



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 D. 4.0.6
Annual Management Report (24-36 months) Module 4

Due date of deliverable: 01-11-2008

Actual submission date: 30-11-2008

Start date of project: 011105

Duration: 4 years

Organisation name of lead contractor for this deliverable: STFI-Packforsk

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	X
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)	

Annual report 36 months Module 4
3rd Period: November 1, 2007 - October 31, 2008

Contents:

1. Module objectives and major achievements during this reporting period (24-36)	3
2. Summary of Module work at WP level in month 24-36	4
2.1 WP 4.0 Co-ordination	4
2.2 WP 4.1 Data collection	4
2.3 WP 4.2 Development of "Process" models	6
2.4 WP 4.3 Development of Industry Dynamics Models	8
2.5 WP 4.4 Inclusion, Acceptance and Evaluation	9

Appendix 1: Periodic Activity Reports (WPs)

Appendix 2: List of deliverables

Appendix 3: List of milestones

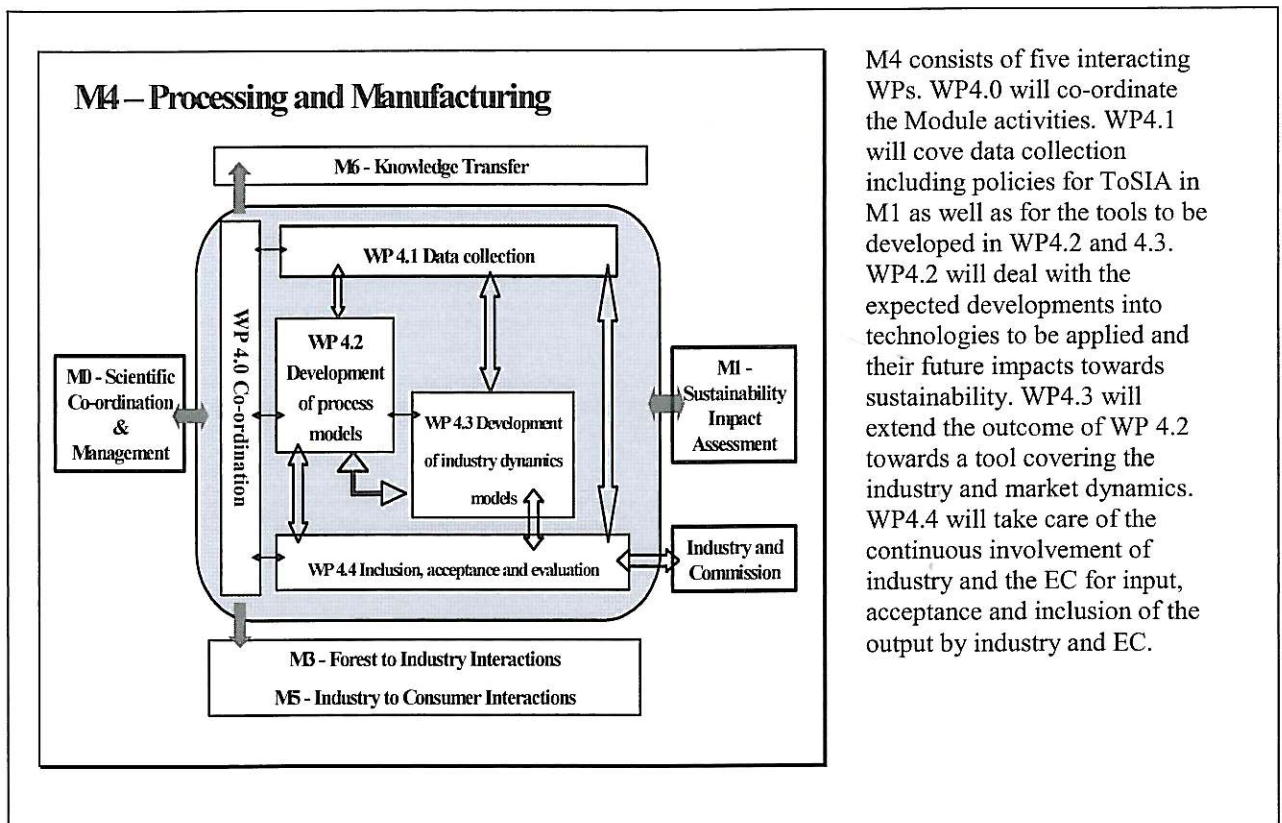
Appendix 4: Justification of major cost items and resources

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

1 Module objectives and major achievements during the reporting period (24-36)

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). Specific models for particular material streams within the Module 4 boundaries will be developed generating a more detailed and specific insight in sustainability for this particular part of the FWCs. Specific attention is given to the incorporation of thresholds and expected upcoming policies. Work is, in close cooperation with the industries and through various European confederations, focused on integrating of industrial and Commission stakeholders to avoid duplication of work and to secure endorsement and confidence of data used, module tools and their methodology.



M4 consists of five interacting WPs. WP4.0 will co-ordinate the Module activities. WP4.1 will cover data collection including policies for ToSIA in M1 as well as for the tools to be developed in WP4.2 and 4.3. WP4.2 will deal with the expected developments into technologies to be applied and their future impacts towards sustainability. WP4.3 will extend the outcome of WP 4.2 towards a tool covering the industry and market dynamics. WP4.4 will take care of the continuous involvement of industry and the EC for input, acceptance and inclusion of the output by industry and EC.

Figure 1. M4 -Processing and Manufacturing

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

Objectives:

- To provide required data in terms of Indicators and supporting information for ToSIA (for assessing selected reference cases and scenarios) and the GTM model.
- To provide methodologies for selection of key indicators, for benchmarking standards, industrial improvement options and to provide partial chain models
- To synthesise results of partial SIAs within the module boundaries, i.e. processing and manufacturing part of the FWC and provide the results in the form of response functions to ToSIA.
- To provide an analysis of scenarios of the major developments in forest product industries and markets within the next 10 to 20 years.
- To maintain industrial and Commission participation in research processes to secure acceptance, confidence and future use of the data used and methodologies developed.

Main deliverables:

- Data on Sustainability Indicators for wood based products, paper and board and bio-energy
- Tools for selection of key-performance indicators, benchmarking standards and industrial improvement options
- Response functions, scenarios and reports describing the major technical, policy, and business developments in the next 10 to 20 years
- To include the impact of policy measures in the analysis to pinpoint potential strengths and weaknesses of their influence and effectiveness to deliver desired effects

2 Summary of Module work at a WP level in month 24-36

2.1 WP 4.0 Co-ordination

See general description of co-ordination work packages in the Implementation plan at page 36.

2.2 WP 4.1 Data collection

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.

Static database * autonomous trend factor

If we consider the M4 part of the large database that will be filled during the project (see figure 2), we see that data are needed for different product groups within each value chain. Moreover we need data on 3 types of indicators (environmental, social and economic), and that for every country in Europe. If we focus more in Figure 2: e.g. environmental data of newsprint production in Country X. This even consists of a list of numerous environmental indicators (e.g. CO₂ emissions, water use etc.). Because of the industrial dynamics most of the data values will change on an annual basis.

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

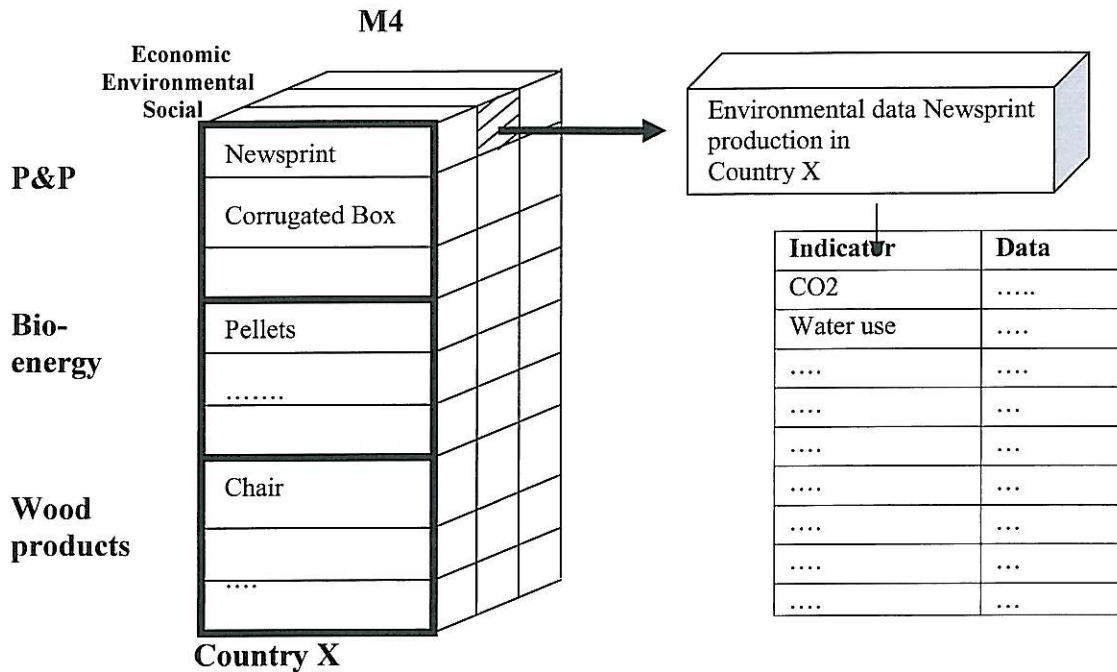


Figure 2. Data collection / generation in M4, per country

A complete picture for M4 data collection is shown schematically in Figure 3. In order to obtain this large amount of data in the upcoming years, it's suggested to come up with a constructive approach with simple and smart but reliable solutions, including for example the use of model mills, the link to already existing databases and the grouping of several products where indicator values will not vary too much between products. Furthermore, the data will be collected for a reference year (i.e. 2005), for the three case studies and also in year 4 for the EU-FWC. The EU countries have been divided into regions to further simplify the data collection so that data from one country can be used for other countries in that region. Countries within a region are supposed to be at the same technological level. Data will also need to be predicted for 2 reference futures and two distinct years 2015 and 2025. Even without real technological breakthroughs in industry there will be an increase in production with e.g. 3% every year. This will change the values of the data for every year in the future. Work in WP 4.1 has and will in the upcoming period therefore focus on finding smart solutions (assumptions related to existing datasets, model mills, etc) to fill this database.

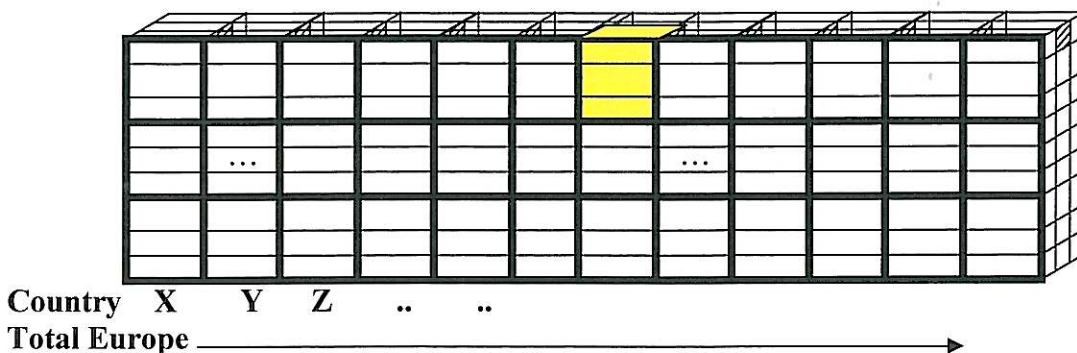


Figure 3. Data collection in M4 total

Annual report 36 months Module 4

3rd Period: November 1, 2007 - October 31, 2008

Objectives and main tasks during the reporting period:

Select and collect data on indicators for the reference year 2005 for the 3 case studies. Start to think about how to come up with new data for the indicators based on the storylines and EFI-GTM runs for the 2 reference futures A1 and B2 and year 2015 and 2025. Define a Technology scenario to be applied to the Scandinavian case study.

Methods:

The work of this WP has been to define boundaries and select relevant processes for the case studies to assess existing data, compile data and information where necessary in a consistent way by means of, for example, literature reviews, study of policy documents, use of existing datasets (within and out-side the consortium) at EU, national and regional levels and the use of models. For the collection of data existing, under development or new datasets and methods from a number of partners will be used.

Outputs and main deliverables:

- Definition of Manufacturing processes in case studies and EU cases all as input towards the development of ToSIA.
- Reference data to be used by ToSIA for the reference year 2005.

Partners: KCL, STFI-Packforsk, KCPK, VTT, BRE, Pöyry, CEI-BOIS, CEPI, TUZVO

2.3 WP4.2 Development of "Process" models

ToSIA will also be able to predict effects of internal (breakthrough technological developments) and external drivers (policies, trends in consumer behaviour etc.) on the sustainability of FWCs. This means that the static database + autonomous trend factors will be used as base data and that response function are used to calculate the new values resulting from these drivers in the year studied.

Benchmarking methods and practices as well as industrial improvement options will be summarized, including future technologies to generate the necessary database which will enable to identify and communicate the application of innovative technologies and best practices. Module specific tools for the sustainability impacts of the selected processes and technologies will be generated. The output of these tools will lead to response function for use in ToSIA.

In Module 4, we find dynamics and models in both 4.2 and 4.3.

In WP 4.2. Two types of models will emerge:

- Models for use **outside** of ToSIA, to back-up choices made within Eforwood or for direct use outside the Eforwood project

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

- Response functions for use **inside** of ToSIA → these will bring the dynamics into ToSIA for *value chain specific* developments¹. Models are used to predict the impact of *process* related policy changes and technologies on the data from WP 4.1.

Work has included a review of existing methodologies and tools relevant to the module in each of the defined value chains. Using input from WP 4.1 and 4.3, this work package will act as a bridge and synthesize partial SIAs for processing and manufacturing segment of FWCs and response functions that describe the way the sustainability (data) is affected by new technologies in our industry.

Objectives and main tasks during the reporting period:

To review and analyze existing tools and methodologies and to develop (if needs arises) new tools or to refine and adopt existing ones. The development/review of models and tools for use outside of ToSIA and thus for use directly in industry as well as the use of these models to study the impact of process related policy changes and technologies on FWCs levels of sustainability in the future. The results of these studies will be transferred in the form of response functions for use within ToSIA in relation to:

- process related technological developments
- process related policy changes

Methods:

First a review of existing tools was performed to identify what was already available and where needs arise for the development of new tools. A review of technology development trends within the various manufacturing processes to identify upcoming technologies in our industries. After identifying these developments, a detailed analysis was performed to indicate the conditions (framework) and consequent timing of these technological developments to be implemented. This included expected policies and economic viability, taking into account country differences; in close cooperation with WP 4.1 and WP 4.3. The module specific tools will be used to estimate the sustainability impacts of the defined technological developments on the 'static' data. The results of the framework study and the sustainability impact study together will result in the development of response functions for use in ToSIA.

Outputs and main deliverables:

Report on review of existing tools. Report on review of technology development trends within the various processes. Analysis of conditions and consequent timing for technological processes to be implemented. Identification of country differences in the adoption of technological developments. The development of response functions for process related technological developments and policy changes based on the output of module specific models.

Partners: BRE, KCPK, STFI-Packforsk, VTT, Pöyry, CEI-BOIS, CEPI, KCL, TUZVO

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

**2.4 WP 4.3 Development of Industry Dynamics
Models**

Response functions (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. Specific tools and datasets will be developed with regard to forest product market and industry dynamics (via additional "response functions"), to complement and support the analysis in WP1.3. 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. Using input from WP 4.1 and WP 4.2 this work package will continue partial SIA for the Processing and Manufacturing part of FWCs.

There is a division of work between WP 1.3 (the EFI-GTM model) and WP 4.3. As an example: scenario with rising energy prices in Europe leads to transferred production to China resulting in the total loss of paper industry from country X. This type of scenario is the domain of WP 1.3. However, WP 4.3 has a crucial role to play in providing data and expert advice to WP 1.3 EFI-GTM team. In addition to the link to WP 1.3, WP 4.3 concentrates on three major components:

- response functions to be used in ToSIA
- industry dynamic reports with information of value, hopefully to all modules
- a model will be created illustrating the shifts in value chain dynamics. This model can be used e.g. to test some of the response functions and as a main task providing understanding of their interdependence of the components of the value chains.

Objectives and main tasks during the reporting period:

Firstly, to provide specifically robust data and support in refining the EFI-GTM model in WP1.3 in the manufacturing, processing and market parts of the FWC chain. Secondly, to carry out complementary, more detailed analysis of key aspects of the industry dynamics. Thirdly, to develop tools and carry out analysis of industry dynamic aspects not covered by the EFI-GTM model in regard to FWCs sustainability levels. This industry dynamics model will generate the ways to optimally incorporate / promote innovation in existing and new processes and products.

Methods:

Methods selected for this WP included in-depth analysis or short term future technical development in forest product industries as well as demand side for forest industry products. There will be a standard definition of production cost structures of forest industry products by country and region (to be used as input in WP1.3). An analysis of regional cost competitiveness and its impact on the industry dynamics by main product was provided. The production costs structures and cost competitiveness was analysed with a model combining technical parameters (mill capacity, product quality, process concept, unit consumption of raw-materials, etc.) and economic parameters (market, unit process of production inputs, interest rates, etc.) of typical production units by product and region / country. Data and analysis of key demand drivers (such as product substitution) and supply drivers (such as known future industry projects) to support and complement the industry dynamics analysis in connection with WP1.3 was integral part of this WP. Finally, an analysis of interdependence

Annual report 36 months Module 4

3rd Period: November 1, 2007 - October 31, 2008

between the agents within FWCs by defining the degree of vertical and horizontal integration in the industry, and assess how this integration affects on the industry dynamics was built in.

Outputs and main deliverables:

Technical development opportunities of the industry, production cost structures and capacities of the industry, regional cost competitiveness analysis and its impact on the industry dynamics, selected data on specific demand and supply drivers in the forest product markets, and analysis of interdependence of the industry within the FWC. WP4.3 worked closely with WP4.2, to provide inputs for M3 for European level sustainability assessment as well as for WP1.3.

Partners: Pöyry, KCPK, STFI-Packforsk, VTT, BRE, CEI-BOIS, CEPI, KCL, TUZVO

2.5 WP4.4 Inclusion, Acceptance and Evaluation

This WP will throughout the projects duration ensure the involvement of industry and the European Commission services. The aim is to gain and maintain acceptance of methodologies and tools developed, but also to stimulate and support the use of these tools in future demonstration activities. These will be directed in particular toward the industry, both to internal use at industry and the use in the contacts between industry and EC services. This will be performed in cooperation with WP 0.1 and WP 6.1. Additionally, support will be given to WP0.1 and WP6.1 for actions towards any other relevant stakeholders in the later phase of the project.

Scenarios: Apart from gaining acceptance for the models and data used, this WP will also 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.

For all three Case Studies which will be studied in WP4.4 a specific action will be taken to discuss and evaluate the cases from an industry perspective. The cases will be discussed with the appropriate committee's at the European industrial associations.

Objectives and main tasks during the reporting period:

WP 4.4 has integrated Industry and the Commission services in this Module's activities, including data collection and the selection of reference FWCs. This activity is seen as an imperative to a successful project that deals with ‘real’ raw data in an aggregate form. It is likely that this project will achieve high rate of acceptance of data and methodologies and tools developed by the Industry and, presumably also by the Commission thanks to the proactive approach that partners already began.

Methods:

Existing industrial networks will be used (representative industry confederations on European level like CEI-Bois and CEPI and their national member federations) to generate information and test M4-specific results. Therefore, key players will be on a number of operational committees and working groups, for example, Research, Environment, Sustainability, social matters, Building and living with wood, and so on.

These mainly consist of industrial representatives and they regularly interact with Commission representatives on relevant matters within their area.

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

Outputs and main deliverables:

The main outputs of WP 4.4 will be 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. The identification of future scenarios, in relation to policies, that will be used within ToSIA. Generation of validated (ex-feedback industry and Commission) results to M1, synchronised with WP4.1, 4.2 and 4.3. Feedback to industry continuously during the project and of final results after the IP is finished will be co-ordinated by M6. Workshops with Industry and Commission, as appropriate during the project, final results to be communicated after the IP is finished (month 50) as part of M6.

During the reported period, two physical meetings with CEPI and CEI-Bois R&D groups have been arranged where the M4 work has been presented and feedback given.

Partners: KCPK, CEI-Bois, STFI-Packforsk, VTT, BRE, Pöyry, CEPI, KCL, TUZVO

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

Appendix 1: Periodic Activity Report

Work package number		4.0	Start date or starting event:					Month 25		
Activity Type		RTD/Innovation (Training components)								
Participant id	KCPK	STFI-Packforsk	VTT	BRE	Pöyry	CEI-BOIS	CEPI	KCL	TUZVO	
Person-months Per participant	1.4	3.2	0,5	0.7	0,4	-	-	0.5	0.5	

Objectives

- To ensure that the objectives of M4 are reached and activities completed in accordance with time schedule and budget
- To co-ordinate the linkages with the IP management and with other Modules
- To initiate thematic cross-module activities if needed to fulfil the objectives of the project

Description of work

- In WP 4.0 common ground for the work of module 4 is established and the work between the work packages is coordinated. Interface management towards the coordinator, IP-Board and partners active in the other modules is organized. Module specific contacts to stakeholders are organized in cooperation with M0. Coordination of the cross WP interaction.
- STFI-Packforsk via Anna von Schenck will take care for the overall Module coordination and is leader of WP 4.0
- KCL via Katri Behm will take care for coordination on fibres / pulp and paper and is leader of WP 4.1
- BRE via Katie Livesey will take care for coordination on solid wood aspects and is leader of WP 4.2
- VTT via Margaretha Wihersari will take care for coordination on bio-energy aspects.
- Pöyry via Pia Nilsson is leader of WP 4.3.
- KCPK via Arie Hooimeijer is leader of WP 4.4.
- Technical communication by e-mail; 2 physical meetings per year and intermediate teleconferences if needed but in principal at least once a month there will be direct contact between the partners.

Deliverables

- PD4.0.5. Intermediate management report (Month 30)*
D4.0.6. Annual Management report (Month 36)

Milestones and expected results

- Delivery in time and budget of activities planned for month 25 to 42 (month 42)

Annual report 36 months Module 4

3rd Period: November 1, 2007 - October 31, 2008

Work Package number	4.1	Start date or starting event						Month 25	
Activity Type	RTD/innovation								
Participants id	KCPK	STFI-Packforsk	VTT	BRE	Pöyry	CEI-Bois	CEPI	KCL	TUZVO
Person-months per participant:	4	7	3.5	3	8	-	-	8	3

Objectives

- Finalise definition of the Manufacturing processes in the case studies
- Collection of data for 2005 for the Case studies
- Report Indicator values for 2015/2025 into the database client. WP 4.2 and WP 4.3 will deal with the forecasting of these values
- Define the EU cases
- Collection of data for 2005 for the EU cases
- Specify module specific scenarios –Technology development, Policies, Legislations etc. Work will be performed in interactions with WP 4.2 and WP 4.3

Description of work

- 3 industry sectors in M4: Solid wood, Pulp & paper and Bio-energy
- A responsible partner for each of these sectors: Solid wood: BRE, Pulp & Paper: KCL, Bio-energy: VTT
- Partners working on Solid wood: BRE, Tuzvo, VTT, Pöyry, Pulp and Paper : STFI-PF, KCL, KCPK, Pöyry, Bio-energy: VTT, STFI-PF, Tuzvo, Pöyry
- Interaction with M1, M3 and M5 in the work of defining the Case and EU studies
- Interaction with M1 is expected in the work of data collection
- Interaction with M0 is expected for external stakeholder interactions

Deliverables

- PD 4.1.7 Report describing the Model Mills and the case studies (month 26)*
- PD 4.1.8 Report with selected policies and future technologies to be used in the module specific scenarios (month 30)*
- D 4.1.9 Report describing the Manufacturing processes in the European cases (month 40)**

Milestones and expected results

- M4.1.1 Define the case studies (Month 26)
- M4.1.2 Define the EU cases (Month 36)
- M4.1.3 Collection of data for 2005 for the case studies (month 28-32)
- M4.1.4 Report of Indicator values for 2015/2025 for the case studies (month 30-33)
- M4.1.5 Defining module specific scenarios (month 36)
- M4.1.6 Data collection for the EU cases (month 42)

Annual report 36 months Module 4

3rd Period: November 1, 2007 - October 31, 2008

Work package number		4.2		Start date or starting event:				Month 25	
Activity Type		RTD/Innovation							
Participant id	KCPK	STFI-Packforsk	VTT	BRE	Pöyry	CEI-BOIS	CEPI	KCL	TUZVO
Person-months Per participant	3	2	4	8	3	-	-	5	2

Objectives

- Continue with development and analysis of applicability of response functions
- Maintain cohesive approach to module specific models supporting ToSIA
- Include new scenarios in the trends and response functions to inspect predictability and responsiveness
- Provide environmental information to support response functions (support WP4.3.)

Description of work

- Continue with following various impacts of technology trends on processes as per finalised case studies
- Carry on with supportive analysis with Module specific models the impact of technology development on scenarios and case studies as per WP4.1., including EU cases
- Review and investigate scenarios as per WP4.1. in relations to trends and functions
- Interpret relationship functions and relevant environmental and economic indicators (close collaboration with WP4.3.)
- Review of relationship functions of most favourable changes to current processes
- Evaluate consideration of supporting model specific tools update in affiliation with TOSIA to support dynamic facet of TOSIA

Deliverables

- PD4.2.6 Conceptual outline of response functions and draft response functions for case studies (month 28)*
- PD4.2.7 Report on conditions and consequent timing of technological developments in processes including the identification of country differences and obstacles to adopting changes relevant to whole Europe (elaboration of PD 4.2.5 for whole Europe) (month 36)*
- PD4.2.8 Draft report on theoretical response functions with practical implications (month 29)*
- PD4.2.9 Sequel to the report on conditions and consequent timing of technological developments in processes in relationship to response functions (month 33)*
- PD4.2.10 Commentary on functions and best, most favourable, changes applicable to the use of response functions s (month 37)*
- D4.2.11 Final report on theoretical response functions with practical implications, including ToSIA (month 41)**

Milestones and expected results

- M4.2.5 Refinement of response functions.
- M4.2.6 Use of response functions in relationship to timing of technical developments
- M4.2.7 Hierarchical framework of best modifications in relationship to response functions

Annual report 36 months Module 4

3rd Period: November 1, 2007 - October 31, 2008

Work Package number	4.3	Start date or starting event						Month 25	
Activity Type	RTD/innovation								
Participants id	KCPK	STFI- Packforsk	VTT	BRE	Pöyry	CEI- Bois	CEPI	KCL	TUZVO
Person-months per participant:	4	2	2	0.5	9	-	-	2	2

Objectives

- Provide specifically robust data and support in refining the EFI-GTM model in WP1.3 in the manufacturing, processing and market parts of the FWC chain.
- Carry out complementary, more detailed analysis of key aspects of the industry dynamics.
- Develop tools and carry out analysis of industry dynamic aspects not covered by the EFI-GTM model in regard to FWCs sustainability levels. This industry dynamics model will generate the ways to optimally incorporate / promote innovation in existing and new processes and products.

Description of work

- Methods selected for this WP include in-depth analysis or short term future technical development in forest product industries as well as demand side for forest industry products.
- There will be a standard definition of production cost structures of forest industry products by country and region (to be used as input in WP1.3). An analysis of regional cost competitiveness and its impact on the industry dynamics by main product will be provided.
- The production costs structures and cost competitiveness will be analysed with a model combining technical parameters (mill capacity, product quality, process concept, unit consumption of raw-materials, etc.) and economic parameters (market, unit process of production inputs, interest rates, etc.) of typical production units by product and region / country.
- Data and analysis of key demand drivers (such as product substitution) and supply drivers (such as known future industry projects) to support and complement the industry dynamics analysis in connection with WP1.3 will be integral part of this WP.
- Analysis of interdependence between the agents within FWCs by defining the degree of vertical and horizontal integration in the industry, and assess how this integration affects on the industry dynamics will be built in.

Deliverables

- PD4.3.6 Support for EFI-GTM modelling (Months 19 - 42)*
- PD4.3.7 Conceptual description of the value added model (Month 30)*
- PD4.3.8 Draft description of response function framework and examples (Month 30)*
- PD 4.3.9 First report on value added model and response functions (Month XX – must be in line with the rest of the ToSIA work)*
- PD4.3.10 Final report on the industry's competitiveness and its impact on the industry dynamics (Month 42)*
- PD4.3.11 Final report on the interdependence between the agents within the FWC (Month 42)**

Milestones and expected result

- M4.3.1 Technical development opportunities of the industry
- M4.3.2 Production cost structures and capacities of the industry
- M4.3.3 Regional cost competitiveness analysis and its impact on the industry dynamics
- M4.3.4 Selected data on specific demand and supply drivers in the forest product markets
- M4.3.5 Analysis of interdependence of the industry within the FWC.
- M4.3.6 WP4.3 will work closely with WP4.2, provide inputs for M3 for European level sustainability assessment as well as for WP1.3

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

Appendix 2: List of deliverables

List all deliverables, giving date of submission and any proposed revision to plans.

Del No.	Deliverable name	WP No.	Due date	Actual/Forecast delivery date	Estimated indicative person-months *)	Used indicative person-months *)	Lead contractor
D 4.0.6	<i>Annual Management report</i>	WP 4.0	081031	081130			STFI-PF

Del No.	Deliverable name	WP No.	Due date	Actual/Forecast delivery date	Estimated indicative person-months *)	Used indicative person-months *)	Lead contractor
PD 4.1.7	<i>Report describing the Manufacturing Processes in the Case Studies</i>	WP4.1	071031	080630			STFI-PF
PD 4.1.8	<i>Report with selected policies and future technologies to be used in the module specific scenarios</i>	WP 4.1	080430	080430			KCL

Del No.	Deliverable name	WP No.	Due date	Actual/Forecast delivery date	Estimated indicative person-months *)	Used indicative person-months *)	Lead contractor
PD 4.2.6	<i>Conceptual outline of response functions and draft response functions for case studies</i>	WP 4.2	080228	090228			Pöyry

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

PD 4.2.7	<i>Report on conditions and consequent timing of technological developments in processes including the identification of country differences and obstacles to adopting changes relevant to whole Europe</i>	WP 4.2	081031	081031			BRE
PD 4.2.8	<i>Draft report on theoretical response functions with practical implications</i>	WP 4.2	080331	090228			BRE
PD 4.2.9	<i>Sequel to the report on conditions and consequent timing of technological developments in processes in relationship to response functions</i>	WP 4.2	080731	090430			BRE
PD 4.2.10	<i>Commentary on functions and best, most favourable, changes applicable to the use of response functions</i>	WP 4.2	081130	090430			BRE

Del No.	Deliverable name	WP No.	Due date	Actual/Forecast delivery date	Estimated indicative person-months *)	Used indicative person-months *)	Lead contractor
PD4.3.6	<i>Support for EFI-GTM modelling</i>	WP 4.3		Month 19-42			Pöyry
PD 4.3.7	<i>Conceptual description of the value added</i>	WP 4.3	080430	080430			Pöyry
PD 4.3.8	<i>Draft description of response function framework and examples</i>	WP 4.3	080430	080430			Pöyry

Del No.	Deliverable name	WP No.	Due date	Actual/Forecast delivery date	Estimated indicative person-months *)	Used indicative person-months *)	Lead contractor
----------------	-------------------------	---------------	-----------------	--------------------------------------	--	---	------------------------

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

D 4.4.2	<i>Report on feedback from industry on the M4 work</i>	WP 4.4	080430	091031			KCPK
PD 4.4.3	<i>Report on module specific scenarios</i>	WP 4.4	081031	090430			KCPK
PD 4.4.4	<i>Feedback / confirmation of case studies based on input via PD 4.1.7</i>	WP 4.4	081031	081231			KCPK
PD 4.4.5	<i>Feedback to first response factors based on input via D4.2.6</i>	WP 4.4	081031	090831			KCPK

*) if available

Appendix 3: List of milestones

Milestone No.	Milestone name	Work package No.	Date due	Actual/ Forecast delivery date	Lead contractor
M4.0.1	<i>Ensure that the module objectives are fulfilled and deliverables provided within time schedule</i>	WP 4.0	Continued	Continued	STFI-PF
M4.0.3	<i>Manage the interfaces and information flow with the other modules including IP Management (M0)</i>	WP 4.0	Continued	Continued	STFI-PF
M4.0.4	<i>Synthesize results from individual Work Packages, transfer the results and deliverables of the Module to the IP Management (M0), dissemination (M6) and other Modules as needed.</i>	WP 4.0	Continued	Continued	STFI-PF

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

M4.0.5	<i>Liaise with stakeholders and end-users in relation with the activities of M0 and M6.</i>	WP 4.0	Continued	Continued	KCPK
M4.0.6	<i>Ensure the quality of the results by taking advise from the Expert Advisory Panel (EAP) (see section 7) and IP "quality control manager"</i>	WP 4.0	Continued	Continued	STFI-PF

Milestone No.	Milestone name	Workpackage No.	Date due	Actual/Forecast delivery date	Lead contractor
M4.1.1	<i>Case studies defined</i>	WP 4.1	071031	071031	STFI-PF
M4.1.2	<i>EU cases defined</i>	WP 4.1	080430	080430	KCL
M4.1.3	<i>Collection of data for 2005 for the case studies</i>	WP 4.1	080831	081031	KCL
M4.1.5	<i>Defining module specific scenarios</i>	WP 4.1	080831	080831	KCPK

Milestone No.	Milestone name	Workpackage No.	Date due	Actual/Forecast delivery date	Lead contractor
M4.2.2	<i>Refinement of response functions</i>	4.2	080831	090228	Pöyry
M4.2.3	<i>Use of response functions in relationship to timing of technical developments</i>	4.2	080831	090228	BRE
M4.2.4	<i>Overview of conditions and consequent timing of technological developments in processes relevant to case studies</i>	4.2	081031	081031	BRE

Milestone No.	Milestone name	Workpackage No.	Date due	Actual/Forecast delivery date	Lead contractor
----------------------	-----------------------	------------------------	-----------------	--------------------------------------	------------------------

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

M4.3.1	<i>Data and support for EFI-GTM modelling</i>	4.3	Continues	Continues	Poyry
M4.3.2	<i>Industry's competitiveness and its impact on the industry dynamics</i>	4.3	Continues	Continues	Poyry
M4.3.3	<i>Interdependence between the agents within the FWC</i>	4.3	Continues	Continues	Poyry
M4.3.4	<i>Conceptual framework for the value added model</i>	4.3	080430	080430	Poyry

Milestone No.	Milestone name	Workpackage No.	Date due	Actual/Forecast delivery date	Lead contractor
M4.4.1	<i>Review of M4 stakeholder evaluation of case studies and data collection, synchronized with WP4.1. (month 32)</i>	WP 4.4	080630	081031	KCPK
M4.4.2	<i>Review of M4 stakeholder input to modelling approach and response function, synchronized with WP4.2</i>	WP 4.4	080630	090331	KCPK
M4.4.3	<i>Review of M4 stakeholders' feedback on industry dynamics synchronized with WP4.3.</i>	WP 4.4	080630	090331	KCPK
M4.4.4	<i>Overall continuous interaction with Industry (associations)</i>	WP 4.4	Continues	Continues	KCPK

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

**Appendix 4: Justification of major cost items and
resources**

WP 4.0

STFI-PF: 3.2 MM

- STFI-PF has been the module leader of Module 4.
- STFI-PF has been responsible for the coordination of work in M4 and the coordination with the other modules, especially module M1, M3 and M5.
- STFI-PF has taken part in IP Board.
- STFI-PF has organized telephone meetings every 1-2 months and 3 physical meetings for M4 partners.

KCPK: 1.4 MM

- KCPK is the leader of WP4.4, so the work done in WP4.0 is associated with the Module 4's reporting of WP4.4.
- KCPK is a member of the IP board and work includes attending IP board meetings and teleconferences and all necessary work in preparation of these meetings and following up on decision and plans.
- KCPK has been participating in and contributing to several of the organised road shows.

VTT: 0.5 MM

- Taking part in Eforwood meeting, April 2008, Uppsala
- Taking part in Eforwood week, May 2008 in Vienna, Austria
- Taking part in Eforwood week October 2008 in Bordeaux, France
- Expert panel scenario's meeting at VTT Espoo Finland 29.9.2008
- Module 4 meeting at BRE Watford, UK, 11.9.2008
- Cross module work within case studies. Specification of how to handle bioenergy in different case studies (Scandinavian, B-W, Iberia).
- Preparing internal position paper: "BIOENERGY WITHIN CASE STUDIES"

BRE: 0.7 MM

- BRE is a co-coordinator for Module 4.
- BRE is responsible for wood based products stream (solid wood products) in M4 and, therefore, negotiates and collaborate closely with module M3 and M5.
- BRE has organised both teleconferences and physical meetings for M4 partners.
- BRE has reviewed WP 4.0 reports.

JPC: 0.4 MM

- Pöyry is the leader of WP 4.3., the work done in WP 4.0 is associated with the Module 4's reporting of WP 4.3.

KCL: 0.5 MM

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

- KCL is the leader of WP4.1, so the work done in WP4.0 is associated with the Module 4's reporting of WP4.1

TUZVO: 0.5 MM

- TUZVO has participated at telephone meetings for M4, Iberian case and physical meetings during EFORWOOD weeks held in Vienna and Bordeaux as well as at the EFORWOOD Workshop on chain designing held at IFER in Jilove, Prague.

WP 4.1

STFI-PF: 7 MM

- STFI-PF has been responsible for the PD 4.1.7 "Report describing the Manufacturing Processes in the Case studies". This report was a bit delayed but has now (June -08) been delivered and accepted.
- STFI-PF has been taking a big part in the work to define the manufacturing processes for the 3 case studies; The Scandinavian case study, the Baden-Wurttemberg case study and the Iberian case study.
- STFI-PF has been responsible for part of the data collection for the Pulp & Paper Model mills in all three case studies.
- STFI-PF has been the coordinator of M4 work in the Scandinavian case study.
- STFI-PF is also taking part in the EU-FWC task force and is working with defining the M4 processes on a EU level and the wood flow allocation for each country in EU-FWC.

KCPK: 4 MM

- Contributing to WP 4.1 deliverables
- Data collection for all *social* indicators for all fibre products for all three case studies.
- Data collection for all *social* indicators for all fibre products for the EU-FWC
- Participating in the Indicator task force and contributing to development of the DCP's.
- Coordination of the Energy indicator work group
- As M4 scenario representative, KCPK gives support to WP 4.1 in relation to data collection for the future (2015 and 2025 for the reference futures and scenarios)

VTT: 3.5 MM

- Design of solid wood model mills (primary conversion: sawmill and mills for panel production, secondary conversion: planed sawn goods, manufacturing of windows, doors wooden building components, wooden houses and furniture) to be used generally in ToSIA.
- Design of pellet production concepts to be used generally in ToSIA
- Specification of model mills for Scandinavian case study matching reality
- Specification of model mills for Nordic region matching reality
- Data client cross module chain connections. Data collection protocol – defining chain structures
- Collecting data for defining indicator values of economical, environmental and social aspects for Scandinavian case study

Annual report 36 months Module 4

3rd Period: November 1, 2007 - October 31, 2008

- Collecting data for defining indicator values of economical, environmental and social aspects for Nordic region
- Data set for technological scenario was defined.
- Participating in writing PD 4.1.7 and 4.1.8
- Internal review of PD4.1.8

BRE: 3 MM

- BRE leads the solid wood stream in M4 and collaborates closely with other modules/M4 partners in definition of case studies and collecting data (primarily environmental but also social indicators for both Scandinavian and BW case study).
- BRE has been reviewing reports on regular basis.
- BRE closely participates in the EU-FWC. The transport information for BW has been submitted and work on further datasets continues.

JPC: 8 MM

- Paper industry and wood products industry's primary conversion related data collection for economic indicators for all three regional cases.
- Commenting the M4 part of the bioenergy chain
- M4 internal work on e.g. developing type mills and manufacturing processes
- Definition of inter and intra module flows in case study and EU-FWC level
- Participation in the work of "Social and Economic Indicators" work group
- Participation in the work of the "Energy Indicators" work group
- Coordination of M4 part of the Iberian case study
- Participation in M4 driven scenario i.e. "Technology" –scenario work

KCL: 8 MM

KCL is the leader of this WP. The work has consisted of the following actions:

- Coordinating data collection responsibilities in Module 4
- Contributing to PD4.1.7
- Coordinating of report PD4.1.8 (Month 30, was delivered in Month 32)
- Coordinating of report D4.1.9 (will be finalized by Month 40)
- Participating in process mappings for the case studies and EU-FWC
- Data collection for environmental indicators for market pulp, magazine paper, fine paper and newsprint processes (Iberian case study) in the case studies
- Data collection for environmental indicators for market pulp, magazine paper and fine paper for EU-FWC
- Participating in Transport work group
- Participating in Environmental indicators work group
- Participating in Energy indicator work group

TUZVO: 3 MM

- TUZVO has contributed to the development of the topology of chains in the description Manufacturing Processes in the Case studies in the solid wood issue.
- The Scandinavian as well as Iberian case study was commented by TUZVO.

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

- Data collection was made for the Slovakian solid wood processing industry

WP 4.2

STFI-PF: 2 MM

- STFI-PF has been commenting the reports and been involved in the discussions about the work content in this WP.

KCPK: 3 MM

- Providing input about recovered paper related technologies to PD4.2.5
- Providing input for the reference futures concerning recovered paper related technologies to PD4.2.7.
- KCPK is coordinating the M4 technology scenario and supporting all WP 4.2. related issues in this as such.

VTT: 4 MM

- Participating in writing PD 4.2.5 Report on conditions and consequent timing of technological advances in processes relevant to case studies
- Internal review of PD 4.27

BRE: 8 MM

- BRE is the leader for this work package.
- PD 4.2.6 has been finalised and work is underway for PD 4.2.7 that is due for submission in month 36.
- Some other deliverables are delayed due to their interlinked nature. For example, PD 4.2.6 and PD 4.2.8 are due month 40.
- Work continues on scenario and the next step is to make quantification on a number of issue before dissemination/presenting to other partners.

IPC: 3 MM

- Development of the methodology for compilation of response functions and draft report PD 4.2.6 "*Conceptual outline for response functions and draft response functions for case studies*". This report will be finalised by Month 40.
- Commenting the other reports and discussions about the work content in this WP.
- Following the other work in WP 4.2 and linking it to the work of WP 4.3.

KCL: 5 MM

- Providing input about pulp and paper technologies to PD4.2.5
- Internal review of PD4.2.5
- Providing input for the reference futures concerning pulp and paper technologies to PD4.2.6.

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

TUZVO: 2 MM

- TUZVO has commented the reports and been involved in the discussions about the work content in this WP.
- TUZVO has contributed to the PD 4.2.5 Report on conditions and consequent timing of technological developments in processes relevant to case studies, mostly relating the solid wood issues in case studies, and was responsible for the parts a/Isolation and development of wood protection chemicals from natural substrates, b/Introduction of laser cutting as well as c/Drying techniques such as use of microwaves
- TUZVO has commented the other parts of the report.

WP 4.3

STFI-PF: 2 MM

- STFI-PF has followed the work in this WP by getting oral information from the WP leader (JPC).
- STFI-PF has been reading the reports and commenting on the work with Response functions that will be used for prediction of the indicator values for the Reference futures and scenarios.

KCPK: 4 MM

KCPK is scenario representative of Module 4. This includes:

- coordinating the technology scenario (driven by M4)
- coordinating the process and communication with other modules concerning this scenario.
- coordinating the M4 work in other scenarios.
- coordinating the M4 work on reference futures and give support to WP 4.1 in relation to data collection for the future
- KCPK is further supporting the WP leader (JPC) in terms of reviewing and commenting on deliverables and milestones.

VTT: 2 MM

- Providing material regarding pellet prices and production costs

BRE: 0.5 MM

- BRE is supporting this WP leader (JPC) in terms of reviewing and commenting on deliverables and milestones.
- When necessary, BRE also manages interlinks with WP 4.2. and WP 4.3.

JPC: 9 MM

Pöyry is the WP leader for WP 4.3. The main tasks in the months 25-42 have been

- Supporting and data input to WP 1.3 / EFI-GTM-model
- Link between M4 / "EFI-GTM world"
- Development of the value added model and compilation of the report PD 4.3.7. "Conceptual description of the value added model"

Annual report 36 months Module 4

3rd Period: November 1, 2007 - October 31, 2008

- Development and writing of the report PD 4.3.8 “*Draft description of response function framework and examples*”
- Working closely with WP4.1. – e.g. model mills and inter and intra module flows
- Working closely with WP 4.2. – e.g. development of response functions

KCL: 2 MM

- Following the situation in WP4.3.

TUZVO: 2MM

- Followed the work

WP 4.4

STFI-PF: 1.7 MM

- STFI-PF has participated at a meeting of the CEPI research group and there presented the M4 work with Model Mills and how to come up with indicator values for the industry for the Reference futures and the scenarios.
- STFI-PF together with KCPK (WP leader of WP 4.4) will organize a meeting for Industry people (CEPI and CEI-BOIS) October 29 where the scenario work in EFORWOOD in general and in Module 4 in particular will be presented. The industry will at this forum be able to give valuable feedback on our work so far.

KCPK: 2.3 MM

KCPK is WP leader for WP4.4. This includes:

- coordinating the activities in this WP
- participation in EFORWOOD road shows in Brussels, Sweden, Portugal and Spain (meetings between EFORWOOD representatives on one hand and national and European industrial associations on the other).
- Organizing an extensive meeting between EFORWOOD representatives on one hand and industrial stakeholders on the other (the R&D groups of the European associations CEPI and CEI-Bois) at October 29 where the cases and the scenario work in EFORWOOD in general and in Module 4 in particular will be presented and discussed. The industry will at this forum be able to give valuable feedback on our work so far and on the afterlife of EFORWOOD
- Taking into account the future application of the EFORWOOD deliverables drafting a document dealing with the afterlife of EFORWOOD

VTT: 1 MM

- Taking part in the work related to reference future and scenarios for 2015 and 2025.
- Technological scenarios for solid wood industry was created by VTT including estimation of impacts.

BRE: 1.7 MM

- BRE is taking a steer from STFI – PF on the role that has to be re-scheduled due to CEI-Bois change of role.

**Annual report 36
months Module 4**

3rd Period: November 1, 2007 - October 31, 2008

- BRE will participate in the industry –research consortium relationship.

JPC: 1.3 MM

- Following and input to reference future and scenario work (co-ordinated by Module 1)

-

CEI-BOIS: 1MM

- Coordinating a meeting with the R&D groups of CEPI and CEI-BOIS together with the WP 4.4 leader planed for October 29, 2008.

KCL: 1.5 MM

- Following the situation in WP4.4.

TUZVO: 1.5 MM

- Followed the work