



UNECE



FAO



University Hamburg

19 October 2007

Wood resources availability and demands - implications of renewable energy policies

A first glance at 2005, 2010 and 2020 in European countries

This paper presents in a draft version the initial results of the study. It should serve as an input and background to the discussion at the UNECE/FAO Policy Forum 2007. The text and figures may be subject to significant revision, following the first round of discussions at the Policy Forum and subsequent inputs by Member States and the European Commission services.

The opinions expressed in this background paper do not reflect the positions of any of the sponsoring organizations.

This background paper was a joint effort of several authors:

Wood resource balance 2005:	Udo Mantau, Florian Steierer
Energy policy analysis:	Sebastian Hetsch, Kit Prins
2010, 2020 scenarios:	Florian Steierer, Sebastian Hetsch, Kit Prins

Foreword

This study is addressed to decision-makers in the field of renewable energy, forestry and wood-based industries. The objective is to assess the current role of wood energy and its future potential to help to achieve political goals on renewable energy and climate change in Europe. The focus of the assessment so far is on the countries in the European Union and EFTA. However, its implications address all UNECE member countries, as the conclusion and policy implications drawn from this study might apply to their national situation as well.

The figures presented are the results of combining actual figures, forecasts of future raw material demand from the wood-processing sector, and scenarios for wood-energy requirements to meet policy targets for renewable energy. The figures presented are not meant to be a forecast of future wood demand, but should be a basis to discuss renewable energy policies and help in finding realistic targets for the future contribution of wood to the overall energy supply.

The assessment is based on the best data available and is seen as a step in an on-going continuous process of data improvement. Delegates and national specialists are invited to join the effort to advance data quality on wood and paper products, wood energy and wood supply.

The study is a joint effort: The sections on the wood resource balance was lead and written by Udo Mantau and Florian Steierer, the analysis of renewable energy policies was elaborated by Sebastian Hetsch and Kit Prins, the scenarios for 2010 and 2020 were compiled by Florian Steierer, Sebastian Hetsch and Kit Prins.

Acknowledgements

The authors express their sincere appreciation to all colleagues supporting the study.

Special thanks the member of the working group, Jeremy Wall (EC DG ENTR), Bénédicte Hendrickx (EPF), Bernard de Galembert (CEPI), Jan-Olof Loman (Swedish Forest Agency), Jarmo Hämäläinen (Metsäteho Oy) and Heikki Pajuoja (Metsäteho Oy) for their valuable inputs and revision to the paper. Adrian Whiteman (FAO) gave important input to the study, especially through his knowledge on forest sector outlook studies.

Several people have kindly assisted the authors in the collection of necessary background information, in particular Alex McCusker (UNECE) as a key persons for data for the timber sector and Michel Francoeur from the International Energy Agency.

Further we would like to thank all colleagues involved in and commenting and revising draft versions of the report.

The authors wish to place on record its appreciation of the financial contributions from the European Panel Federation (EPF) and the Confederation of European Paper Industries (CEPI).

Table of Content

Abbreviations	iv
Executive Summary	v
1. Introduction: forest and energy - a new story?	1
2. Objectives of the study: a 2005 snapshot and future scenarios.....	2
3. Methodology.....	3
3.1. The wood resource balance - capturing and validating sources of wood supply and wood products.....	3
3.2 forecasting forest products demand and supply with EFSOS	6
3.3 Calculating the consequences of policy objectives	7
4. Wood resource balance for Europe 2005 - results.....	8
4.1. Wood supply.....	9
4.2. Wood use	11
4.3. Balancing the balance	12
5. Future wood supply and demand: EFSOS scenarios and energy policies	14
5.1. EFSOS scenarios for wood supply and demand in 2010 and 2020	14
5.2 Wood energy policy objectives (2010 and 2020).....	15
5.3 Combining forest sector outlooks and energy policy objectives	19
6. Conclusions.....	22
7. References.....	24
8. Annex	25
Annex I: European wood resource balance 2005.....	26
Annex II: renewable energy policy targets 2010.....	28
Annex III: renewable energy policy targets 2020.....	29
Annex IV: Scenarios for 2010 and 2020	30
Annex V: Data sources used in the study.....	34
Annex VI: Conversion factors	34
Annex VII: National wood resource balances	35

List of Tables

Table 1: Wood resource balance 2005 for EU/EFTA 29.....	9
Table 2: wood supply from forests and other sources	10
Table 3: Wood use 2005	11
Table 4: Major wood energy-consuming countries	12
Table 5: EU/EFTA supply - use balance	13
Table 6: EU/EFTA: Calculated future wood supply (based on EFSOS).....	14
Table 7: Calculated EU/EFTA future wood demand for material use (EFSOS).....	15
Table 8: Wood required to achieve national policy objectives for renewable energy.....	17
Table 9: Future wood supply and use	19
Table 10: EU/EFTA future wood required to fulfil EFSOS scenario and renewable policy objectives	20
Table 11: Main user of wood fibres in the future	20
Table 12: wood supply versus wood required to fulfil EFSOS projections and policy objectives	21

List of Figures

Figure 1: Components of wood supply and consumption in the wood resource balance.....	4
Figure 2: sources of wood supply EU/EFTA 2005.....	10
Figure 3: Wood use EU/EFTA (2005).....	11
Figure 4: wood required in 2005, 2010 and 2020 to fulfil energy policy targets	17
Figure 5: Percentage wood energy of total energy consumption in 2010 and 2020 ¹³	18

Abbreviations

CHP	combined heat and power generation
EFSOS	European Forest Sector Outlook Study
EFTA	European Free Trade Area
EU/EFTA	EU-27 plus Norway and Switzerland
FAO	Food and Agriculture Organization of the United Nations
ITTO	International Tropical Timber Organization
JFSQ	Joint Forest Sector questionnaire
JWEE	Joint Wood Energy Enquiry
MCPFE	Ministerial Conference on the Protection of Forests in Europe
Mtoe	million tons oil equivalent
NAI	net annual increment
RES	renewable energy sources
SFM	sustainable forest management
TPES	total primary energy supply
UNECE	United Nations Economic Commission for Europe
UNECE region	North America, pan-Europe, Russia, Central Asia

Executive Summary

Having always been one use of wood raw material, energy did not play a major economic role in the last decades; material use of wood (for paper and wood products) had been the dominating use in most countries of the UNECE region¹. In recent years wood energy came back in the focus of society and policy-makers as a renewable energy source to tackle issues of secure energy supply and climate change. In particular the European Union and her Member States have set policy targets for renewable energy (12% by 2010 and 20% by 2020). Since wood energy is currently the major source for renewable energy, these targets can be expected to have major implications for the forest sector.

The **first part** of the study assesses in depth current wood supply and consumption in 29 EU/EFTA countries in 2005, using the "wood resource balance" developed by Mantau (2005). This methodology calculates independently the wood supply on the one hand (directly from the forest as well as indirect sources: wood residues, recovered wood, etc) and wood consumption on the other (by the wood-processing industries and energy generation). Multiple uses of wood (e.g. the use of wood residues, chips and particles etc) are accounted on both sides of the balance, thus it does not only consider the wood supply (and use) directly from the forest.

On EU/EFTA level, the results of the study show a higher (47 million m³) wood consumption (821 million m³), than wood supply (775 million m³). These differences were much higher in some countries, while for others a higher supply was estimated.

Differences can be explained, by weak and missing data. On the supply side data weaknesses were found in particular in: woody biomass outside the forest, post consumer recovered wood and used logging residues. On the consumption side, little or weak information was found in particular on wood use for energy, as well as conversion factors (calculating wood raw material equivalent from units of products).

As other experiences from international (Joint Wood Energy Enquiry) and national level (e.g. household surveys in Germany, France, Norway) have also shown, volumes of wood used by the forest-based industries and in particular for energy generation are sometimes much higher than published in international and national statistics. Therefore empirical research is needed to gain a better picture of the actual situation of wood supply and demand, as well as the current contribution of wood to energy supply.

The **second part** collected and assessed national and EU policy targets for renewable energy, bioenergy and wood energy (if available) and translated them into wood volumes by applying a number of straightforward, transparent assumptions. Furthermore, the study calculated wood consumption from the wood-based industries² for 2010 and 2020, based on the European Forest Sector Outlook Study (UNECE 2005).

The wood requirements from EFSOS and the policy targets were then added up, to estimate wood requirements in 2010 and 2020 of both, the energy and wood-based industries. The combined wood requirements showed a difference to the EFSOS wood supply forecast of 185 million m³ wood in 2010 and 321 / 448 million m³ wood in 2020 (75% scenario and

¹ North America, pan-Europe, Russia and Central Asia

² Wood-based panels, sawmilling and pulp & paper industries

"business as usual" scenario). These calculations are not meant to be forecasts, but should be basis for discussion and help setting realistic wood energy policy targets.

It can be concluded from this study that better data and discussion about the data is needed in different areas of wood supply and wood use. This knowledge is crucial for policy decision on the future role of wood as raw material for the wood-processing industry and energy generation.

The difference between wood requirements to fulfil the EFSOS scenario and policy targets, signifies that one or several of the following developments are necessary:

- an increase in wood supply (from existing or new sources, or through imports),
- the policy targets will not be met, at least not with the share of wood as assumed in this study,
- the wood-based industries will not develop as forecasted in EFSOS.

In any case, overall energy efficiency and efficient use of wood is fundamental for a sustainable future energy and wood resource supply.

1. Introduction: forest and energy - a new story?

Currently, more than half of the wood harvested and removed from European forests is used for industrial processing purposes, where, on top of the carbon storage effect, it generates substantial added value as construction elements, interior finishing applications, furniture, packaging products, etc.

On the other hand, the use of wood for energy has become increasingly important. Although wood is the oldest form of energy, used for thousands of years, it has recently gained new attention. Rising prices for fossil fuels, the increasing dependency on energy imports from insecure regions, and the effects of climate change are challenges that society and policy makers are tackling by various measures:

In the Kyoto Protocol many developed countries committed themselves to reduce greenhouse gas emissions and the EU just disclosed more ambitious climate and energy targets for 2020. Measures will have been taken to increase energy efficiency and energy savings on EU and national levels.

Another important policy component is renewable energies. More precisely, in 1997 the EU set a target for 2010 of having 12% of its primary energy consumption derived from renewable energy sources, such as wood. In 2007, more ambitious targets were announced for 2020, by when 20% of the energy consumed should come from renewable sources.

These targets need to be seen in the context of the current state of renewable energies. In 2005, renewable energies accounted for only 6.5 % of energy use in the European Union. Biomass constitutes the largest source of renewable energies in the EU (66%), and wood is the major source for biomass (80%). Thus, wood is currently the major source for all renewable energy generation in the EU. The rest of Europe has a similar picture.

To close the gap between the current share of renewable energies and the targets, countries are elaborating diverse strategies. The EU has developed a Biomass Action Plan (EC 2005), looking at all kinds of biomass (forest-based, agricultural and municipal) and many other countries are designing similar plans or strategies. The EU Biomass Action Plan suggests doubling the production of bioenergy by 2010. This raises the question: where are these resources supposed to come from?

According to the EU Biomass Action Plan:

- The use of wood from the forest for bioenergy can be expected to more than double.
- Bioenergy from waste is foreseen to increase more than twofold. However, looking more closely at this number, most of this category is by-products and waste from the wood-processing industry, so actually this is wood as well.
- Finally, energy crops from agriculture are expected to increase dramatically from 2 to 44 mtoe (million tonnes of oil equivalent). So far, however, the actual increased use of energy crops has not yet been able to respond to the target.

New players might get interested in wood, once second-generation biofuels - producing ethanol and biodiesel from ligno-cellulosic material - are developed and are economically viable. These players are new to the forest sector and might change behaviour in the forest sector as well, since the energy sector is a fast moving, rapidly evolving sector with huge financial capital and potential.

Energy policies are of highest priority for all countries' and regions' economies and society, while forest policy often play a minor role in the overall policymaking. However, given the circumstances, energy policies will have a strong influence on the forest-based sector and wood-based industries. Therefore, it is important to build outlooks for the forest-based sector in the light of this rapidly changing picture and to analyse the

Replacing only one percent of the total primary energy consumption in EU 27 (1750 mtoe in 2005) would require over 90 million m³ of wood corresponding to about 1/8 of the Net Annual Increment (NAI) of Europe's forest.

impacts and opportunities. However, this must not be done just in the forest-based sector, but a cross-sectoral approach is essential. The forest-based sector has to understand the developments in the energy sector, driven by society and economical demands, but also the energy sector and policy makers should understand the forest-based sector, its opportunities and limits. Linking at least these two sectors and ensuring a good mutual understanding, will help ensure a successful, sustainable development of both sectors and achieving society's demand for green and clean energy.

2. Objectives of the study: a 2005 snapshot and future scenarios

This study is seen as a contribution to increase the understanding between the forest-based and the energy sector and their policies: The study draws a clear picture of the current situation of the forest-based sector and wood energy, and collects information on policies for renewable energy and forecasts for the forest-based sector to analyse possible future interactions.

Various countries have started to conduct national studies on the interaction of forest sector and renewable energy polices, and different stakeholders made analysis on the impacts of these polices on their sector. However, so far no comprehensive study has been carried out on a pan-European level.

Therefore the main objectives of the study are:

- To get a better picture of the current (2005) supply and use of wood from all sources and for all uses. This will be based on best available data, by using a "wood resource balance".
- To produce scenarios of wood demand and supply for 2010 and 2020 by using the existing European Forest Sector Outlook Study (UNECE 2005) scenarios for future wood supply and demand; and incorporate national policy targets for renewable energy to adjust the EFSOS model to incorporate increasing demand for wood energy.

Framework of the study

This study has to be seen in a larger context of activities on "Monitoring and forecasting European wood resources and demands" by the UNECE/FAO Timber Section and partners. It builds in particular on information gathering on wood energy (the Joint Wood Energy Enquiry). The University of Hamburg contributed in particular through its methodological work on wood resource balances and monitoring wood flows.

This study is meant to be an input to the current discussion on bioenergy policies and their interactions with the forest sector. Following its presentation as a draft at the UNECE/FAO Forest Policy Forum (10th October 2007), national correspondents, specialists and stakeholders are invited to help refine it and continue working on collecting better information at national level (empirically) as a possible basis for discussions on policy targets for bioenergy and wood energy at national level that take the potential supply and the impacts and opportunities for all stakeholders into account.

3. Methodology

3.1. The wood resource balance - capturing and validating sources of wood supply and wood products

What is a wood resource balance?

A wood resource balance compares the supply of wood raw material with use (wooden and paper products and energy use) in a national economy. It is a consistency check of national wood flows that counter-checks the sums of all sources of wood materials against the balance sheet total of the consumption side.

The structure of the wood resource balance is based on the German wood resource balance scheme being developed, applied and refined by Mantau (2005). The main advantage is that it makes it possible to detect and roughly estimate missing or weak information by comparing the two sides. It easily integrates information and developments from forestry and energy sector. It could be shown, that unregistered cuttings contributed 16% of the overall forest wood consumption between 1987 and 2005. The approach goes beyond commodities defined by international trade classifications (e.g. Harmonised System) and includes logging residues, post-consumer recovered wood, locally exchanged fuelwood or even black liquor.

In contrast to the methodology applied in Germany, the current assessment could not rely on empirically collected data, although it is hoped to at least partially remedy this in the follow up to the study. Hence, it considers only publicly available information and data from international databases. Important sources of information on the wood sector were the Joint Forest Sector Questionnaire (JFSQ), JWEE - Joint Wood Energy Enquiry (Steierer et al 2006), MCPFE enquiry on quantitative indicators of sustainable forest management (MCPFE/UNECE/FAO 2007³). Energy information was taken from European Commission (Eurostat, DG TREN), World Energy Outlook 2006 (IEA 2007). (Annex V)

³ Data refer to 2005

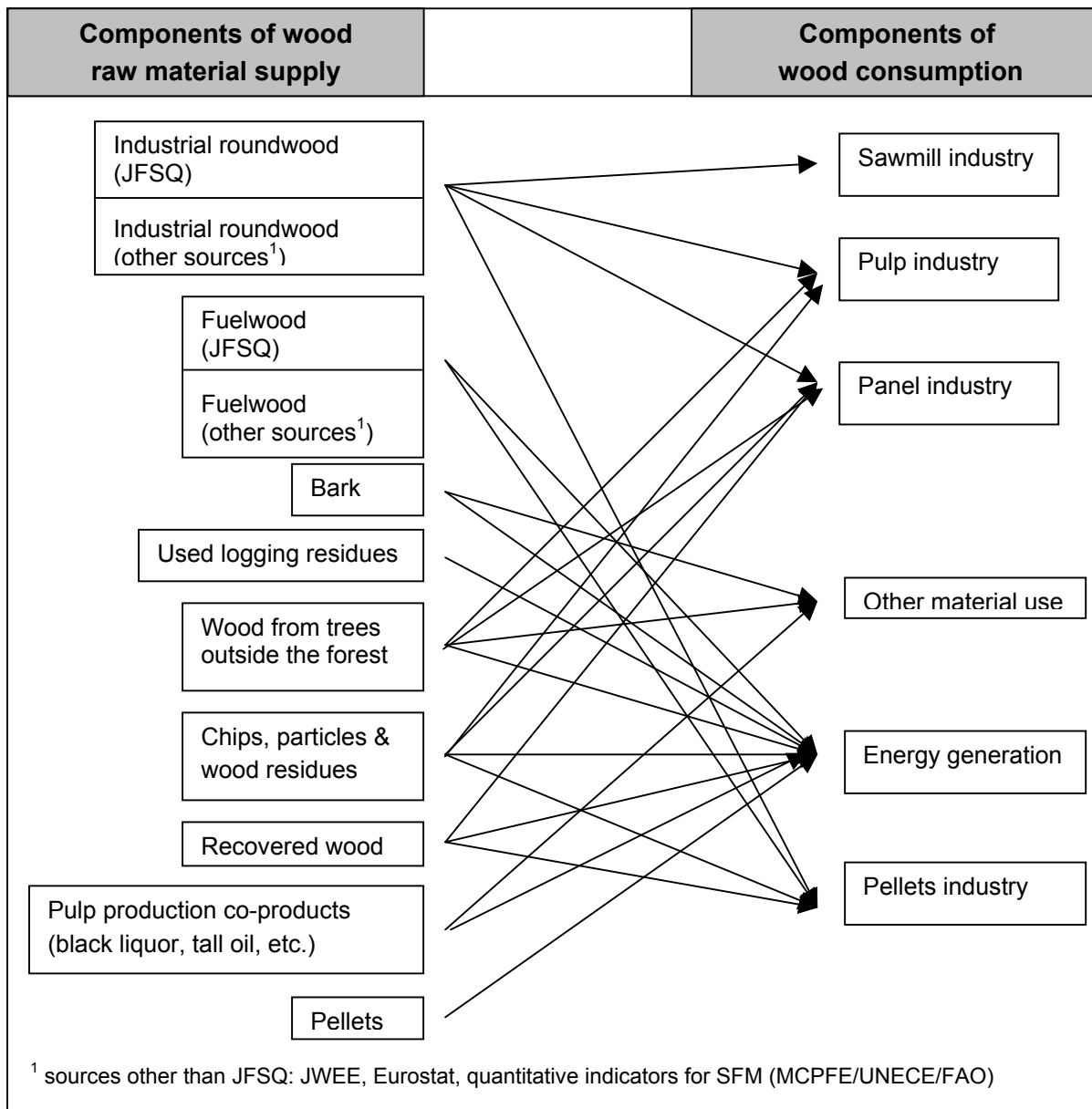


Figure 1: Components of wood supply and consumption in the wood resource balance

Units and conversion factors

In order to compare all different commodities, a common unit is needed. Therefore, all figures in the balance are converted into "solid cubic metre roundwood (m³ under bark)". This is the usual unit for removal data, and therefore less conversion is needed on the supply side of the balance.

However, the different products of "wood use" of the balance are recorded in different units. Therefore, conversion factors are needed to convert from cubic metre sawnwood or panel, tonne pulp or energy units into cubic metre roundwood. As one can easily imagine many different factors influence these conversion factor: wood properties (specific weight), moisture content of the wood, efficiency of the processing, etc. The study used general conversion

factors for each commodity. However, most of the conversion factors have a weak empirical basis.

Counting multiple use

The wood resource balance takes into account the fact that wood is a highly versatile material that can be used and reused in many different processes and several times (for material use and then for energy use). Co-products of the wood-processing industry (chips from sawmill industry) can easily be used directly in on-site integrated processes (e.g. black liquor for energy generation or pellets production in a sawmill), or the co-products are sold to consumer using the fibres in an external processing (e.g. chips from sawmill used for pulp production).

It further takes into account each single production step by itself where co-products issue from a production process and might enter the next degree of processing. Filling and calculating the wood resource balance leads to “double counting” of wood materials. It also needs to include net trade, comprising import and export volumes. The balance carefully balances out every double counting on each of its side. As long as consistency on both sides is safeguarded, this kind of “double counting” is harmless.

Due to double counting it is necessary to take into account residue use and recycling, this adds up in the balance to the "**supply total**" on the supply side. The sum "**supply forest**" does only count the resources directly from the forest, thus no multiple uses are counted here. Thus, the balance sheet total "**total supply**" is considerably higher than the "**supply of wood from the forest**". The difference between the two may be considered an indicator of the degree of recycling and reuse in the sector.

The “double counting” shows the real amount of wood used by the industry and because wood is used multiple this is an appropriate way to demonstrate the overall relevance of woody biomass.

Example: A saw log (*supply*) enters a sawmill. Sawnwood (*use*) is produced, as well as wood chips (*supply*), which is available for further use. These chips might enter the next process - e.g. the pulp production (*use*). After the (chemical) pulping process the contained lignin (and hemi-celluloses) end up as black liquor (*supply*) – which is then used for energy generation (*use*).

Converted to roundwood equivalents, the same fibre might be reported three or more times as source that feeds into a downstream wood use. Hence, each double counting of wood fibres on the supply side is balanced out by a double counting on the use side by a fibre demanding process.

Finished or semi-finished wood products (e.g. sawn wood) are considered as wood fibres leaving the circulation for a longer period - until they reappear as post consumer recovered wood. Only landfilled wood (not shown in the balance) and energy use can be considered as final wood use.

Processed wood fuels

Processed wood fuels comprise pellets and briquettes. They are the only “product” that appears in the wood resource balance and contributes to the intentional double-counting of

wood fibres. Pellets and briquettes might be considered as a final product being produced for energy purposes. In contrast to any other product processed wood fuel has a considerably short life cycle and feeds directly into final use for energy generation.

Counting wood pellets on the supply side (as apparent consumption) is necessary as pellets are perfectly suitable for commodity traded internationally and transported over long distance.

In some countries pellets production already plays a certain role in national wood consumption. Some of those are exporting the bigger part of their pellets production (such net exporter are Lithuania, Poland, Finland, Austria). In such net exporting countries the pellets/briquettes production consumes wood volumes, which are not counter-balanced by a use at national level in the following. Therefore, it is necessary to consider net-export as a way of reducing the amount of processed wood fuels supply feeding into national energy generation (decreasing balance sheet total).

Other countries are huge net importers of wood pellets (such as Denmark, Sweden, Germany). Net imports of processed wood fuels, in combination with their national production increases wood volumes for energy generation (apparent consumption). Hence, the balance sheet total is growing.

The calculation does not consider the storage capacities and change in stock (which might play a certain role for pellets in 2007) because of missing data. In most of the considered countries pellets industries are still small consumer of wood fibres. The dynamic of this young market gains momentum and it has capacities to impact other industries in the future.

3.2 forecasting forest products demand and supply with EFSOS

In order to build scenarios for future wood supply, forecasts are needed. One main source for future forest products demand and supply is the European Forest Sector Outlook Study (2005). In this study, outlooks for industrial roundwood consumption, as well as consumption of sawnwood, pulpwood and panels are made. However, no forecasts are made for the consumption of fuelwood; consumption was assumed to stay level. Since during recent years fuelwood consumption for energy generation is becoming increasingly important, the present study is incorporating this demand by taking policy objectives for renewable energy and wood energy in particular to predict the wood demand for 2010 and 2020.

The EFSOS provides three different scenarios on the sectoral growth (of real production and consumption) of the wood-based industries. The baseline scenario, assuming a moderate growth rate, was used in this study since it is considered to reflect best the expected growth rate of the forest-based industries if energy industries enhance competition for the raw material. The others are based on slower economic growth due to environmental considerations and higher growth taking more globalisation into account.

The reference data (production, net trade, prices, etc) for the EFSOS model is the average of 1999 - 2001. The annual growth of production, net trade and consumption in the model is determined by the various input variable to the model. As shown by Schulmeyer (2006) the EFSOS model predicts the international developments in forest products demand and supply mostly correctly. However, in some countries, most notably in Germany, the production has increased substantially more than predicted by EFSOS. Therefore, the reference data for

production and consumption of forest products (sawnwood, panels and pulp) was updated on the basis of the average data from 2004 - 2006. The annual growth rates (2005 - 2020) for production and net trade were considered to remain unchanged. These growth rates were applied to the new reference data, to obtain forecasts for production and consumption of forest products for 2010 and 2020.

The assumption that material efficiency of the wood-processing industries (wood input per unit produced) would remain constant, leads to a slight over-estimation of the wood consumption in this sector in the future.

3.3 Calculating the consequences of policy objectives

Various paths can be chosen to predicting the future role of wood in energy generation. In this study, no econometric models were used to forecast the demand for wood energy, since EFSOS so far does not model the consumption of wood for energy generation, but it was assumed that the demand would be driven by policies. Prices are not included in the study, in order to keep the analysis simple and comprehensible. However, this implies certain assumptions and restrictions when looking at the results. Thus, no conclusions are made on the price of reaching the policy targets, but rather on the amounts of wood needed (also in comparison with other wood consumers), and this is leading to the question of possible impacts of the policies.

This study has collected national and EU targets for renewable energy, bioenergy and wood energy (if available) and translated them into wood volumes, by applying number of simple transparent assumptions:

1. Obtain credible official scenario for total primary energy supply (taking account of foreseen efficiency savings) if available. Otherwise assume the same energy supply as in 2005;
2. Apply official policy target for energy production from renewable sources to total energy supply. If no targets were found the overall EU targets were assumed (2010: 12% and 2020: 20%⁴).
3. Apply national target for bioenergy if available. Otherwise, estimate the share of energy production from biomass as percentage of energy production from renewable sources (typically by assuming the same share as in 2005)
4. Apply target for wood energy if available. Otherwise, estimate the share of energy production from wood as percentage of energy production from biomass sources (typically by assuming the same share as in 2005)

The same methodology was used for 2010 and 2020, bearing in mind that for 2020 much less information was found on national targets, or targets for bioenergy or even wood energy.

⁴ If the 2010 target was below 12%, and no target was set for 2020, the growth rate of renewable energy (as targeted between 2005 and 2010) is assumed to continue. This leads mostly to a lower figure than 20%.

If the target is already above the EU target and no new targets were set, it is assumed to stay.

"75 % scenario" for 2020

Wood energy has the highest share of all renewable sources in 2005 in most countries (wood energy constitutes over 50% of all renewable energy over the EU as a whole). Therefore, an increase in renewable energy would affect wood energy the most, if the relative shares of different energies would remain constant (as suggested in assumptions 3 and 4). However, in particular this assumption seems unrealistic in the long term (2020), since other renewable energies will develop further and faster (from a lower base) and become more competitive. In addition, the availability of wood raw material is likely to be decreasing, leading to a wood price increase, and in any case the use of wood would probably remain mostly for heating or CHP.

Therefore, the study suggests a scenario, where the relative share of wood compared to all other renewable energy sources decreases to 75%⁵ of the percent share in 2005 by 2020.

However, the scenario made the assumption that despite the decrease in relative share of wood energy compared to other renewable sources, the absolute figures would not be less than 2010. If targets for wood energy for 2020 were available, the scenario stuck to the national targets (as for Finland and Slovakia).

4. Wood resource balance for Europe 2005 - results

As explained in 3.1, the wood resource balance balances sources of wood supply (supply direct from the forest & woody biomass outside the forest, by-products, recovered wood and processed wood fuels) on the left side with sources of wood use (material and energy use) on the right side. Both sides are derived from independent sources, leading to a difference of 47 million cubic metres (6% of the total volume) (Table 1).

⁵ 75% is an arbitrary figure between the baseline scenario (100%) and 50% (which would be less than in 2010 in absolute figure, and thus less realistic).

Table 1: Wood resource balance 2005 for EU/EFTA 29

	million m ³	%	%	million m ³	
Supply from forest & woody biomass outside the forest:					
Industrial Roundwood - JFSQ	377	49%			
Industrial Roundwood*	26	3%		26%	214
Fuelwood - JFSQ	56	7%		11%	89
Fuelwood*	29	4%		19%	155
Bark	12	2%		1%	6
Used logging residues	17	2%		2%	14
Woody biomass outside the forest	13	2%			
Supply by-products:					
Chips, particles & wood residues	122	16%			
Pulp production co-products**	72	9%			
Pulp production co-products				6%	49
Recovered wood***	42	5%		7%	61
Supply processed wood fuel:					
Processed wood fuel	6	1%		12%	96
				17%	138
SUPPLY TOTAL					
	775		Difference	821	TOTAL USE
			47		
* maximum difference unreported to JFSQ ** black liquor, tall oil, etc. *** for material & energy use **** processed wood fuel industry					

4.1. Wood supply

Wood supply from Forest

The European wood resource balance covers wood flows in 27 Member States of the European Union (EU 27) and two EFTA states - Switzerland and Norway⁶. The total wood volumes extracted from the forests including industrial roundwood, fuelwood, bark and logging residues, add up to 499 Million m³ (EU 27) respectively 518 Million m³ (EU/EFTA) (see Table

⁶ Iceland and Liechtenstein were not included

1)⁷. Wood from the forest is the most important source of wood raw material, providing 2/3 of the total wood supply, compared to woody biomass outside the forest, recovered wood, or industry by-products.

Table 2: wood supply from forests and other sources

million m ³	Wood supply from forest	Total wood supply (including internal sources)
EU-27	499	748
EU/EFTA	518	775

Figures for wood removals⁸ are much higher (+/- 10%) than volumes reported to the Joint Forest Sector Questionnaire (JFSQ)⁹, because this study includes wood energy supply (from the forest and outside) unrecorded in JFSQ, bark, residues and recovered wood. In some countries, woody biomass from outside the forest seems to play a crucial role in wood supply – in particular for wood fuel supply for private user (e.g. France). The data coverage about this source is scarce and only some countries could provide information on the issue. Woody biomass outside the forest covers a wide range of sources: urban and amenity trees, hedgerows, trees from fruit orchards, etc.

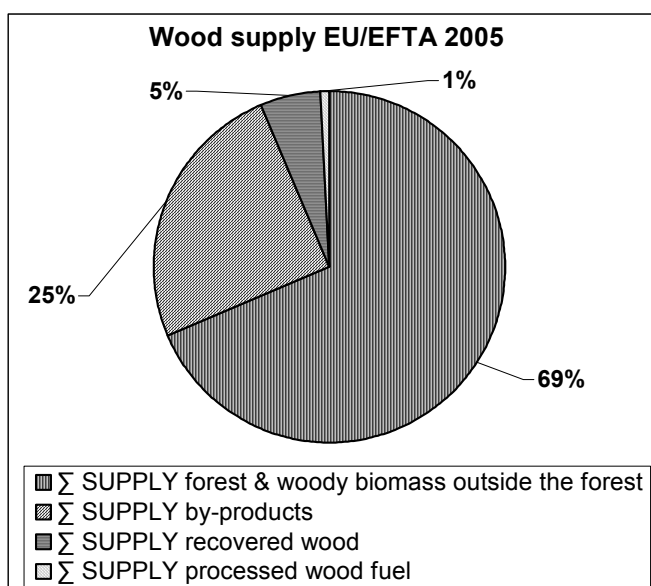


Figure 2: Wood supply (EU/EFTA)

Total wood supply

The total wood supply is the sum of the left side of the balance, taking into account all multiple sources for wood fibres for further processing: It considers supply from forest and woody biomass outside the forest, as well as chips particles and wood residues, recovered wood for material and energy use (excluding landfill), pulp production co-products and processed wood fuel.

⁷ All balances (supply and use) presented for 2005 exclude 35 million m³ from Sweden. The reason was the storm event of 8 January 2005 when a storm heavily impacted forests in southern Sweden. The damage was estimated to about 75 million m³. The effect of the natural disaster retrieves directly in the national balance where wood supply exceeds wood consumption by about 35 million m³. It was assumed that these extraordinary volumes were kept in storage and hence were excluded from the assessment.

⁸ again excluding 35 million m³ from the storm in Sweden

⁹ JFSQ reports 416 million m³ for EU-27 and 433 million m³ for EU/EFTA (both numbers excluding 35 m³ from Sweden)

Production co-products represent on average about 1/3 of the total wood raw material supply to the national wood fibre consumption and make an important contribution to the efficient use of wood. Indirect wood sources seem to play a prominent role (>50%) for the national supply in the Netherlands, Denmark and Belgium. However in Hungary, Bulgaria and Poland the use of co-products from further processing seem play a minor role (< 20%). (see annex I and VII)

Post consumer recovered wood accounts for 42 million m³ and represents a significant secondary wood resource (8% of supply total) already today. The total emergence of recovered wood volumes is estimated to be even higher. For balance reasons, only volumes for energy and material use have been considered, whereas landfilled volumes were excluded. The EU Landfill Directive 1999/31/EC obliges its Member States to reduce the amount of biodegradable waste that they landfill to 35% of 1995 levels by 2016. This goal will certainly increase the amounts of recovered post-consumer wood for material and energy use in the future. Processed wood fuels account for only 1% of the total supply in 2005.

4.2. Wood use

Material use

Material use is any process where wood is used to produce goods like sawnwood, pulp and paper, wood-based panels and other products. All these processes have in common that the wood fibres or particles contained in the products and co-products can be reused in downstream processes. In EU/EFTA the material use of wood accounts for 58% of the total wood use from all sources.

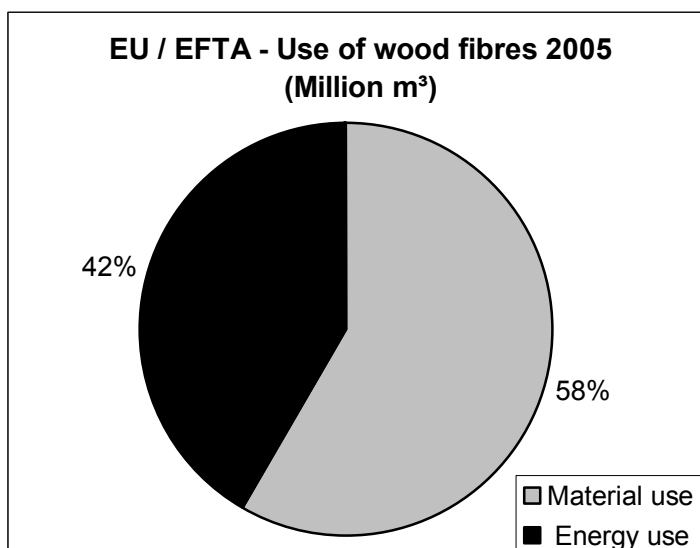


Figure 3: Use of wood 2005 (EU/EFTA)

Table 3: Wood use 2005

	Material use		Energy use		Total use
	million m ³	%	million m ³	%	million m ³
EU-27	460	58%	333	42%	793
EU/EFTA	478	58%	343	42%	821

Among the wood-based industries' sector, the sawmill industry is the biggest wood consumer of solid roundwood for material purposes using 206 million m³ (EU-27) and 214 million m³ (EU/EFTA) – corresponding to 26% of total consumption. The pulp and paper

producing industries are second 147 and 155 million m³ (19% of total consumption) followed by the panel industry (11%) consuming 86 and 89 million m³ respectively.

Each industry has specific requirements for entrant wood qualities. In an efficiently structured and well-linked national forest-based industry, industrial roundwood enters the sawmill sector before its co-products are used in other processes such as pulp and paper or wood-based panel industries. In contrast to the sawmill sector, which depends entirely on roundwood supply, the latter use roundwood only to a certain extent (the pulp industry purchases about $\frac{3}{4}$ ¹⁰ and the panel industry about $\frac{1}{3}$ ¹¹ of their fibres from roundwood).

Energy use

The energy use of wood is smaller than the overall material use by all wood based sectors. However, most countries have a much higher proportion of wood use for energy than recorded in official statistics. About 42 %, or 333 million m³ (EU27) and 343 million m³ (EU/EFTA) of the total wood volumes available are used for energy generation. According to available statistics, Greece, Hungary and Denmark seem to have exceedingly high percentages of wood use for energy – accounting for more than 80% of the national wood consumption. According to available data and information Belgium, Slovakia and the United Kingdom seem to use less than 25% of the nationally available wood volumes for energy generation. The biggest wood energy producing countries consume together 166 million m³ (40% of total wood volumes used for energy generation in Europe).

Table 4: Major wood energy-consuming countries

country	million m ³
France	50
Sweden	41
Germany	40
Finland	35

4.3. Balancing the balance

In the national wood resource balances, available wood volumes often do not match volumes of wood use. 16 of the 28¹² countries available data showed higher use than supply. In 10 cases the difference exceeded 25%. 13 countries of the 28 showed slightly higher wood supply volumes than wood consumption, of which only two showed an difference of more than 20%. Summing up all 29 countries, the wood resource balance revealed a difference of 47 million m³ (6% of total use).

¹⁰ CEPI annual report – see: www.cepi.org

¹¹ Result of this study

¹² Sweden was excluded due to storm

Table 5: EU/EFTA supply - use balance

EU/EFTA (million m ³)	Total wood supply	Difference	Total use
2005	775	47	821

The balance sheet total of wood use might be higher than the balance sheet total of the wood supply in many countries. Due to scattered data sources and global conversion factors, no judgement can be made at that stage of the study as to whether countries are facing a general supply gap, indicating unrecorded cuttings, or whether the use side has been overestimated due to conversion factors and efficiency rates of national wood industries.

A question of data?

The wood resource balance used many different data sources to build national wood resource balances. Even though calculated independently from each other, the total sum of the supply and use sides are in all countries of the same order of magnitude.

The data used in the wood resource balance is the best available data at international (and partly national) level. However, some areas remain vague, due to weak available data and statistics.

- Weaknesses in trade statistics (e.g. uncaptured imports or exports) can lead to an imbalance on either side. This is also partly due to missing or vague trade definitions (e.g. for pellets)
- Wood storage is not considered in the balance because of missing data on European level. This plays an important role after calamities, like storm damages insect outbreaks, where a lot of wood is stored (such as in Sweden in 2005). Hence, 35 million m³ wood removal were excluded from the Swedish figures on wood removal, since it was stored and not consumed directly.

Regarding the wood use, data and information is in particular weak on:

- Information on wood use for energy in private households (quantities/origin/qualities), small CHP plants, or internal energy generation.
- Possibly the largest single source of discrepancies is the inaccuracy of the conversion factors used to estimate wood needs to produce a given quantity of product: there are huge technical differences between mills and few reliable measurements. Indeed the same international conversion factors have been "recycled" in so many studies, which refer to each other that considerable caution must be used in assessing the cubic meter equivalent figures, which may be under- or overestimates.

Underestimations can occur on the supply side of the balance where cuttings are not reported to official statistics (which is a problem related to data gathering). Examples are :

- Fuelwood removal for personal use or wood harvesting in private forest, which is not always captured by official statistics:
- Amounts and use of bark, logging residues, stumps;
- Trees outside the forest (urban/agriculture trees, shrubs and hedges):

- Amounts and use of recovered wood;
- Current and future contribution of short rotation coppice.

Lacking information on unreported extraction of wood needs to be clearly distinguished from illegal logging! In many cases fuelwood extraction is done by collecting logging residues after harvesting activities or by small forest owners selling on informal markets e.g. to private households; thus, no statistics necessarily capture these wood flows. However, these unregistered volumes can add up to significant numbers. Therefore, they can play a crucial role in assessing wood availability, because much more wood might already be used than recorded in official statistics.

Missing national data have not been extrapolated from average data in other countries. Filling these gaps requires empirical research in the ECE Member States. Imbalances on national level may be caused to a certain extent by the patchwork of different data sources and conversion factors from energy and wood statistics - in some cases a part of the discrepancies may also be partly explained by:

However, despite these shortcomings, the basic volumes - especially of production and removals - can be considered robust, and the balance structure provides its own validation mechanism. The data presented in this study can be considered the best available estimate and as such suitable for use in policy-making.

5. Future wood supply and demand: EFSOS scenarios and energy policies

This chapter adds future wood consumption from wood-based industries, based on the EFSOS model, and wood requirements to fulfil renewable energy policy objectives. The figures are not meant to be a forecast of future wood demand, but should be a basis to discuss renewable energy policies and help to finding realistic targets for the future contribution of wood to the overall energy supply.

5.1. EFSOS scenarios for wood supply and demand in 2010 and 2020

Calculated supply from the forest

The EFSOS baseline scenario proposes, that industrial roundwood removals from the forests in EU/EFTA will increase to 532 million m³ in 2010 and 559 million m³ in 2020. EFSOS does not contain information on the development of future fuelwood removals. Forecasts of future roundwood removals from the forests were derived from the future demand of wood raw material for the wood-based industries, and were then validated by country correspondents.

Table 6: EU/EFTA: Calculated future wood supply (based on EFSOS)

	Supply directly from the forest	Supply total (wood from the forest & co-products and recovered wood)
	[million m ³]	[million m ³]
2005	518	775
2010	532	791
2020	559	825

Calculated total supply

The total supply comprises wood from forest as well as all sorts of co-products from the wood-based industries (wood chips, black liquor, etc). It was assumed that co-products are directly linked to the wood processing and it was further assumed that efficiency of the sectors remains unchanged, and thus the relative production of co-products would remain constant. Annual growth rates for each wood-processing sector (sawmill, panel and pulp industry) were taken from the EFSOS baseline scenario. The share of wood co-products from the different material uses remains stable and contributes 1/3 of the total supply. 18 million m³ of recovered wood are still being landfilled or reported with unknown use in 2005. Even though it is likely that a part of these amounts will be recovered and used a raw material in the future, no development was calculated or assumed in the future. Future wood supply from fuelwood, trees outside forests and unregistered wood removals were assumed to remain unchanged, as no information is available in EFSOS.

The calculated total amount of wood supply based on the EFSOS baseline scenario will sum up to 791 million m³ in 2010 and 825 million m³ in 2020.

Wood use

EFSOS provides growth rates for each country and for each wood-processing industry (except pellets). The baseline scenario (assuming a quite moderate growth of the wood-processing industry in the region) was used to calculate future wood consumption by the wood-based sector.

Wood use for energy is modelled in EFSOS, but since recent energy policies have changed the developments drastically, this study is not using the EFSOS forecast for wood energy, but rather interprets the renewable energy targets (see section 5.2.).

According to EFSOS, the wood-based industries (sawmills, panel and pulp and paper industry) will consume 495 million m³ in 2010 and increase to 536 million m³ in 2020 (Table 7).

Table 7: Calculated EU/EFTA future wood demand for material use (EFSOS)

Year	Material use - EFSOS calculation [million m ³]
2005	478
2010	495
2020	536

5.2 Wood energy policy objectives (2010 and 2020)

Detailed numbers for all countries future energy consumption, and renewable energy targets can be found in annex II and III. The results are summarised in figures 3 and 4.

Future total primary energy supply

Policy objectives or targets are mostly set for renewable sources in general. Most countries, especially including the European Union, have expressed these targets a percentage of overall energy consumption and not in absolute figures (like volumes of wood used for energy production). Thus, the total amount of renewable energy needed to fulfil the targets depends on the overall energy consumption in the country. Therefore, it is essential to determine first of all

the future overall energy consumption. The EU has also set targets for the overall energy consumption, namely 20% energy saving by 2020 (EC 2005 b). EU Member States are starting to adopt their national strategy to achieve this goal. In the past, energy consumption was driven by economic growth and influenced by energy price. In future, the cost for carbon might also influence the overall energy consumption, as part of the energy cost.

For most major European economies, scenarios for future total primary energy supply were found. However, only some scenarios incorporated energy efficiency targets. Ministries in Germany and France for example presented scenarios with a substantial decrease in total primary energy supply, while other countries just foresee a moderate decrease in total primary energy supply or constant. Only for some countries no energy efficiency scenario was found, and a high increase in total primary energy supply (TPES) is assumed in this study (in particular this is the case for Spain in 2020).

2010 renewable energy targets

Policy targets for renewable energy and bioenergy were mostly (in particular for 2010) derived from national strategies and plans, often published on ministries' web pages. Some information was also obtained through national contacts or the European Commission web page.

The overall target of the European Union is 12% share of renewable energy by 2010. Most countries have targets for renewable energy production in 2010, only for smaller ones the generic target of 12% was used. Some had objectives for the share of biomass in renewable energy supply in 2010, but only for two countries (Finland and Slovakia) information was found on the share of wood in future energy generation. For the EU, the Biomass Action Plan was taken as the basis: 150 Mtoe of energy should derive from biomass in 2010. Assuming the same share of wood as in 2005, about 591 million m³ of roundwood equivalent would be needed. National biomass actions plans are available in some countries. When adding up the national objectives for renewable energy and bioenergy gathered in this study, 446 million m³ solid roundwood (EU 25) or 481 million m³ would be required to meet the national targets (assuming again the same share of wood to renewable energy production as in 2005).

2020 renewable energy targets

The European Union has set a target, stating that 20% of its TEPS should come from renewable energy sources. Since the policy target is only recently set, most countries have not set national targets for renewable energy for 2020 yet and so, if objectives for renewable energy in 2020 were found, they did not necessarily yet take the new 20% target of the European Union into account, which means that a revision of these targets is likely.

For most countries either the generic 20% EU target was assumed, or a target based on the growth rate between 2010 and 2020. Mostly no (national) targets were found for biomass or wood, since no national targets were found for all renewable sources either. Therefore, in all countries (except Finland and Slovakia) the same share of wood to renewables as in 2005 was assumed. Interpreting the EU-25 targets, 768 million m³ of roundwood equivalent would be required in 2020. When summing up the national objectives, 689 million m³ of roundwood equivalent would be required to meet these objectives under the given assumptions.

The "75 % scenario" for 2020

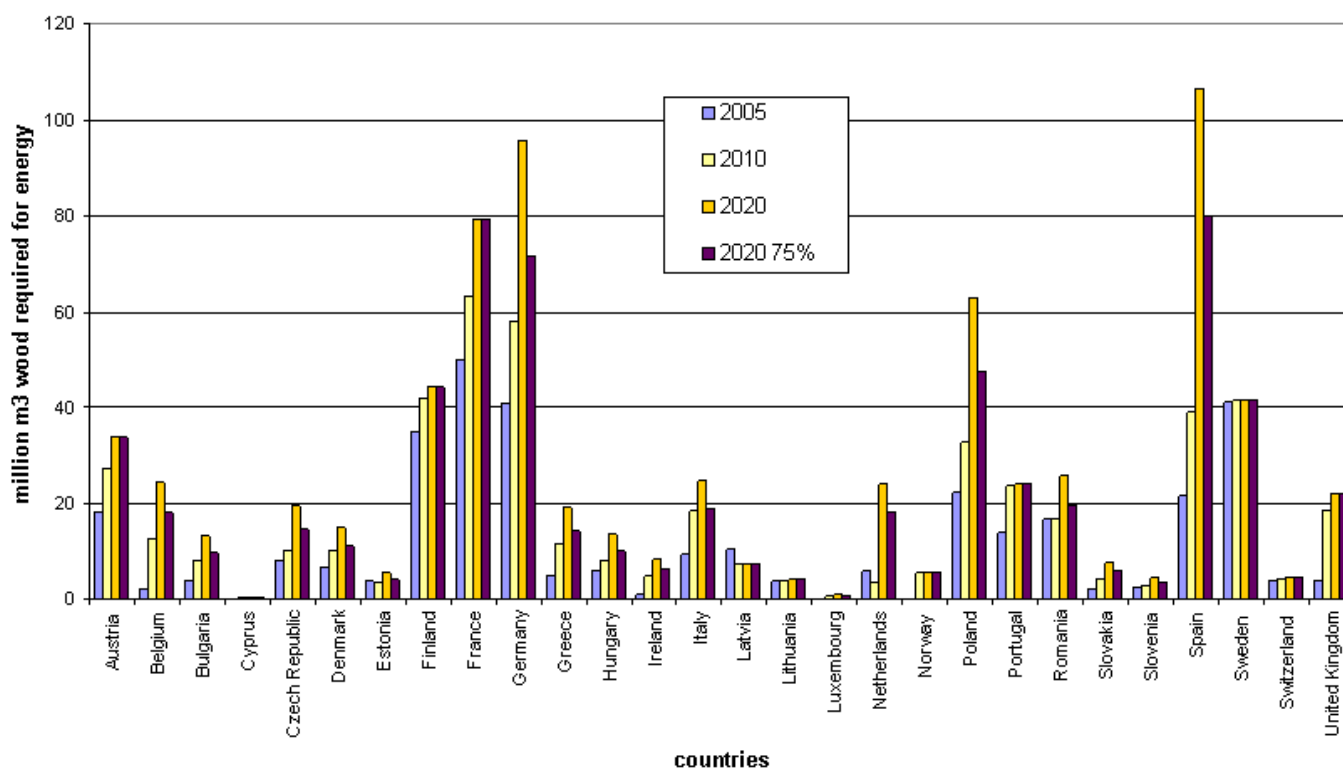
In this scenario the relative share of wood to other renewable sources decreases by 25% in 2020 compared to 2005, unless the absolute value of wood for energy generation would then be below 2010. In this scenario the wood demand to fulfil the renewable energy targets is reduced (compared to the baseline scenario) in all those countries that have a high increase in renewable energy in absolute figures. This is the case, if:

- countries have a strong increase in their scenario for TPES (like Spain), or
- a strong increase in percentage of renewables (and a slowly increasing, or decreasing TPES).

Table 8: Wood required to achieve national policy objectives for renewable energy

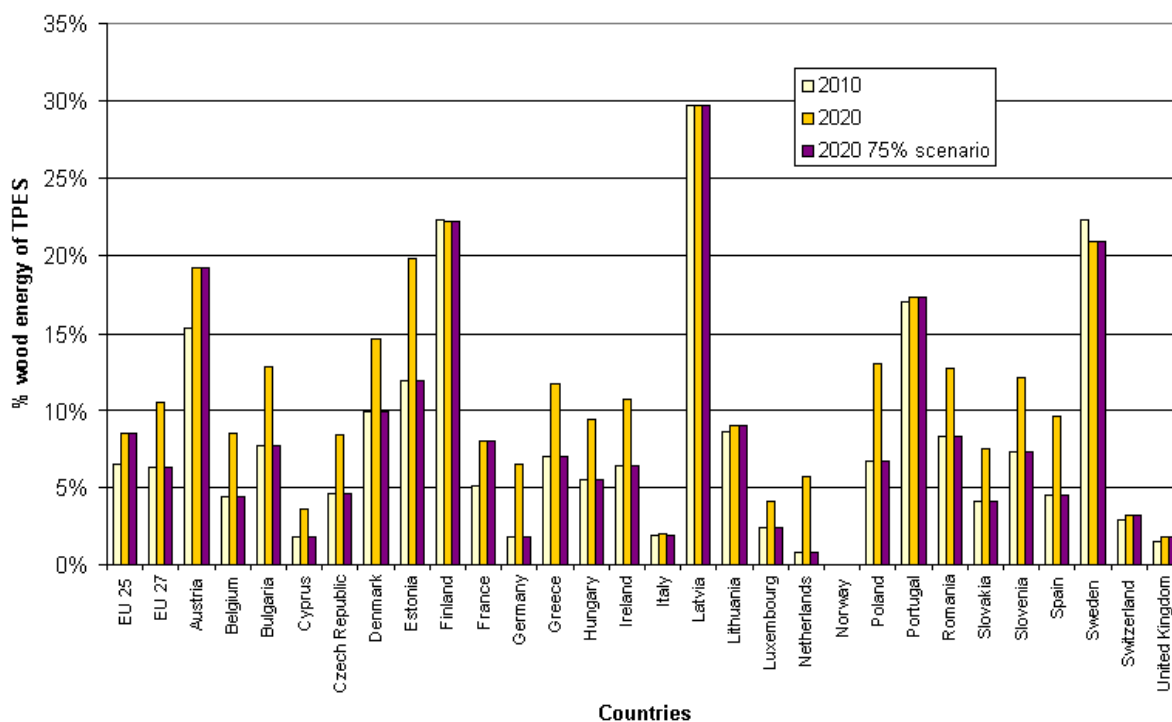
year	2005 [million m ³]	2010 [million m ³]	2020 [million m ³]	2020 "75% scenario" [million m ³]
EU 25	313	591	768	591
Sum of national targets in EU 25 countries	313	446	689	581
Sum of national targets in EU/EFTA countries	343	481	738	620

Figure 4: wood required in 2005, 2010 and 2020 to fulfil energy policy targets ¹³



¹³ Assuming the relative share of wood energy to other renewables remains as in 2005. In the "75% scenario" the relative share of wood energy to other renewables decreases to 75% of the level in 2005

Figure 5: Percentage wood energy of total energy consumption in 2010 and 2020 ¹³



Reality check

Achieving the renewable energy targets depend on various variables. One major component is the success of energy efficiency and saving measures: High overall energy consumption, will make it much more difficult to fulfil the policy targets, which are based on a relative share. A lower TPES would increase the relative share of renewable energy even without increasing the absolute production! The study is based on an energy-efficient future TPES scenario in some countries, but not in all (e.g. Spain, Italy). In order to generate realistic figures neither too optimistic TPES scenarios are useful, nor scenarios that do not take efforts in energy efficiency into account.

The study assumes that the contribution of wood to renewable energies would be the same as in 2005, if no other information were found on national level. This assumption is however unlikely, since research and development in other renewable energies will progress and they are likely to become more competitive. Furthermore, mobilisation of additional wood resources is limited or at least connected with greater difficulties; thus prices are likely to rise in the long term, making wood energy less competitive. Therefore, even the scenario considering 25% less contribution of wood to renewable energy compared with other sources may over-estimate the possibilities (still assuming that the 2010 and 2020 targets are being met).

It is important to point out, that the figures presented in this section are not meant to be realistic forecasts of future wood demand for energy, but a picture of the consequences for wood demand of current energy policies and what this may imply for the forest sector. The numbers can and should be revised according to realistic national energy targets, taking the potential wood supply into account - inside and outside the forest, domestic and imports, and being aware of economic, environmental and social implications of these decisions.

For 2010, the European Commission predicts that the 2010 targets (12%) will not be met, and rather 9% share of RES can be expected ¹⁴.

5.3 Combining forest sector outlooks and energy policy objectives

As explained in 5.2, wood demand for energy is driven, or at least heavily influenced, by policy objectives to reach a certain share of renewable energy production and energy policies to promote renewable energies. EFSOS on the other hand did not model wood energy demand adequately. Therefore, this study combines EFSOS forecasts of wood supply and demand with the theoretical potential required to fulfil the renewable energy targets. Doing this, one has to be well aware, that this is not an econometric model, but a rather crude scenario, explaining how much wood would be needed, if the consumption of wood and paper products develops as forecasted in EFSOS, and the renewable energy targets were met, as assumed in this study (see 3.3).

Since no prices are included, nor additional potential wood resources (inside and outside the forest, domestic or imports), this scenario should be purely used as a basis for discussion about possible implications of these energy policies: If the wood theoretically required to fulfil the EFSOS predictions and the energy targets is larger than the wood supply (forecast by EFSOS), then either the targets cannot be reached (at least not with wood energy), the industry will grow less, or additional sources will be found - probably a bit of each can be observed in the future just to achieve part of the target.

Table 9: Future wood supply and use

	2005	2010	2020	2005	2010	2020	2020 (75%)	
Supply from forest & woody biomass outside the forest:								
Industrial Roundwood - JFSQ	377	389	417	Material use:				
Industrial Roundwood*	26	26	26	214	213	212	212	Sawmill industry
Fuelwood - JFSQ	56	56	56	89	99	123	123	Panel industry
Fuelwood*	29	29	29	155	162	181	181	Pulp industry
Bark	12	12	12	6	6	6	6	Pellets, briquetts etc.****
Used logging residues	17	18	17	14	14	14	14	Other material use
Woody biomass outside the forest	13	13	13					
Supply by-products:								
Chips, particles & wood residues	122	122	120	Energy use:				
Pulp production co-products**	72	75	84	343	481	738	620	Total energy use
Supply recovered wood:								
Recovered wood***	42	42	42					
Supply processed wood fuel:								
Processed wood fuel	6	6	6					
Total supply	775	791	825	821	976	1 274	1 156	Total use
* maximum difference unreported to JFSQ ** black liquor, tall oil, etc. *** for material & energy use **** processed wood fuel industry								

¹⁴ Source: DG TREN webpage http://ec.europa.eu/energy/res/index_en.htm

If the energy objectives were achieved and the wood-based industries would develop as forecasted in EFSOS, a steep increase in wood raw material supply would be required: 155 million m³ wood until 2010, compared to 2005, corresponding to an increase of 18%; and another 298 million m³ (compared to 2010) in 2020 (+31 % compared to 2010). The 75% scenario would require less wood: an increase of 180 million m³ would be needed between 2010 and 2020 (+17%). (Table 10)

Table 10: EU/EFTA future wood required to fulfil EFSOS scenario and renewable policy objectives

million m ³	Material use (EFSOS calculation)	Energy goals (policy objectives)	Total use
2005	478*	343*	821*
2010	495	481	976
2020	536	738	1 274
2020 "75% scenario"	536	620	1156

*actual figure

Following the assumptions of this study, the main driver for the increase in future wood demand would be due to wood demand of the energy sector. Material use of wood accounts for 58% of the total wood fibre use in 2005. This percentage would decrease to 51% in 2010. If the renewable energy objectives were reached in 2020 according to our assumptions, the former ratio will be turned around and more wood fibre wood be used for energy than for wood and paper products. (Table 11)

Table 11: Main user of wood fibres in the future

Year	Material use projections	Energy use (policy targets)
2005	58 %	42 %
2010	51 %	49 %
2020	42 %	58 %
2020 "75% scenario"	46 %	54 %

Wood supply as forecasted by EFSOS

Based on EFSOS, the future total wood supply is estimated to increase by 16 million m³ in 2010 and by 50 million m³ in 2020 (both compared to 2005). These figures include both the wood supply directly from the forest and the supply of wood raw material from co-products from the wood processing industry (wood chips, particles, black liquor, etc). Assuming that both, EFSOS and the policy targets, developed as outlined in this study, much more wood would be required than available in the EFSOS supply scenario (Table 12).

The difference would be 185 million m³ in 2010 and 448 million m³ in 2020 (or 317 million m³ in the 75%-scenario). However, these numbers have to be interpreted very carefully. As mentioned, the supply data is derived from EFSOS, predicting actual roundwood removals from the forest (and not a theoretical potential), as well as forecasts for wood processing co-products. However, some sources of wood are not included in these figures, which might play a bigger role in future supply of wood raw material for the energy sector.

Table 12: wood supply versus wood required to fulfil EFSOS projections and policy objectives

year	Total wood supply * [million m ³]	Wood demand ** [million m ³]	Difference
2005	775	821	47
2010	791	976	185
2020	825	1 274	448
2020 75%	825	1156	321

* direct from the forest and indirect (EFSOS forecast)

** required to fulfil EFSOS projections and policy objectives

Comparison with increment data

Net annual increment (NAI) of forest available for wood supply is one major indicator of sustainable supply of wood raw material. However, when comparing the volumes of wood required meeting the EFSOS scenario and the policy objectives, the NAI is only of limited use:

- NAI is based on forest inventory data and calculated above bark. Removal data is based on trade statistics and calculated below bark, which makes a direct comparison difficult.
- Also NAI is reported for forest areas available for wood supply, this is not the potential of wood that can be mobilised, but just a physical potential. The potential of wood that can be mobilised is limited by a variety of reasons (economic, forest tenure, etc.) (cutting and measuring losses, unused stemwood).
- NAI only reports stem wood. However, in particular for energy use, also other parts of the trees can be used that are currently not reported in NAI.
- Sources of wood raw material outside the forest are not reported in NAI, but will be important for future wood supply.
- Harvesting NAI is not necessarily sustainable in the long term. Age structure of the forest as well as potential rotation age has to be taken into account. Therefore harvest can be higher than NAI and still be sustainable (like in Germany), or has to be less like in Finland and Sweden due to the forests age structure. However, this issue will not be assessed in details in this study.

Therefore, the study provides the data for NAI (see country sheets in annex V), but it should be seen as a partial indicator. It is important for countries to conduct studies on national level to assess the potential wood supply, including wood from the forest (used and currently unused sources), woody biomass from outside the forest, wood residues, recovered wood and other sources. Importing wood raw material (or wood products) is another option, which has to be considered, and its impacts have to be taken into account.

Accordingly, country correspondents and specialists are invited to consider the calculated wood amounts for their country and to give feed back about any national study on future wood or woody biomass supply potentials.

6. Conclusions

1. The wood resource balance for 2005, at the national and EU/EFTA levels has shown the broad pattern of wood supply and use in demand and the approximate size of “gaps”. Projecting this approach forward to 2010 and 2020, using EFSOS scenarios and official targets for renewable/biomass energies, shows that the foreseeable demand for wood - if the energy targets are to be met - is considerably higher than the supply forecast by EFSOS. The size of the margin is subject to discussion, but not the general direction. Therefore, they are likely to have major impacts on the forest sector, in particular wood-based industries and the energy sector itself through rising prices.
(Comment: the major problem in the next years will be to foster the raw material basis – that means mobilisation activities, efforts in assortments, etc. This is (also) a political task by setting framework conditions and offering support schemes).
2. Traditional analysis of wood supply and demand, centred on wood removals from forests and wood input to industries is not only inadequate but also out-moded. Therefore, an updated, more complex approach, based on comprehensive wood resource balances, is necessary. Many of the elements for such a wood resource balance are already available, even at the international level, but several other elements need original research and data gathering, notably the following:
 - a. Unrecorded sources of wood supply and use (trees outside the forest, logging residues, and post consumer recovered wood on the supply side, as well as wood use for energy, in particular in private households and small CHP plants, on the wood use side)
 - b. Input/output conversion factors for wood using industries (inaccuracies in this respect could significantly increase, or decrease, the estimated “gap” between supply and use of wood)
3. What could be the **significance of the apparent gap** between supply of wood and forecast/intended use? One or several of the following developments are necessary to keep supply and use in balance both now and also in the future:
If wood supply is not increased, or not increased sufficiently:
 - a. The targets for renewable energies will simply not be met;
 - b. The targets will be met, but with non-wood renewables and other biomass energies which will be developed faster than wood-based energy.
 - c. Wood-processing industries will not develop as forecast in EFSOS, but their production will increase less (or even decrease). Thus, some wood will be transferred from use as raw material to use as an energy source
In order to increase wood supply:
 - d. Wood supply from new sources should be expanded, notably through expansion of the area used to grow wood (whether or not this area is considered “forest”). This approach cannot really bear fruit by 2010, but could by 2020.
 - e. Wood supply from existing sources (forest and non-forest) should be expanded, e.g. through higher wood removals

- f. Increase imports of wood, (roundwood, products or wood energy sources) from outside the ECE region
In this context, it should be noted that the extensive use of non-wood biomass and/or imports from other regions could compound problems rather than solving them, for example though the use of agri-energy crops taking land needed for growing food or feed.
4. In order to fulfil the increasing demand, some recommendations need to be taken into account, **whether or not** wood supply expands:
 - a. Energy efficiency will have to be radically improved
 - b. There will be further improvements in the efficiency of use of wood flows, with negligible waste of recovered wood products, residues of all types (logging and industrial) for both raw material and energy uses.
5. There is an urgent need to **analyse** in quantitative terms, taking account of local realities, such as costs, ownership patterns, quality requirements, infrastructure etc., the **potential of each of the above strategies and their combinations**.
6. The **concept and level of sustainable levels of wood supply** needs re-examination in the light of the more complex realities presented in this report. Certainly, net annual increment (i.e. of stemwood in forests), although vitally important, is not a sufficient indicator by itself of what is a sustainable level of supply; age structure, ownership, location and infrastructure, conservation and protection needs, quality aspects and other features must all be considered.
7. Modelling scenarios, such as EFSOS, need to be re-examined and modified as appropriate to the needs of this field of activity. This work should include some more sophisticated approaches, such as sensitivity analyses, e.g. on the inter-action of wood prices with energy/forest product/feed prices, etc.

7. References

- European Commission (1997) Energy for the Future: Renewable Sources of Energy. White Paper for a Community Strategy and Action Plan. COM(97)599 final, 26 Nov 1997. Brussels, Belgium.
- European Commission (2005 a): Biomass action plan. COM(2005) 628 final. 7 December 2005. Brussels, Belgium.
- European Commission (2005 b): Green paper on energy efficiency: Doing more with less. COM(2005) 265 final. 22 June 2005. Brussels, Belgium.
- EurObserv'ER (2006): State of renewable energies in Europe. 6th report. Paris, France. Online: <http://www.energies-renouvelables.org/>
- IEA (2005): World Energy Outlook 2006. Paris, France.
- Mantau, U. (2005) Development of methods to generate market information and linkages between biomass supply and demand. INFRO - Information Systems for Resources. Hamburg, Germany.
online: [http://webapp.rrz.uni-hamburg.de/~holz/files/161_Methods%2006.pdf]
- MCPFE/UNECE/FAO (2007MCPFE) enquiry on quantitative indicators of sustainable forest management
- Schulmeyer, F. (2005) European Forest Sector Outlook Study: Trends 2000-2005 compared to the EFSOS Scenarios. Geneva Timber and Forest Discussion Paper 47. ECE/TIM/DP/47. Geneva, Switzerland.
- Steierer F, Fischer-Ankern A, Francoeur M, Wall J, Prins K. 2007: Wood energy in Europe and North America: A new estimate of volumes and flows. Joint Wood Energy Enquiry, UNECE/FAO, Geneva, Switzerland.
- UNECE (2005) European Forest Sector Outlook Study. Main Report. Geneva Timber and Forest Study Paper 20. ECE/TIM/SP/20. Geneva, Switzerland.
- UNECE (2007) Timber Committee Price Database. Online: [<http://www.unece.org/trade/timber/mis/fp-stats.htm>]

Annex I: European wood resource balance 2005

2005	A	B	C	D	E	F	G	H	I	J	K	L	M
1000 m ³ (Roundwood equivalent)	Industrial Roundwood		Fuelwood		Bark	Used logging residues	Woody biomass outside the forest	Chips, particles & wood residues	Recovered wood for material & energy use	Pulp production co- products (black liquor, tall oil, etc.)	Processe d wood fuel	Σ SUPPLY FOREST (A+B+C+D+E+ F)	Σ SUPPLY TOTAL
	JFSQ	Maximum difference unreported to JFSQ	JFSQ	Maximum difference unreported to JFSQ									
	(P+I-X)	(P)	(P+I-X)	(P)									
Austria	20 579	140	3 892	3 013	1 304	0	0	7 080	1 271	3 417	1 218	28 928	41 914
Belgium	6 408	0	634	0		0	0	1 601	410	2 805	0	7 043	11 859
Bulgaria	2 798	1 497	2 555	0		0	0	449	196	248	0	6 851	7 743
Czech Republic	12 490	0	966	0	175	1 365	2 833	2 356	0	1 851	40	14 996	22 077
Denmark	1 228	0	1 528	0		0	0	1 535	0	0	1 347	2 756	5 638
Estonia	4 527	0	933	0		0	0	2 691	0	168	0	5 460	8 318
Finland	62 399	0	4 758	0	7 625	1 825	0	20 165	1 488	19 699	98	76 607	118 057
France	29 966	2 277	2 386	23 200	0	3 440	9 200	12 429	12 070	4 622	333	61 269	99 924
Germany	47 665	6 582	6 387	1 057	2 520	9 900	283	16 252	11 924	4 267	333	74 111	107 170
Greece	637	0	1 034	0		0	0	518	0	0	0	1 671	2 188
Hungary	2 170	646	3 003	0		0	0	652	19	0	0	5 819	6 490
Ireland	2 524	0	19	0		0	0	955	646	0	0	2 543	4 144
Italy	7 758	5 032	6 538	0		0	0	4 784	2 963	240	383	19 327	27 698
Latvia	9 056	0	608	0		0	0	2 109	0	0	0	9 664	11 772
Liechtenstein	18	3	4	0		0	0	0	0	0	0	25	25
Lithuania	4 043	1 326	1 116	300	289	65	0	2 068	0	0	141	7 138	9 347
Luxembourg	377	0	-45	0		0	0	216	0	0	0	332	548
Malta	0	0	0	0		0	0	0	0	0	0	0	0
Netherlands	675	290	263	0	0	0	0	1 109	2 429	226	0	1 229	4 992
Norway	11 111	0	1 287	1 753	0	0	0	3 197	369	2 016	41	14 151	19 774
Poland	29 982	1 194	3 404	0	0	227	636	3 916	31	1 888	17	34 807	41 294
Portugal	9 594	0	595	0		0	0	2 315	61	2 840	0	10 189	15 405
Romania	11 787	241	2 891	0		0	0	3 430	0	295	0	14 919	18 645
Slovakia	7 369	0	178	0		0	0	2 055	0	1 352	0	7 547	10 955
Slovenia	1 920	85	808	0	0	159	276	427	149	303	12	2 971	4 138
Spain	16 788	0	2 105	0		0	0	5 454	2 040	2 880	0	18 893	29 267
Sweden	97 091	6 800	7 032	100	0	0	0	20 586	1 450	22 218	2 093	111 023	157 371
Switzerland	2 823	0	1 214	5	210	500	240	1 320	0	334	0	4 752	6 645
United Kingdom	8 459	0	126	1	0	0	0	2 682	4 872	170	183	8 586	16 492
EU 27	363 043	26 112	53 719	27 671	11 912	16 981	13 228	117 834	42 019	69 488	6 199	499 439	748 207
EU 27 / EFTA	376 977	26 112	56 220	29 429	12 122	17 481	13 468	122 350	42 388	71 838	6 240	518 342	774 627

Σ SUPPLY FOREST (A+B+C+D+E +F)	Σ SUPPLY TOTAL	Balance		Σ USE TOTAL	Sawmill industry	Panel industry	Pulp industry	Processed wood fuel industry	Other physical utilization	Energy use	
					(C)	(C)	(C)	(C)	(C)	(C)	
28,928	41,914	-8,761	-17%	50,675	18,437	4,623	7,414	2,021	0	18,180	Austria
7,043	11,859	-1,119	-9%	12,979	2,120	3,272	5,394	0		2,193	Belgium
6,851	7,743	1,908	25%	5,835	934	573	476	0		3,852	Bulgaria
14,996	22,077	1,299	6%	20,777	7,120	1,863	3,524	193	109	7,968	Czech Republic
2,756	5,638	-2,011	-26%	7,649	324	345	0	333		6,646	Denmark
5,460	8,318	-175	-2%	8,493	3,923	674	236	0		3,660	Estonia
76,607	118,057	12,816	11%	105,241	23,901	4,586	41,322	392	321	34,719	Finland
61,269	99,924	2,855	3%	97,069	20,140	8,480	9,273	250	8,802	50,124	France
74,111	107,170	-3,421	-3%	110,591	36,686	20,500	10,320	333	1,889	40,864	Germany
1,671	2,188	-4,012	-65%	6,200	306	933	0	0		4,961	Greece
5,819	6,490	-423	-6%	6,913	344	804	0	0		5,765	Hungary
2,543	4,144	6	0%	4,138	1,692	1,332	0	0		1,115	Ireland
19,327	27,698	6,253	23%	21,445	2,567	8,060	1,255	283		9,279	Italy
9,664	11,772	-6,266	-35%	18,039	6,940	798	0	0		10,301	Latvia
25	25	25	100%	0	0	0	0	0		0	Liechtenstein
7,138	9,347	1,226	13%	8,121	3,000	545	0	267	494	3,815	Lithuania
332	548	-1,060	-66%	1,608	899	709	0	0		0	Luxembourg
0	0	0	100%	0	0	0	0	0		0	Malta
1,229	4,992	-2,602	-34%	7,594	475	22	463	0	714	5,920	Netherlands
14,151	19,774	466	2%	19,308	5,139	823	7,167	71	336	5,773	Norway
34,807	41,294	-13,496	-25%	54,790	17,500	9,837	3,847	333	987	22,286	Poland
10,189	15,405	-9,123	-37%	24,529	2,780	1,793	5,881	0		14,075	Portugal
14,919	18,645	-7,313	-28%	25,957	7,021	1,629	568	0		16,739	Romania
7,547	10,955	1,367	12%	9,588	4,302	921	2,302	0		2,063	Slovakia
2,971	4,138	-1,112	-21%	5,250	1,410	695	540	58	116	2,431	Slovenia
18,893	29,267	-12,895	-31%	42,162	7,116	7,260	6,104	33		21,649	Spain
111,023	157,371	35,265	22%	122,106	31,100	1,152	47,100	1,608	0	41,146	Sweden
4,752	6,645	-2,195	-25%	8,840	2,642	1,487	897	0	29	3,785	Switzerland
8,586	16,492	1,101	7%	15,391	5,250	4,924	840	183	466	3,727	United Kingdom
499,439	748,207			793,140	206,286	86,331	146,859	6,289	13,897	333,477	EU 27
518,342	774,627	-46,662	-6%	821,288	214,067	88,641	154,923	6,360	14,262	343,035	EU 27 / EFTA

Annex II: renewable energy policy targets 2010

2010	TPES [mtoe]		renewable energy sources [mtoe]			bioenergy [mtoe]			wood [mtoe]				million m ³ wood	
	Country	target	2005	target	%	calculated	target	%	based on 2005 share	target	%	based on 2005 RES share		based on 2005 bioenergy share
EU 25 (not sum)		1752.3		12.0	210.274	150.000		143.319	0.000			108.942	114.0	591.085
Austria	33.2	34.0	9.51	30.0	9.960	5.679		5.337	3.793			4.920	5.2	27.136
Belgium	61.5	55.0		12.0	7.380			6.431				2.396		12.420
Bulgaria		19.9		12.0	2.386			1.523				1.523		7.898
Cyprus		2.5		10.2	0.251			0.045				0.045		0.234
Czech Republic	42.3	44.8	5.445	5.5	2.332			2.182				1.970		10.218
Denmark	21.3	19.5		19.5	4.146			3.108				1.936		10.037
Estonia		5.6		12.0	0.668			0.660				0.660		3.422
Finland	36.1	34.5	9.912	27.4	9.902	8.527		8.414	8.073			8.168	8.3	41.851
France	240.0	275.4	27.000	11.3	27.120	22.080	9.2	19.414	12.240	5.1		15.369	17.5	63.453
Germany	322.3	345.5	27.085	8.4	27.069	10.200		19.737				11.185	5.8	57.985
Greece	35.6	31.2		12.0	4.276			2.271				2.196		11.382
Hungary	27.1	27.9		6.5	1.762			1.650				1.537		7.973
Iceland		3.6		73.0	2.635			0.003						
Ireland	18.5	15.1		12.0	2.221			1.131				0.973		5.043
Italy	196.8	186.8	18.020	8.5	16.728			5.957				3.583		18.575
Latvia		4.7		36.0	1.698			1.411				1.400		7.259
Lithuania		8.6	0.918	12.0	1.031	0.751		0.974	0.737			0.967	0.75	3.820
Luxembourg		4.7		12.0	0.564			0.449				0.114	0	0.592
Netherlands	81.7	81.0		12.0	9.804	2.150		9.002				2.780	0.67	3.441
Norway		32.2		40.0	12.876									
Poland		93.9		7.5	7.045	6.482		6.716				6.520	6.3	32.622
Portugal	29.98	26.7		22.5	6.750			4.920				4.5540	4.6	23.608
Romania		39.1		13.0	5.089			3.239				3.239		16.792
Slovakia	19.4	19.4	1.552	8.0	1.553	0.788		0.787	0.788			0.690	0.70	4.086
Slovenia		7.3		12.0	0.877			0.539				0.531		2.754
Spain	167.1	143.5	20.220	12.1	20.219	11.408		11.906				9.694	7.5	38.865
Sweden	35.9	51.6		30.0	10.757			9.078				7.989		41.417
Switzerland	27.1			17.0	4.604			1.564				0.791	0.79	4.104
UK	238.6	232.3			11.930			9.588				3.545		18.380

Annex III: renewable energy policy targets 2020

2020	TPES [mtoe]		renewable energy sources [mtoe]			bioenergy [mtoe]			wood [mtoe]				75% scenario
	target	2005	target	%	calculated	target	%	based on 2005 share	target	%	based on share 2005	million m ³ wood	million m ³ wood
EU 25 (not sum)		1752.3		20	350.457	195.000		238.865			148.226	768.410	768.4
Austria		34.0		39.5	13.407			7.086			6.531	33.857	33.9
Belgium		55.0		20	10.990			12.602			4.695	24.337	18.3
Bulgaria		19.9		20	3.977			2.539			2.539	13.163	9.9
Cyprus		2.5		20	0.492			0.089			0.089	0.459	0.3
Czech Republic		44.8		10.5	0.000			4.165			3.763	19.506	14.6
Denmark		19.5		26.5	5.178			4.615			2.875	14.906	11.2
Estonia		5.6		20	1.113			1.100			1.100	5.703	4.3
Finland	38.4	34.5	10.712	27.9	10.712	9.124	23.7	9.103	8.523		8.836	44.182	44.2
France	191.0	275.4	33.998	17.8	33.998	27.695	14.5	27.695	15.280	8	15.280	79.212	79.2
Germany	284.3	345.5	44.760	15.7	44.635	32.545		32.545			18.443	95.612	71.7
Greece		31.2		20	6.248			3.786			3.659	18.970	14.2
Hungary		27.9		11	3.084			2.805			2.614	13.551	10.2
Iceland		3.6											
Ireland		15.1		20	3.024			1.885			1.621	8.406	6.3
Italy	243.6	186.8	24.116	9.9	18.490			7.972			4.795	24.860	18.6
Latvia		4.7		36	1.698			1.411			1.400	7.259	7.3
Lithuania		8.6	1.129	17.3	1.486			1.404	0.772		1.394	4.003	4.0
Luxembourg		4.7		20	0.940			0.749			0.190	0.987	0.7
Netherlands		81.0		20	16.193			15.003			4.633	24.018	18.0
Norway		32.2											
Poland		93.9		14	13.151			12.537			12.172	63.101	47.3
Portugal		26.7		23	6.136			5.026			4.652	24.118	24.1
Romania		39.1		20	7.829			4.983			4.983	25.833	19.4
Slovakia	20.2	19.4	3.201	15	3.027	2.150	10.0	2.271	1.505		1.589	7.801	5.9
Slovenia		7.3		20	1.461			0.898			0.885	4.589	3.4
Spain	214.3	143.5		20	42.866			25.242			20.552	106.542	79.9
Sweden	38.3	51.6		30	11.479			9.078			7.989	41.417	41.4
Switzerland		27.1		18.7	5.055			1.717			0.869	4.506	4.5
United Kingdom		232.3		6	13.936			11.506			4.254	22.056	22.1

Annex IV: Scenarios for 2010 and 2020

	A	B	C	D	E	F	G	H	I	K	L	M	N
2010	Industrial Roundwood		Fuelwood		Bark	Used logging residues	Woody biomass outside the forest	Chips, particles & wood residues	Recovered wood for material & energy use	Pulp production co-products (black liquor, tall oil, etc.) updated	Processed wood fuel	Σ SUPPLY FOREST	Σ SUPPLY TOTAL
1000 m³	JFSQ unchanged	Maximum difference unreported to JFSQ unchanged	JFSQ unchanged	Maximum difference unreported to JFSQ unchanged	updated	updated	unchanged	updated	unchanged	updated	unchanged		
	(P'+I-X)	(P)	(P+I-X)	(P)	(P'+I-X)	(P')	(P)	(P'+I-X)	(P)	(P')	(P+I-X)		
Austria	22 432	140	3 892	3 013	1 426	0	0	7 113	1 271	4 046	1 218	30 903	44 551
Belgium	6 664	0	634	0	0	0	0	1 467	410	3 078	0	7 298	12 253
Bulgaria	2 985	1 497	2 555	0	0	0	0	447	196	282	0	7 038	7 963
Czech Republic	13 856	0	966	0	182	1 423	2 833	2 296	0	2 202	40	16 428	23 800
Denmark	1 251	0	1 528	0	0	0	0	1 565	0	0	1 347	2 779	5 691
Estonia	4 939	0	933	0	0	0	0	2 621	0	187	0	5 872	8 680
Finland	63 353	0	4 758	0	7 748	1 854	0	19 826	1 488	20 131	98	77 714	119 256
France	30 029	2 277	2 386	23 200	0	3 630	9 200	12 429	12 070	4 825	333	61 523	100 381
Germany	49 040	6 582	6 387	1 057	2 573	10 111	283	15 972	11 924	4 030	333	75 751	108 293
Greece	588	0	1 034	0	0	0	0	518	0	0	0	1 622	2 140
Hungary	2 167	646	3 003	0	0	0	0	642	19	0	0	5 816	6 478
Ireland	2 780	0	19	0	0	0	0	1 013	646	0	0	2 799	4 458
Italy	7 918	5 032	6 538	0	0	0	0	4 645	2 963	259	383	19 487	27 737
Latvia	8 948	0	608	0	0	0	0	2 122	0	0	0	9 556	11 678
Liechtenstein	18	3	4	0	0	0	0	0	0	0	0	25	25
Lithuania	4 247	1 326	1 116	300	307	69	0	2 033	0	0	141	7 365	9 539
Luxembourg	363	0	-45	0	0	0	0	216	0	0	0	318	534
Malta		0	0	0	0	0	0	0	0	0	0	0	0
Netherlands	705	290	263	0	0	0	0	1 121	2 429	258	0	1 259	5 067
Norway	11 075	0	1 287	1 753	0	0	0	3 081	369	2 059	41	14 115	19 665
Poland	31 669	1 194	3 404	0	0	237	636	4 032	31	2 427	17	36 505	43 647
Portugal	9 621	0	595	0	0	0	0	2 293	61	3 037	0	10 216	15 607
Romania	12 955	241	2 891	0	0	0	0	3 277	0	354	0	16 087	19 718
Slovakia	6 198	0	178	0	0	0	0	2 055	0	1 352	0	6 376	9 784
Slovenia	2 067	85	808	0	0	159	276	427	149	303	12	3 119	4 285
Spain	18 195	0	2 105	0	0	0	0	5 410	2 040	3 248	0	20 300	30 998
Sweden	77 745	6 800	7 032	100	0	0	0	20 745	1 450	22 820	2 093	91 677	138 786
Switzerland	3 016	0	1 214	5	219	521	240	1 353	0	374	0	4 974	6 942
United Kingdom	9 528	0	126	1	0	0	0	2 833	4 872	166	183	9 655	17 709
EU / EFTA	389 485	26 112	56 220	29 429	12 456	18 006	13 468	121 553	42 388	75 439	6 240	531 708	790 797
EU 25	359 454	24 374	48 273	27 671	12 237	17 485	13 228	113 395	41 823	72 369	6 199	489 495	730 310

M	N	O	P	Q	R	S	T	U	V	W	
Σ SUPPLY FOREST	Σ SUPPLY TOTAL	Balance		Σ USE TOTAL	Material use					Energy use	2010
					Sawmill industry	Panel industry	Pulp industry	Processed wood fuel industry	Other physical utilization	changed (C')	1000 m³
					updated	updated	updated	unchanged	unchanged		
					(C')	(C')	(C')	(C')	(C)		
30 903	44 551	-17 148	-28%	61 699	18 524	5 240	8 778	2 021	0	27 136	Austria
7 298	12 253	-11 686	-49%	23 939	1 941	3 659	5 920	0		12 420	Belgium
7 038	7 963	-2 132	-21%	10 095	931	723	543	0		7 898	Bulgaria
16 428	23 800	-37	0%	23 837	6 940	2 185	4 192	193	109	10 218	Czech Republic
2 779	5 691	-5 401	-49%	11 092	331	390	0	333		10 037	Denmark
5 872	8 680	404	5%	8 276	3 821	771	264	0		3 422	Estonia
77 714	119 256	6 126	5%	113 130	23 499	4 839	42 229	392	321	41 851	Finland
61 523	100 381	-11 038	-10%	111 419	20 141	9 094	9 680	250	8 802	63 453	France
75 751	108 293	-20 064	-16%	128 356	36 054	22 349	9 746	333	1 889	57 985	Germany
1 622	2 140	-10 555	-83%	12 695	306	1 007	0	0		11 382	Greece
5 816	6 478	-2 795	-30%	9 273	339	960	0	0		7 973	Hungary
2 799	4 458	-3 909	-47%	8 366	1 795	1 528	0	0		5 043	Ireland
19 487	27 737	-3 984	-13%	31 721	2 492	9 013	1 357	283		18 575	Italy
9 556	11 678	-3 507	-23%	15 185	6 984	942	0	0		7 259	Latvia
25	25	25		0	0	0	0	0		0	Liechtenstein
7 365	9 539	1 327	14%	8 212	2 949	683	0	267	494	3 820	Lithuania
318	534	-1 750	-77%	2 284	899	792	0	0		592	Luxembourg
0	0			0	0	0	0	0		0	Malta
1 259	5 067	-123	-2%	5 190	480	25	529	0	714	3 441	Netherlands
14 115	19 665	537	3%	19 128	4 952	830	7 320	71	336	5 619	Norway
36 505	43 647	-24 479	-36%	68 125	18 019	11 220	4 944	333	987	32 622	Poland
10 216	15 607	-19 036	-55%	34 644	2 753	1 993	6 289	0		23 608	Portugal
16 087	19 718	-6 670	-25%	26 388	6 708	2 209	680	0		16 792	Romania
6 376	9 784	-1 827	-16%	11 611	4 302	921	2 302	0		4 086	Slovakia
3 119	4 285	-1 287	-23%	5 573	1 410	695	540	58	116	2 754	Slovenia
20 300	30 998	-30 070	-49%	61 068	7 059	8 228	6 883	33		38 865	Spain
91 677	138 786	14 867	11%	123 919	31 341	1 177	48 375	1 608	0	41 417	Sweden
4 974	6 942	-2 583	-27%	9 525	2 708	1 678	1 005	0	29	4 104	Switzerland
9 655	17 709	-13 058	-42%	30 767	5 545	5 369	825	183	466	18 380	United Kingdom
531 708	790 797	-184 721	-19%	975 518	213 222	98 520	162 402	6 360	14 262	480 752	EU / EFTA
489 495	730 310	-173 873	-19%	910 382	197 923	93 080	152 853	6 289	13 897	446 339	EU 25

A | B | C | D | E | F | G | H | I | K | L | M | N

2020	Industrial Roundwood		Fuelwood		Bark	Used logging residues	Woody biomass outside the forest	Chips, particles & wood residues	Recovered wood for material & energy use	Pulp production co-products (black liquor, tall oil, etc.) updated	Processed wood fuel unchanged	Σ SUPPLY FOREST	Σ TOTAL SUPPLY
	JFSQ updated	Maximum difference unreported to JFSQ unchanged	JFSQ unchanged	Maximum difference unreported to JFSQ unchanged									
	(P''+I-X)	(P)	(P+I-X)	(P)									
Austria	25 298	140	3 892	3 013	1 304	0	0	7 181	1 271	5 671	1 218	33 648	48 989
Belgium	7 177	0	634	0		0	0	1 230	410	3 708	0	7 812	13 159
Bulgaria	3 479	1 497	2 555	0		0	0	444	196	368	0	7 531	8 539
Czech Republic	15 223	0	966	0	175	1 365	2 833	2 182	0	3 116	40	17 729	25 900
Denmark	1 713	0	1 528	0		0	0	1 628	0		1 347	3 241	6 215
Estonia	4 897	0	933	0		0	0	2 486	0	232	0	5 830	8 549
Finland	64 918	0	4 758	0	7 625	1 825	0	19 164	1 488	21 024	98	79 126	120 900
France	33 615	2 277	2 386	23 200	0	3 440	9 200	12 430	12 070	5 258	333	64 918	104 210
Germany	51 295	6 582	6 387	1 057	2 520	9 900	283	15 426	11 924	3 594	333	77 741	109 302
Greece	529	0	1 034	0		0	0	518	0	0	0	1 564	2 081
Hungary	2 130	646	3 003	0		0	0	623	19	0	0	5 779	6 422
Ireland	3 422	0	19	0		0	0	1 140	646	0	0	3 441	5 227
Italy	8 372	5 032	6 538	0		0	0	4 378	2 963	303	383	19 941	27 969
Latvia	8 823	0	608	0		0	0	2 149	0	0	0	9 431	11 580
Liechtenstein	18	3	4	0		0	0	0	0	0	0	25	25
Lithuania	4 938	1 326	1 116	300	289	65	0	1 965	0	0	141	8 034	10 140
Luxembourg	357	0	-45	0		0	0	216	0	0	0	312	528
Malta		0	0	0		0	0	0	0	0	0	0	0
Netherlands	836	290	263	0	0	0	0	1 146	2 429	337	0	1 389	5 301
Norway	12 671	0	1 287	1 753	0	0	0	2 862	369	2 148	41	15 711	21 131
Poland	34 455	1 194	3 404	0	0	227	636	4 275	31	4 009	17	39 280	48 247
Portugal	9 837	0	595	0		0	0	2 249	61	3 473	0	10 432	16 215
Romania	14 866	241	2 891	0		0	0	2 992	0	508	0	17 998	21 498
Slovakia	6 198	0	178	0		0	0	2 055	0	1 352	0	6 376	9 784
Slovenia	2 067	85	808	0	0	159	276	427	149	303	12	3 119	4 285
Spain	20 076	0	2 105	0		0	0	5 324	2 040	4 130	0	22 181	33 675
Sweden	82 400	6 800	7 032	100	0	0	0	21 068	1 450	24 073	2 093	96 332	145 016
Switzerland	3 376	0	1 214	5	210	500	240	1 421	0	471	0	5 304	7 436
United Kingdom	12 407	0	126	1	0	0	0	3 160	4 872	160	183	12 534	20 909
EU / EFTA	417 494	26 112	56 220	29 429	12 122	17 481	13 468	120 138	42 388	84 237	6 240	558 859	825 331
EU 25	383 103	24 374	48 273	27 671	11 912	16 981	13 228	112 419	41 823	80 743	6 199	512 314	766 727

M | N | O | P | Q | R | S | T | U | V | W

Σ SUPPLY FOREST	Σ TOTAL SUPPLY	Balance		Σ USE TOTAL	Material use					Energy use updated	2020 1000 m³
					Sawmill industry updated	Panel industry updatd	Pulp industry updated	Processed wood fuel industry unchanged	Other physical utilization unchanged		
					(C')	(C')	(C')	(C')	(C)	(C')	
33 648	48 989	-24 624	-33%	73 613	18 699	6 731	12 305	2 021	0	33 857	Austria
7 812	13 159	-24 511	-65%	37 671	1 628	4 575	7 130	0		24 337	Belgium
7 531	8 539	-7 407	-46%	15 946	925	1 152	707	0		13 163	Bulgaria
17 729	25 900	-9 440	-27%	35 341	6 592	3 007	5 933	193	109	19 506	Czech Republic
3 241	6 215	-9 866	-61%	16 082	344	499	0	333		14 906	Denmark
5 830	8 549	-2 112	-20%	10 661	3 624	1 006	328	0		5 703	Estonia
79 126	120 900	3 803	3%	117 097	22 715	5 386	44 102	392	321	44 182	Finland
64 918	104 210	-25 203	-19%	129 413	20 142	10 458	10 549	250	8 802	79 212	France
77 741	109 302	-58 613	-35%	167 915	34 823	26 565	8 693	333	1 889	95 612	Germany
1 564	2 081	-18 368	-90%	20 449	306	1 173	0	0		18 970	Greece
5 779	6 422	-8 829	-58%	15 251	329	1 371	0	0		13 551	Hungary
3 441	5 227	-7 211	-58%	12 438	2 020	2 012	0	0		8 406	Ireland
19 941	27 969	-12 382	-31%	40 351	2 349	11 271	1 588	283		24 860	Italy
9 431	11 580	-4 066	-26%	15 646	7 072	1 315	0	0		7 259	Latvia
25	25	25	100%	0	0	0	0	0		0	Liechtenstein
8 034	10 140	1 456	14%	8 683	2 850	1 070	0	267	494	4 003	Lithuania
312	528	-2 347	-82%	2 874	899	988	0	0		987	Luxembourg
0	0			0	0	0	0	0		0	Malta
1 389	5 301	-20 644	-80%	25 945	491	32	690	0	714	24 018	Netherlands
15 711	21 131	2 025	10%	19 106	4 600	844	7 637	71	336	5 619	Norway
39 280	48 247	-58 043	-55%	106 289	19 105	14 596	8 167	333	987	63 101	Poland
10 432	16 215	-20 258	-56%	36 473	2 700	2 463	7 191	0		24 118	Portugal
17 998	21 498	-15 493	-42%	36 991	6 123	4 058	977	0		25 833	Romania
6 376	9 784	-5 541	-36%	15 325	4 302	921	2 302	0		7 801	Slovakia
3 119	4 285	-3 123	-42%	7 408	1 410	695	540	58	116	4 589	Slovenia
22 181	33 675	-99 164	-75%	132 839	6 946	10 566	8 752	33		106 542	Spain
96 332	145 016	17 902	12%	127 114	31 828	1 230	51 031	1 608	0	41 417	Sweden
5 304	7 436	-3 344	-31%	10 780	2 845	2 137	1 263	0	29	4 506	Switzerland
12 534	20 909	-15 157	-42%	36 066	6 185	6 382	794	183	466	22 056	United Kingdom
558 859	825 331	-448 438	-35%	1 273 769	211 853	122 502	180 679	6 360	14 262	738 113	EU / EFTA
512 314	766 727	-424 218	75%	1 190 945	197 361	114 312	170 095	6 289	13 897	688 992	EU 25

Annex V: Data sources used in the study

Data source	Organization	Data obtained
Joint Forest Sector Questionnaire (JFSQ)	UNECE, FAO, Eurostat, ITTO	Production, import and export of forest products (sawnwood, panels, pulp) and removals (industrial roundwood, fuelwood)
Joint Wood Energy Enquiry (JWEE)	UNECE/FAO Timber Section, IEA, Eurostat	Fuelwood removals, energy use of wood
Enquiry on quantitative indicators of sustainable forest management	UNECE/FAO Timber Section, MCPFE Liaison Unit Warsaw	Net Annual Increment, marketed roundwood and fellings
Eurostat	Eurostat	Overall energy consumption, energy consumption from renewable, biomass and wood sources
Renewables and waste questionnaire	IEA	Wood and wood waste for energy generation
World Energy Outlook	IEA	Regional trend (EU25) on energy consumption and efficiency based on the alternative energy scenario (until 2030)

Annex VI: Conversion factors

Product	Original unit	Conversion factor (in m ³ roundwood under bark)	Source
Sawn timber (non-coniferous)	M ³	1.71	EFSOS
Sawn timber (coniferous)	M ³	1.80	EFSOS
Particle board	M ³	2.564	EPF (1.47 EFSOS)
OSB	M ³	1.961	EPF
Plywood	M ³	2.55	EFSOS
Veneer	M ³		
MDF	M ³	2.137	EPF (2.04 EFSOS)
Hard board	M ³	2.04	EFSOS
Insulating board	M ³	2.04	EFSOS
Pulp	tonne d.m.		Factor was provided by CEPI for individual countries, if no data available general value was assumed
Mechanical pulp	tonne d.m.	2.40	EFSOS
Chemical pulp	tonne d.m.	4.69	EFSOS
Wood energy	Mtoe	5.184	World Energy Council (0.3215 mtoe/tonne wood and 0.6 tonne /m ³)

Annex VII: National wood resource balances

EU / EFTA

2005

1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	376.977	49%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	26.112	3%
Fuelwood - JFSQ	(P+I-X)	56.220	7%
Fuelwood - Maximum difference unreported to JFSQ	(P)	29.429	4%
Bark	(P)	12.122	2%
Used logging residues	(P)	17.481	2%
Woody biomass outside the forest	(P)	13.468	2%

Material use:

26%	214.067	(C)	Sawmill industry
11%	88.641	(C)	Panel industry
19%	154.923	(C)	Pulp industry
1%	6.360	(C)	Processed wood fuel industry
2%	14.262	(C)	Other physical utilization

Supply by-products:

Chips, particles & wood residues	(P+I-X)	122.350	16%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	71.838	9%

Energy use:

6%	48.518	(C)	Power and heat
7%	61.176	(C)	Industrial internal
12%	95.626	(C)	Private households
17%	137.715	(C)	Undifferentiated energy use

Supply recovered wood:

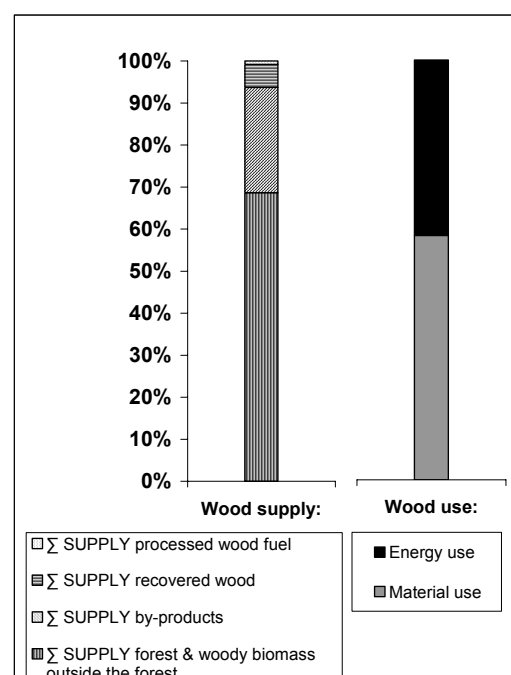
Recovered wood for material & energy use	(P)	42.388	5%
--	-----	--------	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	6.240	1%
---------------------	---------	-------	----

Σ SUPPLY TOTAL		774.627	Difference	821.288	Σ USE
			46.661		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - EU / EFTA (2005)			
Wood supply:			
Σ SUPPLY forest & woody biomass outside the forest	531.810	69%	
Σ SUPPLY by-products	194.189	25%	
Σ SUPPLY recovered wood	42.388	5%	
Σ SUPPLY processed wood fuel	6.240	1%	
Wood use:			
58%	478.253	Material use	
42%	343.035	Energy use	

EU / EFTA :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
720.757	-	765.862	796.941

Austria

2005

1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	20.579	49%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	140	0%
Fuelwood - JFSQ	(P+I-X)	3.892	9%
Fuelwood - Maximum difference unreported to JFSQ	(P)	3.013	7%
Bark	(P)	1.304	3%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	7.080	17%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	3.417	8%

Supply recovered wood:

Recovered wood for material & energy use	(P)	1.271	3%
--	-----	-------	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	1.218	3%
---------------------	---------	-------	----

Σ SUPPLY TOTAL		41.914	
----------------	--	--------	--

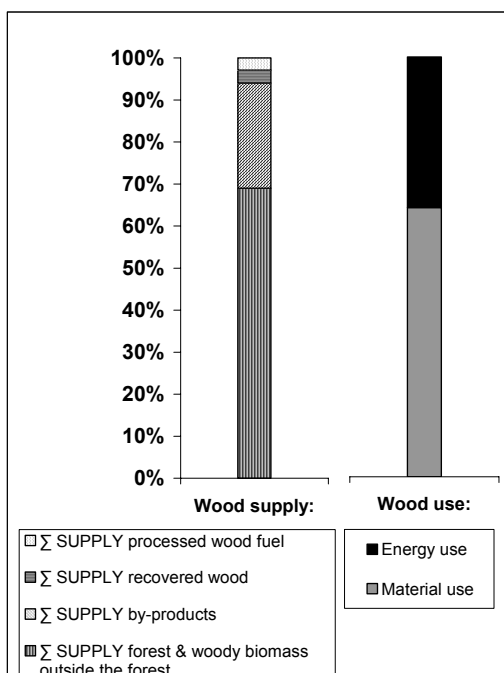
Material use:			
36%	18.437	(C)	Sawmill industry
9%	4.623	(C)	Panel industry
15%	7.414	(C)	Pulp industry
4%	2.021	(C)	Processed wood fuel industry
0%	0	(C)	Other physical utilization

Energy use:			
4%	2.051	(C)	Power and heat
8%	3.855	(C)	Industrial internal
17%	8.538	(C)	Private households
7%	3.737	(C)	Undifferentiated energy use

Difference	
8.761	

50.675	Σ USE
--------	-------

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Austria (2005)

Wood supply:

Σ SUPPLY forest & woody biomass outside the forest	28.928	69%
Σ SUPPLY by-products	10.497	25%
Σ SUPPLY recovered wood	1.271	3%
Σ SUPPLY processed wood fuel	1.218	3%

Wood use:

64%	32.495	Material use
36%	18.180	Energy use

Austria :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
27.337	-	31.255	-

1.000 m ³	%		%	1.000 m ³
----------------------	---	--	---	----------------------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	6.408	54%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%
Fuelwood - JFSQ	(P+I-X)	634	5%
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%
Bark	(P)	0	0%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	1.601	14%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	2.805	24%

Supply recovered wood:

Recovered wood for material & energy use	(P)	410	3%
--	-----	-----	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	0	0%
---------------------	---------	---	----

Material use:

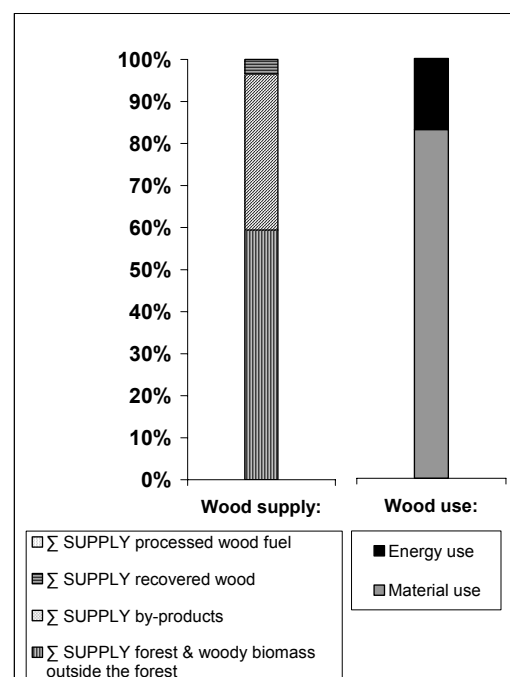
16%	2.120	(C)	Sawmill industry
25%	3.272	(C)	Panel industry
42%	5.394	(C)	Pulp industry
0%	0	(C)	Processed wood fuel industry
0%	0	(C)	Other physical utilization

Energy use:

0%	0	(C)	Power and heat
0%	0	(C)	Industrial internal
0%	0	(C)	Private households
17%	2.193	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	11.859	Difference	12.979	Σ USE
		1.119		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Belgium (2005)			
Wood supply:		Wood use:	
Σ SUPPLY forest & woody biomass outside the forest	7.043	59%	83%
Σ SUPPLY by-products	4.407	37%	10.786
Σ SUPPLY recovered wood	410	3%	17%
Σ SUPPLY processed wood fuel	0	0%	2.193
			Material use
			Energy use

Belgium :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
5.176	-	5.289	5.289

Bulgaria

2005

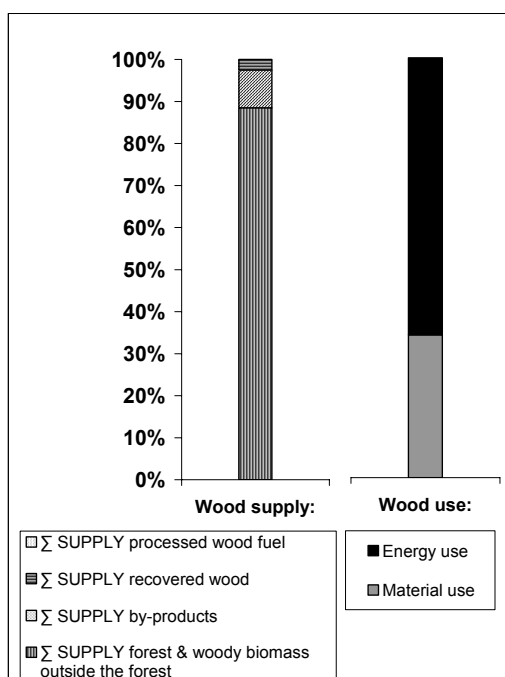
1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

	(P+I-X)			Material use:			
Industrial Roundwood - JFSQ	(P+I-X)	2.798	36%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	1.497	19%	16%	934	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	2.555	33%	10%	573	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%	8%	476	(C)	Pulp industry
Bark	(P)	0	0%	0%	0	(C)	Processed wood fuel industry
Used logging residues	(P)	0	0%	0%	0	(C)	Other physical utilization
Woody biomass outside the forest	(P)	0	0%				
Supply by-products:							
Chips, particles & wood residues	(P+I-X)	449	6%				
Pulp production co-products (black liquor, tall oil, etc.)	(P)	248	3%				
Supply recovered wood:							
Recovered wood for material & energy use	(P)	196	3%	0%	0	(C)	Power and heat
Supply processed wood fuel:							
Processed wood fuel	(P+I-X)	0	0%	0%	0	(C)	Industrial internal
				0%	0	(C)	Private households
				66%	3.852	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	7.743	Difference	5.835	Σ USE
		1.908		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Bulgaria (2005)			
Wood supply:			
Σ SUPPLY forest & woody biomass outside the forest	6.851	88%	
Σ SUPPLY by-products	696	9%	
Σ SUPPLY recovered wood	196	3%	
Σ SUPPLY processed wood fuel	0	0%	
Wood use:			
34%	1.983		Material use
66%	3.852		Energy use

Bulgaria :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
11.239	-	13.563	14.120

Czech Republic

2005

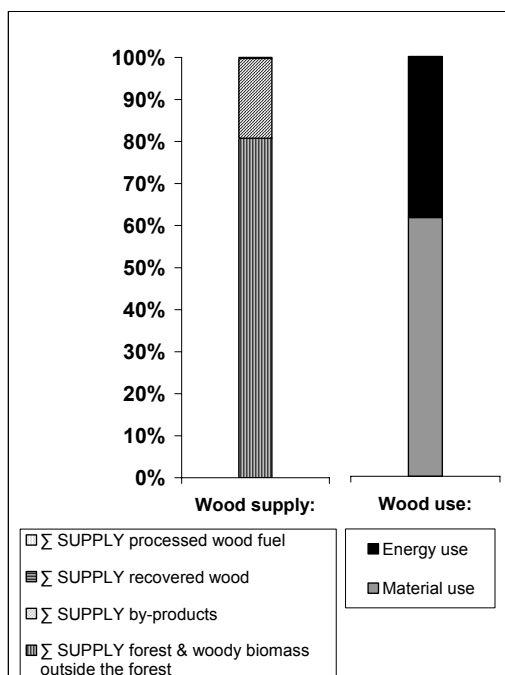
1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

	(P+I-X)		%								
Industrial Roundwood - JFSQ	(P+I-X)	12.490	57%	Material use:							
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%					34%	7.120	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	966	4%					9%	1.863	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%					17%	3.524	(C)	Pulp industry
Bark	(P)	175	1%					1%	193	(C)	Processed wood fuel industry
Used logging residues	(P)	1.365	6%					1%	109	(C)	Other physical utilization
Woody biomass outside the forest	(P)	2.833	13%					Energy use:			
Supply by-products:				3%	538	(C)	Power and heat				
Chips, particles & wood residues	(P+I-X)	2.356	11%	11%	2.270	(C)	Industrial internal				
Pulp production co-products (black liquor, tall oil, etc.)	(P)	1.851	8%	25%	5.131	(C)	Private households				
Supply recovered wood:				0%	29	(C)	Undifferentiated energy use				
Recovered wood for material & energy use	(P)	0	0%								
Supply processed wood fuel:											
Processed wood fuel	(P+I-X)	40	0%								

∑ SUPPLY TOTAL	22.077	Difference	20.777	∑ USE
		1.299		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Czech Republic (2005)			
Wood supply:			
∑ SUPPLY forest & woody biomass outside the forest	17.829	81%	
∑ SUPPLY by-products	4.207	19%	
∑ SUPPLY recovered wood	0	0%	
∑ SUPPLY processed wood fuel	40	0%	
Wood use:			
62%	12.809		Material use
38%	7.968		Energy use

Czech Republic :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
17.000	-	19.800	20.500

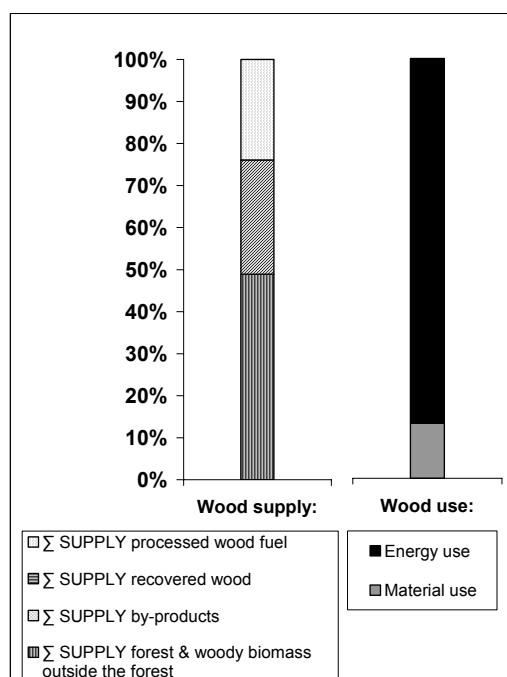
1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

	(P+I-X)		%								
Industrial Roundwood - JFSQ	(P+I-X)	1.228	22%	Material use:							
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%					4%	324	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	1.528	27%					5%	345	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%					0%	0	(C)	Pulp industry
Bark	(P)	0	0%					4%	333	(C)	Processed wood fuel industry
Used logging residues	(P)	0	0%					0%	0	(C)	Other physical utilization
Woody biomass outside the forest	(P)	0	0%					Energy use:			
Supply by-products:											
Chips, particles & wood residues	(P+I-X)	1.535	27%	0%	0	(C)	Power and heat				
Pulp production co-products (black liquor, tall oil, etc.)	(P)	0	0%	0%	0	(C)	Industrial internal				
Supply recovered wood:											
Recovered wood for material & energy use	(P)	0	0%	0%	0	(C)	Private households				
Supply processed wood fuel:											
Processed wood fuel	(P+I-X)	1.347	24%	87%	6.646	(C)	Undifferentiated energy use				

∑ SUPPLY TOTAL	5.638	Difference	7.649	∑ USE
		2.011		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Denmark (2005)			
Wood supply:			
∑ SUPPLY forest & woody biomass outside the forest	2.756	49%	
∑ SUPPLY by-products	1.535	27%	
∑ SUPPLY recovered wood	0	0%	
∑ SUPPLY processed wood fuel	1.347	24%	
Wood use:			
13%	1.003		Material use
87%	6.646		Energy use

Denmark :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
4.552	-	4.849	5.176

1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	4.527	54%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%
Fuelwood - JFSQ	(P+I-X)	933	11%
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%
Bark	(P)	0	0%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	2.691	32%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	168	2%

Supply recovered wood:

Recovered wood for material & energy use	(P)	0	0%
--	-----	---	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	0	0%
---------------------	---------	---	----

Material use:

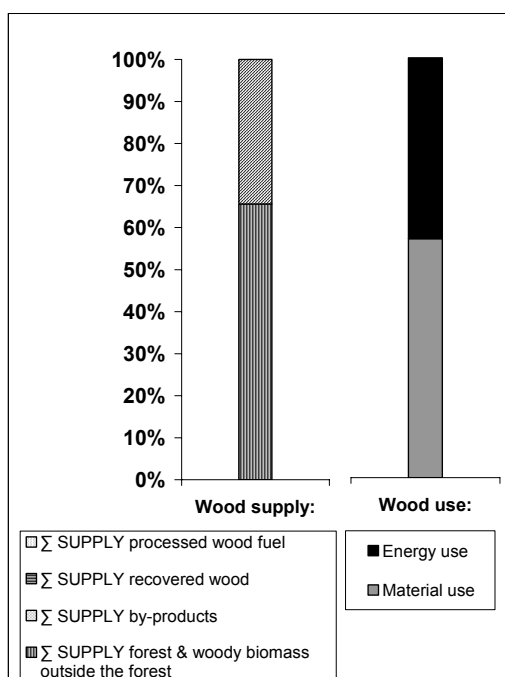
46%	3.923	(C)	Sawmill industry
8%	674	(C)	Panel industry
3%	236	(C)	Pulp industry
0%	0	(C)	Processed wood fuel industry
0%	0	(C)	Other physical utilization

Energy use:

0%	0	(C)	Power and heat
0%	0	(C)	Industrial internal
0%	0	(C)	Private households
43%	3.660	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	8.318	Difference	8.493	Σ USE
		175		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Estonia (2005)			
Wood supply:		Wood use:	
Σ SUPPLY forest & woody biomass outside the forest	5.460	66%	57%
Σ SUPPLY by-products	2.858	34%	43%
Σ SUPPLY recovered wood	0	0%	
Σ SUPPLY processed wood fuel	0	0%	
			4.833
			3.660
			Material use
			Energy use

Estonia :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
10.168	-	11.363	11.015

1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	62.399	53%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%
Fuelwood - JFSQ	(P+I-X)	4.758	4%
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%
Bark	(P)	7.625	6%
Used logging residues	(P)	1.825	2%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	20.165	17%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	19.699	17%

Supply recovered wood:

Recovered wood for material & energy use	(P)	1.488	1%
--	-----	-------	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	98	0%
---------------------	---------	----	----

Material use:

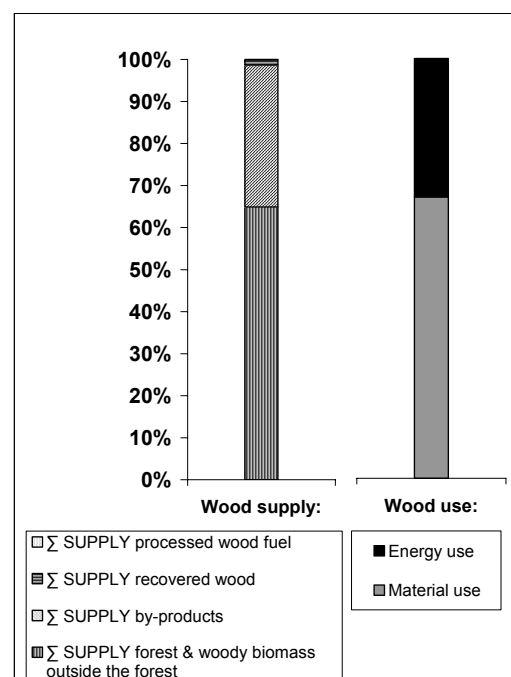
23%	23.901	(C)	Sawmill industry
4%	4.586	(C)	Panel industry
39%	41.322	(C)	Pulp industry
0%	392	(C)	Processed wood fuel industry
0%	321	(C)	Other physical utilization

Energy use:

10%	10.399	(C)	Power and heat
18%	18.596	(C)	Industrial internal
5%	5.724	(C)	Private households
0%	0	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	118.057	Difference	105.241	Σ USE
		12.816		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Finland (2005)			
Wood supply:			
Σ SUPPLY forest & woody biomass outside the forest	76.607	65%	
Σ SUPPLY by-products	39.864	34%	
Σ SUPPLY recovered wood	1.488	1%	
Σ SUPPLY processed wood fuel	98	0%	
Wood use:			
	67%	70.522	Material use
	33%	34.719	Energy use

Finland :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
76.031	-	79.362	92.860

1.000 m³	%	%	1.000 m³
----------	---	---	----------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	29.966	30%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	2.277	2%
Fuelwood - JFSQ	(P+I-X)	2.386	2%
Fuelwood - Maximum difference unreported to JFSQ	(P)	23.200	23%
Bark	(P)	0	0%
Used logging residues	(P)	3.440	3%
Woody biomass outside the forest	(P)	9.200	9%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	12.429	12%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	4.622	5%

Supply recovered wood:

Recovered wood for material & energy use	(P)	12.070	12%
--	-----	--------	-----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	333	0%
---------------------	---------	-----	----

Material use:

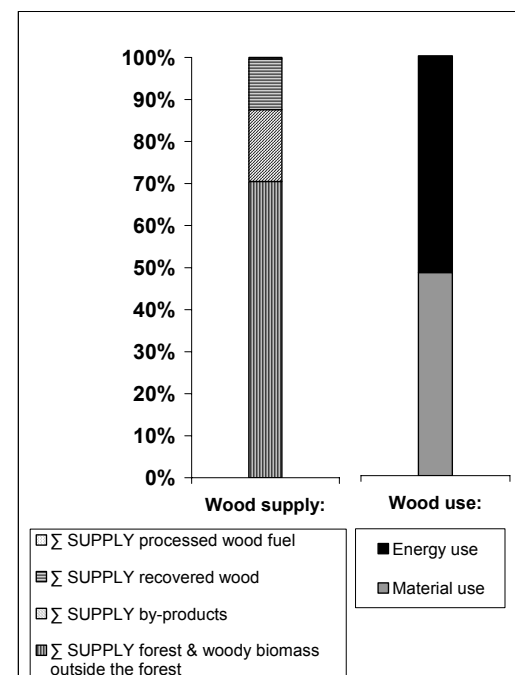
21%	20.140	(C)	Sawmill industry
9%	8.480	(C)	Panel industry
10%	9.273	(C)	Pulp industry
0%	250	(C)	Processed wood fuel industry
9%	8.802	(C)	Other physical utilization

Energy use:

1%	514	(C)	Power and heat
4%	3.825	(C)	Industrial internal
38%	36.927	(C)	Private households
9%	8.859	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	99.924	Difference	97.069	Σ USE
		2.855		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - France (2005)			
Wood supply:			
Σ SUPPLY forest & woody biomass outside the forest	70.469	71%	
Σ SUPPLY by-products	17.051	17%	
Σ SUPPLY recovered wood	12.070	12%	
Σ SUPPLY processed wood fuel	333	0%	
Wood use:			
48%	46.945		Material use
52%	50.124		Energy use

France :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
84.050	-	97.578	102.456

1.000 m³	%		%	1.000 m³
----------	---	--	---	----------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	47.665	44%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	6.582	6%
Fuelwood - JFSQ	(P+I-X)	6.387	6%
Fuelwood - Maximum difference unreported to JFSQ	(P)	1.057	1%
Bark	(P)	2.520	2%
Used logging residues	(P)	9.900	9%
Woody biomass outside the forest	(P)	283	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	16.252	15%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	4.267	4%

Supply recovered wood:

Recovered wood for material & energy use	(P)	11.924	11%
--	-----	--------	-----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	333	0%
---------------------	---------	-----	----

Material use:

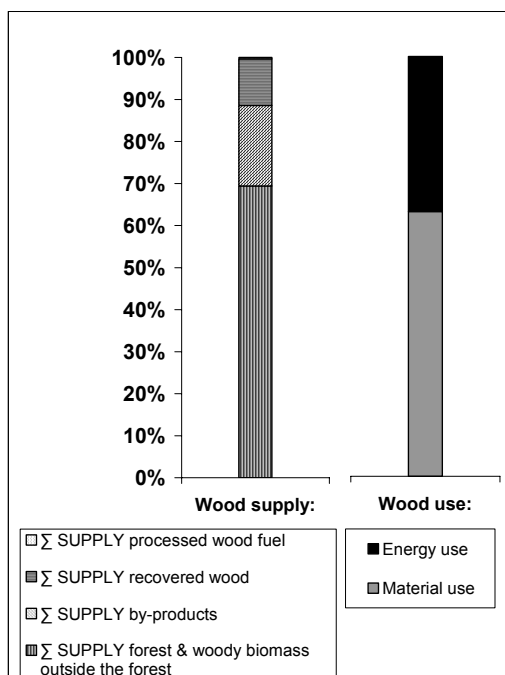
33%	36.686	(C)	Sawmill industry
19%	20.500	(C)	Panel industry
9%	10.320	(C)	Pulp industry
0%	333	(C)	Processed wood fuel industry
2%	1.889	(C)	Other physical utilization

Energy use:

14%	15.364	(C)	Power and heat
4%	4.800	(C)	Industrial internal
19%	20.700	(C)	Private households
0%	0	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	107.170	Difference	110.591	Σ USE
		3.421		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Germany (2005)			
Wood supply:		Wood use:	
Σ SUPPLY forest & woody biomass outside the forest	74.394	69%	63%
Σ SUPPLY by-products	20.519	19%	37%
Σ SUPPLY recovered wood	11.924	11%	
Σ SUPPLY processed wood fuel	333	0%	
			69.727
			40.864
			Material use
			Energy use

Germany :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
-	-	122.000	122.000

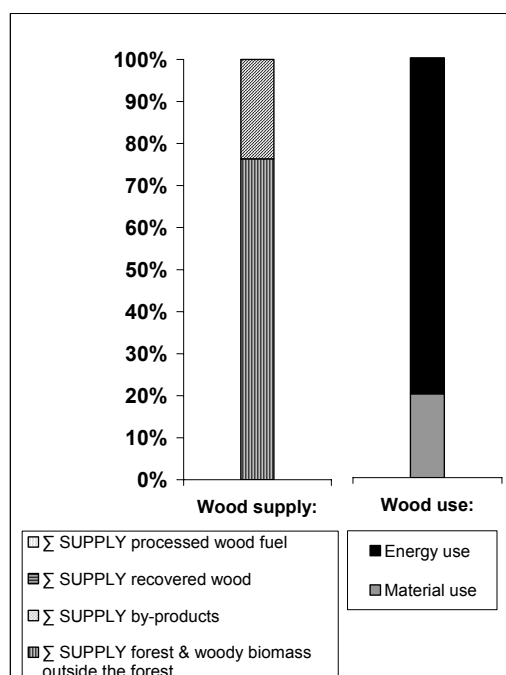
1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

	(P+I-X)		%								
Industrial Roundwood - JFSQ	(P+I-X)	637	29%	Material use:							
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%					5%	306	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	1.034	47%					15%	933	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%					0%	0	(C)	Pulp industry
Bark	(P)	0	0%					0%	0	(C)	Processed wood fuel industry
Used logging residues	(P)	0	0%					0%	0	(C)	Other physical utilization
Woody biomass outside the forest	(P)	0	0%					Energy use:			
Supply by-products:											
Chips, particles & wood residues	(P+I-X)	518	24%	0%	0	(C)	Power and heat				
Pulp production co-products (black liquor, tall oil, etc.)	(P)	0	0%	0%	0	(C)	Industrial internal				
Supply recovered wood:				0%	0	(C)	Private households				
Recovered wood for material & energy use	(P)	0	0%	80%	4.961	(C)	Undifferentiated energy use				
Supply processed wood fuel:											
Processed wood fuel	(P+I-X)	0	0%								

∑ SUPPLY TOTAL	2.188	Difference	6.200	∑ USE
		4.012		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Greece (2005)			
Wood supply:			
∑ SUPPLY forest & woody biomass outside the forest	1.671	76%	
∑ SUPPLY by-products	518	24%	
∑ SUPPLY recovered wood	0	0%	
∑ SUPPLY processed wood fuel	0	0%	
Wood use:			
20%	1.239		Material use
80%	4.961		Energy use

Greece :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
3.813	-	-	-

1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	2.170	33%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	646	10%
Fuelwood - JFSQ	(P+I-X)	3.003	46%
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%
Bark	(P)	0	0%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	652	10%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	0	0%

Supply recovered wood:

Recovered wood for material & energy use	(P)	19	0%
--	-----	----	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	0	0%
---------------------	---------	---	----

Material use:

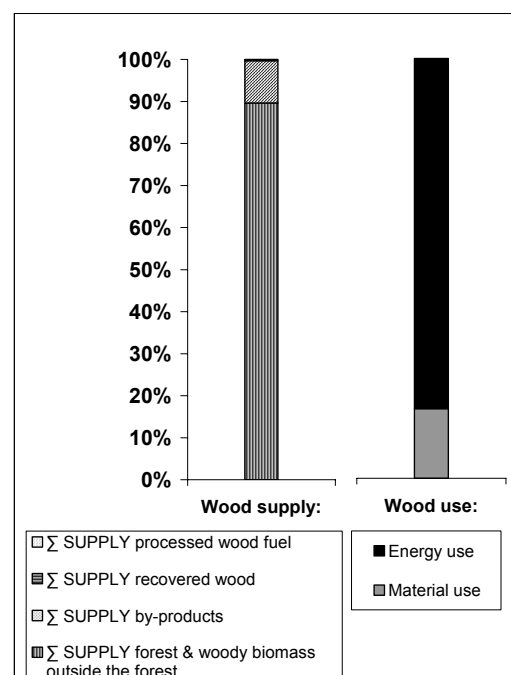
5%	344	(C)	Sawmill industry
12%	804	(C)	Panel industry
0%	0	(C)	Pulp industry
0%	0	(C)	Processed wood fuel industry
0%	0	(C)	Other physical utilization

Energy use:

0%	0	(C)	Power and heat
0%	0	(C)	Industrial internal
0%	0	(C)	Private households
83%	5.765	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	6.490	Difference	6.913	Σ USE
		423		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Hungary (2005)			
Wood supply:		Wood use:	
Σ SUPPLY forest & woody biomass outside the forest	5.819	90%	17% 1.148 Material use
Σ SUPPLY by-products	652	10%	83% 5.765 Energy use
Σ SUPPLY recovered wood	19	0%	
Σ SUPPLY processed wood fuel	0	0%	

Hungary :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
11.002	-	11.711	12.899

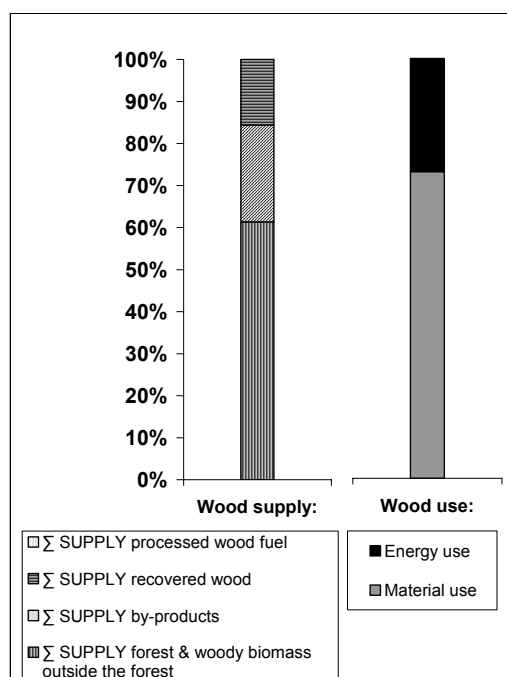
1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

	(P+I-X)		%								
Industrial Roundwood - JFSQ	(P+I-X)	2.524	61%	Material use:							
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%					41%	1.692	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	19	0%					32%	1.332	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%					0%	0	(C)	Pulp industry
Bark	(P)	0	0%					0%	0	(C)	Processed wood fuel industry
Used logging residues	(P)	0	0%					0%	0	(C)	Other physical utilization
Woody biomass outside the forest	(P)	0	0%					Energy use:			
Supply by-products:											
Chips, particles & wood residues	(P+I-X)	955	23%	0%	0	(C)	Power and heat				
Pulp production co-products (black liquor, tall oil, etc.)	(P)	0	0%	0%	0	(C)	Industrial internal				
Supply recovered wood:											
Recovered wood for material & energy use	(P)	646	16%	0%	0	(C)	Private households				
Supply processed wood fuel:											
Processed wood fuel	(P+I-X)	0	0%	27%	1.115	(C)	Undifferentiated energy use				

∑ SUPPLY TOTAL	4.144	Difference	4.138	∑ USE
		6		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Ireland (2005)			
Wood supply:			
∑ SUPPLY forest & woody biomass outside the forest	2.543	61%	
∑ SUPPLY by-products	955	23%	
∑ SUPPLY recovered wood	646	16%	
∑ SUPPLY processed wood fuel	0	0%	
Wood use:			
73%	3.023		Material use
27%	1.115		Energy use

Ireland :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
-	-	-	-

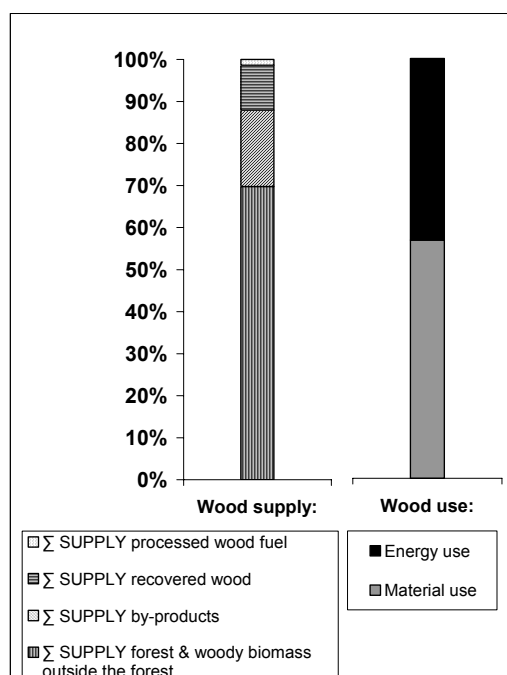
1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

	(P+I-X)		%								
Industrial Roundwood - JFSQ	(P+I-X)	7.758	28%	Material use:							
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	5.032	18%					12%	2.567	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	6.538	24%					38%	8.060	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%					6%	1.255	(C)	Pulp industry
Bark	(P)	0	0%					1%	283	(C)	Processed wood fuel industry
Used logging residues	(P)	0	0%					0%	0	(C)	Other physical utilization
Woody biomass outside the forest	(P)	0	0%					Energy use:			
Supply by-products:											
Chips, particles & wood residues	(P+I-X)	4.784	17%	0%	0	(C)	Power and heat				
Pulp production co-products (black liquor, tall oil, etc.)	(P)	240	1%	0%	0	(C)	Industrial internal				
Supply recovered wood:											
Recovered wood for material & energy use	(P)	2.963	11%	0%	0	(C)	Private households				
Supply processed wood fuel:											
Processed wood fuel	(P+I-X)	383	1%	43%	9.279	(C)	Undifferentiated energy use				

∑ SUPPLY TOTAL	27.698	Difference	21.445	∑ USE
		6.253		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Italy (2005)			
Wood supply:			
∑ SUPPLY forest & woody biomass outside the forest	19.327	70%	
∑ SUPPLY by-products	5.024	18%	
∑ SUPPLY recovered wood	2.963	11%	
∑ SUPPLY processed wood fuel	383	1%	
Wood use:			
	57%	12.165	Material use
	43%	9.279	Energy use

Italy :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
26.296	-	31.836	38.320

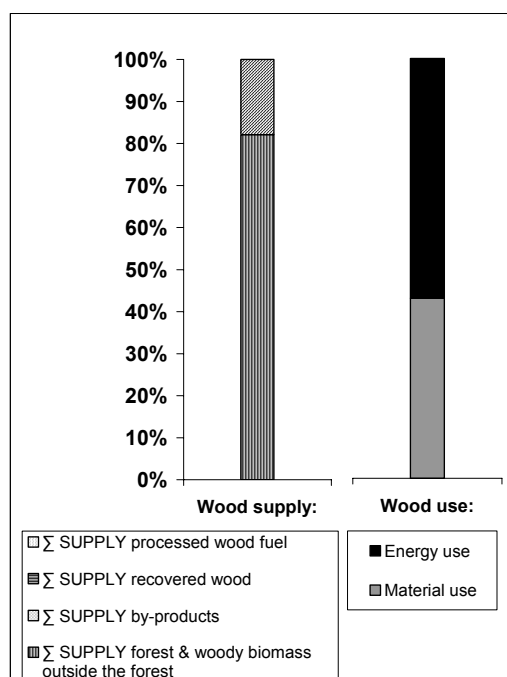
1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

	(P+I-X)		%				
Industrial Roundwood - JFSQ	(P+I-X)	9.056	77%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%	38%	6.940	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	608	5%	4%	798	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%	0%	0	(C)	Pulp industry
Bark	(P)	0	0%	0%	0	(C)	Processed wood fuel industry
Used logging residues	(P)	0	0%	0%	0	(C)	Other physical utilization
Woody biomass outside the forest	(P)	0	0%				
Supply by-products:							
Chips, particles & wood residues	(P+I-X)	2.109	18%				
Pulp production co-products (black liquor, tall oil, etc.)	(P)	0	0%				
Supply recovered wood:							
Recovered wood for material & energy use	(P)	0	0%	0%	0	(C)	Power and heat
Supply processed wood fuel:							
Processed wood fuel	(P+I-X)	0	0%	0%	0	(C)	Industrial internal
				0%	0	(C)	Private households
				57%	10.301	(C)	Undifferentiated energy use

∑ SUPPLY TOTAL	11.772	Difference	18.039	∑ USE
		6.266		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Latvia (2005)			
Wood supply:			
∑ SUPPLY forest & woody biomass outside the forest	9.664	82%	
∑ SUPPLY by-products	2.109	18%	
∑ SUPPLY recovered wood	0	0%	
∑ SUPPLY processed wood fuel	0	0%	
Wood use:			
43%	7.738		Material use
57%	10.301		Energy use

Latvia :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
16.500	-	16.500	16.500

1.000 m³	%	%	1.000 m³
----------	---	---	----------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	18	72%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	3	12%
Fuelwood - JFSQ	(P+I-X)	4	17%
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%
Bark	(P)	0	0%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Material use:

#####	0	(C)	Sawmill industry
#####	0	(C)	Panel industry
#####	0	(C)	Pulp industry
#####	0	(C)	Processed wood fuel industry
#####	0	(C)	Other physical utilization

Supply by-products:

Chips, particles & wood residues	(P+I-X)	0	0%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	0	0%

Energy use:

#####	0	(C)	Power and heat
#####	0	(C)	Industrial internal
#####	0	(C)	Private households
#####	0	(C)	Undifferentiated energy use

Supply recovered wood:

Recovered wood for material & energy use	(P)	0	0%
--	-----	---	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	0	0%
---------------------	---------	---	----

Σ SUPPLY TOTAL	25	Difference	0	Σ USE
		25		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption

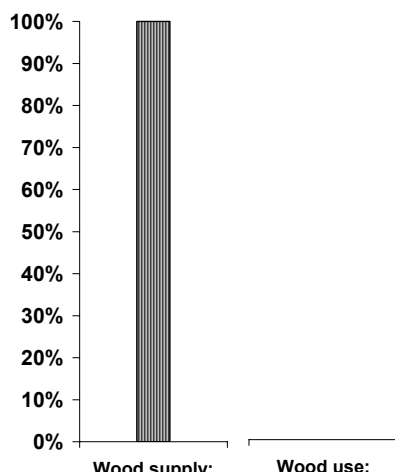
Wood supply and use - Liechtenstein (2005)

Wood supply:

Σ SUPPLY forest & woody biomass outside the forest	25	100%
Σ SUPPLY by-products	0	0%
Σ SUPPLY recovered wood	0	0%
Σ SUPPLY processed wood fuel	0	0%

Wood use:

#####	0	Material use
#####	0	Energy use



□ Σ SUPPLY processed wood fuel	■ Energy use
▨ Σ SUPPLY recovered wood	▣ Material use
□ Σ SUPPLY by-products	
▨ Σ SUPPLY forest & woody biomass outside the forest	

Liechtenstein :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
25	-	25	-

1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	4.043	43%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	1.326	14%
Fuelwood - JFSQ	(P+I-X)	1.116	12%
Fuelwood - Maximum difference unreported to JFSQ	(P)	300	3%
Bark	(P)	289	3%
Used logging residues	(P)	65	1%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	2.068	22%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	0	0%

Supply recovered wood:

Recovered wood for material & energy use	(P)	0	0%
--	-----	---	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	141	2%
---------------------	---------	-----	----

Material use:

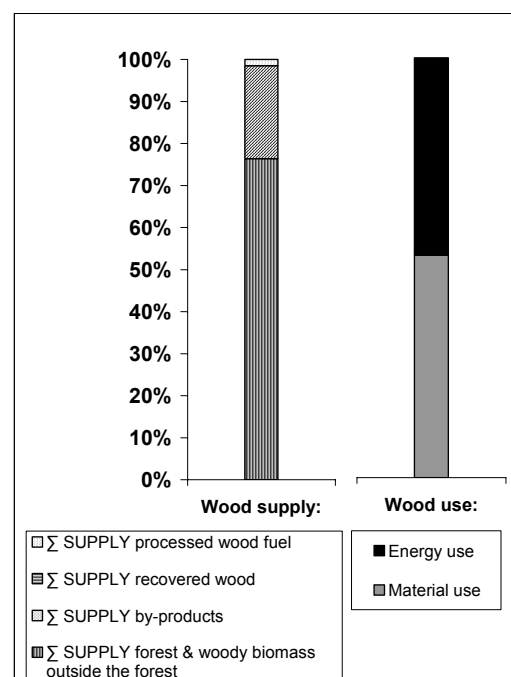
37%	3.000	(C)	Sawmill industry
7%	545	(C)	Panel industry
0%	0	(C)	Pulp industry
3%	267	(C)	Processed wood fuel industry
6%	494	(C)	Other physical utilization

Energy use:

10%	775	(C)	Power and heat
5%	422	(C)	Industrial internal
25%	2.012	(C)	Private households
7%	607	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	9.347	Difference	8.121	Σ USE
		1.226		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Lithuania (2005)

Wood supply:

Σ SUPPLY forest & woody biomass outside the forest	7.138	76%
Σ SUPPLY by-products	2.068	22%
Σ SUPPLY recovered wood	0	0%
Σ SUPPLY processed wood fuel	141	2%

Wood use:

53%	4.306	Material use
47%	3.815	Energy use

Lithuania:

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
-	-	8.966	9.888

Luxembourg

2005

1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	377	69%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%
Fuelwood - JFSQ	(P+I-X)	-45	-8%
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%
Bark	(P)	0	0%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	216	39%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	0	0%

Supply recovered wood:

Recovered wood for material & energy use	(P)	0	0%
--	-----	---	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	0	0%
---------------------	---------	---	----

Material use:

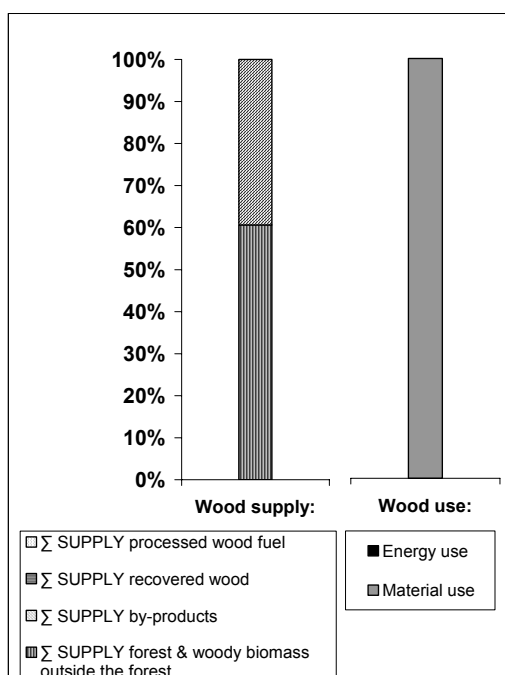
56%	899	(C)	Sawmill industry
44%	709	(C)	Panel industry
0%	0	(C)	Pulp industry
0%	0	(C)	Processed wood fuel industry
0%	0	(C)	Other physical utilization

Energy use:

0%	0	(C)	Power and heat
0%	0	(C)	Industrial internal
0%	0	(C)	Private households
0%	0	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	548	Difference	1.608	Σ USE
		1.060		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Luxembourg (2005)			
Wood supply:			
Σ SUPPLY forest & woody biomass outside the forest	332	61%	
Σ SUPPLY by-products	216	39%	
Σ SUPPLY recovered wood	0	0%	
Σ SUPPLY processed wood fuel	0	0%	
Wood use:			
100%	1.608		Material use
0%	0		Energy use

Luxembourg :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
650	-	650	650

1.000 m³	%	%	1.000 m³
----------	---	---	----------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	0	0%	Material use:				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%		#####	0	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	0	100%		#####	0	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%		#####	0	(C)	Pulp industry
Bark	(P)	0	0%		#####	0	(C)	Processed wood fuel industry
Used logging residues	(P)	0	0%		#####	0	(C)	Other physical utilization
Woody biomass outside the forest	(P)	0	0%					

Supply by-products:

Chips, particles & wood residues	(P+I-X)	0	0%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	0	0%

Supply recovered wood:

Recovered wood for material & energy use	(P)	0	0%
--	-----	---	----

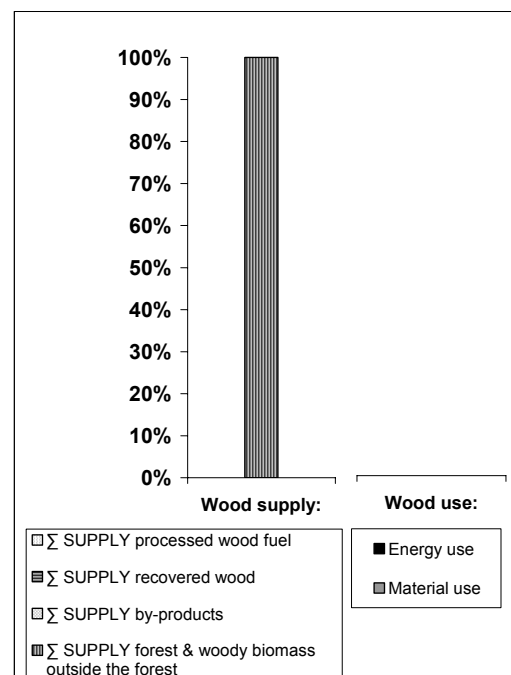
Supply processed wood fuel:

Processed wood fuel	(P+I-X)	0	0%
---------------------	---------	---	----

Energy use:	#####	0	(C)	Power and heat
	#####	0	(C)	Industrial internal
	#####	0	(C)	Private households
	#####	0	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL		0	Difference	0	Σ USE
			0		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Malta (2005)			
Wood supply:		Wood use:	
Σ SUPPLY forest & woody biomass outside the forest	0	100%	##### 0 Material use
Σ SUPPLY by-products	0	0%	##### 0 Energy use
Σ SUPPLY recovered wood	0	0%	
Σ SUPPLY processed wood fuel	0	0%	

Malta :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
-	-	-	-

Netherlands

2005

1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	675	14%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	290	6%
Fuelwood - JFSQ	(P+I-X)	263	5%
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%
Bark	(P)	0	0%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	1.109	22%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	226	5%

Supply recovered wood:

Recovered wood for material & energy use	(P)	2.429	49%
--	-----	-------	-----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	0	0%
---------------------	---------	---	----

Material use:

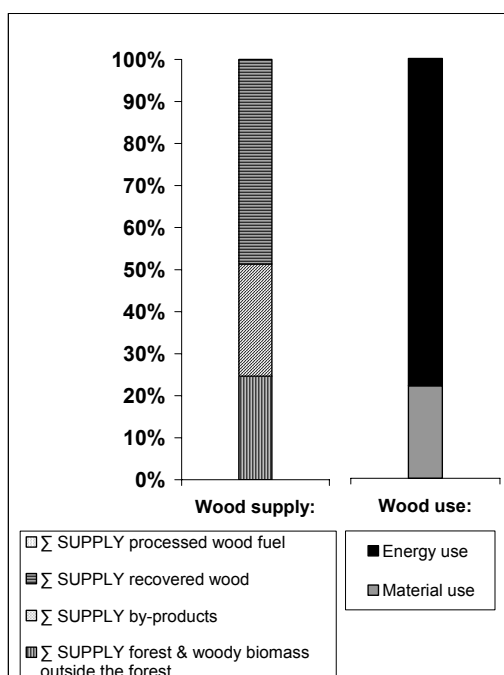
6%	475	(C)	Sawmill industry
0%	22	(C)	Panel industry
6%	463	(C)	Pulp industry
0%	0	(C)	Processed wood fuel industry
9%	714	(C)	Other physical utilization

Energy use:

18%	1.400	(C)	Power and heat
2%	150	(C)	Industrial internal
5%	412	(C)	Private households
52%	3.958	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	4.992	Difference	7.594	Σ USE
		2.602		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Netherlands (2005)			
Wood supply:			
Σ SUPPLY forest & woody biomass outside the forest	1.229	25%	
Σ SUPPLY by-products	1.335	27%	
Σ SUPPLY recovered wood	2.429	49%	
Σ SUPPLY processed wood fuel	0	0%	
Wood use:			
22%	1.674		Material use
78%	5.920		Energy use

Netherlands :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
2.200	-	2.227	2.230

1.000 m³	%	%	1.000 m³
----------	---	---	----------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	11.111	56%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%
Fuelwood - JFSQ	(P+I-X)	1.287	7%
Fuelwood - Maximum difference unreported to JFSQ	(P)	1.753	9%
Bark	(P)	0	0%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	3.197	16%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	2.016	10%

Supply recovered wood:

Recovered wood for material & energy use	(P)	369	2%
--	-----	-----	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	41	0%
---------------------	---------	----	----

Material use:

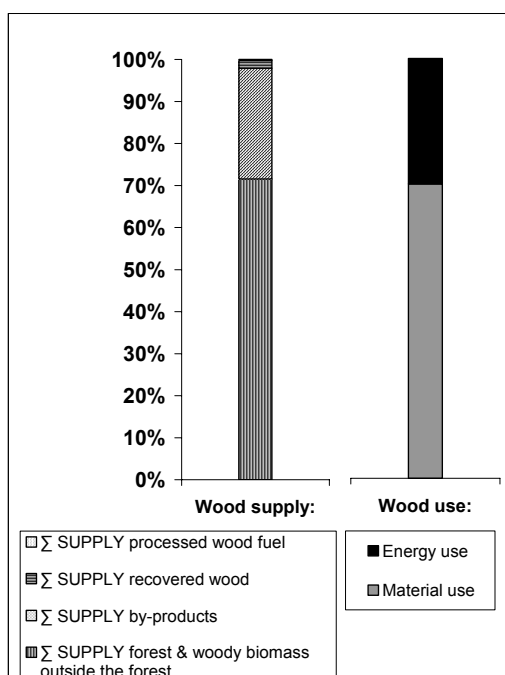
27%	5.139	(C)	Sawmill industry
4%	823	(C)	Panel industry
37%	7.167	(C)	Pulp industry
0%	71	(C)	Processed wood fuel industry
2%	336	(C)	Other physical utilization

Energy use:

3%	595	(C)	Power and heat
10%	2.011	(C)	Industrial internal
16%	3.167	(C)	Private households
0%	0	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	19.774	Difference	19.308	Σ USE
		466		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Norway (2005)		
Wood supply:		
Σ SUPPLY forest & woody biomass outside the forest	14.151	72%
Σ SUPPLY by-products	5.213	26%
Σ SUPPLY recovered wood	369	2%
Σ SUPPLY processed wood fuel	41	0%
Wood use:		
70%	13.535	Material use
30%	5.773	Energy use

Norway :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
20.121	-	22.676	23.954

1.000 m³	%	%	1.000 m³
----------	---	---	----------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	29.982	73%	Material use:			
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	1.194	3%	32%	17.500	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	3.404	8%	18%	9.837	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%	7%	3.847	(C)	Pulp industry
Bark	(P)	0	0%	1%	333	(C)	Processed wood fuel industry
Used logging residues	(P)	227	1%	2%	987	(C)	Other physical utilization
Woody biomass outside the forest	(P)	636	2%				

Supply by-products:

Chips, particles & wood residues	(P+I-X)	3.916	9%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	1.888	5%

Supply recovered wood:

Recovered wood for material & energy use	(P)	31	0%
--	-----	----	----

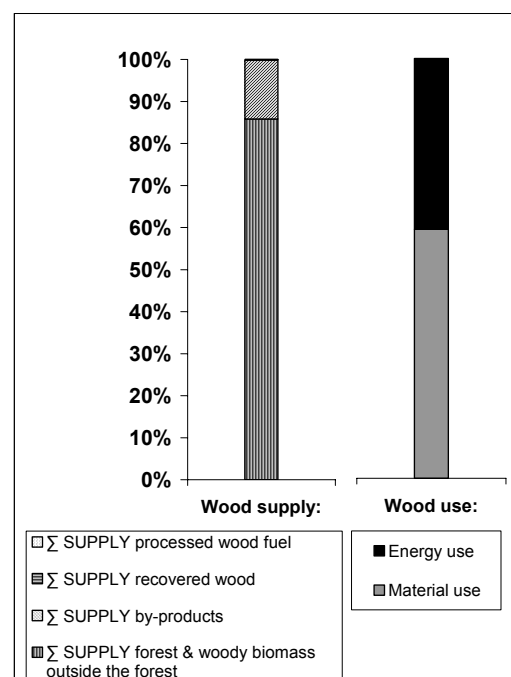
Supply processed wood fuel:

Processed wood fuel	(P+I-X)	17	0%
---------------------	---------	----	----

5%	2.885	(C)	Power and heat
9%	4.800	(C)	Industrial internal
1%	525	(C)	Private households
26%	14.076	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	41.294	Difference	54.790	Σ USE
		13.496		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Poland (2005)			
Wood supply:		Wood use:	
Σ SUPPLY forest & woody biomass outside the forest	35.442	86%	59%
Σ SUPPLY by-products	5.804	14%	41%
Σ SUPPLY recovered wood	31	0%	32.504
Σ SUPPLY processed wood fuel	17	0%	22.286
			Material use
			Energy use

Poland :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
-	-	-	67.595

1.000 m³	%	%	1.000 m³
----------	---	---	----------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	9.594	62%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%
Fuelwood - JFSQ	(P+I-X)	595	4%
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%
Bark	(P)	0	0%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	2.315	15%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	2.840	18%

Supply recovered wood:

Recovered wood for material & energy use	(P)	61	0%
--	-----	----	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	0	0%
---------------------	---------	---	----

Material use:

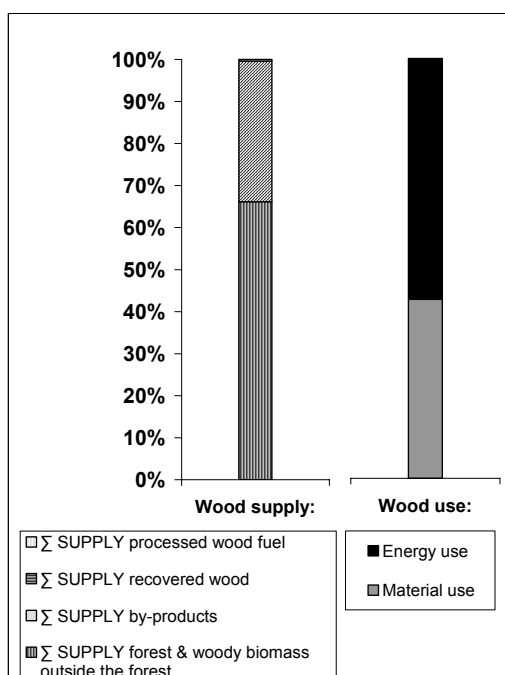
11%	2.780	(C)	Sawmill industry
7%	1.793	(C)	Panel industry
24%	5.881	(C)	Pulp industry
0%	0	(C)	Processed wood fuel industry
0%	0	(C)	Other physical utilization

Energy use:

0%	0	(C)	Power and heat
0%	0	(C)	Industrial internal
0%	0	(C)	Private households
57%	14.075	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	15.405	Difference	24.529	Σ USE
		9.123		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Portugal (2005)			
Wood supply:			
Σ SUPPLY forest & woody biomass outside the forest	10.189	66%	
Σ SUPPLY by-products	5.155	33%	
Σ SUPPLY recovered wood	61	0%	
Σ SUPPLY processed wood fuel	0	0%	
Wood use:			
43%	10.454		Material use
57%	14.075		Energy use

Portugal :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
-	-	12.900	-

1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	11.787	63%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	241	1%
Fuelwood - JFSQ	(P+I-X)	2.891	16%
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%
Bark	(P)	0	0%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	3.430	18%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	295	2%

Supply recovered wood:

Recovered wood for material & energy use	(P)	0	0%
--	-----	---	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	0	0%
---------------------	---------	---	----

Material use:

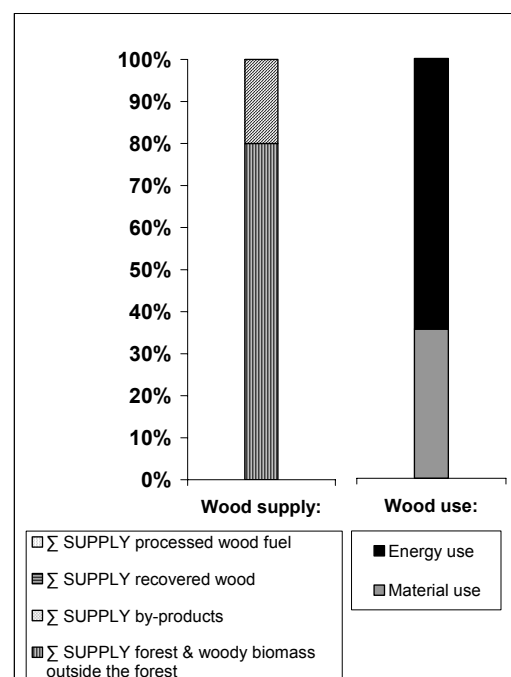
27%	7.021	(C)	Sawmill industry
6%	1.629	(C)	Panel industry
2%	568	(C)	Pulp industry
0%	0	(C)	Processed wood fuel industry
0%	0	(C)	Other physical utilization

Energy use:

0%	0	(C)	Power and heat
0%	0	(C)	Industrial internal
0%	0	(C)	Private households
64%	16.739	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	18.645	Difference	25.957	Σ USE
		7.313		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Romania (2005)			
Wood supply:			
Σ SUPPLY forest & woody biomass outside the forest	14.919	80%	
Σ SUPPLY by-products	3.726	20%	
Σ SUPPLY recovered wood	0	0%	
Σ SUPPLY processed wood fuel	0	0%	
Wood use:			
36%	9.218		Material use
64%	16.739		Energy use

Romania :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
32.100	-	34.600	34.600

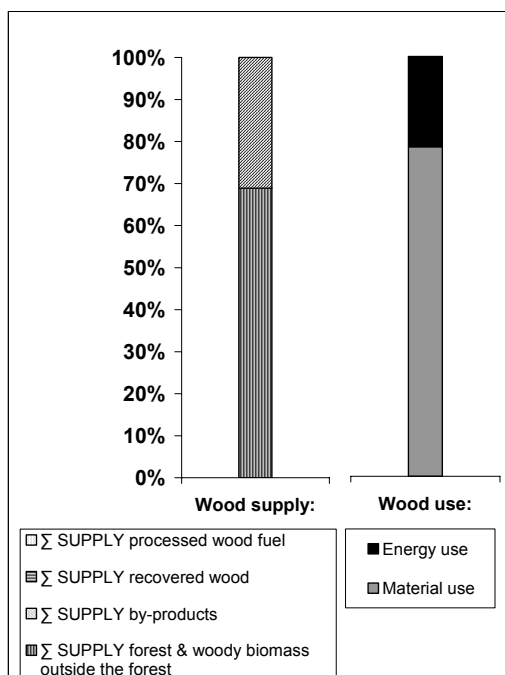
1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

	(P+I-X)		%								
Industrial Roundwood - JFSQ	(P+I-X)	7.369	67%	Material use:							
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%					45%	4.302	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	178	2%					10%	921	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%					24%	2.302	(C)	Pulp industry
Bark	(P)	0	0%					0%	0	(C)	Processed wood fuel industry
Used logging residues	(P)	0	0%					0%	0	(C)	Other physical utilization
Woody biomass outside the forest	(P)	0	0%					Energy use:			
Supply by-products:											
Chips, particles & wood residues	(P+I-X)	2.055	19%	0%	0	(C)	Power and heat				
Pulp production co-products (black liquor, tall oil, etc.)	(P)	1.352	12%	0%	0	(C)	Industrial internal				
Supply recovered wood:				0%	0	(C)	Private households				
Recovered wood for material & energy use	(P)	0	0%	22%	2.063	(C)	Undifferentiated energy use				
Supply processed wood fuel:											
Processed wood fuel	(P+I-X)	0	0%								

∑ SUPPLY TOTAL	10.955	Difference	9.588	∑ USE
		1.367		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Slovakia (2005)			
Wood supply:			
∑ SUPPLY forest & woody biomass outside the forest	7.547	69%	
∑ SUPPLY by-products	3.408	31%	
∑ SUPPLY recovered wood	0	0%	
∑ SUPPLY processed wood fuel	0	0%	
Wood use:			
78%	7.525		Material use
22%	2.063		Energy use

Slovakia :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
10.155	-	11.748	11.980

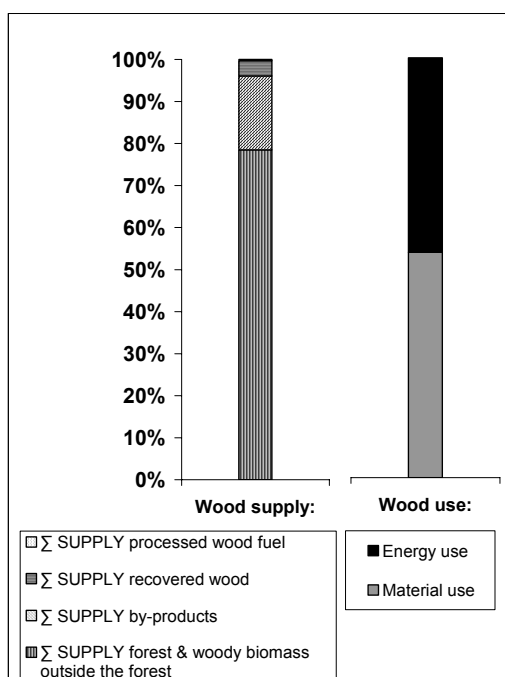
1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

	(P+I-X)		%				
Industrial Roundwood - JFSQ	(P+I-X)	1.920	46%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	85	2%	27%	1.410	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	808	20%	13%	695	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%	10%	540	(C)	Pulp industry
Bark	(P)	0	0%	1%	58	(C)	Processed wood fuel industry
Used logging residues	(P)	159	4%	2%	116	(C)	Other physical utilization
Woody biomass outside the forest	(P)	276	7%				
Supply by-products:							
Chips, particles & wood residues	(P+I-X)	427	10%				
Pulp production co-products (black liquor, tall oil, etc.)	(P)	303	7%				
Supply recovered wood:							
Recovered wood for material & energy use	(P)	149	4%	1%	28	(C)	Power and heat
Supply processed wood fuel:							
Processed wood fuel	(P+I-X)	12	0%	10%	531	(C)	Industrial internal
				32%	1.655	(C)	Private households
				4%	218	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	4.138	Difference	5.250	Σ USE
		1.112		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Slovenia (2005)			
Wood supply:			
Σ SUPPLY forest & woody biomass outside the forest	3.247	78%	
Σ SUPPLY by-products	729	18%	
Σ SUPPLY recovered wood	149	4%	
Σ SUPPLY processed wood fuel	12	0%	
Wood use:			
54%	2.819		Material use
46%	2.431		Energy use

Slovenia :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
5.116	-	6.546	7.277

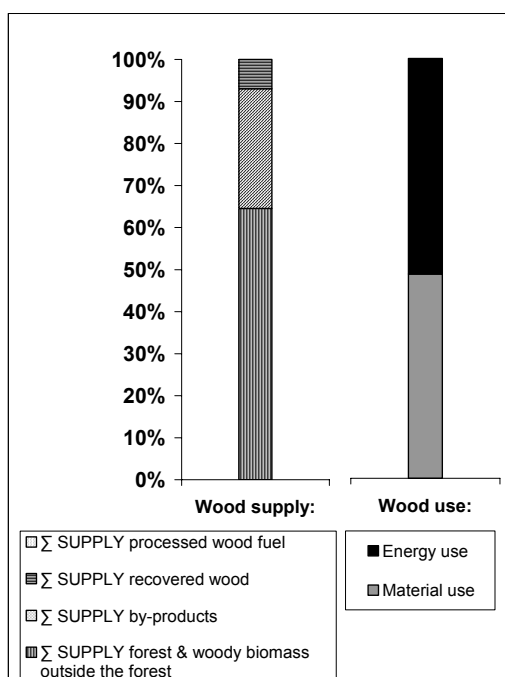
1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

	(P+I-X)		%								
Industrial Roundwood - JFSQ	(P+I-X)	16.788	57%	Material use:							
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%					17%	7.116	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	2.105	7%					17%	7.260	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	0	0%					14%	6.104	(C)	Pulp industry
Bark	(P)	0	0%					0%	33	(C)	Processed wood fuel industry
Used logging residues	(P)	0	0%					0%	0	(C)	Other physical utilization
Woody biomass outside the forest	(P)	0	0%					Energy use:			
Supply by-products:											
Chips, particles & wood residues	(P+I-X)	5.454	19%	0%	0	(C)	Power and heat				
Pulp production co-products (black liquor, tall oil, etc.)	(P)	2.880	10%	0%	0	(C)	Industrial internal				
Supply recovered wood:											
Recovered wood for material & energy use	(P)	2.040	7%	0%	0	(C)	Private households				
Supply processed wood fuel:											
Processed wood fuel	(P+I-X)	0	0%	51%	21.649	(C)	Undifferentiated energy use				

∑ SUPPLY TOTAL	29.267	Difference	42.162	∑ USE
		12.895		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Spain (2005)			
Wood supply:			
∑ SUPPLY forest & woody biomass outside the forest	18.893	65%	
∑ SUPPLY by-products	8.334	28%	
∑ SUPPLY recovered wood	2.040	7%	
∑ SUPPLY processed wood fuel	0	0%	
Wood use:			
49%	20.514		Material use
51%	21.649		Energy use

Spain :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
-	-	28.589	-

1.000 m ³	%	%	1.000 m ³
----------------------	---	---	----------------------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	97.091	62%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	6.800	4%
Fuelwood - JFSQ	(P+I-X)	7.032	4%
Fuelwood - Maximum difference unreported to JFSQ	(P)	100	0%
Bark	(P)	0	0%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	20.586	13%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	22.218	14%

Supply recovered wood:

Recovered wood for material & energy use	(P)	1.450	1%
--	-----	-------	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	2.093	1%
---------------------	---------	-------	----

Material use:

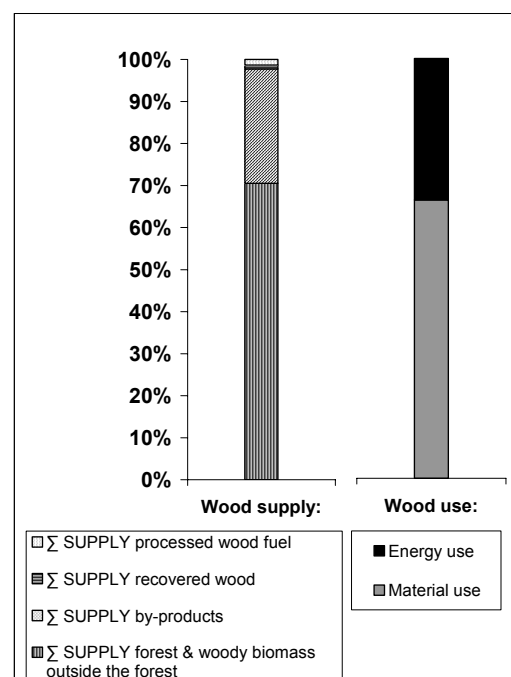
25%	31.100	(C)	Sawmill industry
1%	1.152	(C)	Panel industry
39%	47.100	(C)	Pulp industry
1%	1.608	(C)	Processed wood fuel industry
0%	0	(C)	Other physical utilization

Energy use:

9%	10.995	(C)	Power and heat
16%	19.458	(C)	Industrial internal
7%	8.923	(C)	Private households
1%	1.769	(C)	Undifferentiated energy use

∑ SUPPLY TOTAL	157.371	Difference	122.106	∑ USE
		35.265		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - Sweden (2005)

Wood supply:

∑ SUPPLY forest & woody biomass outside the forest	111.023	71%
∑ SUPPLY by-products	42.804	27%
∑ SUPPLY recovered wood	1.450	1%
∑ SUPPLY processed wood fuel	2.093	1%

Wood use:

66%	80.960	Material use
34%	41.146	Energy use

Sweden:

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
90.174	-	90.724	91.355

1.000 m³	%	%	1.000 m³
----------	---	---	----------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	2.823	42%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%
Fuelwood - JFSQ	(P+I-X)	1.214	18%
Fuelwood - Maximum difference unreported to JFSQ	(P)	5	0%
Bark	(P)	210	3%
Used logging residues	(P)	500	8%
Woody biomass outside the forest	(P)	240	4%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	1.320	20%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	334	5%

Supply recovered wood:

Recovered wood for material & energy use	(P)	0	0%
--	-----	---	----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	0	0%
---------------------	---------	---	----

Material use:

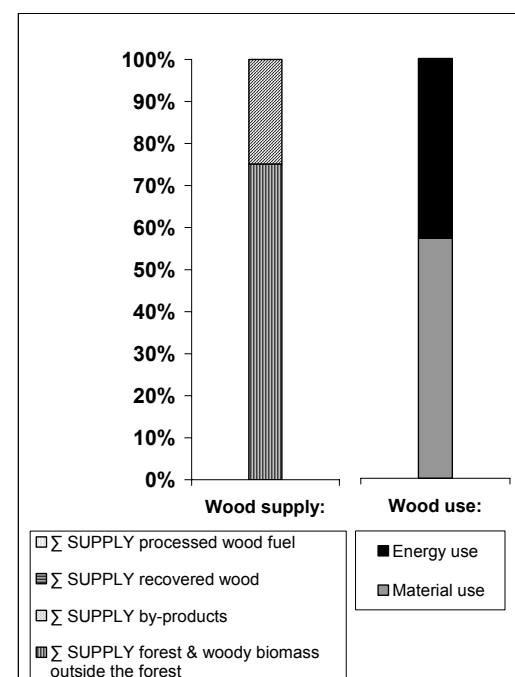
30%	2.642	(C)	Sawmill industry
17%	1.487	(C)	Panel industry
10%	897	(C)	Pulp industry
0%	0	(C)	Processed wood fuel industry
0%	29	(C)	Other physical utilization

Energy use:

26%	2.268	(C)	Power and heat
3%	224	(C)	Industrial internal
15%	1.293	(C)	Private households
0%	0	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	6.645	Difference	8.840	Σ USE
		2.195		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



<u>Wood supply and use - Switzerland (2005)</u>			
Wood supply:		Wood use:	
Σ SUPPLY forest & woody biomass outside the forest	4.992	75%	57%
Σ SUPPLY by-products	1.654	25%	43%
Σ SUPPLY recovered wood	0	0%	
Σ SUPPLY processed wood fuel	0	0%	
			5.056
			3.785
			Material use
			Energy use

Switzerland :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
-	-	8.981	-

United Kingdom

2005

1.000 m³	%	%	1.000 m³
----------	---	---	----------

Supply from forest & woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	8.459	51%
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	0	0%
Fuelwood - JFSQ	(P+I-X)	126	1%
Fuelwood - Maximum difference unreported to JFSQ	(P)	1	0%
Bark	(P)	0	0%
Used logging residues	(P)	0	0%
Woody biomass outside the forest	(P)	0	0%

Supply by-products:

Chips, particles & wood residues	(P+I-X)	2.682	16%
Pulp production co-products (black liquor, tall oil, etc.)	(P)	170	1%

Supply recovered wood:

Recovered wood for material & energy use	(P)	4.872	30%
--	-----	-------	-----

Supply processed wood fuel:

Processed wood fuel	(P+I-X)	183	1%
---------------------	---------	-----	----

Material use:

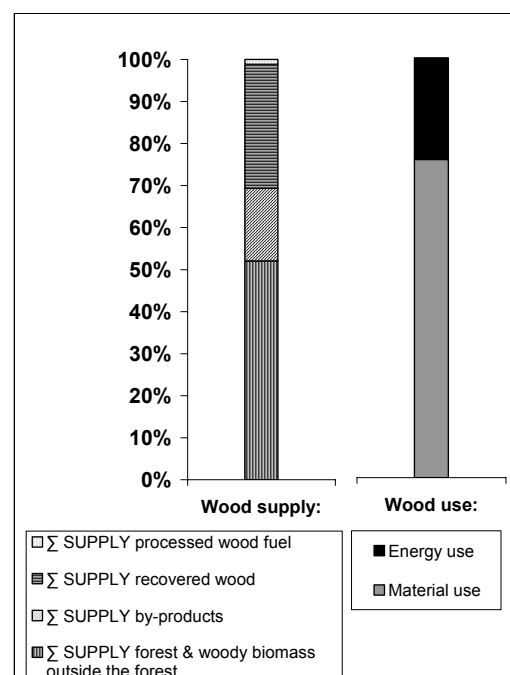
34%	5.250	(C)	Sawmill industry
32%	4.924	(C)	Panel industry
5%	840	(C)	Pulp industry
1%	183	(C)	Processed wood fuel industry
3%	466	(C)	Other physical utilization

Energy use:

5%	708	(C)	Power and heat
2%	235	(C)	Industrial internal
4%	620	(C)	Private households
14%	2.165	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	16.492	Difference	15.391	Σ USE
		1.101		

(C)	Wood consumption
(P)	Production / Removals
(P+I-X)	Apparent consumption



Wood supply and use - United Kingdom (2005)			
Wood supply:		Wood use:	
Σ SUPPLY forest & woody biomass outside the forest	8.586	52%	76%
Σ SUPPLY by-products	2.852	17%	24%
Σ SUPPLY recovered wood	4.872	30%	11.664
Σ SUPPLY processed wood fuel	183	1%	3.727
			Material use
			Energy use

United Kingdom :

Net annual increment (MCPFE/UNECE/FAO-2007):

1990	1995	2000	2005
18.000	-	20.700	20.700

UNECE - FAO - University Hamburg - European Commission

Wood resources availability and demands - implications of renewable energy policies