1.1. has been deleted)* Rasmussen (5) For calculating a balance, we need to combine flux values (a-c) and stock values (d-j) so that a reference situation is needed, for instance stock values at the present time (2006). *(WP1.1.included)* Rasmussen (6) Measurement units: see new formulation proposed. *(WP1.1. unclear)*
Comments by Stakeholders to Indicator draft Set3	CEPI: greenhouse gas split between fossil and biomass origin *(WP1.1. not done)*

Key definitions:

Draft 2006 IPCC Guidelines for National Greenhouse Gas Inventories: (http://www.ipcc-nggip.iges.or.jp/public/2006gl/ppd.htm)

(17) Transport

Full name of indicator (including subclasses):	Transport distance and volume of freight per mode of transport
General FWC sustainability indicator subclasses:	17.1. Transport distance in total FWC and by sub-sector classified by mode of transport i. road ii. rail iii. inland waterways iv. sea v. air 17.2. Volume of freight in total FWC and by sub-sector classified by mode of transport i. road ii. rail iii. inland waterways iv. sea v. air
Measurement units:	17.1) kilometres per tonne per mode of transport per reference unit (t.b.d.) 17.2) ktonnes per mode of transport per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat (see Transport Annual Statistics) ECMT (see Statistical Trends in Transport) UNECE (see Annual Bulletin of Transport Statistics for Europe)
Potential future data provider (national)	National Statistics Office
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	*LI17a Transport distance road transport* *LI17b Transport distance rail transport* *LI17c Transport distance water transport (inland waterways and sea)* *LI17d Transport distance air transport* *LI 17e Freight volume road transport* *LI 17f Freight volume rail transport* *LI 17g Freight volume water transport (inland waterways and sea)* *LI 17h Freight volume air transport*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above October 2006:	17.1. Transport distance by processes within each Module (M2-M5) classified by mode of transport: i. by road **(LI 17a)** ii. by rail **(LI 17b)** iii. by water **(LI 17c)** iv. by air **(LI 17d)** 17.2. Volume of freight by processes within each Module (M2-M5) classified by mode of transport i.. by road **(LI 17e)** ii. by rail **(LI 17f)** iii. by water **(LI 17g)** iv. by air **(LI 17h)**

Measurement units:	17.1 – 17.2) ktonnes per mode of transport per kilometres
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Comments:	-It is suggested to combine data collection for "inland waterways and sea" into one "water transport sub-class for the test chains -indicator should ideally also reflect transport related activities -from ToSIA perspective it would be ok to combine freight and distance data into one sub-class (ton*kilometres per mode of transport), but we simplify later and suggest keeping the indicators separate for the data collection
Comments by EFORWOOD experts to Indicator draft Set3	WP 1.4.Transport is both, a process and an indicator, which might be confusing (*WP 1.1. ok, we are aware of this)* M3: Difficult to obtain, only company by company (WP1.1. we agree) M5: Policy decision needed on: Should transports be separate boxes/ processes or integrated in other processes? If separate process, then 17 is unnecessary *(WP1.1. we cannot leave it out, as all sustainability indicator sets have a transport indicator)*
Comments by Stakeholders to Indicator draft Set3	No specific comment

Key definitions:

Mode of transport = Modal split of freight transport (% in total inland freight tonne-km): defined as the percentage share of each mode of transport in total inland transport expressed in tonne-kilometre (tkm). It includes transport by road, rail and inland waterways. Road transport is based on all movements of vehicles registered in the reporting country. Rail and Inland waterways transport is generally based on movements on national territory, regardless of the nationality of the vehicle or vessel, but there are some variations in definitions from country to country. (Eurostat Indicator)

(18) Water

Full name of indicator (including subclasses):	Water use classified by origin and class
General FWC sustainability indicator subclasses:	18.1. Water use in total FWC and by sub-sector classified by: a) origin of water (water abstraction) b) class of water i.Fresh surface water ii.used water (cooling, process water) iii.polluted water iv.recycled water
Measurement units:	18.1.a) Mio m^3 per reference unit (t.b.d) 18.1.b) ktonnes or m^3 per reference unit (t.b.d)
Potential future data provider (international):	Eurostat Joint OECD/Eurostat Questionnaire on the State of the Environment Environmental Energy Agency (EEA) European Topic Centre on Water OECD UN-ECE bodies
Potential future provider (national)	National ministries of environment and national environmental institutes; National Statistics Office
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	*LI18a Water use in total* *LI18b) Water pollution with organic substances* *LI18c) Water pollution with nutrients* *LI18d) Water pollution with hazardous substances*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above October 2006:	18.1. Water use by processes within each Module (M2-M5) classified by volume **(LI18a)**
Measurement units:	18.1.) Mio m^3 per reference unit (t.b.d)
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Comments:	Rather complex sub-classes for water use by origin and class of water; for ToSIA test chains a more simplified data collection is aimed at *WP1.1.Water pollution needs to be moved to "Emissions indicator*
Comments by EFORWOOD experts to Indicator draft Set3	WP 1.4. Quite many categories, difficult to achieve (*WP 1.1 categories have been reduced; emissions indicator 21 has been created)* WP 1.4.In "water" and "air" indicators may be emissions could be separated indicators ("emissions to water"; "emissions to air") (*WP 1.1. included see Indicator 21)* M5: Limit subclasses *(WP1.1. included)* Rasmussen: include new subclass of water use: (a) ecosystem use of water: evapotranspiration, surplus of water (precipitation – evapotranspiration) Motivation: Water from forests is an important

	product (most big towns in EU depend on this). Evapotranspiration is the use of water by the ecosystem. It will depend mainly on tree species, stocking, and rotation length. Surplus is the water left for other uses *(WP1.1. we reduced categories instead of increasing them; maybe this can be included in module-specific indicators)* Rasmussen: update Measurement units *(WP1.1. ok)*
Comments by Stakeholders to Indicator draft Set3	CEPF: Link to water quality in forest management need to be insured *(WP1.1. could be included in the module specific indicators)* Water needs to be more taken into account in the forest part *(WP1.1. could be included in the module specific indicators)*

Key definitions:

Gross water abstraction (= water withdrawal): Water removed from any source, either permanently or temporarily. Mine water and drainage water are included. Water abstractions from groundwater resources in any given time period are defined as the difference between the total amount of water withdrawn from aquifers and the total amount charged artificially or injected into aquifers. Water abstractions from precipitation (e.g. rain water collected for use) should be included under abstractions from surface water. The amounts of water artificially charged or injected are attributed to abstractions from that water resource from which they were originally withdrawn. Water used for hydroelectricity generation is an in-situ use and should be excluded.

Fresh surface water: Water which flows over, or rests on the surface of a land mass, natural watercourses such as rivers, streams, brooks, lakes, etc., as well as artificial watercourses such as irrigation, industrial and navigation canals, drainage systems and artificial reservoirs. For purposes of this questionnaire, bank filtration is included under (fresh) surface water. Sea-water, and transitional waters, such as brackish swamps, lagoons and estuarine areas are not considered surface water and so are included under non fresh water resources.

Discharge of used water: Water discharged into fresh waters after use (with or without treatment), like waste water or cooling water, so that it becomes available again for abstraction. Discharges to the sea are excluded.

Industrial process waste water: Water discharged after being used in, or produced by, industrial production processes and which is of no further immediate value to these processes. Where process water recycling systems have been installed, process waste-water is the final discharge from these circuits. To meet quality standards for eventual discharge into public sewers, this process waste-water is understood to be subjected to ex-process in-plant treatment. Cooling water is not considered to be process waste-water for purposes of this questionnaire. Sanitary waste-water and surface run-off from industries are also excluded here.

Waste water generated: a) quantity of water in cubic meters (m3) that has been polluted during use by adding waste or heat. B) substances (pollution in kg BOD/day or comparable) that have been added to the waste water. The origin can be domestic use (used water from bathing, toilets, cooking etc.) or industrial use.

Water pollution: presence in water of harmful and objectionable material – obtained from sewers, industrial wastes and rainwater run-off – in sufficient concentrations to make it unfit for use.

All definitions described in instructions for the Joint OECD/Eurostat Questionnaire on the State of the Environment, Section Inland waters.

Integrated Pollution Prevention and Control (IPPC) – Best Available techniques in the Pulp and paper Industry see: http://www.bvt.umweltbundesamt.de/archiv-e/espulpandpaper-e.pdf

(19) Forest area and growing stock

Full name of indicator:	Area of forest and other wooded land classified by forest type and related growing stock classified by type and by availability of wood supply
General FWC sustainability indicator subclasses: **(MCPFE)**	19.1. Area of forest classified by: a) forest types (predominantly conifers, predominantly broadleaved, mixed types) 19.2. Area of other wooded land classified by: a) forest types (predominantly conifers, predominantly broadleaved, mixed types) 19.3. Growing stock classified by: a) forest types (predominantly conifers, predominantly broadleaved, mixed types) b) forest available for wood supply
Measurement units:	19.1.a) 1000 ha per reference unit (t.b.d.) 19.2.a) 1000 ha per reference unit (t.b.d.) 19.3.a – 19.3b) 1000m³ (growing stock is measured over bark) per reference unit (t.b.d.)
Potential future data provider (international)	JRC/ENV ICP Forests UNECE/FAO
Potential future data provider (national)	National forestry inventory
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	NOT INCLUDED
Comments:	
Comments by EFORWOOD experts to Indicator draft Set3	WP1.4. The name of the indicator could be changed to "State of the Forest", described by area and standing volume (*WP 1.1 we sticked to already existing wording; State of forests refers to all SFM indictors in current policy use)* WP 1.4.This indicator is related to both, processes and products of the processes. For example, after a thinning the wood (product) placed on the roadside will also have an impact on the environment (*WP 1.1 We need to have at least one "forest indicator", if not the set of indicators would be exchangeable with other indicator sets)* WP 1.4. How to reflect biodiversity? "Status of the forest" reflecting biodiversity should be considered (*WP 1.1. biodiversity is reflected in the indicator of Indicator 23: "naturalness")* M5: not applicable *(WP 1.1. for M5?)*
Comments by Stakeholders to Indicator draft Set3:	MCPFE: need for better evaluation of wood resources and facts; also by management type (sustainable management) *(WP1.1. tried to include)*

Key definitions:

Forest: Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use. (MCPFE, FAO)

Other wooded land: Land not classified as forest, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use. (FAO 2004)

Forest types are classified as follows, based on EUNIS Top Level and TBFRA 2000:

- predominantly broadleaved woodland
- predominantly coniferous woodland
- mixed broadleaved and coniferous woodland (MCPFE 2003)

Growing stock: The living tree component of the standing volume (MCPFE 2003, from TBFRA 2000). Volume over bark of all living trees more than X cm in diameter at breast height. Includes the stem from ground level or stump height up to a top diameter of Y cm, and may also include branches to a minimum diameter of W cm. Explanatory notes:

1. The countries must indicate the three thresholds (X, Y, W in cm) and the parts of the tree that are not included in the volume. The countries must also indicate whether the reported figures refer to volume above ground or above stump.
2. The diameter is measured at 30 cm above the end of the buttresses if these are higher than 1 meter.
3. Includes wind fallen living trees.
4. Excludes: Smaller branches, twigs, foliage, flowers, seeds, and roots. (FAO 2004)

(20) Recycling and recovery

Full name of indicator (including subclasses):	Recycling and recovery of wood products, by-products and waste
General FWC sustainability indicator subclasses:	20.1. Recycling in total FWC and by sub-sector classified by: a) wood products (residues, paper and paper board and others) b) by-products (lignin, cellulose, heat and others) c) waste (wood waste, used wood – classification see annex) 20.2. Recovery in total FWC and by sub-sector classified by: a) wood products (residues, paper, paper board and others) b) by-products (lignin, cellulose, heat and others) c) waste (wood waste, used wood – classification see annex)
Measurement units:	20.1.a,b,c – 20.2.a,b,c) Million tonnes per reference unit (t.b.d.)
Potential future data provider (international):	CEPI CEI-Bois European Panel Federation European Topic Centre on Waste and Material Flows (ETC/WMF)
Potential future data provider (national)	National ministry of environment, National Statistics Office (?)
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	*LI20 Share of recycled material in process inputs*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above October 2006:	20.1. Share of recycled material in process input within each Module (M2-M5) classified by volume **(LI 20)**
Measurement units:	20.1. in % of total volume per reference unit (t.b.d.)
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Comments:	According to the definition recycling is a special case of material recovery; the link to the process is only feasible when indicator assesses share of recycled / recovered material for the inputs of the process
Comments by EFORWOOD experts to Indicator draft Set3	WP1.4: It might be better to name this indicator as "share of recycling input" (*WP 1.1. why? That is the only connection that we see to the processes. Otherwise it is the material flow in the different waste treatment options of multiple FWCs.)* For M3 non-relevant indicator *(WP1.1. ok)* M5: Recycling and recovery are handled as processes in ToSIA, hence, is there a need for a special indicator? Will this not be calculated by ToSIA? *(WP1.1. data need to collected nonetheless)*
Comments by Stakeholders to Indicator draft Set3	

Key definitions:

Recovery is defined as any waste management operation that diverts a waste material from the waste stream and which results in a certain product with a potential economic or ecological benefit. Recovery mainly refers to the following operations:

- material recovery, i.e. recycling
- energy recovery, i.e. re-use a fuel
- biological recovery, e.g. composting
- re-use

Direct recycling or reuse within industrial plants at the place of generation is excluded. (Eurostat / OECD Definition)

Recycling is defined as any reprocessing of material in a production process that diverts it from the waste stream, except reuse as fuel. Both reprocessing as the same type of product, and for different purposes should be included. Direct recycling within industrial plants at the place of generation should be excluded. (Eurostat / OECD Definition)

Re-use shall mean any operation by which end of life products and equipment (e.g. electrical and electronic equipment) or its components are used for the same purpose for which they were conceived. Direct reuse at the place of generation (i.e. establishment) is excluded. (Eurostat / OECD Definition)

Groups of recovered paper grades according to the EN 643 European Lit of Standard Grades of Recovered Paper and Board (see CEPI)

4.2 General Whole Chain Environmental indicators

(21) Emissions to soil, water and air

Full name of indicator (including subclasses):	Emission to soil, water classified by organic substances, nutrients and hazardous substances and air classified by SO2, NOX, CO, N2O, CH4 and NMVOC
General FWC sustainability indicator subclasses:	21.1. Emission to soil in total FWC and by sub-sector 21.2. Emission to water in total FWC and by sub-sector classified by a) organic substances (biochemical oxygen demand) b) nutrients (nitrogen, phosphorus) c) hazardous substances 21.3. Emissions to air in the total FWC and by sub-sector classified by SO2, NOX, CO, N2O, CH4 and NMVOC
Measurement units:	21.1) g/l per reference unit (t.b.d.) 21.2.a – 21.2.c) g/l water per reference unit (t.b.d.) 21.3) per ktonnes per reference unit (t.b.d.)
Potential future data provider (international)	European Commission, Eurostat (IPC Forest) European Environment Agency; Joint Research Centre (JRC) (EUSIS-European Soil Information System) UNECE Convention on Long-range Transboundary Air Pollution (CLRTAP)
Potential future data provider (national)	National Ministry of Environment; National Environmental Agency, National Statistics Office (?)
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	*Nothing specified*
Proposed ToSIA version 2: has been modified because of consistency reasons with set above October 2006:	Moved from indicator 18: 21.2. Water pollution by processes within each Module (M2-M5) classified by: a) organic substances (biochemical oxygen demand) **(LI 18b)** b) nutrients (nitrogen, phosphorus) **(LI 18c)** c) hazardous substances **(LI 18d)**
Data provider (regional – case studies):	Data needs to be provided by each Module for each process defined for the three test-chains
Measurement units	21.2.a – c) g/l water per reference unit (t.b.d.)
Comments:	
Comments by EFORWOOD experts to Indicator draft Set3	M2: Soil condition (WCI 21). As noted above we have doubts about the availability of forest soil data to cover the main timber producing areas in the EU of 25. We don't think that providing estimates of e.g. erosion by process is feasible. We would advise reducing this to a module 2 and 3 specific indicator, possibly using data from case study forests *(WP1.1. ok, soil condition will be moved to module specific indicators)*

	M3: measurement units: *(WP1.1. have been updated accordingly)* a) kg, C/N ratio iones, moles/liter, NB subclasses b) pH classes and % c) ? g/l water d) ?g/l water M3 generally: Very difficult to get data; c) no data for contamination; d) proposal: sites that risk of erosion (unit: ha) *(WP1.1. indicator has become a module specific indicator – comment needs to be taken up in that list)* Rasmussen for water: include new subclass in water pollution: (d) sinks and sources at ecosystem level: retention of N (input – output to water) and leaching of N (nitrate) to water (output); Motivation: Forests are a major sink for air pollution N in Europe. It is an important unaccounted product / benefit from forests. This also to clarify that much of the output on N from forests actually originates from pollution. The N deposition (input) field for Europe and regionally is available from EEA and UN-ECE and there are models (dynamic as well as empirical) available on European and regional level that can estimate the output of N from the ecosystem. *(WP1.1. to specific, would like to refer this to the list of module specific indicators)* M3: These emissions forms impact categories that are of value for the interpretation of environmental impact. Green house gases form GWP, other emissions form Regional impacts – Acidification, Photo-oxidant formation and Eutrophication. These impacts are dominantly formed by the use of fuel driven vehicles in forests or on road and the regional impacts might be of importance in Central Europe in densely populated areas during summer days (Photo – oxidant ormation). These are of consequence for especially for M3 and M4. and should be reported by them. *(WP1.1.comment refer to previous air indicator, that has been changed now)* M5: Too many subclasses. CO2 should be covered by 16. Data availabilioty problems. *(WP1.1.comment refer to previous air indicator, that has been changed now; CO^2 has been removed as it is covered by Ind.16))*
Comments by Stakeholders to Indicator draft Set3	CEPI: depends on how to measure the positive points / functions of the forests *(WP1.1. comment refers to soil and need to be taken up when discussing the module specific indicators)* CEPI: need for clear boundaries *(WP1.1 comments refers to air indicator; this is important for all indicators)*

Key definitions:

Water pollution: presence in water of harmful and objectionable material – obtained from sewers, industrial wastes and rainwater run-off – in sufficient concentrations to make it unfit for use.

Soil pollution: Modifications of soil features or, more generally, of its chemical and biological balance, caused by the discharge of polluting substances.

(22) Emissions to air – has been deleted (air emissions moved to Ind.21)

(23) Tree species composition (Indicator Naturalness has been substituted by a new one)

Full name of indicator (including subclasses):	Area of forest and other wooded land classified by number of tree species occurring and by forest type
General FWC sustainability indicator subclasses:	22.1. Area of forest in total FWC and by sub-sector for classified by: a) number of tree species occurring b) forest types - predominantly conifers - predominantly broadleaved - mixed types 22.2. Area of other wooded land in total FWC and by sub-sector classified by: a) number of tree species occurring b) forest types - predominantly conifers - predominantly broadleaved - mixed types
Measurement units:	22.1.a & 22.1.b – 22.2.a & 22.2.b) total number per 1000 ha per reference unit (t.b.d.)
Potential future data provider (international)	European Environmental Agency (EEA) UNECE / FAO Berne Convention data Council of Europe: EMERALD data UNEP
Potential future data provider (national)	National Environmental Agency, National Ministry of Environment
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	NOT INCLUDED
Comments:	
Comments by EFORWOOD experts to Indicator draft Set3	M2: Naturalness (whole chain indicator (WCI) 23). We all have some doubts about the usefulness of this and particularly the extent to which the classifications/categories are transnational. For instance Scots pine forests in Scandinavia managed for timber will probably be classed as 'semi-natural' while stands of the same species of the same age in parts of Scotland would be classed as 'plantations'. However, their impact upon environmental aspects could well be similar? If only one general FWC indicator is chosen for biodiversity, tree species composition (MCPFE Vienna C41.) would be prefereable, however this needs to be completed by module specific indicators on biodiversity *(WP1.1. we agree)* M5: not applicable
Comments by Stakeholders to Indicator draft Set3	CEPF: classification needs to be modified *(WP1.1. has been modified)* Not measurable. Alternative based on forest area by type in

	combination with population trend of selected indicator species *(WP1.1. we used tree species composition MCPFE Ind.4.1.)* Add. Com: Naturalness is difficult issue; suggested an alternative – area of forest types and quality of species data is certainly available *(WP1.1. we used tree species composition MCPFE Ind.4.1.)*

(24) Corporate responsibility

Full name of indicator (including subclasses):	Consumption of goods and services from certified or verified sources including legal origin and enterprises with environmental management systems
General FWC sustainability indicator subclasses:	23.1. Goods and services in total FWC and by sub-sector classified by: a) certified source b) verified source c) legal origin d) other 23.2. enterprises with environmental management system in total FWC and by sub-sector
Measurement units:	23.1.a – d) ktonnes per reference unit (t.b.d.) 23.2. total number per reference unit (t.b.d.)
Potential future data provider (international)	UNECE, others?
Potential future data provider (national)	ISO certified enterprises, communes and county boards; etc; national Ministry of Economics; national Ministry of Forestry
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	NOT INCLUDED
Comments:	
Comments by EFORWOOD experts to Indicator draft Set3	M3: A renewable source is a quality of its own, but it could be over utilized. Certified is a higher quality. These two suggested levels are therefore relevant *(WP1.1. we agree)* M5: Remove “renewable” in description. This is just one aspect of responsible sourcing. Suggested definition of subclass: “Products from certified or verified source” (*WP1.1. we agree)*
Comments by Stakeholders to Indicator draft Set3	Legal origin equally important, rather than renewable –> sustainability *(WP1.1. important issue)*

(25) Generation of waste

Full name of indicator (including subclasses):	Generation of waste classified by type
General FWC sustainability indicator subclasses:	24.1.Generation of waste in total FWC and by sub-sector classified by type of waste: i. municipal solid waste ii. industrial waste iii. hazardous waste
Measurement units:	24.1) ktonnes per reference unit (t.b.d.)
Potential future data provider (international)	Eurostat European Topic Centre on Waste and Material Flows (ETC/WMF)
Potential future data provider (national)	ISO certified enterprises, communes and county boards etc.
Comment	Values of subclasses will be calculated / aggregated; no data collection is planned at this stage
EFORWOOD ToSIA data collection:	NOT INCLUDED
Comments:	
Comments by EFORWOOD experts to Indicator draft Set3	M5: Suggest that subclass "solid waste" is changed to MSW (Municipal Solid Waste) to avoid overlap with Industrial waste.*(WP 1.1. included)*
Comments by Stakeholders to Indicator draft Set3	CEPI: clarification about waste definition, residues etc. *(WP1.1. definitions are included below; see also list of waste as defined by Commission decision)*

Waste classification according to: Commission decision: 2000/532/EC of 16 January 2001

List of waste: http://europa.eu.int/eur-lex/en/consleg/pdf/2000/en_2000D0532_do_001.pdf

Key definitions

Waste refers to materials that are not prime products (i.e. products produced for the market) for which the generator has no further use for own purpose of production, transformation or consumption, and which he discards, or intends or is required to discard. Waste may be generated during the extraction of raw materials during the processing of raw materials to intermediate and final products, during the consumption of final products, and during any other human activity. Excluded in this definition are:
- Residuals directly recycled or reused at the place of generation (i.e. establishment);
- Waste materials that are directly discharged into ambient water or air. (Eurostat / OECD definition)

Hazardous waste refers to the categories of waste to be controlled according to the Basel Convention on the control of transboundary movements of hazardous waste and their disposal (Article 1 and Annex I). (Eurostat / OECD definition)

Industrial wastes are liquid, solid and gaseous wastes originating from the manufacture of specific products. (OECD definition)

Solid waste is useless and sometimes hazardous material with low liquid content. Solid wastes include municipal garbage, industrial and commercial waste, sewage sludge, wastes resulting from agricultural and animal husbandry operations and other connected activities, demolition wastes and mining residues. (OECD definition)

5 Indicators under consideration

5.1 Economic indicators

(26) Compliance costs

Full name of indicator:	Compliance costs (red-tape related costs)
accept or reject? (Modules answer)	Rejected by M3 and M4; M5 has doubts about measurability
New suggestion of WP1.1.	move to a list of qualitative indicators

5.2 New economic indicator under consideration

(9) Revenue

Full name of indicator:	Gross and net revenue
General FWC sustainability indicator subclasses:	9.1. goods and services (see classification in the annex) in total FWC and by sub-sector classified by value
Measurement units:	9.1.a) Euro (million)
Comments by EFORWOOD experts to Indicator draft Set3	M4: wants to delete the indicator
Comments by Stakeholders to Indicator draft Set3	CEPI: revenue = profit? Clarification needed CEI-Bois: same comment -> profitability ENFE: players share of added value
Request of WP1.1.	As we have some overlapping with the Indicator 1) Gross value added and gross domestic product, the indicator 9 was moved to the list of indicators under consideration; please vote and comment

Modules	include	exclude	Comments
M2			
M3			
M4			
M5			

New indicator (30) Increment and fellings

Full name of indicator:	Balance between net annual increment and annual fellings of wood on forest available for wood supply
General FWC sustainability indicator subclasses: **(MCPFE)**	30.1. Forest available for wood supply classified by a) net annual increment b) annual fellings
Measurement units:	30.1.a – 30 .1.b) 1000m³ (is measured over bark) per reference unit (t.b.d.)

Modules	include	exclude	Comments

M2			
M3			
M4			
M5			

5.3 Social indicators

(27) Governance and capacity building

Full name of indicator:	**Governance and capacity building**
Accept or reject?	M2 and M3 support indicator (maybe with some further elaboration); M5 has doubts about its measurability
Comments by Stakeholders to Indicator draft Set3	CEPI: something about product safety? FACE: interesting needs more clarification CEPF Ind 27 as 'governance and capacity building' we would support that if this is behind that indicators; it's also on property rights – should be included and reflected
Suggestion of WP1.1.	We would suggest to rename the indicator previously suggested under the heading "Community participation and service provision" into "governance and capacity building" and move this indicator to a list of qualitative indicators as community and social issues are very important

(28) Corporate management systems in

(it has been included in Indicator 24)

5.4 New social indicator under consideration

(14) Quality of employment (moved to under consideration)

Full name of indicator (including subclasses):	Number of persons employed classified by skills, type of employment and equality of treatment
General FWC sustainability indicator subclasses:	14.1. Persons employed in total FWC and by sub-sector classified by: a) skills i. low skilled workers ii. high skilled workers b) type of employment i. direct employment ii. indirect employment c) equality of treatment
Measurement units:	14.1.a – 14.1.c) absolute number (in full-time equivalents) per reference unit (t.b.d.)
Potential future data provider (international):	Eurostat - Social Statistics - Community Labour Force Survey

EFORWOOD ToSIA data collection: **Proposed version 1: September 2006**	NOT INCLUDED
Comments:	
Comments by EFORWOOD experts to Indicator draft Set3	M5: Questionable. What does it bring on top of 10,11 and 13
Comments by Stakeholders to Indicator draft Set3	CEPI: definition? Qualitative indicator? EUSTAFOR: How is the quality of employment defined (gender, age class –> do this indicators really say something about quality?) -> could be integrated into indicators 11-13 ENFE: research into quality of work, criteria required; description given is not sensible (redundant to indicator 10)
WP1.1. suggestion	We would suggest to move it As we have some overlapping with the Indicator 10) the indicator 14 was moved to the list of indicators under consideration; We suggest to rename and call it 'Quality of work'; furthermore we suggest to move it to a list of qualitative indicators please vote and comment

Modules	include	exclude	Comments
M2			
M3			
M4			
M5			

New indicator (31) Recreational use of forests (new)

Full name of indicator:	Recreational use of forests
initiated by	Stakeholder Panel (September 13th, Kerkrade NL)
WP 1.1. suggestion:	We suggest to include this new indicator "recreational use of forest in the set of environmental indicators Please vote and comment

Modules	include	exclude	Comments
M2			
M3			
M4			
M5			

New indicator (32) Consumer attitudes on forest management, forestry and forest products

Full name of indicator:	Public opinion /consumer attitudes on forest management, forestry, and forest products
initiated by	Stakeholder Panel (September 13th, Kerkrade NL)

WP.11.	We suggest to include this new indicator in the set of environmental indicators Please comment and vote		
Modules	include	exclude	Comments
M2			
M3			
M4			
M5			

5.5 Environmental indicators

(29) Use of hazardous chemicals

Full name of indicator:	Index of consumption of chemicals by toxicity class (N, T and T+)
initiated by	By M5
Comment by WP 1.1.	Support the idea
Comments by EFWORWOOD experts	M2: Hazardous chemicals (WCI 29). We like the idea of estimating the use of chemicals within the chain and note that reduction of the use of chemicals is something urged and monitored (at least to some degree) under our FSC accredited forest certification scheme.
Comments by Stakeholders to Indicator draft Set3	CEPI: for paper industry already a lot of legislation in place: REACH etc.; indicator not necessary CEI-BOIS: state of the end should be taken into consideration; classification is not certain: a lot of discussions in the field are going on CEI-BOIS: Ind 29 I would prefer from an industrial point of view not to address it as it is not clear what is toxic and what is not; standardisation process is on-going and not addressing characteristics of the wood products – too critical to be addressed as you can easily address the wrong ones:
accept or reject?	M2, M3 and M5 support indicator; M5 suggests as a measurement unit: weight, e.g. kg
WP1.1. request:	Further discussion needed, please indicate your opinion on how to proceed with this indicator

6 Annex 1: Processes defined for the three test chains

A regional-defined spruce chain (Baden-Württemberg)
Module 2 processes – Forest resources management
Stage1: Regeneration
Process1a: Weed control in planted spruce forest
Process1b: Development of planted spruce stand in regeneration phase
Process1c: Natural regeneration of spruce
Process1d: Weed control in naturally regenerated spruce forest
Process1e: Development of naturally regenerated spruce stand in regeneration phase
Process1f: Regeneration of spruce with planting
Stage2: Young
Process2a: Development of naturally regenerated spruce stand in young phase
Process2b: Development of planted spruce stand in young phase
Process2c: Precommercial thinnings in naturally regenerated spruce forest
Stage3: Medium
Process3a: Development of planted spruce stand in medium phase
Process3b: Development of naturally regenerated spruce stand in medium phase
Stage4: Adult
Process4a: Development of naturally regenerated spruce stand in adult phase
Process4b: Development of planted spruce stand in adult phase
Module 3 processes – Forest to industry interactions
Stage1: Harvesting
Process1a: Thinnings in naturally regenerated spruce forest
Process1b: Thinnings in planted spruce forest
Process1c: Precommercial thinnings in planted spruce forest
Stage2: Forwarding
Process2a: Forwarding with medium forwarder
Process2b: Skidding with double-winch wheel skidder
Stage 3: Transport
Process3a: Transport by truck for long timber with crane
Process3b: Transport by truck for short timber with crane
Stage4: Mill gate
Process4a: Final measuring and sorting
Module 4 processes – Processing and manufacturing
Stage1: Sawmilling
Process1a: Saw milling

Stage2:Industrial Transformation
Process2a: Timber frame construction
Module 5 processes – Industry to consumer interactions
Stage1: Distribution channels
Process1a: Transportation to wholesaler
Stage2: Consumption
Process2a: House construction with timber frame
Process2b: Transportation to building site
A product defined fine paper, newspaper chain mainly based on eucalyptus and including recycling
Module 2 processes – Forest resources management
Stage1: Regeneration
Process1a: Application of fertilizers and thinning of eucalyptus saplings on second and third coppice rotation
Process1b: Development of planted eucalyptus stand in regeneration phase
Process1c: Site preparation, weed control and planting of eucalyptus
Process1d:Development of coppiced eucalyptus stand in regeneration phase
Stage2: Young
Process2a: Development of coppiced eucalyptus stand in young phase
Process2b: Weed controls in planted eucalyptus stand
Process2c: Weed controls and fertilization of planted eucalyptus stand in young phase
Process 2d: Development of planted eucalyptus stand in young phase
Stage3: Medium
Process3a: Development of planted eucalyptus stand in medium phase
Process3b: Development of coppiced eucalyptus stand in medium phase
Module 3 processes – Forest to industry interactions
Stage1: Harvesting
Process1a: Harvesting of eucalyptus with small single-grip harvester
Stage2: Forwarding
Process2a: Forwarding by medium forwarder
Stage3: Transport
Process3a: Transport by truck with crane
Stage4: Mill gate
Process4a: Final measuring, grading and sorting
Module 4 processes – Processing and manufacturing
Stage1: Integrated Pulp and Paper milling
Process1a: Integrated pulp and paper production
Stage2: Recycling

Process2a: Pulping (de-inking) and newsprint production from recovered fibres
Module 5 processes – Industry to consumer interactions
Stage1: Distribution channels
Process1a: Whole sale distribution of fine paper
Process1b: Transportation of newsprint
Stage2: Industrial transformation
Process2a: Office printing laser b/w
Process2b: Distribution of newspaper to subscribers
Stage3: Use
Process3a: Information - use
Process3b: Information/ entertainment - use of newspaper
Stage4: Recovery logistics
Process4a: Non -separate collection of used paper
Process4b: Waste management of used paper
Process4c: Multi material collection and sorting
Process4d: Separate collection and sorting
Process4e: Transportation of recovered paper
A forest-defined pine chain in Scandinavia for furniture and bio-energy
Module 2 processes – Forest resources management
Stage1: Regeneration
Process1a:
Process1b:
Stage2: Young
Process2a: Development of planted pine stand in young phase
Stage3: Medium
Process3a: Development of planted pine stand in medium phase
Stage4: Adult
Process4a: Development of planted pine stand in adult phase
Module 3 processes – Forest to industry interactions
Stage1: Harvesting
Process1a: Harvesting, clear cut of planted pine stand
Process1b: Thinning of planted pine stand
Process1c: Pre-commercial thinning of planted pine stand
Stage2: Forwarding
Process2a: Forwarding of pine after thinning
Process2b: Forwarding of pine after final felling
Stage3: Transport

Process3a:Transport of pine logs
Module 4 processes – Processing and manufacturing
Stage1: Sawmilling
Process1a: Timber conversion (pine) at saw mill
Stage2: Manufacturing
Process2a: Production of chair components from pine wood
Process2b: Chair production from pine wood
Process2c: Pellet production from pine wood residues
Module 5 Industry to consumer interactions
Stage1: Waste management
Process1a: Ash disposal to the landfill
Stage2: Transport
Process2a: Transportation of chair to wholesaler
Process2b: Transportation of chair to retail
Stage3:Utilization
Process3a: Using the chair
Process3b: Consumption, energy heat production

7 Annex II Classifications

7.1 Sector Classes

Selected List and corresponding ISIC-Classes (see ISIC Rev.3-http://unstats.un.org/UNSD/cr/registry/-regcst.asp?Cl=2)

NACE -- Classification of Economic Activities in the European Community
ISIC -- International Standard Industrial Classification of all Economic Activities

NACE	DESCRIPTION	ISIC
A	Agriculture, hunting and forestry	
01	Agriculture, hunting and related service activities	
01.12	Growing of vegetables, horticultural specialities and nursery products	0112
01.13	Growing of fruit, nuts, beverage and spice crops	0113
02	Forestry, logging and related service activities	
02.0	Forestry, logging and related service activities	020
02.01	Forestry and logging	0200x
02.02	Forestry and logging related service activities	0200x
19.30	Manufacture of footwear	1920
DD	Manufacture of wood and wood products	
20	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	
20.1	Sawmilling and planing of wood; impregnation of wood	201
20.10	Sawmilling and planing of wood; impregnation of wood	2010
20.2	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards	202x
20.20	Manufacture of veneer sheets; manufacture of plywood, laminboard, particle board, fibre board and other panels and boards	2021
20.3	Manufacture of builders carpentry and joinery	202x
20.30	Manufacture of builders carpentry and joinery	2022
20.4	Manufacture of wooden containers	202x
20.40	Manufacture of wooden containers	2023
20.5	Manufacture of other products of wood; manufacture of articles of cork, straw and plaiting materials	202x
20.51	Manufacture of other products of wood	2029x
20.52	Manufacture of articles of cork, straw and plaiting materials	2029x
DE	Manufacture of pulp, paper and paper products; publishing and printing	
21	Manufacture of pulp, paper and paper products	
21.1	Manufacture of pulp, paper and paperboard	210x
21.11	Manufacture of pulp	2101x
21.12	Manufacture of paper and paperboard	2101x
21.2	Manufacture of articles of paper and paperboard	210x
21.21	Manufacture of corrugated paper and paperboard and of containers of paper and paperboard	2102
21.22	Manufacture of household and sanitary goods and of toilet requisites	2109x
21.23	Manufacture of paper stationery	2109x
21.24	Manufacture of wallpaper	2109x
21.25	Manufacture of other articles of paper and paperboard n.e.c.	2109x
22	Publishing, printing and reproduction of recorded media	
22.1	Publishing	221
22.11	Publishing of books	2211
22.12	Publishing of newspapers	2212x
22.13	Publishing of journals and periodicals	2212x

22.14	Publishing of sound recordings	2213
22.15	Other publishing	2219
22.2	Printing and service activities related to printing	222
22.21	Printing of newspapers	2221x
22.22	Printing n.e.c.	2221x
22.23	Bookbinding	2222x
22.24	Pre-press activities	2222x
28.52	General mechanical engineering	2892x
28.6	Manufacture of cutlery, tools and general hardware	289x
28.61	Manufacture of cutlery	2893x
28.62	Manufacture of tools	2893x
29.3	Manufacture of agricultural and forestry machinery	292x
29.32	Manufacture of other agricultural and forestry machinery	2921x
29.55	Manufacture of machinery for paper and paperboard production	2929x
DN	Manufacturing n.e.c.	
36	Manufacture of furniture; manufacturing n.e.c.	
36.1	Manufacture of furniture	361
36.11	Manufacture of chairs and seats	3610x
36.12	Manufacture of other office and shop furniture	3610x
36.13	Manufacture of other kitchen furniture	3610x
36.14	Manufacture of other furniture	3610x
36.2	Manufacture of jewellery and related articles	369x
36.22	Manufacture of jewellery and related articles n.e.c.	3691x
36.3	Manufacture of musical instruments	369x
36.30	Manufacture of musical instruments	3692
36.4	Manufacture of sports goods	369x
36.40	Manufacture of sports goods	3693
36.5	Manufacture of games and toys	369x
36.50	Manufacture of games and toys	3694
36.6	Miscellaneous manufacturing n.e.c.	369x
36.62	Manufacture of brooms and brushes	3699x
36.63	Other manufacturing n.e.c.	3699x
37	Recycling	
37.2	Recycling of non-metal waste and scrap	372
37.20	Recycling of non-metal waste and scrap	3720
E	Electricity, gas and water supply	
40.11	Production of electricity	4010x
F	Construction	
45	Construction	
45.1	Site preparation	451
45.22	Erection of roof covering and frames	4520x
45.43	Floor and wall covering	4540x
51	Wholesale trade and commission trade, except of motor vehicles and motorcycles	
51.13	Agents involved in the sale of timber and building materials	5110x
51.15	Agents involved in the sale of furniture, household goods, hardware and ironmongery	5110x
51.53	Wholesale of wood, construction materials and sanitary equipment	5143x
52.44	Retail sale of furniture, lighting equipment and household articles n.e.c.	5233x
I	Transport, storage and communication	
60	Land transport; transport via pipelines	
60.1	Transport via railways	601
60.10	Transport via railways	6010
60.2	Other land transport	602
60.21	Other scheduled passenger land transport	6021

60.24	Freight transport by road	6023
60.3	Transport via pipelines	603
60.30	Transport via pipelines	6030
61	Water transport	
61.1	Sea and coastal water transport	611
61.10	Sea and coastal water transport	6110
61.2	Inland water transport	612
61.20	Inland water transport	6120
62	Air transport	
62.1	Scheduled air transport	621
62.10	Scheduled air transport	6210
62.2	Non-scheduled air transport	622x
62.20	Non-scheduled air transport	6220x
63	Supporting and auxiliary transport activities; activities of travel agencies	
63.1	Cargo handling and storage	630x
63.11	Cargo handling	6301
63.12	Storage and warehousing	6302
63.2	Other supporting transport activities	630x
63.21	Other supporting land transport activities	6303x
63.22	Other supporting water transport activities	6303x
63.23	Other supporting air transport activities	6303x
73	Research and development	
73.1	Research and experimental development on natural sciences and engineering	731
73.10	Research and experimental development on natural sciences and engineering	7310
73.2	Research and experimental development on social sciences and humanities	732
73.20	Research and experimental development on social sciences and humanities	7320
M	Education	
80	Education	
80.1	Primary education	801
80.10	Primary education	8010
80.2	Secondary education	802
80.21	General secondary education	8021
80.22	Technical and vocational secondary education	8022
80.3	Higher education	803
80.30	Higher education	8030
80.4	Adult and other education	809
80.41	Driving school activities	8090x
80.42	Adult and other education n.e.c.	8090x
O	Other community, social and personal service activities	
90	Sewage and refuse disposal, sanitation and similar activities	
90.0	Sewage and refuse disposal, sanitation and similar activities	900
90.01	Collection and treatment of sewage	9000x
90.02	Collection and treatment of other waste	9000x
90.03	Sanitation, remediation and similar activities	9000x
91	Activities of membership organizations n.e.c.	
91.1	Activities of business, employers and professional organizations	911
91.11	Activities of business and employers organizations	9111
91.12	Activities of professional organizations	9112
91.2	Activities of trade unions	912
91.20	Activities of trade unions	9120
91.3	Activities of other membership organizations	919
91.31	Activities of religious organizations	9191
91.32	Activities of political organizations	9192

91.33	Activities of other membership organizations n.e.c.	9199
92.52	Museums activities and preservation of historical sites and buildings	9232
92.53	Botanical and zoological gardens and nature reserves activities	9233

7.2 Raw material classification

(1) round wood
- industrial wood in the rough (saw logs and veneer logs, pulpwood (round and split), others)
- wood fuel

(2) wood-based panels
- plywood
- particle board, especially oriented strand board (OSB)
- fibreboard
- veneer sheets

(3) wood pulp (mechanical, semi-chemical, chemical, dissolving grades)

(4) other pulp
- pulp from fibres other than wood
- recovered fibre pulp

(5) paper and paperboard
- newsprint
- printing and writing papers (uncoated mechanical; coated mechanical; coated woodfree ; uncoated woodfree)
- tissue
- case materials (kraftliner, testliner, fluting medium)
- carton-boards (SBS, FBB, WLC, LPB)
- wrappings (sackkraft);
- specialised papers (other)

(6) secondary materials
- building elements (windows, roof trusses, doors, flooring)
- packaging: wooden pallets
- recovered paper

(7) others (WP1.1.could be further defined by modules)

7.3 Products classification

Goods:

(1) round wood
- industrial wood in the rough (saw logs and veneer logs, pulpwood (round and split), others)
- wood fuel

(2) wood-based panels
- plywood
- particle board, especially oriented strand board (OSB)
- fibreboard
- veneer sheets

(3) wood pulp (mechanical, semi-chemical, chemical, dissolving grades)

(4) other pulp
- pulp from fibres other than wood
- recovered fibre pulp

(5) paper and paperboard
- newsprint
- printing and writing papers (uncoated mechanical; coated mechanical; coated woodfree ; uncoated woodfree)
- tissue
- case materials (kraftliner, testliner, fluting medium)
- carton-boards (SBS, FBB, WLC, LPB)
- wrappings (sackkraft);
- specialised papers (other)

(6) secondary materials
- building elements (windows, roof trusses, doors, flooring)
- packaging: wooden pallets
- recovered paper

(7) others (WP1.1.could be further defined by modules)

Engineered products including wood composits

Non-wood goods:

-
- Christmas trees (1000ps) (tonnes)
- Mushrooms and truffles (tonnes)
- Fruits, berries and edible nuts (tonnes)
- Cork (tonnes)
- Resins, raw material: medicine, arom. products, colorants, dye (tonnes)
- Decorative foliage, incl. ornamental plants (mosses,..) (tonnes)
- Other plant products (tonnes)
- Game meat (tonnes)
- Game harvest (1000)
- Pelts, hides, skins and trophies (1000)
- Wild honey and bee-wax (tonnes)
- Raw material for medicine, colorants (tonnes)
- Other animal products (tonnes)

Services (from forests)

Recreational services
- Environmental services
- Protective services
- Other services

7.4 Educational categories

See: http://forum.europa.eu.int/irc/dsis/employment/info/data/eu_lfs/F_LFS_STATISTICAL_CLASSIFICATIONS.htm

0= not completed primary education
1= primary or first stage of basic education
2= lower secondary or second stage of basic education
3= upper secondary education
4= post secondary, non tertiary education
5= first stage of tertiary education
6= second stage of tertiary education

7.5 Wood waste

according to REGULATION (EC) No 2150/2002 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 25 November 2002 on waste statistics

07.5 Wood wastes
07.51 Wood packaging
- Non-hazardous
- wooden

07.52 Sawdust and shavings
- Non-hazardous

- sawdust
- shavings, cuttings, spoiled timber/particle board/veneer

07.53 Other wood wastes

- Non-hazardous
- waste bark and cork
- bark
- wood