



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 PD4.0.2
Intermediate Management Report

Due date of deliverable: Month 18

Actual submission date: Month 27

Start date of project: 011105

Duration: 4 years

Organisation name of lead contractor for this deliverable: KCPK

Final version

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including the Commission Services)	X
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)	

Executive summary

This intermediate management report (PD 4.0.2) follows the annual management report that was published at the end of 2006 (D 4.0.1). This report will give an overview of activities in Module 4 over the last 6 months, included are some backgrounds, M4 approach and M4 results, threats and opportunities, conclusions and further steps.

We can conclude that the activities in Module 4 have been very much in line with the developments in EFORWOOD and the development of ToSIA in particular. The way the work in Module 4 is organised fits the ToSIA structure. Work in the various work packages had been progressing according to plan, although work in WP 4.4. is a little behind.

Module 4 has some serious concerns about the current focus in the project and how this will influence the end results. The goal of the project (SA or SIA?) remains unclear and current developments in the project appear to focus on both. Module 4 sees as a threat that too much effort is put on data collection in 2005, that will soon be outdated anyhow, and too less on the expected developments in the FWC and on how these will effect the future sustainability (response functions). Besides, the main aim of EFORWOOD is to analyse how several scenarios (e.g. policy changes) affect the sustainability of the FWC, both now, in the future and in different areas and Module 4 believes that the number of scenario's currently proposed is very limited.

Module 4 will proceed with its activities according to plan (13-30 months plan) and keeps striving towards an equal balance between current data collection, industrial dynamics, technological developments, analysis of current policies and scenarios.

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1 Introduction

This intermediate management report (PD 4.0.2) follows the annual management report that was published at the end of 2006 (D 4.0.1). This report will give an overview of activities in Module 4 over the last 6 months, included are background, approach and results, threats and opportunities, conclusions and further steps.

2 Background

From the DoW and the updated 13-30 months plan we recapture the objectives and goals of the EFORWOOD project since the specific goals of Module 4, as described in the DoW and the updated 13-30 months plan, should help to contribute towards the overall goals of the project and the development of ToSIA.¹

The **main objective** of EFORWOOD is to develop a tool for Sustainability Impact Assessment (SIA) of FWCs 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 a wood-based product. EFORWOOD shall produce, as an output, a tool, which will allow analysis of Sustainability Impacts (SI) of existing and future FWCs. (...) The project will provide methods to assess the sustainability impacts of modifications of FWCs as influenced by policy changes, market drivers, or technological innovations.

From the above we can summarize that the EFORWOOD project aims towards a tool that allows the assessment of sustainability impacts of modifications, influenced by policy changes, market drivers, or technological innovations, (scenarios) on the current and future FWCs.

To obtain this goal we need to:

- Define the indicators to measure sustainability impacts
- Define the FWCs (80-90 % of the material flows at regional and European level according to DoW)
- Define the current (2005) status of the FWCs in terms of sustainability
- Estimate the future (2015, 2025) status of the FWCs in terms of sustainability
- Identify scenarios to be investigated
- Analyse the potential impact of the scenarios on the current and future statuses of the FWCs in term of sustainability

2.1 ToSIA setting the structure

ToSIA consists of a static database that adds up data-values of indicators along a FWC chain. However, ToSIA will also be able to predict effects of internal (technological developments) and external drivers (policies, trends) on the sustainability of FWCs.

In principal ToSIA considers SIA as follows:

Sustainability impacts = scenario sustainability – baseline sustainability

where

¹ Besides that, extra models or tools could be developed in Module 4 for use outside ToSIA to back-up choices made within Eforwood or for direct use by industry.

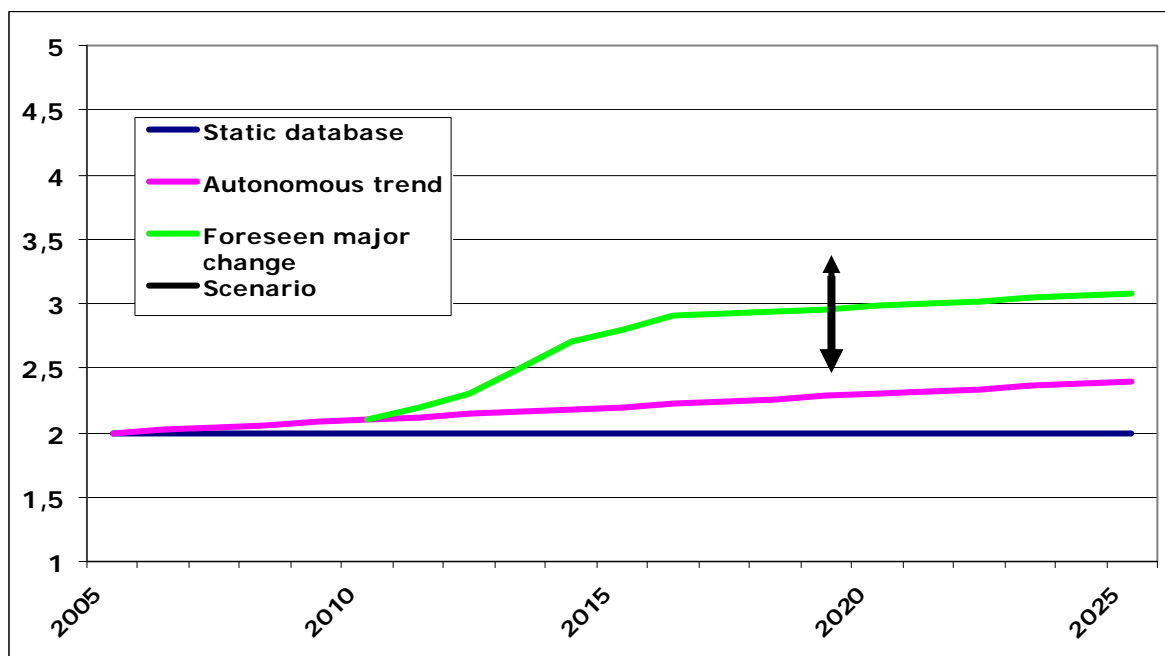
scenario sustainability = static database * autonomous trend factor* foreseen major changes * scenarios²

and

baseline sustainability = Static database * autonomous trend factor* foreseen major changes

Static database refers to sustainability indicator data in the ToSIA reference year (2005)

Autonomous trend factor represents the change in data over the years without major changes in technology, economy etc. because of continuous *evolutionary changes*. Foreseen major changes represents the impact of expected technology and policy developments, product demands etc. within the value chains (*major changes*). Scenario's represents the impact of all new policies, economic changes, etc. which are beyond the "foreseeable" changes on the sustainability of the current and future FWC. They deal with the so called "what if" questions. (*Radical changes*).



EFORWOOD will define and study a limited number of scenarios which will be applied consistently through-out the FWC. The scenarios will be specified with detailed storylines, characterising the underlying assumptions of the scenarios about the development of key variables, both environmental (e.g. climate conditions) and socio-economic (e.g. GDP development, energy prices, wood product demand). The final selection of scenarios will be made after extensive stakeholder, including the EC, consultations.

² The exact naming and definitions of these factors is foreseen after cross-module discussions in the upcoming months 13-30. Changes are therefore possible.

3 Approach: ToSIA setting the structure for Module 4

Module 4 focuses on manufacturing and processing of forest-based raw materials, from entering the industrial processes until material changes from being a commodity and becomes a specific material or a component to be used by a consumer or an input product for another processing section. This module also includes re-use and recycling of recovered products. Processes considered include wood based production (most relevant products are sawn wood, panels, and engineered wood), fibre-based production (most relevant products are graphical paper, newsprint, board boxes, liquid board, fibre panels etc.) and biomass-energy generation (input: forest residue, wood residue within the forest industry, paper in municipal solid waste, output: heat, steam, electricity, wood-based fuels).

The objectives and description of work can be found in detail in the DoW and the new 13-30 month plan. A short overview of how ToSIA is setting the structure in M4 is given here:

WP 4.1 Data collection

*Static database * autonomous trend factor*

In WP 4.1 data will be collected to support the development, testing and application of ToSIA and as an input to WP 4.2 and 4.3. In this work package the static data (for the base year 2005) will be collected together with autonomous trend factors for the different data in our dataset.

WP4.2 Development of “Process” models

Foreseen major changes (I)

Response function are used, together with the static data + autonomous trend factors defined in WP 4.1, to calculate the sustainability values in the future years studied

In Module 4, we find dynamics and models in both 4.2 and 4.3. In WP 4.2 response functions for *value chain specific* developments are developed. Models are used to predict the impact of:

- process related technological developments
- process related policy changes.

WP 4.3 Development of Industry Dynamics Models

Foreseen major changes (II):

In WP 4.3 also dynamics are introduced. In this work package we can model the impact of developments that are not directly process related or value chain specific. The analysis will focus on the following issues in relation to the levels of FWCs sustainability: future product demand, technical development opportunities and competitiveness of the industry as well as impact on the industry dynamics and future development in Europe.

WP4.4 Inclusion, Acceptance and Evaluation

Scenarios:

This WP will function as ‘antenna’ for upcoming policies, developments, trends and needs from industry. This WP will play a great role in the identification of future scenarios, in relation to policies, that will be used within ToSIA. Furthermore, WP 4.4 will include the organization and review of industries’ and Commissions feedback, to case studies and data (4.1), (partial) models and response functions (4.2. and 4.3) and on expected evolutions synchronized throughout our Module.

4 Results over the past 6 months (12-18)

4.1 Activities WP 4.1

Work in the past 6 months in WP 4.1. has been manifested in the active participation of M4 members in the:

Definition of the 3 Case studies

Three case studies are being defined (products and processes). In all case studies there is M4 representation from all three M4 value chains (paper and board, wood products and bio energy). Besides the WP 4.1. work package leader has been represented in all three case studies to coordinate M4 activities.

Indicator Working Groups

M4 has been represented in all 5 indicator working groups. One of the working groups (Energy) has been coordinated by an M4 representative

4.2 Activities WP 4.2

Within work package 4.2, work over the past 6 months has, among other things, resulted in the output of 3 deliverables in this period:

D 4.2.2. Report on review of existing tools (Month 15)

It's main objectives are to:

- Review the existing tools for the assessment of different sustainability criteria
- Gather tools from different regions and sources to facilitate a better understanding of Sustainable Development assessment.

This report outlines existing sustainability assessment tools relevant to the Forestry Wood Chain (FWC) manufacturing stages. These tools are based on, Ecological Footprint Analysis (EFA), Life Cycle Analysis (LCA), Multi Criteria Analysis (MCA), Cost Effective Analysis (CEA), Cost Benefit Analysis (CBA) or Whole Life Costing (WLC).

This deliverable draws on previous work undertaken within EFORWOOD project (especially in Module 4) in particular work on criteria and indicators. This report reviews FWC's sustainability appraisal tools and methodologies for all three tiers of sustainability, economic, social and environmental. All tools and methodologies have strengths and weaknesses depending on the objectives, timeline, and other criteria. What seems to be the most appropriate approach is to set objectives for each assessment and get information and results in various levels of detail. Therefore, it is advisable to employ more than one tool or methodology for more detailed analysis.

This work has shown national differences in the need for sustainability assessment linked to national requirements of relevant legislation and regulations. Individual companies often seek sustainability assessment for a particular reason and their requirements and objectives will call for a bespoke, tailored approach regardless which tool is being used. For the FWC's sustainability, assessment is traditionally closely associated with the forestry side of business.

Economic performance indicators were most frequently used in early sustainability assessments and have the longest history of being relevant to manufacturing. They are strongly correlated with inputs to woodlands, forestry and mill operations as well as the sustainable development of resources. Environmental issues are establishing themselves more and more for the manufacturing stage of the FWC most frequently as Life Cycle Assessment (LCA).

BRE has undertaken a focused research into the tools for assessing sustainability but was not able to identify any tools/methodologies that are being in-use in Europe for social tier in FWC relevant to manufacturing stages, which is the focus of Module 4

The FWC has been scrutinised by various stakeholders to address social issues in the forestry phase. Sustainable Forest Management (SFM) provides a system of assessment (for both environmental and social elements of sustainability). SFM certification includes a wide range of social issues; it is applicable only to forestry even though it includes a number of indicators that are applicable to primary processing within FWC. SFM and CoC certification streamlines and supports the development of supply chain communication. The major problem with social indicators or CSR indicators is that they are in their nature qualitative. They include how companies perform in relation to stakeholders including the community, to training, and equality in employment. It is possible to quantify some indicators, such as, health and safety (e.g. number of incidents), and availability of training. Manufacturing, not only in the FWC, is lagging behind in development and implementation of comprehensive social issues assessment tools or methodologies. If social criteria are measurable and reported, they are typically linked to H&S executives in each country or industry respectively. The FWC as well as other industries would benefit from more assistance in understanding what sector-relevant social issues are appropriate in the international context.

PD 4.2.3 Report on review of technology development trends within various processes (Month 15)

This report is a review of technology development trends in the forest sector. Technologies are being developed continuously throughout the Europe. The aim is to gain profit and benefits with the new techniques, and/or to avoid damages, injuries or other drawbacks. The technologies listed in this deliverable have a significant positive impact on economic, environmental, social, and/or quality aspects of FWCs. Furthermore, technologies are influenced by consumer demands and legislations, which direct the technology development to certain directions.

Technologies in Forestry wood chain processes are being developed continuously. The development is guided with legislations and consumer demands, but also with the need to improve the competitiveness of the industries, quality of the products, and exploitation of the raw material. At the same time the three aspects of sustainability, i.e. economical, environmental and social aspects are included in the developing process.

The new technologies aim at gaining profit and advantages to the companies, but they are most often valuable to customers and environment as well. Technologies are improved in order to get the biggest possible benefit from used amount of raw materials. Improved product properties are pursued by treating the raw materials in different ways for each purpose or by using new raw materials. Recyclability is an important issue which influences not only product properties, but also both energy and environmental aspects.

The trends in pulp and paper industry and in the wood products industry are quite similar to each other. As the techniques are improved and developed, automation measuring technology, intelligent and flexible systems have become more exploited as a tool for channelling the raw materials to optimal end-use and for improving yield and product quality. Improved product properties enable new end uses for the products. The new technologies have also provided possibilities to replace or reduce the need of those chemicals or substances which may be harmful or toxic to users or the environment.

Bio energy is a vital issue in the climate change aspect. Not only will it be environmentally friendlier than the fossil fuels, but it also improves competitiveness of the forest industry. CHP production, gasification technologies and pellet production are just examples of possibilities to exploit bio energy. Bio energy production also provides solutions for waste management issues. Present pulp mills are already self-sufficient in energy, but the new and improved technologies enable production and selling of excess bio energy, thus creating economical profit to companies.

As a summary it can be said that new technologies are mainly focused on three impacts:

- *Improved product properties* considering end use is highly important while developing new processes or methods. If the new technologies dilute the product quality, they will be of no use. Consumer acceptance and demand are highly dependent on this.
- *Environmentally friendly processes/products* are preferred when developing technologies. Energy savings, bioenergy, and efficient use of raw materials are in a big role in this. The less impact the process has on nature, the more accepted it will be. This issue affects also economical aspect of sustainability, since environmental protection tax and emissions trading are causing costs for the companies.
- *Increased profit* for companies is always the biggest driver in all industries. It is the main reason for the existence of industries, and must not be neglected while developing technologies. Increased profit means eco-efficiency e.g. when the use of raw materials is reduced and the profit is maintained or increased at the same time.

The technologies presented in this deliverable are not covering all appearing in the forest industry right now. This report is not promoting the listed technologies, but only presenting them in order to give instructions and ideas for future studies and possibilities. The future works in EFORWOOD may also include other technologies outside this deliverable. As far as ToSIA is concerned, it is important that this deliverable is checked regularly, e.g. every two years, in order to find out changes in technology situations in the forest industry.

PD4.2.4 Benchmarking options for companies / regions / national / European level across the manufacturing FWC and throughout Europe (Month 18)

The first part of the report describes general benchmarking theory. Then, some features and requirements for benchmarking indicators are given. The case study part of the report presents very diverse types of benchmarking cases- four wood based products industry and one from paper industry.

The main conclusion of the report can be summarised as: *the big picture matters; a pattern must be evaluated as a dynamic whole.*

The content of this work is intrinsically linked with future work on response functions in work packages 4.2 and 4.3 as well as in M1, the development and interpretation of ToSIA.

4.3 *Activities WP 4.3*

Within work package 4.3, work over the past 6 months has, among other things, resulted in the output of 4 deliverables in this period:

PD4.3.1 Data and support for EFI-GTM modelling (Months 1-18)

Providing of specific data and support in refining the EFI-GTM model covering issues such as expected economic and societal changes as well as other factors driving the market/demand development of forest products in Europe, the dependence of the demand of forest products on economic and societal changes, current forest industry production/capacity by product and country in Europe taking into consideration of known industrial investment projects. This work has started already at the start of the EFORWOOD project. Work has continued during the last 6 months.

PD4.3.2 First report on the industry's competitiveness and its impact on the industry dynamics (Month 18) (to be completed in months 19-48)

This is the first report on the industry's competitiveness and its impact on industry dynamics. In this report, the general of competitiveness, current trends and drivers, investments and cost sensitivity example mills are studied. All these issues have an impact on individual companies and the whole industry's dynamics.

Competitiveness in itself is a very broad-spectrum topic. It lurks brazenly in news headlines and political speeches, it echoes in local workplaces when downsizing occurs, it lurks in the corridors of financial power. No-one seems to be able to get a handle on it – in practice. On a theoretical plane it is easier to grasp, but makes high demands on the plot. There has to be a clear progression from concepts to practical details of a mill's daily life.

The plot thread chosen here runs from

- The concept of competitiveness through
- Trends and drivers having an impact on competitiveness to
- Changes in forest products competitiveness, to the level of individual, representative, hypothetical mills

This report is closely linked to Report PD 4.3.3, where value chain interdependencies are described in more detail. Both of these reports will be linked to ToSIA scenarios at a later stage of the Eforwood projects.

PD4.3.3 First report on the interdependence between the agents within the FWC (Month 18) (to be completed in months 19-48)

This report describes the interdependency between the several agents within the Forestry Wood Chain. A first draft will be soon available. The report will be further completed in the upcoming 2,5 years.

PD4.3.4 Trade projections forest products by country and product (Month 18)

This report examines global trade of forest products. The purpose of this report is to give information to other EFORWOOD partners on the nature of different forest based products from the global trade point of view. Together with PD 4.3.2 and PD 4.3.3, this study reports about the comprehensive picture of the industry dynamics. The information in these reports is essential for the future work in the development and interpretation of ToSIA. These reports provide also support in refining the EFI-GTM model covering current trade flows of forest products by country and by product. EFI-GTM model will provide direct data input to ToSIA.

4.4 *Activities WP 4.4*

Activities in WP 4.4. are to assure maximum involvement of relevant industrial stakeholders and to assure the acceptance and inclusion of results.

In the past months and Industrial Task Force has been formed and Module 4, via WP 4.4. is active in this task force.

Work in WP 4.4 can be considered a little behind, mainly due to two reasons: a) the work package leader (CEI-Bois) has faced some resources (personnel) deficiencies due to unexpected circumstances b) overoptimistic planning of feedback on reports that have been delivered just recently.

4.5 *Other M4 activities*

Module 4 has been responsible for the organisation of the upcoming EFORWOOD week. The event will take place at the home base of TUZVO, the technical university of Zvolen, which is one of the M4 partners. TUZVO has, over the past 6 months, took all actions needed to make the EFORWOOD event in Zvolen possible.

5 Threats and opportunities

One of the most important issues is that it needs to become clear **what exactly the ultimate aim of the project** is? Although it is described in the project's description of work (DoW), experience has learned that there are two different views on this, that can be summarized as performing a:

- 1) Sustainability Assessment (SA) where the sustainability of the FWC is determined by deriving indicator values for the processes in the FWC. This is merely filling the 2005 database and e.g. comparing the sustainability of individual chains.
- 2) Sustainability Impact Assessment (SIA) where the focus is to determine the impact of changes on the sustainability of the FWC.

Option 1) is analysing the absolute sustainability which is interesting only if one aims to compare the sustainability of the current FWC with the sustainability of other material chains or if one aims to compare the sustainability of different forest based products and chains within the FWC against each other.

Option 2) is analysing the effect of certain actions or merely time on the sustainability of the FWC which is interesting if one aims to analyse the impact of changes, either internal (e.g. industry dynamics, technological innovations) or external (policies) on the sustainability of the FWC.

We believe that option 2 is what we agreed upon. Besides, it is what the EU Commission and Industry intended it to be and what science can benefit most from.

Currently, developments in the EFORWOOD project have a strong focus towards the collection of data for the current situation (static database 2005). In EFORWOOD we are unique in the fact that we are dealing with the complete chain, from forestry to consumer. Working together we learned that there exist clear differences in dynamics between the forestry sector on the one hand and the industry and consumers on the other side. In industry, we have seen fast changes over the years. A clear example is the economic development in Central and Eastern Europe that has led to the building of new mills in rapid tempo. These new mills replace their older, smaller (and more polluting) facilities and increases their production output. A similar pattern is visible in e.g. China. This has a clear impact on the facilities in western Europe that are becoming outdated due to these developments. Independent of policy actions taken, we can therefore expect changes in the sustainability indicators, moreover, these changes are probably different and faster in one region than in another. It is very important to get grip on the expected developments in a fast moving industry, since these are expected to have a great impact on the sustainability indicators on the one hand and on the effect of policies on the other.

Considering the above, we see as a threat that too much effort is put on data collection in 2005, that will soon be outdated anyhow, and too less on the expected developments in the FWC and on how these will effect the future sustainability (response functions). Besides that, we also want to analyse how several scenarios (e.g. policy changes) affect the sustainability of the FWC, both now, in the future and in different areas. The number of scenario's currently proposed is very limited. Moreover, to analyse the impact of e.g. policies on the sustainability

of our industry, it is important to explore the policies that are, currently, already in place. Country differences can in this aspect be great. A new waste policy, for example, will have a much larger impact in countries where nowadays no waste policies exist than in countries with strict waste regulations. We might run the risk of missing the analysis of impacts of changes on the sustainability of the FWC chain when focusing only on its current sustainability. We do not want ToSIA to become a low quality LCA that could be misused for product comparisons instead of becoming an impact assessment tool to indicate the effect of changing policies, dynamics, technologies etc. on the sustainability of the whole chain.

With the current approach, due to the very detailed indicators list, resulting in massive amounts of data to be collected (especially also given our large product portfolio) and the extensive elaborations of case studies, much of our resources are consumed in describing the current situation. It is, considering the above, questionable if this is worth so much effort. We are therefore striving towards a more equal balance between data collection, industrial dynamics, technological developments, analysis of current policies and scenarios.

6 Conclusions and further steps

We can conclude that the activities in Module 4 have been very much in line with the developments in EFORWOOD and the development of ToSIA in particular. The way the work in Module 4 is organised fits the ToSIA structure. Work in the various work packages had been progressing according to plan, although work in WP 4.4. is a little behind.

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