EFORWOOD
Tools for Sustainability Impact Assessment

Status and account of stakeholder and user-group interaction with recommendations for further involvement

Christian Gamborg

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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

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EFORWOOD

Sustainability Impact Assessment of the Forestry - Wood Chain

Project no. 518128

EFORWOOD

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PU	Public	
PP	Restricted to other programme participants (including the Commission Services)	PP
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)	

EFORWOOD
Sustainability Impact Assessment
of the Forestry - Wood Chain

Status and account of stakeholder and user group interaction with recommendations for further involvement is the ninth report on stakeholder aspects of research undertaken by the EFORWOOD Tools for sustainability impact assessment of the forestry wood chain. The report was prepared Christian Gamborg, senior scientist at University of Copenhagen, Forest & Landscape. Input to the report made by Kaj Rosén is gratefully acknowledged.

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1 Summary

As concluded in the D0.1.4 it has become clear that there is no one-fits-all panel approach to the EFORWOOD interaction with Foresty-Wood-Chain stakeholders. Many of the hitherto involved Pan-European stakeholder organisations are busy and sought after for many projects and issues, hence commitment can be difficult to maintain. Altogether, this has called for a more flexible and adaptive approach of interaction.

The main approach has been focused, bilateral meetings and interviews with key stakeholders (a so-called "roadshow") to ensure input and feedback. Meetings which primarily have taken place at the stakeholders' premises. The results of the roadshow are presented in greater detail in PD0.1.8 (Gamborg, 2008). As it has also been pointed out by evaluators, the roadshow has proved a successful approach to reach stakeholders and getting feedback.

Three main categories of stakeholders have been focused on: industrial stakeholders, commission services and other significant non-industrial stakeholders.

The key topics have been overall ToSIA development, Indicators, MCA and scenarios. See Annex 1 to this report. Efforts have been coordinated to the extent possible with the communications strategy (and plans) elaborated by M6 in collaboration with WP0.1.

2 Introduction

This report presents a status and an assessment of the stakeholder interaction in the EFORWOOD project. The report builds on D0.1.4 Stakeholder interaction and PD0.1.8 Roadshow status and results report (Gamborg, 2008).

WP 0.1 ensures active and integrated stakeholder and user-groups participation in the SIA of the FWC to secure a continuous dialogue using best practice methods of involvement.

A stated aim of sustainability impact assessment (SIA) is to improve transparency in public policy decision making. A requirement in SIA is to involve stakeholders to ensure relevance and legitimacy in the use of SIA results. However, also in the *development* of the tool for conducting SIA (ToSIA), interaction and direct dialogue with end-users and other stakeholders along the FWC (e.g. industry, commission services, political decision makers, forest administrators, intergovernmental bodies and NGO's – all at different levels), is considered highly important by EFORWOOD.

One of the central aims of the involvement is to get stakeholders' views, constructive feedback and recommendations on key EFORWOOD developments and outcomes. Thus, an essential role of stakeholder interaction in EFORWOOD is to supplement the technical and scientific expertise of project partners. For example, in completing the first draft set of proposed indicators for the whole European FWC, end-users and other stakeholders provided valuable input and discussion. Future interaction, including physical meetings, written comments as well as web-based surveys and discussions will take place on e.g. FWC scenarios development and on the purpose, interface and uses of ToSIA.

As defined in the communications strategy, a FWC stakeholder is seen as anyone who can affect or be affected to a significant degree by the selection of an alternative and who is felt to have a legitimate claim to have their interests considered by the decision makers in the project. Some FWC stakeholders are already part of the EFORWOOD project as partners (e.g. industry and private forest owners associations) whereas others (e.g. European Newspaper Publishers' Association) are not.

It is important to note the difference between project stakeholders and *FWC* stakeholders. For example, the federations CEPF; CEPI and CEI-BOIS are FWC stakeholders, but are also partners in EFORWOOD and thus not project stakeholders.

Some of the stakeholders are also end-users of the results of EFORWOOD. An end-user, or user-group, is the ultimate user of the results for whom the EFORWOOD outcomes are intended (e.g. Commission services, industry planners and strategists). The user-group can be seen as a specific type of stakeholder who may benefit from using the tool after it has been fully developed by EFORWOOD.

A wider range of stakeholders include a broader range of relevant industry-based organisations along the forestry wood chain, NGOs (such as various European consumer organisations), the wider research community, European legislators and politicians at various levels.

In an EFORWOOD context, we have furthermore distinguished between primary, secondary and key stakeholders. Primary stakeholders are taken to be those whose interests and behaviour are ultimately affected by the decision/process or action, here, in relation to FWC. Secondary stakeholders are intermediaries in the process, and include typically interest organisations, umbrella associations and so on.

Key stakeholders are defined as those who can to a significant degree influence or are otherwise important to the process, thus Groups A, B and C are referred to as key stakeholders, cf. Figure 1. These include EU Commission services, FWC related industry (e.g. CEPI, CEI-Bois), FWC related non-industrial stakeholders such as forest owners associations (CEPF) and non-governmental organisations active in and/or impacted by the FBS (e.g. IUCN).

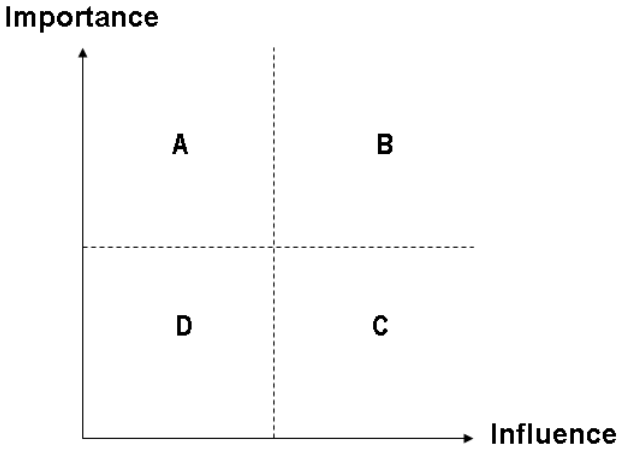

Figure 1. Stakeholder groups plotted in a Importance/Influence Grid. After Studd (2002).

Group A, characterised by high importance but low influence, traditionally require special attention because of low influence as e.g. 'socially excluded' group or in the context of EFORWOOD those that may not be normally well represented (e.g. SMEs, public groups) from various parts of Europe. With Group B, the ones with high importance and high influence (e.g. forest industry) a good relationship must be established to ensure support. Group C, with high influence, but low overlap of interests with the project, may constitute a risk. Some of these groups might be special interest organisations. Group D has low priority for the project, and is unlikely to be involved.

3 Status for stakeholder interaction

Interaction with stakeholders in larger EU projects is notoriously difficult. Questions of representativeness (i.e. who should be involved), issues (i.e. interaction about what) and purpose (i.e. why involve, and for the benefit of whom) need to be addressed and subsequently suitable methods must be applied.

In the context of EFORWOOD, stakeholder participation has been through representation from companies, organisations, associations, federations, networks or other groups. Participation, meaning to take part, is used for processes ranging from information giving, public meetings to joint decision making. In EFORWOOD, participation outside the sphere of project partners has involved the steps aiming at information gathering and consultation, i.e. listening and learning, but with all decision-making made by the project. M6 is responsible for information giving. *Consultation* is carried out through a combination of written consultation documents, remote surveys (can be web-based) and deliberative procedures in the format of bilateral meetings of a select group of stakeholders and end-users.

The aim has been to get interaction with FWC relevant industry, forest and other land owners, forest managers, policy makers, international and EU forest related organisations, other forest related organisations, environmental NGOs as well citizens and other society organisations. In the EFORWOOD project so far, groups B and C (cf. Figure 1) have dominated as stakeholders to include, as there is no statutory obligation or legal requirement to include stakeholders as Group A in the development process. More so, they are to be contemplated more in the implementation phase of the TOSIA.

Throughout the EFORWOOD project, various methods of interaction have been used, including workshops, interviews and written consultations. Workshops has been held also under other Modules, e.g. MCA workshop with select stakeholders in the case of Baden-Württemberg. However, to enable more in-depth feedback from stakeholders and more consistent creation of awareness about the project among key stakeholders, a 'roadshow' approach was developed. A roadshow is here defined as a smaller dedicated, targeted two-way discussion meeting with key persons from EFORWOOD and representatives of a certain end-user or other stakeholder, i.e. the target group for the meeting, usually at their premises. The roadshow should build on current levels of awareness and understanding. The meetings should enable a more direct consultation and feedback on the general idea and outcomes of EFORWOOD, but also make room for discussion of more specialized issues (e.g. scenarios) or certain parts of the FWC if relevant

The target groups for the roadshow comprised EU Commission, large industries, other FBS industry and associations, other decision/policy makers, as well significant non-industrial NGOs. The aim of the roadshow has been twofold: *a)* to increase awareness and understanding of project impacts, and *b)* get direct input/feedback on project developments (general + specialized). More than 20 stakeholder organisations have been visited in Europe and USA, at their premises. The main European organisations visited are shown in Figure 2.

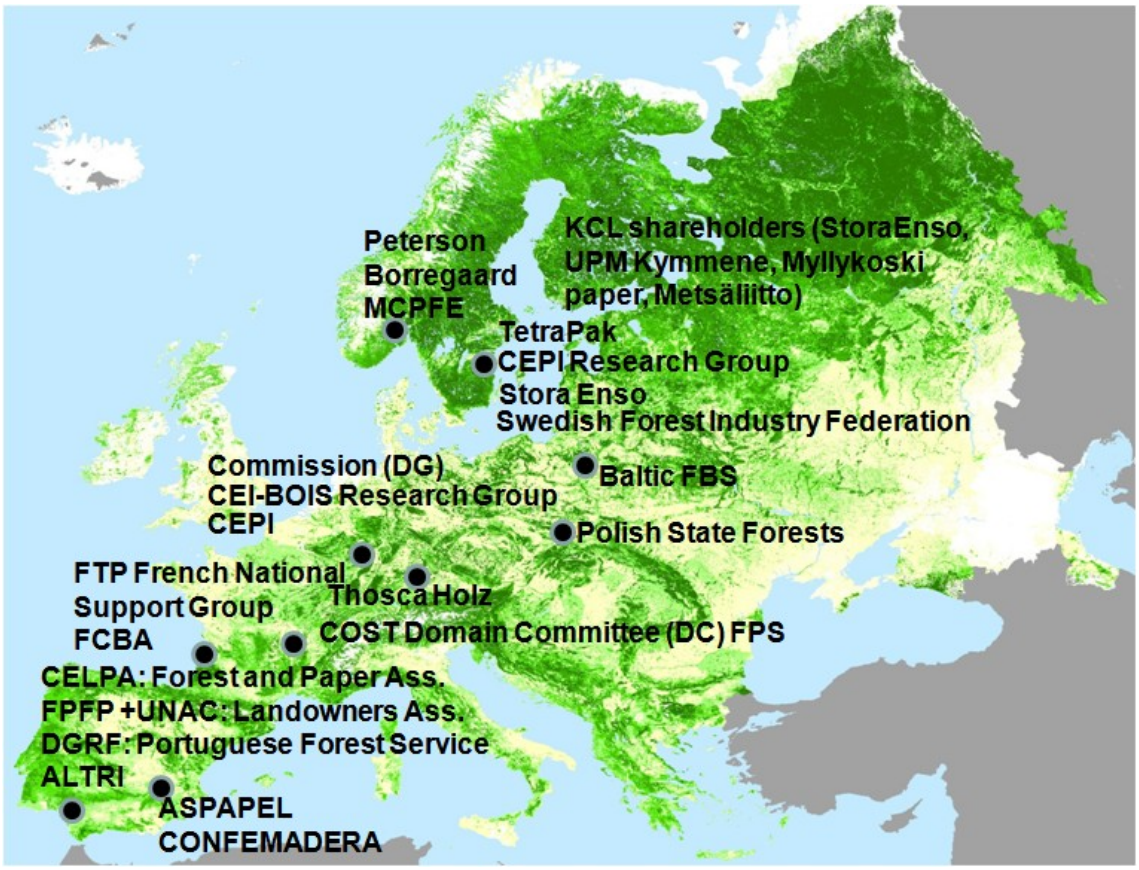

Figure 2. Roadshow meetings held during EFORWOOD

In addition to the European stakeholder organisations, EFORWOOD was presented and discussed with 7 American organisations to get a non-European view of the approach taken by EFORWOOD. See PD0.1.8 for further details of these meetings.

4 Assessment of stakeholder interaction

Coverage of key stakeholders has been satisfactory, especially when it comes to industrial stakeholders, commission services and other decision makers. The most difficult part has proven to be the significant non-industrial stakeholders. As it is evident from several EU projects and acknowledged by these types of stakeholders themselves, they are invited all the times by different scientific, political and special interest groups to discuss a very wide variety of projects. Although interested in a project such as EFORWOOD, often these types of stakeholders, although significant, have very limited resources and overloaded work plans resulting in strict prioritization of engagements. Interaction with some of these non-industrial stakeholders was, however, obtained with the help of a broader workshop format during EFORWOOD.

In general, stakeholders visited have been interested in the EFORWOOD project but also expressed difficulties in getting an overview, and moreover, some reservations regarding the use of the tool. This is fully understandable, part of the reason being the discussions have focused on a tool/concept under development. Table 1 shows some of the main areas of discussion of the stakeholder interaction.

Table 1. Selected questions, issues and concerns (according to main topic, non-prioritised) raised during roadshow meetings

Topic	Questions, issues and concerns
ToSIA	• What will ToSIA look like – and what is it planned to do? • Who are the envisioned users of ToSIA? • Can ToSIA be used without expert help? • Can you compare different chains? • Is e.g. concrete/steel – in general substitution covered? • How are other materials than wood in products (e.g. plastic in packaging) handled? • How well does ToSIA reflect reality? • Who will be in charge of ToSIA; post-project maintenance and upgrading?
Indicators	• What kind of indicators are used? • How does the indicator set used in EFORWOOD compare with other sets (e.g. MCPFE)? • How are indicators consolidated? • Indicators used in ToSIA for comparisons of between FWCs should always cover the sensitive issues for both "lines" • How to handle import/export in relation to impacts?
MCA and CBA	• How do you compare/aggregate different indicators? • Who is determining the importance of indicator values? • How is subjective valuation handled? How transparent are the choices? • How are GHG emissions and carbon sequestration handled?
Scenarios	• What are scenarios, which areas? • How is the time aspect handled? • How to include external drivers (e.g. climate change, Chinese import) • FBS is global, not only European, how to take into account?
Other issues	• How is renewability reflected? • Misuse of results to discredit FBS (e.g. by locating "hot spots") • Use of results by policy makers to justify already decided policies (tweaking)

For further details, including answers to these questions, especially TOSIA indicators, MCA and CBA as well as scenarios, see Annex 1, cf. PD0.1.8.

5 Recommendations for further involvement

In order to follow up upon the status and assessment, the next steps will be to finalise the interaction with stakeholders. This ensured through the following tasks.

A first task is to finalise roadshow meetings.

A second task is to finalise reporting of the input and feedback from stakeholders into the project. Reporting has taken place to the stakeholders visited through detailed minutes (available at the EFORWOOD Portal under partner pages).

A third task will be to coordinate with M6 Dissemination of Knowledge, the possibility of stakeholders to attend (i) the final scientific conference presenting results of EFORWOOD 23-24 September 2009 in Uppsala, and (ii) relevant to the potential user groups the TOSIA training session taking place 9 November 2009 in Stockholm.

6 Conclusion

- **The main approach used to interact with stakeholders in the EFORWOOD project has been the so-called roadshows, which has proven a useful approach, as also concluded by the external evaluators in the Year 3 report.** PD0.1.8 describes the main outcomes and results of this interaction, concluding that this form of stakeholder interaction seems a more 'sustainable' approach than many bigger multi-stakeholder workshops often employed in similar projects.

- **In general, stakeholders visited have been positively interested in the EFORWOOD project but also expressed difficulties in getting an overview, grasping the consequences of applying TOSIA and conceptualising the boundaries for using the tool**. As the meetings have presented work in progress, this is fully understable. Main topical areas of discussion at meetings have been: ToSIA as a tool, indicators, MCA and scenarios.

- **The main outcomes of the stakeholder interaction, especially the roadshows, have been: *a)* communicating the project to key stakeholders, *b)* exploring concerns and views related to EFORWOOD and *c)* getting feedback on key project elements, in particular ToSIA, indicators, MCA and scenarios**. The "results" – i.e. the issues and concerns which have more or less consistently come up at the meetings raised during the meetings – of the roadshow have been made use of internally as input and feedback in project Modules and externally such as FAQ on project web portal, see also Annex 1 to this report.

7 References

D0.1.4 Stakeholder interaction preliminary assessment**.** EFORWOOD D0.1.8. University of Copenhagen.

Gamborg, C. 2008. Roadshow status and results report. EFORWOOD PD0.1.8. University of Copenhagen.

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8 Annex 1 Questions and answers roadshow

Q&A related to ToSIA

What is ToSIA planned to do? ToSIA is a decision support tool producing as structured background material for analysis of proposed or likely changes. ToSIA is designed to answer 'what if' questions (e.g. changes in markets, changes to oil prices). These changes are reflected in changes in a sustainability index for the forestry wood chain or parts of the forestry wood chain..

What will ToSIA look like? ToSIA will come in two modes: ToSIA-FWC which will material flows in single/multiple FWCs and assess indicator values to indentified FWC-processes. ToSIA-FWC will include a module, ToSIA-E, to be used for analysis of indicator values, providing different possibilities for summarised indeces. ToSIA-E will allow for CBA (cost-benefit or cost efficiency) and MCA (multi-criteria). ToSIA-U will be a more demo kind of version. The actual user interface has not been developed yet, but will also be done in interaction with stakeholders.

Who will be the users of ToSIA? ToSIA will be provided in open source and could in principle be used by anybody. EFORWOOD is commissioned by the EU and intended for Commission or national authorities to use ToSIA when considering a new policy, as well as larger FBS companies (more for strategic purposes, not for deciding exclusively on e.g. new investments), industry confederations.

Can ToSIA be used in connection with public consultations? Technically speaking, yes. However, running the tool at a level required for informed decision making support requires external expert help to use it. The group mode in MCA (see below) could be used for comparing different stakeholder views.

Which concept definition of sustainability is used in EFORWOOD? The main point in EFORWOOD is not the actual definition, but to have a comprehensive set of indicators to cover the different dimensions of sustainability (ecological, economic and social aspects). The user's weighing/balancing of indicators in ToSIA will reflect the user's emphasis on aspects of sustainability.

Is it possible to make simulations, taking into account different sustainability criteria? ToSIA will have a set of guiding scenarios pre-defined which allows for some sort of "simulation" where impact with regard to selected indicators can be assessed – in relation to an alternative FWC.

Will the Commission know how to use it – Each commissioner has different objectives? It is not a "computer game" to be used on the spot by each desk officer. Ex-

pert/consultant help will be needed to use the tool for proper analyses (see question below). *If* it is to be taken further along the route of using it without consultant is a post-project question, which is in the process of being considered. Moreover, there is still the issue of collecting data for indicator values which is difficult.

Is concrete/steel substitution covered? It is not covered directly, but the impact of an increase in the use of wood or wood fibres is covered. Substitution questions are in a possible, subsequent project. The FBS is used to develop the methodology, well aware that for many the substitution question is important.

How is other material than wood in products handled? In the model, only wood and fibres are included. Recycling/land fill aspect is included.

If ToSIA evaluates internal changes (within one value chain), how can ToSIA be used to compare wood based products with products based on other materials (e.g. plastic or bricks/concrete), i.e. will ToSIA compare different sectors? EFORWOOD's focus is decision support in relation to improvements in sustainability within the FBS. Depends further on how the question is understood. *No*, you cannot compare different types of industry (e.g. wood and steel). EFORWOOD develops a methodology, which in time may be possible to apply to other sectors. However, different chains within the forest based sectors can be compared, but only if the different chains are comparable. For example: we want to compare different Spruce chains which differ in the management. Or it may be interesting to compare alternative bioenergy chains (which energy product is more sustainable: pellets or district heating?). However, comparing a beech chain and a pine chain in the same region or pine chain in Sweden and Spain respective sustainability is not meaningful. Sustainability impact assessment makes sense when you assess impacts of technological or policy drivers within comparable system boundaries.

What decisions are to be made with the help of the tool? ToSIA is a decision support tool producing a structured background material for analysis of proposed or likely changes. ToSIA is designed to answer 'what if' questions (e.g. changes in markets, changes to oil prices). These changes are reflected in changes in a sustainability index for the forestry wood chain or parts thereoff .

What about horizontal EU standards on building materials? See answer above. EFORWOOD could be of assistance by getting their specialists to 'balance' the picture at relevant meetings, subject to representatives of relevant partners to do this. In relation to the issue of recyclability of material, which was reported to be a tenet of e.g. steel, it depends on how recycled is defined.

Will ToSIA expose "weak" points of the Forest Based Sector? Yes, can be used to locate "hot spots". But as SIA is required by the EU before a new policy is introduced, ToSIA could actually be an advantage for FBS. EFORWOOD produces a SIA tool, and in other "sister" projects, such as SENSOR, and SEAMLESS, SIA tools for land-use and the agricultural sector are being developed.

Who is ToSIA intended for? The tool has been commissioned by the EU commission, as following 2002, any new policy to be introduced should be assessed for sustainability impact. Besides commission desk officers, the tool could also be used by the forest based sector itself, e.g. industry associations, larger companies and NGOs. The model will be available as open source, in principle for everyone to apply. However, after the 4 years of the project lifetime, the tool should be able to be run with the aid of an expert consultant for doing actual analyses such as MCA or CBA. In addition there will also be possibilities of using the web based demo version or of partial models.

What is put into the model? ToSIA need input of the following: definition of system boundaries for an analyses FWC; processes identified for a FWC, products identified for the FWC.

Will ToSIA compare different chains? Depends on how the question is understood. *No*, it is not possible to compare different types of industry (e.g. wood and steel) within this project. *Yes,* but only if the different chains are comparable. For example: we want to compare different Spruce chains which differ in the management. Or it may be interesting to compare alternative bioenergy chains (which energy product is more sustainable: pellets or district heating)? You can assess the sustainability of FWCs, also if they are not directly comparable (e.g. beech chain and pine chain in the same region or pine chain in Sweden and Spain). However, comparing their respective sustainability is not meaningful. Sustainability impact assessment makes sense when you assess impacts of technological or policy drivers within comparable system boundaries.

How can an industry (e.g.) organisation use ToSIA? ToSIA will come in two modes: ToSIA-FWC which will assess material flows in single/multiple FWCs and indicator values. ToSIA-FWC will include a module,ToSIA-E, which will allow for analysis using CBA (cost-benefit or cost efficiency) and MCA (multi-criteria) and for prioritising, weighing, analysing and summarising indicator values. ToSIA-U will be a more demo kind of web based version. Except for the ToSIA-U, expert help is in principle needed to run the model.

What about the rest of the world – only part of the picture looking at Europe ; what is more sustainable/better European or imported products – does it make sense to talk about European FWC as the FBS consists of local to global players? In EFORWOOD the focus is on the European FWC as a systems boundary. See also answer on import/export. However, the method is general and could in principle be applied anywhere in the world, as long as system boundaries are defined.

Is ToSIA possible to use outside Europe? ToSIA is general, and scalable. However the chain structures and database are set up for Europe in the current project. However, nothing prevents definition of FWCs and creations of data bases for regions outside Europe.

How are import/export issues handled? E.g. What about the environmental impact of exported products (Europe net export of wood* products) *E.g. raw material is imported from outside Europe, product is made in Europe and then exported outside Europe? It would seem that by importing raw material (e.g. pulp), the potential negative effects would not be subscribed to the European FWC. So, seen in isolation there would be a difference between sustainable production and consumption. However, through the indicators the effects are being taken into account. The focus is on changes in the European FWC, and analyses are being done on the external effects using a general trade model (EFI-GTM) which can be used to analyse the effect of e.g. Russian tax, as input to the model.

How are imports/exports outside Europe handled? It would seem that by important raw material (e.g. pulp), the potential negative effects would not be subscribed to the European FWC. So, seen in isolation there would be a difference between sustainable production and consumption. Through the indicators the effects are being taken into account. It is a question of system boundaries. In EFORWOOD the focus is on changes in the European FWC, and analyses are being done on the external effects using a general trade model (EFI-GTM) which can be used to analyse the effect of e.g. Russian tax.

Where in the EU commission is use of ToSIA envisioned? The tool has been commissioned by the EU commission (DG Research), as following 2002, any new policy to be introduced should be assessed for sustainability impact, thus potential use in for example DG Environment, DG Agri, DG Enterprise.

Can ToSIA be applied on a national level? It is possible. In EFORWOOD, a regional case, Baden Württenberg in Germany is currently pursued. As part of the European FWC analysis, ToSIA will be applied at the country level for all EU countries. For a separate country-level study specific data are needed to characterize all relevant chains with ensuing aggregation and simplification (to some degree) of the processes (cf. in the European FWC, the aim is to cover 60-80% of the material flow).

Would companies in the FBS use the tool? Also larger FBS companies (more for strategic purposes, not for exclusively deciding on e.g. new investments – and for doing their analyses of potential policy changes or checking on results and assumptions from EU commission and other FWC stakeholders), industry confederations are seen as potential users.

What is understood by the European FWC? EFORWOOD works with EU 25 plus Norway and Switzerland (Romania and Bulgaria are not included) as a systems boundary for European FWC. EFORWOOD aims at covering 60-80% of the mass flows within this defined system.

What kind of data input is required of the user? It is clear that using the tool relies heavily on data related to indicator values and mass flows and value chains. A selected set of data are in the tool (see also scenarios) but additional data may well be needed for a specific part of the chain or a certain perspective or resolution.

Will ToSIA compare different chains? Not likely because of great difficulties in getting the same type of data. Moreover, what might be an issue for paper production in Spain (e.g. water) may not be so in Finland. The aim is to compare within a chain – given changes e.g. in transport policy or in bioenergy subsidies.

Will EFORWOOD by locating 'hot spots' lead to exposing the Forest Based Sector (FBS) to other sectors – before foreseen new part (beyond the four year EFORWOOD project) about comparing competing materials? FBS sector is exposed anyway. The aim is to improve transparency and to be able to document e.g. "use of forests as a resource is better" and be able to specify why, how and with regard to what.

Is data reliability checked, and is data updating foreseen? Using the data in ToSIA is a way of picking inconsistencies and errors in data sets. The update of data is not fully decided upon in the project. In many instances, reliance is on data which anyway is regularly updated (e.g. through national inventories).

What kind of ToSIA interface will be available – for whom? Two types of ToSIAs are foreseen: ToSIA FWC (basic data part) including ToSIA-E (analysis part to new policies or new processes) and ToSIA-U (more limited, demo type). Most parts of ToSIA will be open source, some models might be developed under a license. However, expert support to use the tools after the initial 4 years of the project must be expected. The EU Commission has funded 13 mill. Euros out of a total of 20 mill. Euros. The commercialisation of ToSIA is not been put up for discussion within the Consortium or with the Commission yet.

How well does the model reflect reality? The question is whether the aim is too ambitious, also trying to cover economic and social as well as ecological aspects. ToSIA tries to be realistic in covering the whole FWC and not just one part and taking into account all three pillars of sustainability. Other EU Integrated Projects also work with developing sustainability impact assessment as all EU policies should be analysed/assessed according to sustainability impact, regarding e.g. land use (SENSOR) + and agriculture (SEAMLESS).

Will different users get different results running the tool? Potentially yes. In essence, different users may well have different values/interests resulting in different indicator priorities (e.g. in comparing two chains, what is more important? Economical or environmental issues? Production cost or employment effect?) Multi-criteria analysis (MCA) – which is used as an analytical part of ToSIA – is designed to gather stakeholder and expert preferences in terms of (a) importance of indicators, and (b) the indicator values of specific FWCs. MCA allows to transfer indicators measured on different scales to a uni-dimension "preference" scale which then makes it possible to synthesize the transformed indicator values for the overall holistic comparison of decision alternatives.

Who will be in charge of ToSIA and how will post-project upgrading and maintenance be handled? Most of ToSIA is open source (except for some parts where commercial software/models might be included). Use of ToSIA will require expert help for doing analyses. It is not decided yet who will be in charge of that. Other EU Integrated Projects also work with developing sustainability impact assessment as all EU policies should be analysed/assessed according to sustainability impact, regarding e.g. land use (SENSOR) + and agriculture (SEAMLESS).

Can ToSIA evaluate the impact on traditional sawn timber chain when energy prices increase elsewhere in Europe (= competition for raw material) linked to energy policies (e.g. subsidies EU wide or nationally)? See answer above on comparing chains, and see answer on MCA (which is more sustainable, particle boards or bioenergy – depends on perspective).

Is it possible to change mathematical models in the tool? There are no models embedded directly in the tool. It is possible for the user to use own e.g. growth models to come up with data for growing stocks or use own inventory data. Data protocols for all indicators (and sub-indicators) are specified.

Are there any SME's involved, and if not, why? SME's are not directly involved in the project as single partners but represented through the Pan-European confederations (CEPI, CEI-BOIS and CEPF) to avoid a too large and unmanageable consortium.

Will ToSIA be used to compare production value chains for competing materials/industrial sectors? Not within the project lifetime. However, a natural further step for a subsequent project is to expand the methodology developed to other sectors.

How is the issue of renewability reflected in ToSIA (as against e.g. recyclability)? The renewability of wood as compared to other materials; e.g. steel and concrete, is a main positive aspect, which could also well be reflected in the relative weighing. This aspect is maybe not at the moment fully reflected in indicators. In the indicator on GHG the aspect comes in. Work needs to be done on how to reflect renewability in more than the GHG aspect.

Can ToSIA be used for "green washing" (or the opposite) by industry or pressure groups, e.g. will users be able to define their own scenarios – and thus manipulate by e.g. not taking fully into account e.g. global aspects? ToSIA (as a result of the 4 year EFORWOOD project) will be restricted to the scenarios chosen in EFORWOOD but can be used dynamically along response functions. Abuse can be made, however a single ToSIA run needs to be analysed for assumptions (see on ToSIA + MCA).

Who will own ToSIA – IPR? The tool is open source – as far as possible. During the project time ToSIA is "owned" by the partners of the project consortium. What will happen after EFORWOOD has ended is discussed within the project at the moment. The tool is based open source and will as far as possible be available for free to any

user. However expert help will probably be needed before the tool is further developed to into a more user friendly version.

Is the tool flexible enough to allow for "special analyses". E.g can TOSIA be run for the French forest-based sector? Yes, at least if you are prepared to feed it with the necessary data for the specific Forestry-wood chains that you would like to design. ToSIA will include a data base, which, however, not might be enough for your purposes.

How will future improvements and developments be handled? The matter is discussed within the project consortium at the moment. Some kind of joint responsibility/activity among interested partners will most probably be developed. EFI will be the leading partner in the future development of ToSIA.

Q&A related to indicators

What kinds of indicator are used – is the set of indicators generic? Indicators for all three pillars of sustainability – in relation to the whole forestry wood chain (FWC) – are used (10 environmental, 9 economic and 8 social indicators, see Table 2). The indicators have been chosen with due reference to and consideration of all relevant indicator development processes on sustainability indicators in the EU, in particular the EU sustainable development indicators and the EU Sustainability Impact Assessment Guidelines. The FWC indicator development process also took sector specific indicator sets into account, most notably those for sustainable forest management (MCPFE criteria and indicators) and EU rural development. The large majority of indicators is generic in the sense that these indicators are not sector-specific, but generally valid and applicable across different sectors and industries (e.g. indicators on trade balance, employment, or energy generation and use). A few indicators, particularly on forestry (such as forest biodiversity), are sector specific.

Table 2. Economic, social and environmental FWC Sustainability indicators used in EFORWOOD

FWC sustainability dimension	Indicators	
Economic	(1)	*Gross value added*
	(2)	*Production cost*
	(3)	*Trade balance*
	(4)	*Resource use, incl. recycled material*
	(5)	*Forest sector enterprise structure*
	(6)	*Investment and research & development*
	(7)	*Total production*
	(8)	*Productivity*
	(9)	*Innovation*
Social	(10)	*Employment*
	(11)	*Wages and salaries*
	(12)	*Occupational safety and health*
	(13)	*Education and Training*
	(14)	*Corporate social responsibility*
	(15)	*Quality of employment*
	(16)	*Provision of public forest services*
	(17)	*Consumer behaviour and attitudes*
Environmental	(18)	*Energy generation and use*
	(19)	*Greenhouse gas emissions and carbon stock*
	(20)	*Transport*
	(21)	*Water use*
	(22)	*Forest resources*
	(23)	*Soil condition*
	(24)	*Water and air pollution*
	(25)	*Forest biodiversity*
	(26)	*Forest damage*
	(27)	*Generation of waste*

How general are the indicators (in relation to other materials' possible indicators and as a lot of standardisation work is going on related to the wood based industry)? The large majority of indicators are general in the sense that these indicators are not sector-specific, but valid and applicable across different sectors and industries. A few indicators, particularly on forestry (such as forest biodiversity), are sector specific. Standardization work usually standardise product or process specifications in detail and are considerably more specific than the indicators.

How are sub-indicators defined? Sub-indicators are defined according to one of the main 27 indicators. Each indicator has a number of sub-indicators (e.g. for the indicator "employment", there are sub-indicators for the gender aspects, thus including male and

female employment or for "biodiversity" sub-indicators include deadwood and species distribution). For each sub-indicators data collection protocols are specified. Currently 162 sub-indicators have been specified.

Do all indicators have the same unit? No. Some indicators are e.g. in euros/m3, some in m3/ha etc. One indicator value cannot directly be compared with the value of a different indicator. To evaluate across indicators, ToSIA allows for either using Cost-Benefit Analysis (CBA) putting all values on a uniform monetary scale or Multi-Criteria Analysis (MCA) making comparison possible through the use of elicited preferences.

How is quality of data determined, and what is the reliability of data? Data is collected on the basis of agreed and detailed "data collection protocols" for the indicators by specific experts. These experts also have to specify data quality and data reliability. Some data is obtained through national and international statistics, in which case data specifications are internationally harmonised or standardised. Depending on the indicator in question, data reliability varies. For instance, data on resource use or total production is deemed more reliable than data on education and training, or soil condition.

How are indicators consolidated? The indicators are used as specified and results shown for each of the indicator. For a range of indicators, values are converted into material flow in the TOSIA model. Indicators are consolidated in two specific analysis tools within TOSIA, i.e the CBA (Cost Benefit Analysis) and MCA (Multi-criteria Analysis) tools. In CBA all indicator values are converted and thereby consolidated into €. In MCA indicator values are weighted by the user or user groups, based on their respective perception of importance of indicators.

How are differences in countries with regard to e.g. classification systems handled? Data is collected on the basis of agreed and detailed "data collection protocols", which have been elaborated for each indicator by a team of experts from different countries. These experts had to ensure classification compatibility and/or ways to convert between different classifications. Data to is obtained through national and international statistics are based on classification systems that are already internationally harmonised or standardised.

Q&A related to MCA and CBA

How will you compare and aggregate different indicators (with different units as well)? For this task multi-criteria tools will be applied. Multi-criteria analysis (MCA) is designed to gather stakeholder and expert preferences in terms of (a) importance of indicators, and (b) the indicator values of specific FWCs. MCA allows to transfer indicators measured on different scales to a uni-dimensional preference scale which then makes it possible to aggregate the transformed indicator values for the overall holistic

comparison of decision alternatives. This aggregation can be done partially, for instance, within Modules of a FWC, or within sustainability pilars.

What are they main purposes of Multi-Criteria Analysis in EFORWOOD?
Multi-criteria analysis (MCA) is a set of methods designed to support decision-making by (i) taking explicit account of multiple, conflicting indicators, criteria or objectives, (ii) structuring a decision problem where the focus is on the comparison of a finite number of alternatives, (iii) identifying most preferable options among alternative courses by means of sustainability indicators, (iv) providing a formal model for such problems that can serve as a focus for discussion, and (v) offering a process that leads to rational, justifiable, and explainable decisions.

How can you handle the subjective valuation*?* In a multi-stakeholder setting, stakeholders may have different interests and values leading to different perceptions of indicators and indicator values. MCA provides the formal interface for eliciting preferences and values of actors involved in a decision making process. Participation supported by multi-criteria methods in sustainability impact assessment is essential to improve the capacity to understand complex issues. Moreover it helps to increase credibility of decision making and trust in decisions. In case no agreement is found contrasting opinions are documented and made transparent. For a given background (e.g., a regional case study) MCA may reveal overall differences in stakeholder perspectives in a consistent and transparent manner. The MCA software component of ToSIA will hence not support computational decision-making but prepare the decision environment for analysis, exchange and negotiation (e.g., how changes in weights may change the overall preferability of an alternative). It is important to note that values and interests of stakeholders and decision makers in comparing alternative FWCs in different regions may vary. Thus, there is no single "true" weighting scheme for indicators.

Who is judging the importance of indicators? In general, the user(s) by giving weights to indicator either valid for the whole FWC or specific for each phase of the FWC (e.g., forest management, harvesting and transport, wood processing, or purchase). The MCA software module within ToSIA is designed to support single user mode as well as a group mode where a stakeholder panel can analyse a FWC simultaneously. Because values of stakeholders and decision makers are involved there is *not one single true answer*. If a user is interested how his preferences may affect the assessment of FWCs he may set the relative importance of indicators. In a participative assessment environment stakeholders may produce "their" own reference profile for indicators and indicator values and compare it to those of other stakeholders. This comparison then may be used in finding a compromise solution.

What is the difference between single user mode and group mode in the MCA? There are two modes foreseen in the EFORWOOD MCA software**?** In single user mode, only one set of preferences is considered, whereas in group mode, a multitude of users' preference sets are included, allowing for comparison among sets of preferences and aiding e.g. negotiation between different stakeholders. The MCA workshop on the regional

case of Baden-Württemberg served as an example of a multiple stakeholder/user way of determining and aggregating weights, making the underlying scoring explicit. Such type of workshops may be used to build up some commonly agreed weights (1) to discuss from, and (2) to compare against.

How important is a difference between alternatives with regard to an indicator (e.g. production costs)? The importance of a difference can be assessed via MCA in ToSIA by means of preference functions. The user is asked whether to accept a default setting based on an expert enquiry or to define a personalized preference function by stating indifference and strict preference for a difference of e.g. productions costs.

What happens when a run is done of a selected FWC, and different users get different results? The MCA software within ToSIA supports comparison of users´ preference profiles both in a Delphi style (i.e., comparing one´s judgement against the group opinion and adjusting or confirming your vote) and in a group analysis. The latter item is to identify consensus and disconsensus among MCA participants and builds the ground for further discussion and negotiation on indicator weights, significances of indicator performances and ranking of alternatives.

How are MCA results stored/presented to the user? A report is automatically produced, giving main results and preference ranges etc. In this report it will also be stated if the user is applying an unbalanced set of indicators to compare the sustainability impact of e.g. a certain policies on alternative FWCs.

Different user groups may use the results – how to get balanced user groups? There is not one definitive answer from the tool. There is not an objective measure of when a user group is 'balanced'. Building balanced user groups lies in the responsibility of the facilitator/negotiator. Yet, ToSIA may support a distinct analysis per interest group and hence serve as tool to document specific interests in a multi-stakeholder dialogue.

Are regional differences in e.g. harvesting in Northern and Southern Europe taken into account? Yes, there are regional parameters which are mostly covered by data within the database. Yet, there could also be differences regarding region-specific preferences. Typically, those "regional specifics" will be unveiled in case-to-case applications in any of the given regions. In the software, default preference settings which are based on expert enquiry can be applied in a case-specific manner.

How is CBA included as an analytical tool in TOSIA?Cost benefit analysis is a technique for the assessment of the relative desirability of competing alternatives. In the context of the EFORWOOD project, cost-benefit isused to evaluate the overall sustainability impact of different policy measures on the forestry wood chains. The assessment involves the comparison of the status quo (baseline case) to one or more alternatives considering the incremental differences between the baseline case and the alternatives. The CBA compares the costs and benefits measured in monetary terms.

How is the social perspective taken into account in CBA? In the framework of the EFORWOOD project, the social perspective on the cost-benefit analysis is taken as the benchmark. A social CBA attempts to assess the overall impact of a project improving the welfare of the society as a whole, rather than of the (private) agents that implement the project. Whenever the implementation of a certain project has an impact on the environment representing positive or negative externalities, these external effects must be taken into consideration, in addition to the effects on marketed goods and values, in the process of project evaluation. The changes in the quality or quantity of environmental and conventional goods and services produce changes in social benefits associated with their consumption, which should be accounted for in the CBA.

How are emissions (such as GHG) and carbon sequestration handled? Whenever the implementation of a certain project has an impact on the environment representing positive or negative externalities, these external effects must be taken into consideration in the process of project evaluation. The externalities considered for the purposes of the CBA included e.g. GHG and non-GHG emissions, and carbon sequestration.

Q&A related to scenarios

What are scenarios in EFORWOOD? A scenario – as used in EFORWOOD – is neither a prediction nor a forecast, but is used to create a consistent image of a future. A set of scenarios aims to describe divergent futures against two so-called reference futures (i.e. 'benchmark' scenarios with dynamics, but without major policy interventions), derived from the IPCC A1 and B2 scenarios. Scenarios encompass a significant portion of the underlying uncertainties in the main driving forces. These drivers cover a wide range of key characteristics such as demographic change, economic development, and technological change. Different "storylines" are used – which assume a distinctly different direction for future developments. However, a scenario does not claim or aim to be a prediction. Conclusions should not be drawn from these storylines; nor are they advocated views of EFORWOOD on the future of European forest and forest industry. The scenarios cannot be used to assess a single product's future.

What kind of changes will be looked at in EFORWOOD? Currently, four scenarios are being developed, dealing with changes in: 1) "Policy" (bioenergy), 2) "Planet" (nature conservation), 3) "People" (consumption and lifestyle), and 4) "Production" (technological development). These are applied to the three regional cases, and to the one European scale Forest Wood Chain (FWC). One scenario will be applied per case. ToSIA is tested on various scenarios. Effects on sustainability of a selected scenario will be evaluated against a "Reference future". The two Reference futures used in EFORWOOD are neither a prediction nor a forecast, but are used to create a consistent image of a future. The reference futures encompass a significant portion of underlying uncertainties in the main driving forces. These drivers cover a wide range of key characteristics such as demographic change, economic development, and technological change.

Which scenarios are being developed? Currently, four scenarios are being developed, dealing with changes in: 1) "Policy" (bioenergy), 2) "Planet" (nature conservation), 3) "People" (consumption and lifestyle), and 4) "Production" (technological development). These are applied to respectively Baden-Wurttemberg, EU, Iberia, and Northern Sweden. ToSIA is tested on various scenarios.

How is the time aspect handled within the scenarios? In relation to sustainability impact assessment, the time aspect is important. Depending on the chosen time horizon the type of management/harvesting schemes may well be changed or the markets may change; e.g. to more global supply. The dynamic models underlying the data generated and supplied to the Tosia database, have taken into account time dynamics. Thus, these dynamics are covered when indicator values are generated for 2015. 2025 and (in case of forests) 2050.

Is expansion of EU included, e.g. in relation to forestry potential and effects on markets? EFORWOOD works with EU 25 plus Norway and Switzerland (Cyprus and Malta are not included). Again, it is a systems boundary issue. The scenarios provide results for 2005, 2015 and 2025 where other countries may well be included. Trade changes that may occur because of future EU expansion are not included

What about economic drivers – in relation to changed capacity in Europe. It is not only a question of flow of material, but of capital. E.g. changes in China? The storyline sketch a certain world where either there is a more free trade of goods and capital (A1) or a world that is more depending on its own region (B2). This is the only degree we can handle such dynamic relations between countries. These general assumptions result in a degree of dependence on Europe's own resource.

The scenarios in ToSIA seem valid, but are they mutually exclusive? In the running of ToSIA, the scenarios are treated as exclusive even though in some areas (e.g. bioenergy and technology) drivers are overlapping. The idea is to single out effects of e.g. a nature conservation framework policy such as Natura 2000. Here there would be a need for investigating overlap and feedback functions from different scenarios.

The reference futures are in some respects extremes, but in others not (e.g. both assume stronger or weaker economic growth) – what about economic recession? The reference futures are set as a baseline to 'test' the tool/approach. They do not pretend to be all encompassing or realistically predicting.

Is it realistic to expect a certain stakeholder to build scenarios – what does it take? As the tool stands now it will require expert help (to e.g. define forestry wood chains and processes and set data protocols and get data).