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## **Wood resources availability and demands – Part I**

### **National and regional wood resource balances 2005**

#### **EU/EFTA countries**

Mantau, U., Steierer F., Hetsch S., Prins Ch. (2008): Wood resources availability and demands – Part I National and regional wood resource balances 2005; Background paper to the UN-ECE/FAO Workshop on Wood balances, Geneva, 2008

## 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. A first draft of the study was presented at the UNECE/FAO Policy Forum on bioenergy policies in October 2007. Delegates and national specialists were invited to review and revise the data presented. The final version incorporates the revision and feedback received from the countries and European Commission.

## Acknowledgements

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## Abbreviations

CHP	Combined heat and power generation
DG TREN	European Commission Directorate General for Energy and transport
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
HS	Harmonized Commodity Description and Coding System
WCO	World Customs Organization
ITTO	International Tropical Timber Organization
IEA	International Energy Agency
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
PJ	Peta Joule
RES	Renewable Energy Sources
SFM	Sustainable Forest Management
SITC	Standard International Trade Classification
UN SD	United National Statistical Division
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 region<sup>1</sup>. Since the late 1990s, 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 are also of high relevance for the forest sector.

This study is divided in two parts. Part I aims at giving a comprehensive picture of current (2005) sources of wood supply and wood uses. Part II aims at providing first information on future wood demand for energy, and first input to a discussion on future wood availability.

**Part I** assesses in depth current wood supply and consumption in 29 EU/EFTA countries in 2005, using the structure of the "wood resource balance" developed by Mantau (2004, 2005, 2006). This methodology calculates independently the wood supply and use of wood fibres, it considers national import and export patterns as well as use and re-use of wood fibres for material and energy purposes.

At EU/EFTA level, the results of the study show a lower wood supply (775 million m<sup>3</sup>), than wood consumption (822 million m<sup>3</sup>). This difference comes unevenly forward at countries' level, and in some cases calculated wood supply is higher than the figure for wood use. The imbalance of 47 million m<sup>3</sup> is probably due to by weak and missing data on both sides of the balance (e.g. data on woody biomass supply from outside the forest, supply of post consumer recovered wood, use of logging residues). The study rates data on wood use for energy in private households particularly weak in many countries. Hence the study can not conclude neither on the quality (supply deficit v.s. unknown use), nor size of the difference of balance sheets totals - This can only be done by detailed empiric research at country level.<sup>2</sup>

Despite some data weaknesses, results of the first part are considered as best information available. They provide a solid basis for the assessment in the second part. National correspondents confirmed in a vital review process (response rate: 60%) data to be in the right order of magnitude. Only 6 out of 21 responses proposed changes, totalling to increasing supply by 17,6 million m<sup>3</sup> (+2%) and increasing use by 10 million m<sup>3</sup> (+1%).

Results of the 2005 wood resource balance indicate that 68% of the EU/EFTA wood fibres supply comes directly from forests, 3% of the woody biomass derives from outside the forest, 24% from co-products of the forest based industries (including chips, particles and black liquor), 4% from post consumer recovered wood and 1% from processed wood fuels (such as pellets

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<sup>1</sup> North America, pan-Europe, Russia and Central Asia

<sup>2</sup> 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 national and international 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.



and briquetts). With 58% material use dominates the energy use of wood fibres (42%) on the wood use.

In **part II**, national and EU policy targets for renewable energy (and if available for bio-energy and wood energy) are gathered and simple, transparent scenarios are build to “translate” these policy targets into volumes of wood possibly required to meet the targets. Furthermore, the study calculates wood consumption from the wood-based industries<sup>3</sup> for 2010 and 2020, based on the European Forest Sector Outlook Study (UNECE 2005).

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.

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

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<sup>3</sup> Wood-based panels, sawmilling and pulp & paper industries

# 1. Introduction:

## 1.1. Forest and energy – the revival of an old 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 in January 2007 the EU disclosed new climate and energy targets for 2020. Important for reaching these targets are an increase in 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, targets were announced for 2020, by when 20% of the energy consumed should come from renewable sources.

These targets have to be seen in the context of the current state of renewable energies. In 2005, renewable energies accounted for only 8.5 % of energy consumption in the European Union. Biomass constitutes the largest source of renewable energies in the EU (66%), and wood is the major source for biomass (89%). Thus, wood is currently the major source for all renewable energy generation in the EU. Similar patterns are found in most other European countries.

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 a), 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 co-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).

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 sec-

tor 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 policies 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 develop outlooks for the forest-based sector in the light of this rapidly changing picture and to analyse the 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.

## **1.2 Objectives of the wood resource balance for Europe (part I)**

This study is seen as a contribution to increase the understanding between the forest-based and the energy sector and their policies. Various countries have started to conduct national studies on the interaction of forest sector and renewable energy policies, and different stakeholders made analysis on the impacts of these policies on their sector. However, so far no comprehensive study has been carried out on a pan-European level.

The main objective of the study part I is to draw a better picture of the current (2005) supply and use of wood from all sources and for all, energy and material uses. This is based on best available data and feeding into the structure and method of a "wood resource balance".

## **1.3. 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 gathered on wood energy (mainly through the Joint Wood Energy Enquiry, Steierer et al 2007). The University of Hamburg contributed in particular through its methodological work on wood resource balances and monitoring wood flows, which is explained and discussed in part I.

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 were invited to review and to help refine the results.

The study should encourage stakeholders on national and international level to continue collecting better (empirically) information as a basis and input for policies and policy targets for bioenergy and wood energy. Future wood demand and potential supply are crucial information to determine the impacts and opportunities when designing these policies.

## 2. Methodology

### 2.1. Why a wood resources balance?

International timber production and trade statistics (e.g. Joint Forest Sector Questionnaire of the UNECE/FAO/Eurostat/ITTO) provide best internationally available data on wood removals, trade and production. Inherent to their structure, these statistics are consistent within themselves and subtitles always sum up to the main heading. Definitions and classifications of the commodities are bound to international production and trade (SITC<sup>4</sup> and HS<sup>5</sup>) definitions and classifications.

Hence they cover economically important activities of the wood and timber markets to a great extent. Nevertheless, trade statistics are not able to cover informal trade (e.g. wood use by private households) wood residues and waste recovery streams (e.g. black liquor, post consumer recovered wood). For a long time this information deficiency on minor wood fibre sources did not matter, as overall sufficient wood resources were readily available and sustainable forest management was a matter of course.

High market prices for fossil fuels and policies decisions to ensure energy security and to tackle climate change gave strong stimulus to renewable energy sources in general and wood energy in particular. High market prices for fossil fuels and important decisions in energy and climate policies gave strong stimulus to renewable energy sources in general and wood energy in particular. Thus, the fast evolving energy sector links up with the forest and timber sector and boosts demand and competition for wood as raw material. Consequently, two unequal sectors start competing for woody biomass – even though each with a slightly different criterion. Energy producer interests are energy-content driven whereas most of the raw material needs of the forest based industries are quality driven.

Commodities with formerly little economic value experience raising demand (e.g. bark, logging residues, woody biomass outside the forest, post consumer recovered wood) and their mobilized and traded volumes increase rapidly. In addition, high value wood fuel commodities emerge on the market. Wood pellets have become a shooting star by traded volume as well as by its estimated economical value. Their high energy content per volume and homogenous, often standardized quality, make them perfectly suitable for enhanced trade over longer distances.

Wood pellets are an easily accessible substitute for light fuel oil heating systems in single and multiple dwellings due to their characteristics. Despite the economic value of the wood pellets' market, no separate production or trade classification is available, yet. Hence, international wood and timber statistics fail to keep track of trade and production of this commodity, too.

Pace keeping with fast changing markets requires a more holistic assessment method for wood volumes and flows. The wood resource balance easily integrates cross-sectoral information, going far beyond existing trade and production classifications of the forest based sector.

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<sup>4</sup> SITC – Standard International Trade Classification (United National Statistical Commission)

<sup>5</sup> HS – Harmonized Commodity Description and Coding System (World Customs Organization)

### **Wood balance vs. wood resource balance**

**Wood balances** are based on production and trade statistic and product related conversion factors. They aim at back-calculating roundwood equivalents over one or several production steps which would theoretically be required to produce a wooden product having a measurable final volume. Consumption is calculated as difference of the balance sheet total. Hence they are weak in detecting unrecorded flows (e.g. fuelwood removals from forests), accounting re-entering/regained volumes such as post consumer recovered wood.

**Wood resource balances** are based on available production and trade statistics and a consumption analysis which can be based on available statistics is strongly supplemented with field research. Conversion factors are used to measure the transferred amount of wood from one sector to another. Thereby data gaps in new and traditional markets are detected. Data gaps are filled with empiric (field) research or by gap calculation in all flows. The more consistent and complex approach of wood resource balances facilitates assessing inter-sectoral trade flows and cascaded uses.

## **2.2. Structure and data**

A wood resource balance compares the entire supply of wood fibres with its use for material and energy purposes in a national economy. It is a consistency check of national wood flows that counter-checks the balance sheet total all sources of woody material against the independently derived balance sheet total of the consumption side. It includes wood fibres import and export at national level. Generally it is possible to take stock changes into account as well, but by practical reasons (lack of data) it is not included. The regional wood resource balance is the sum of different national wood resource balances.

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. Results of the German indicate that unregistered cuttings contributed 16% of the overall forest wood consumption between 1987 and 2005 in Germany. The key solution for improved information was a comprehensive empiric assessment of the forest based sector, including marginal commodities such as fuel wood use in private households and post consumer recovered wood.

In contrast to the methodology applied in Germany, the actual study does not rely on empirically collected data, although it is hoped to at least partially remedy this in the follow up to the study<sup>6</sup>. It considers only publicly available information and data from international databases. Important sources of information on the wood sector are the above mentioned Joint FAO/ UNECE/ ITTO/ Eurostat Forest Sector Questionnaire<sup>7</sup> (JFSQ), Joint FAO/ UNECE/ IEA/ Eurostat Wood Energy Enquiry<sup>8</sup> (JWEE), MCPFE/ UNECE/ FAO enquiry on quantitative indica-

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<sup>6</sup> Difficulties to keep track of Intra-European trade / Threshold – transport pattern

<sup>7</sup> UNECE, FAO, Eurostat and ITTO

<sup>8</sup> UNECE, FAO, EC and IEA ((Steierer et al 2006))

tors of sustainable forest management<sup>9</sup>. Energy information comes from European Commission (Eurostat, DG TREN), World Energy Outlook 2006 (IEA 2007) and the EurObserv'ER. Information on post consumer recovered wood derives from the results of the COST E31 on recovered wood.

The wood resource balance of this study presents a comprehensive picture of wood supply and use at regional and national level. It does not present or discuss wood flows and wood procurement pattern for single wood processing sectors. Information on roundwood, co-products, residues or post consumer recovered wood use by each sector is contained in the underlying database (see figure 1). Nevertheless, these details are not presented to keep the report and information comprehensible to facilitate a focussed discussion.

Despite the comprehensive approach, regional and national wood resource balances cover intra-European trade only as far as international timber trade statistics does. Fibres from recovered paper and cardboard are not included in the balance (for both the supply and use) so far, but could be easily included as well.

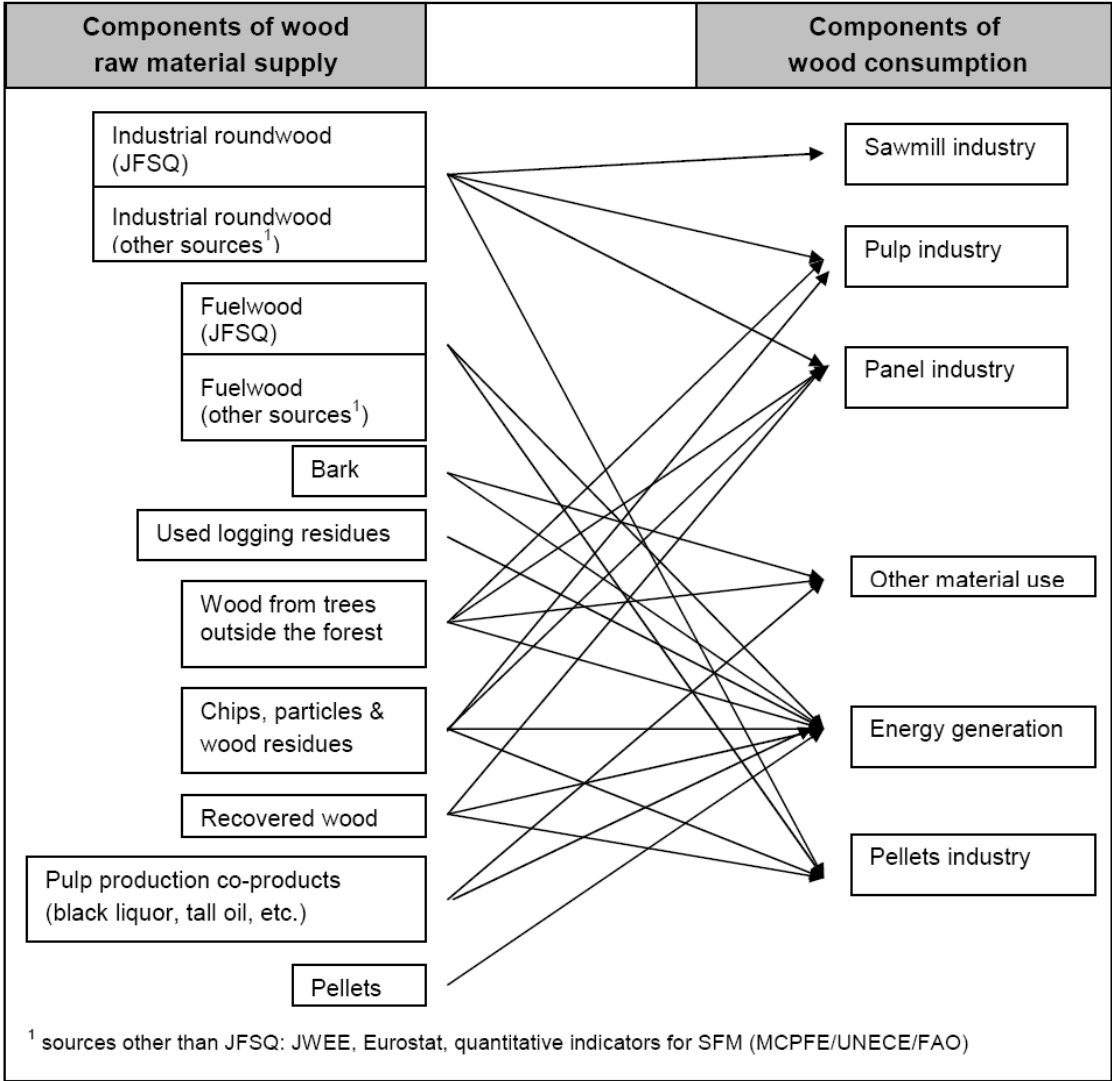


Figure 1 : Wood fibre streams for supply and consumption

<sup>9</sup> MCPFE/UNECE/FAO

## 2.3. 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 roundwood equivalent (cubic metre of solid volume under bark). This is the usual unit for wood removals, production and trade data, and therefore conversions are needed in fewer cases on the supply side of the balance.

On the use side each wood processing technique of the different forest based sector industries requires individual conversion factors to calculate the sector specific roundwood equivalent of the recorded production.

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, material and energy efficiency of the processing, etc. The study used general conversion factors for each commodity. Even though most of the conversion factors have a weak empirical basis, only marginal changes to sectoral wood consumption have been proposed during the review process with national correspondents.

Wood volumes for energy use are based upon results of the Joint Wood Energy Enquiry (Steierer et al. 2007) and data from international energy statistics (IEA, Eurostat, Eurobserv'ER). Data from energy statistics require conversion factors to calculate corresponding roundwood equivalents. The study applies global conversion factors (energy content of fuelwood, etc.) as presented by the World Energy Council<sup>10</sup> to convert energy units (Toe<sup>11</sup>/PJ<sup>12</sup>) to the above mentioned roundwood equivalent.

These global conversion factors, for energy as well as material use, may only provide an approximation of the real picture at national and regional level. This does not imply that the conversion factors are correct, but they seem to be the best available, in many countries.

Only few countries dispose of the required (empirically gained) precise information on conversion factors and are currently able to check and provide such information (e.g. Finland, Austria, Germany).

The authors of the study urge countries to improve or develop scarce information on conversion factors for material and energy use at national level. The national conversion factors should consider the structure, processing technologies and the material efficiencies of each branch of the forest based sector. Similar information is urgently required for the energy production, too. Respective background information and suggestions for improvement can be found in the background paper for the UNECE/FAO workshop on "national wood resource balances" (Thivolle-Cazat 2008).

Improved conversion factors will certainly influence the difference between the balance sheet total of the supply and use side.

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<sup>10</sup> [www.energycouncil.org](http://www.energycouncil.org)

<sup>11</sup> Mtoe: Toe : tons of oil equivalent

<sup>12</sup> PJ : Peta Joule

## 2.4. Measuring wood fibres' cascaded use

Wood is a highly versatile material being used and reused in many different processes. Co-products of the wood-processing industry (chips from sawmill industry) are an important raw material for further processing. They can easily be used directly in on-site integrated processes (e.g. black liquor for energy generation or pellets production by sawmills) or they are sold to trader and/or producer using the fibres for subordinated processing (e.g. chips from sawmill used for pulp production, sawdust for panel production, etc.). Wood fibres that reappear as "secondary" raw material increase the overall wood availability on the market. This kind of cascade use can be documented by the wood resource balance.

It is sometimes seen as "double-counting", but this kind of cascade use is a typical advantage of wood resources. On the other hand without including cascade use, the wood resource balance would be incomplete. However, it is always possible to set up special wood resource balances for forest resources, industrial rest wood, post consumer wood or others.

This is already done in the flow chart models of the wood resources balance in Germany where sufficient empirical data are available. In this case the wood resource balance is not set up on its own, but is the sum of the flow charts models of all resources.

The cascade-factor of the EU/EFTA wood resource balance is 1,5 (822 M m<sup>3</sup> overall use / 531 M m<sup>3</sup> wood supply from forest).

The wood resource balance translates fibres' reuse by cascade counting of wood fibres on the supply side. Subordinated production processes that use co-products, residues or recovered wood to at least some extent (e.g. wood pellets production, panel industry, incineration, etc.) counterbalance the cascade counting of the use side. When reporting properly all wood fibres supplies and uses, cascade-counting does not introduce a systematic over- or underestimation of either the wood supply or wood use, but it enlarges the balance sheet total on both side.

The inclusion of re-used fibres on the supply side allows accounting for net trade (import and export) of those items. Similar to wood products, international trade can play an important role for wood co-products and residues in some countries. International trade becomes particularly important for wood pellets.(see "processed wood fuels").

The increase of the balance sheet total by accounting for the multiple use may be a suitable indicator for the material efficiency of national forest based sectors. A higher difference between initially harvested and supplied wood volumes from the forest ("supply forest") and the balance sheet total ("total supply") indicates a better integrated and more (material) efficient forest based sector.



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*). Hence the triple supply of the fibre is counterbalanced by triple use

Converted to solid cubic metre equivalents, the same fibre might be reported three or more times as source that feeds into a downstream wood use. Hence, each cascade counting of wood fibres on the supply side is balanced out by an additional 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 real final wood use.

## 2.5. Processed wood fuels

Processed wood fuels comprise pellets and briquettes. They are the only “product” that appears in the wood resource balance on the supply side and contributes to intentional cascade-counting. Pellets and briquettes are considered as a final product being exclusively produced for energy purposes. In contrast to any other product, processed wood fuels have a short life cycle and feeds directly into final use for energy generation. Energy use comprises pellets and briquettes consumption and counterbalances the double counting on the use side.

Wood pellets and briquettes are suitable commodities for international trade and long distance transported (e.g. shipping). Hence it is absolutely necessary to consider their net trade at country level. Some countries export up to 100% of their production (e.g. Baltic states), whereas other countries depend heavily on pellets imports (e.g. Denmark, Italy or the Netherlands). Results<sup>13</sup> from different studies indicate that about 1/3 of the global wood pellets production is being traded internationally. Reporting processed wood fuels on the supply side facilitates taking into account the importance of net trade. In countries with an export oriented pellets production the balance sheet total of the supply side remains unchanged (or increases only by little), whereas it increases in case of net importing countries.

The study does not consider storage capacities and stock changes of wood pellets. It was assumed that these didn't play any role in the reference year 2005 due to high demand. These details may play a certain role in the successive years (e.g. 2007)<sup>14</sup>.

## 3. Data update

### 3.1. Data review process

The first draft version of the report served as a background paper to the UNECE/FAO Policy Forum, held in Geneva 10<sup>th</sup> October 2007. Since then, the original draft report and data presented have undergone an extensive review process. The report was sent to country correspondents of all countries presented in the report as well as countries annexing geographically to the Eurasian area.

Out of 42 Countries contacted (29 EU/EFTA / 13 Non-EU/EFTA) 27 replies were sent back (19 EU/EFTA / 8 Non-EU). The remarkable response rate was confirms the high interest of the issue wood energy. Nevertheless, the responses were of very different qualities.

7 countries confirmed and endorsed (calculated) dataset

6 countries proposed data adjustments

8 countries provided (positive) general comments without rejecting/correcting data

4 countries responses are still pending as research is ongoing

2 countries provided complete new data set (Serbia and Turkey)

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<sup>13</sup> JWEE (UNECE 2007), Alakangas (2007)

<sup>14</sup> Further information on the market situation of wood pellets may be found in the pellets@las ([www.pelletcentre.info](http://www.pelletcentre.info))

**Table 1 : Result of the data revision process (EU/EFTA only)**

(million m <sup>3</sup> )	Wood supply	Wood use
Proposed increase	+29.8	+12.5
Proposed decreased	- 12.2	- 2.5
Net change	+17.6	+10.0

Data provided in the data review process increased the supply more than the use side. Hence the original difference of the balance sheet total between supply and use decreased by about 7 million m<sup>3</sup>.

Bark and woody biomass outside the forest clearly increased, whereas recovered wood, industrial roundwood and pulp production co-products clearly decreased. Increase and decrease of wood chips and residues showed an uneven picture and came close to a tie. The increase of 3 million m<sup>3</sup> as corrected by some countries where superimposed by 5 million m<sup>3</sup> decrease by some other countries.

The feed back from the data review process confirms that data presented in the draft report tended to be prudent estimations that slightly underestimated use and supply.

### 3.2. Updated JFSQ dataset

Correspondents commented that presented JFSQ data e.g. on industrial roundwood and fuelwood trade did not correspond to their latest dataset submitted. This was correct as the draft version of the report used a dataset query from the UNECE/FAO Timber Section database as of July 2007. Since then the database has been updated.

The final version of the study now incorporates the JFSQ dataset for the year 2005 as of 10<sup>th</sup> February 2008. Due to this new dataset slight changes may have occurred in countries that did not propose any changes to their dataset during the review process. Nevertheless, the new dataset had only a slight impact on the balance sheet total and the difference between supply and use. Only Swedish data refers to JFSQ data for 2004 (industrial roundwood and fuelwood),

<b>EU / EFTA</b>		<b>2005</b>				
	million m <sup>3</sup>	%	%	million m <sup>3</sup>		
<b>Supply from forest &amp; woody biomass outside the forest:</b>						
Industrial Roundwood - JFSQ	381	49%				
Industrial Roundwood*	16	2%	26%	217	Sawmill industry	
Fuelwood - JFSQ	79	10%	11%	88	Panel industry	
Fuelwood*	6	1%	19%	155	Pulp industry	
Bark	25	3%	1%	7	Pellets, briquetts etc. ****	
Used logging residues	23	3%	2%	14	Other physical utilization	
Woody biomass outside the forest	20	3%				
<b>Supply co-products:</b>						
Chips, particles & wood residues	118	15%				
Pulp production co-products**	70	9%				
<b>Supply recovered wood:</b>						
Recovered wood***	29	4%	6%	49	Power and heat	
			8%	65	Industrial internal	
<b>Supply processed wood fuel:</b>						
Processed wood fuel	7	1%	11%	92	Private households	
			16%	135	Undifferentiated energy use	
<b>SUPPLY TOTAL</b>		775	<b>Difference</b>	822	<b>TOTAL USE</b>	
			47			

\* maximum difference unreported to JFSQ  
 \*\* black liquor, tall oil, etc.  
 \*\*\* post consumer recovered wood for material & energy use  
 \*\*\*\* processed wood fuel industry

Figure 2 : Components of wood supply and consumption in the wood resource balance

However significant changes occurred balance-internal. Data for “Fuelwood – JFSQ” jumped from 56 million m<sup>3</sup> (draft report) to 79 million m<sup>3</sup> (final version). At the same moment “fuelwood - unreported to the JFSQ” dropped from 29 million m<sup>3</sup> (draft report) to 5 million m<sup>3</sup> (final version). The reason for the radical change of unrecorded removals was due improved data supply methodology in France. Since 2005 the French data submission to the JFSQ incorporates empirical results on fuelwood use by private households. The authors highly appreciate this improvement and wish to encourage other countries to follow the excellent example.

## 4. Results

### 4.1. Wood supply

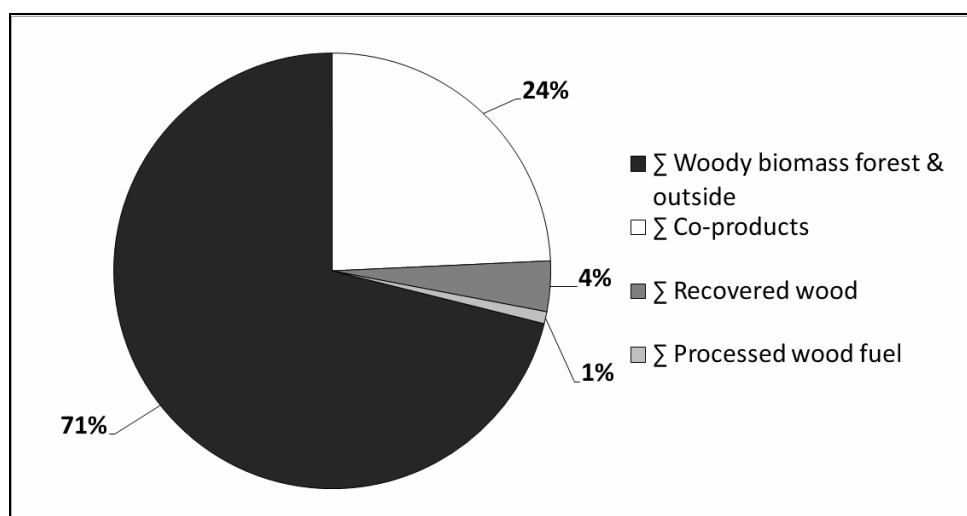
#### Direct wood supply form the forest

The European wood resource balance covers wood flows in 27 member states of the European Union (EU 27) and two EFTA states - Switzerland and Norway<sup>15</sup>. The total wood volumes extracted from the forests including industrial roundwood, fuelwood, bark and logging residues, add up to 512 Million m<sup>3</sup> (EU 27) respectively 531 Million m<sup>3</sup> (EU/ EFTA) (see Table 2)<sup>16</sup>.

**Table 2 : Direct and indirect sources (EU/EFTA)**

million m <sup>3</sup>	Wood supply from forest (direct)	Total wood supply
<b>EU-27</b>	512	749
<b>EU/EFTA</b>	531	775

Wood from the forest is the most important source of wood raw material, providing 2/3 of the total wood supply. Woody biomass outside the forest, industry co-products, recovered wood or processed wood fuels provide only 1/3 of the total supply.



**Figure 3 : Wood supply EU/EFTA**

<sup>15</sup> Iceland and Liechtenstein are not included

<sup>16</sup>Swedish JFSQ data on industrial roundwood and fuelwood removals, import and export data refer to 2004 as a storm event heavily impacted forests in southern Sweden on 8 January 2005. The total damage was estimated to about 75 million m<sup>3</sup>. The effect of the natural disaster originally retrieved directly in the national balance (draft version) where wood supply exceeded wood consumption by about 35 million m<sup>3</sup>.

Wood removals from forests are significantly higher than reported by the Joint Forest Sector Questionnaire (JFSQ)<sup>17</sup>. Roundwood removals in international trade statistics amount to only 454 (EU27) respectively 469 (EU/EFTA) million m<sup>3</sup>. Bark and felling/logging residues are not comprised by international definition of roundwood removals. In addition to unclassified products a certain amount of unrecorded wood removals may occur in many countries.

These removals must be distinguished from illegal logging. It is the nature of definitions, reporting structures and value thresholds for reporting that not all wood removals feed into national records (see German experience under 2.4.). Therefore unrecorded removals are not illegal in most (probably all) cases of the national wood resources balances in Europe. Woody biomass from outside the forest deliberately avoids the JFSQ definition “*other wooded land or other felling sites*”. It 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 (empiric) 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.

### **Total wood supply**

The total wood supply is the balance sheet total 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.

Production co-products and recovered wood 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, the use of co-products from further processing seems to play a minor role (<20%)<sup>18</sup> in Hungary, Bulgaria and Poland.

Post consumer recovered wood accounts for 29 million m<sup>3</sup> and represents a significant secondary wood resource (4% 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 decrease landfill of biodegradable products 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.

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<sup>17</sup> JFSQ reports 416 million m<sup>3</sup> for EU-27 and 433 million m<sup>3</sup> for EU/EFTA

<sup>18</sup> see annex I and III

## 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, recovery or recycling processes. In EU/EFTA the material use of wood accounts for 58% of the total wood use from all sources.

**Table 3 : Wood use 2005 (EU/EFTA)**

	Material use		Energy use		Total use
	millionm <sup>3</sup>	%	millionm <sup>3</sup>	%	millionm <sup>3</sup>
<b>EU-27</b>	<b>462</b>	<b>58 %</b>	<b>332</b>	<b>42 %</b>	<b>794</b>
<b>EU/EFTA</b>	<b>481</b>	<b>58 %</b>	<b>341</b>	<b>42 %</b>	<b>822</b>

Among the wood-based industries' sector, the sawmill industry is the biggest wood consumer of solid roundwood for material purposes using 209 million m<sup>3</sup> (EU-27) and 217 million m<sup>3</sup> (EU/EFTA) – corresponding to 26% of total consumption. The pulp and paper producing industries are second accounting for 147 and 155 million m<sup>3</sup> (19% of total consumption) followed by the panel industry (11%) consuming 85 and 88 million m<sup>3</sup> respectively. Each industry has specific requirements for entrant wood qualities. In a material efficient and well-linked national forest-based industry, industrial roundwood would enter the sawmill sector before its co-products would be 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  $\frac{3}{4}$ <sup>19</sup> and the panel industry about  $\frac{1}{3}$ <sup>20</sup> 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 international (energy) statistics. About 42 %, or 332 million m<sup>3</sup> (EU27) and 341 million m<sup>3</sup> (EU/EFTA) of the total wood volumes available are already 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 total national wood consumption (including imports). 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. Reason for these extremes can only be identified by empirical research at country.

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<sup>19</sup> CEPI annual report – see: [www.cepi.org](http://www.cepi.org)

<sup>20</sup> CEI-Bois annual "GESBOIS" questionnaire

**Table 4 : Major wood energy consuming countries**

Country	million m <sup>3</sup>
Sweden	48
France	44
Germany	41
Finland	35

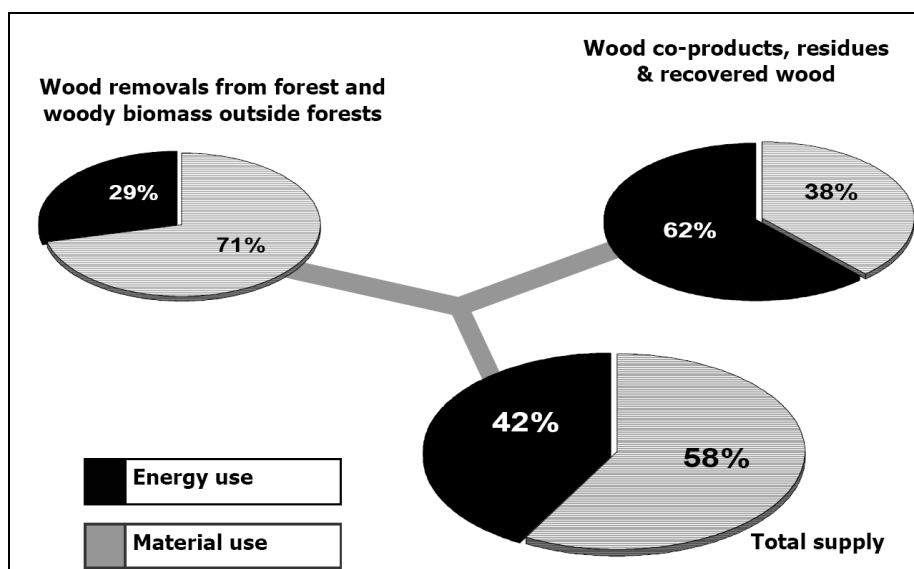
The biggest four wood energy producing countries consume together 168 million m<sup>3</sup>. This corresponds to almost 50% of total wood volumes used for energy generation in EU 27. Compared to the overall wood resource balance of the EU/EFTA these volumes represent about 20 % of the total use.

### Energy versus material use by assortment

The wood resource balance contains information on shares of fresh roundwood used by each wood processing sector. With additional in depth information on the energy generating sector it is possible to derive the fibre qualities that are used for energy and material purposes.

Based on these data it is estimated that 62% of the secondary wood fibres (recovered wood, co-products) are used for energy purposes. Only a smaller proportion of these wood qualities feed into subordinated material application.

Fresh wood fibres show a different use pattern. Over 2/3 (71%) enter processes for material application. Only 29% of the wood removals from forests and woody biomass outside the forest end up in direct energy production



**Figure 4 : Material versus energy use by fibre provenance (EU/EFTA)**



### 4.3. Balancing the balance - A question of data!

#### Supply and use at national and regional level

In the national wood resource balances, available wood volumes often do not match volumes of wood use<sup>21</sup>. The difference of the balance sheet total between supply and use remained below 5% in five countries (Germany, Ireland, Norway and Slovakia and Sweden).

In 22 countries<sup>22</sup> the difference between supply and use exceeds the threshold of 5% of the balance sheet total in either way.

The national wood resource balance of four countries reports significantly higher (>5%;<25%) wood fibre use than wood fibre supply. 10 countries show a tremendously (>25%) higher use than supply.

Higher wood supplies than wood consumptions were found in 8 countries, but only in Bulgaria and Italy the difference exceeds 20%.

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 (see below).

Summing up the quite inconsistent supply and use balanced of all 29 countries, the regional wood resource balance comes to a final difference of 35 million m<sup>3</sup> - corresponding to 4% supply deficit.

**Table 5: Total wood supply and use (EU/EFTA)**

EU/EFTA (million m <sup>3</sup> )	Total wood supply	Difference	Total use
2005	775	46	822

Even though 46 million m<sup>3</sup> is a considerable high value by itself, it is an astonishing small difference by relative means (6%). It is indispensable taking into account the above mentioned huge differences and problems at national level. Any conclusion must consider all difficulties which the study encountered at national level. However, this does not imply that the overall data problem isn't bigger than 6%, because this is just the result of different data problems on both sides. Thus the difference can be much higher in specific sectors.

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<sup>21</sup> percentage bases upon exceeding/missing volumes compared to reported supply

<sup>22</sup> excluding Luxembourg, Cyprus and Malta

## Particularly weak data

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 information in:

### Trade statistics:

- Weaknesses in trade statistics (e.g. undocumented imports or exports e.g. intra-European trade) 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).

### Wood use for energy:

- 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:

#### Material efficiency:

Few reliable measurements on raw material input to produce given product quantities. Different production techniques (for the same product) may have considerable in material efficiencies. The same international conversion factors have been "recycled" in so many studies and refer to each other. Considerable caution must be used in assessing the cubic metre cubic metre equivalent figures, as they may be under- or overestimates (see also paper from Thivolle-Cazat (2008)).

#### Energy efficiency:

Humidity related specific energy content of solid biofuels hampers estimating precisely raw material input for energy (heat and/or electricity) production. Sound and detailed national conversion factors converting energy to biomass units are crucial precondition to foster communication and understanding between energy and forestry sector.

### Wood supply for energy:

Cuttings and removals are not reported to production and trade statistics (problem related to data gathering). Lacking information on unreported wood extraction needs to be clearly distinguished from illegal logging! Fuelwood extraction can occur by collecting logging residues after harvesting activities or by small forest owners selling on informal markets (e.g. to private households); No statistics necessarily capture these wood flows, however, these volumes can add up to significant numbers. They can play a crucial role in assessing future wood availability, because much more wood might already be used than shown by statistics.

- Fuelwood removal for personal use / wood harvesting in private forest.
- Amounts and use of bark, logging residues, stumps.
- Trees outside the forest (urban/agriculture trees, shrubs and hedges).
- Emerging amounts of recovered wood.
- Current and future contribution of short rotation coppice.

## 6. Summary and Conclusions

The wood resource balance for 2005, at the national and EU/EFTA levels shows the broad pattern of wood supply and use in demand. Unevenly distributed data weaknesses on both sides of the wood resource balance confirm clearly that further empirical research is needed at national level. Nevertheless, the regional wood resource balanced allows some first conclusions:

1. Wood energy is the most important regional renewable energy source at present.
2. Where available, results from empiric studies on wood energy at country level (France/Germany/Norway/Austria) confirm that direct energy use of wood is much higher than previously assumed. The supply for unrecorded use of energy wood is mostly not recorded either. Therefore, these removals have to be taken into account when estimating the available potential wood supply.
3. Traditional analysis of wood supply and demand, centred on wood removals from forests and wood input to industries seems to be inadequate, since not all sources and uses of wood is considered. Therefore, an up-dated, 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, in particular trees outside the forest, logging residues, and post consumer recovered wood.
  - b. Unrecorded use of wood, in particular for energy in private households and small CHP plants.
  - c. Input/output conversion factors for wood using industries (inaccuracies in this respect could significantly increase, or decrease, the difference between supply and use of wood).
4. There is an urgent need to analyse the potential of wood supply in quantitative terms, taking account of local realities, such as costs, ownership patterns, quality requirements, infrastructure etc.

# Glossary

- Bioenergy:** Energy derived from any sort of biomass.
- Biofuel:** Solid, liquid or gaseous renewable energy sources from biomass.
- Co-products:** The volume of roundwood that is left over after the production of primary forest products in the forest processing industry (i.e. forest processing residues) or that has been reduced to chips or particles. It includes sawmill rejects, slabs, edgings and trimmings, veneer log cores, veneer rejects, sawdust. It comprises wood that has been reduced to small pieces and is suitable for pulping, for particleboard and/or fibreboard production, for use as a fuel, or for other purposes. It excludes wood chips made either directly in the forest from roundwood or made from residues (i.e. already counted as pulpwood, round and split or wood chips and particles).
- Forest-based industries:** Forest-based industries consist of the wood products industry (sawn wood, wooden panels, plywood, wooden boards, joinery industry, house-building and wooden furniture), pulp, paper and paperboard industries, and the printing industry. The forestry sector is an essential part of the forest-based industries.
- Other Wooded land:** Land not classified as forest, spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5–10 percent, or trees able to reach these thresholds in situ; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban land use (MCPFE 2007 / FAO 2004).
- Post consumer recovered wood:** Recovered wood includes all kinds of wooden material that is available at the end of its use as a wooden product (“post-consumer” or “post-use” wood).
- Recovered wood mainly comprises
  - Packaging materials,
  - Demolition wood,
  - Timber from building sites and
  - Fractions of used wood from residential, industrial & commercial activities.
- Processed wood fuel:** Wood pellets and briquettes.

**Removals:**

The volume of all trees, living or dead, that are felled and removed from the forest, other wooded land or other felling sites. It includes natural losses that are recovered (i.e. harvested), removals during the year of wood felled during an earlier period, removals of non-stem wood such as stumps and branches (where these are harvested) and removal of trees killed or damaged by natural causes (i.e. natural losses), e.g. fire, windblown, insects and diseases. It excludes bark and other non-woody biomass and any wood that is not removed, e.g. stumps, branches and tree tops (where these are not harvested) and felling residues (harvesting waste). It is reported in cubic metres solid volume underbark (i.e. excluding bark). Where it is measured overbark (i.e. including bark), the volume has to be adjusted downwards to convert to an underbark estimate.

**Roundwood:**

All wood removed with or without bark, including wood removed in its round form, or split, roughly squared or in other form (e.g. branches, roots, stumps and burls (where these are harvested) and wood that is roughly shaped or pointed. It is an aggregate comprising wood fuel, including wood for charcoal and industrial roundwood (wood in the rough). It is reported in cubic metres solid volume underbark (i.e. excluding bark).

**Woody biomass  
outside the forest:**

Any woody biomass originating from other than forest and other wooded land. This includes urban and amenity trees, hedgerows, trees from fruit orchards, rail and roadside green and trees.

**Material use:**

Wood fibres feeding into production processes of the forest based industries that lead to physical products. Wood fibres or particles contained in the products and co-products can be reused in downstream processes, recovery or recycling processes.

**Energy use:**

Wood fibres used for energy (heat and/or electricity) production.

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# **ANNEX**

- ANNEX I: European wood resource balance - detailed overview
- ANNEX II : Regional wood resource balances EU/EFTA
- ANNEX III : National wood resource balances EU/EFTA countries
- ANNEX IV : National wood resource balances Serbia and Turkey

ANNEX I : Regional wood resource balances EU/EFTA:

2005	A	B	C	D	E	F	G	H	I	J	K	L
1000 m <sup>3</sup> (Roundwood equivalent)	Industrial Roundwood		Fuelwood		Bark (P+I-X)	Used logging residues (P)	Woody biomass outside the forest (P)	Chips, particles & wood residues (P+I-X)	Recovered wood for material & energy use (P)	Pulp production co-products (P)	Processed wood fuel (P+I-X)	Σ SUPPLY  FOREST (A+B+C+D+E+F)
	JFSQ	Maximum difference unreported to JFSQ	JFSQ	Maximum difference unreported to JFSQ								
	(P+I-X)	(P)	(P+I-X)	(P)								
Austria	21.100	0	5.100	1.805	2.800	0	7.000	9.600	0	3.417	1.218	30.805
Belgium	6.408	0	634	0		0	0	1.601	410	2.805	0	7.043
Bulgaria	2.798	1.497	2.555	0		0	0	449	196	246	0	6.851
Cyprus	6	3	4	0		0	0	4	0	0	0	13
Czech Republic	12.490	0	966	0	175	1.365	2.833	2.356	0	1.851	40	14.996
Denmark	1.885	0	1.549	0		0	0	1.535	0	0	1.347	3.434
Estonia	4.527	0	933	0		0	0	1.991	0	168	0	5.460
Finland	62.399	0	5.310	0	7.625	1.825	0	18.027	1.488	19.699	98	77.158
France	26.735	0	24.104	1.482	0	3.440	8.700	12.429	1.700	4.622	333	55.761
Germany	47.091	6.582	6.387	1.057	2.520	9.900	283	15.570	11.924	4.267	333	73.537
Greece	637	0	1.034	0		0	0	518	0	0	0	1.671
Hungary	2.170	646	3.003	0		0	0	652	19	0	0	5.819
Ireland	2.524	0	19	0		0	0	955	646	0	0	2.543
Italy	7.758	5.032	6.538	0		0	0	4.784	2.963	240	383	19.327
Latvia	9.056	0	608	0		0	0	2.109	0	0	0	9.664
Lithuania	4.043	1.027	1.118	298	704	65	0	2.027	0	0	141	7.254
Luxembourg	350	12	-39	0		0	0	216	0	0	0	324
Malta	0	0	0	0		0	0	0	0	0	0	0
Netherlands	750	0	263	0	125	0	0	1.928	600	226	880	1.139
Norway	11.111	0	1.287	1.753	0	0	0	3.193	369	2.016	41	14.151
Poland	29.982	1.194	3.404	0	0	227	636	3.916	31	1.888	17	34.807
Portugal	9.234	0	595	0		0	0	1.685	61	2.749	0	9.829
Romania	11.787	241	2.662	0	869	0	0	1.920	0	294	0	15.559
Slovakia	7.369	0	178	0	150	10	30	2.055	50	470	0	7.707
Slovenia	1.924	85	808	0	0	159	276	456	149	294	12	2.975
Spain	16.788	0	2.105	0		0	0	5.454	2.040	2.880	0	18.893
Sweden	69.276	0	6.135	0	9.699	6.000	0	18.920	1.450	21.325	1.836	91.110
Switzerland	2.824	0	1.219	0	210	500	240	1.320	0	334	0	4.753
United Kingdom	8.122	0	126	1	200	0	0	2.677	4.872	0	200	8.449
<b>EU 27</b>	<b>367.210</b>	<b>16.318</b>	<b>76.100</b>	<b>4.643</b>	<b>24.867</b>	<b>22.991</b>	<b>19.758</b>	<b>113.834</b>	<b>28.599</b>	<b>67.440</b>	<b>6.839</b>	<b>512.129</b>
<b>EU 27 / EFTA</b>	<b>381.145</b>	<b>16.318</b>	<b>78.606</b>	<b>6.396</b>	<b>25.077</b>	<b>23.491</b>	<b>19.998</b>	<b>118.347</b>	<b>28.968</b>	<b>69.790</b>	<b>6.880</b>	<b>531.032</b>



ANNEX I : Regional wood resource balances EU/EFTA:

M	N		O	P	Q	R	S	T	U	V	2005
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)		
52.041	2.942	6%	49.098	18.100	4.100	7.414	2.021	0	17.463	Austria	
11.859	-1.119	-9%	12.979	2.120	3.272	5.394	0	2.193	Belgium		
7.742	1.909	25%	5.832	934	573	474	0	3.852	Bulgaria		
17	10	57%	7	7	0				Cyprus		
22.077	1.299	6%	20.777	7.120	1.863	3.524	193	109	7.968	Czech Republic	
6.316	-1.333	-17%	7.649	324	345	0	333	6.646	Denmark		
7.618	-867	-10%	8.486	3.923	668	235	0	3.660	Estonia		
116.470	11.230	10%	105.241	23.901	4.586	41.322	392	321	34.719	Finland	
83.546	-6.910	-8%	90.455	20.140	8.480	9.273	250	8.802	43.511	France	
105.914	-4.426	-4%	110.340	36.434	20.500	10.320	333	1.889	40.864	Germany	
2.188	-3.949	-64%	6.137	306	870	0	0	4.961	Greece		
6.490	-423	-6%	6.913	344	804	0	0	5.765	Hungary		
4.144	6	0%	4.138	1.692	1.332	0	0	1.115	Ireland		
27.698	6.432	23%	21.266	2.567	7.882	1.255	283	9.279	Italy		
11.772	-6.266	-35%	18.039	6.940	798	0	0	10.301	Latvia		
9.423	1.324	14%	8.098	3.000	586	0	352	494	3.666	Lithuania	
539	-1.069	-66%	1.608	899	709	0	0			Luxembourg	
0	0	100%	0	0	0	0	0			Malta	
4.772	-3.002	-39%	7.774	475	22	463	180	714	5.920	Netherlands	
19.770	462	2%	19.308	5.139	823	7.167	71	336	5.773	Norway	
41.294	-13.496	-25%	54.790	17.500	9.837	3.847	333	987	22.286	Poland	
14.325	-9.097	-39%	23.421	1.673	1.793	5.881	0		14.075	Portugal	
17.773	-8.181	-32%	25.954	7.021	1.629	565	0		16.739	Romania	
10.313	237	2%	10.076	4.302	1.381	2.593	40		1.760	Slovakia	
4.163	-1.204	-22%	5.367	1.410	786	565	58	116	2.431	Slovenia	
29.267	-12.895	-31%	42.162	7.116	7.260	6.104	33		21.649	Spain	
134.642	1.634	1%	133.008	36.000	1.113	46.605	1.600	0	47.690	Sweden	
6.646	-2.194	-25%	8.840	2.642	1.487	897	0	29	3.785	Switzerland	
16.198	2.195	14%	14.003	5.250	4.229	814	200	466	3.043	United Kingdom	
748.600	-45.019		793.619	209.498	85.419	146.648	6.603	13.897	331.555	EU 27	
775.016	-46.751	-6%	821.767	217.279	87.729	154.712	6.674	14.262	341.112	EU 27 / EFTA	

**EU 27** **2005**

million m <sup>3</sup>	%	%	million m <sup>3</sup>
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**Supply from forest  
& woody biomass outside the forest:**

Industrial Roundwood - JFSQ	367	49%
Industrial Roundwood*	16	2%
Fuelwood - JFSQ	76	10%
Fuelwood*	5	1%
Bark	25	3%
Used logging residues	23	3%
Woody biomass outside the forest	20	3%

**Supply co-products:**

Chips, particles & wood residues	114	15%
Pulp production co-products**	67	9%

**Supply recovered wood:**

Recovered wood***	29	4%
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**Supply processed wood fuel:**

Processed wood fuel	7	1%
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**Material use:**

26%	209	Sawmill industry
11%	85	Panel industry
18%	147	Pulp industry
1%	7	Pellets, briquetts etc. ****
2%	14	Other physical utilization

**Energy use:**

6%	46	Power and heat
8%	63	Industrial internal
11%	87	Private households
17%	135	Undifferentiated energy use

<b>SUPPLY TOTAL</b>	<b>749</b>	<b>Difference</b>	<b>794</b>	<b>TOTAL USE</b>
		<b>45</b>		

\* maximum difference unreported to JFSQ

\*\* black liquor, tall oil, etc.

\*\*\* post consumer recovered wood for material &amp; energy use

\*\*\*\* processed wood fuel industry

**EU / EFTA 2005**

million m <sup>3</sup>	%	%	million m <sup>3</sup>
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**Supply from forest  
& woody biomass outside the forest:**

Industrial Roundwood - JFSQ	381	49%
Industrial Roundwood*	16	2%
Fuelwood - JFSQ	79	10%
Fuelwood*	6	1%
Bark	25	3%
Used logging residues	23	3%
Woody biomass outside the forest	20	3%

**Supply co-products:**

Chips, particles & wood residues	118	15%
Pulp production co-products**	70	9%

**Supply recovered wood:**

Recovered wood***	29	4%
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**Supply processed wood fuel:**

Processed wood fuel	7	1%
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**Material use:**

26%	217	Sawmill industry
11%	88	Panel industry
19%	155	Pulp industry
1%	7	Pellets, briquetts etc. ****
2%	14	Other physical utilization

**Energy use:**

6%	49	Power and heat
8%	65	Industrial internal
11%	92	Private households
16%	135	Undifferentiated energy use

<b>SUPPLY TOTAL</b>	<b>775</b>	<b>Difference</b>	<b>822</b>	<b>TOTAL USE</b>
		<b>47</b>		

\* maximum difference unreported to JFSQ

\*\* black liquor, tall oil, etc.

\*\*\* post consumer recovered wood for material &amp; energy use

\*\*\*\* processed wood fuel industry

**Austria****2005**

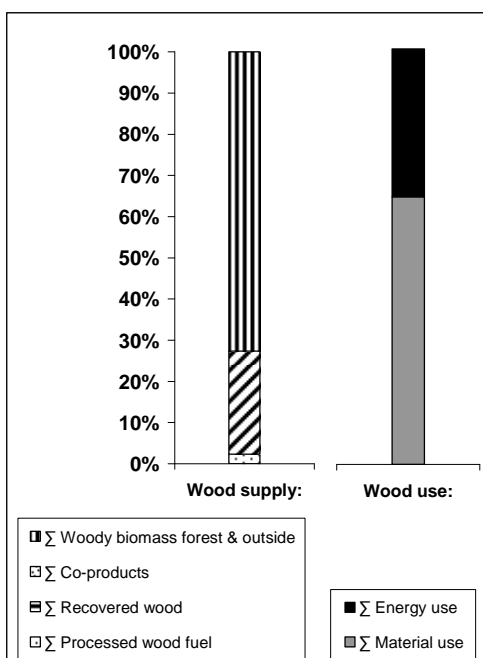
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	21 100	41%				
Industrial Roundwood - JFSQ	(P+I-X)	21 100	41%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			37%	18 100	(C)	Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	5 100	10%	8%	4 100	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	1 805	3%	15%	7 414	(C)	Pulp industry
Bark	(P)	2 800	5%	4%	2 021	(C)	Processed wood fuel industry
Used logging residues	(P)					(C)	Other physical utilization
Woody biomass outside the forest	(P)	7 000	13%				
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	9 600	18%				
Pulp production co-products	(P)	3 417	7%				Energy use:
<b>Supply recovered wood:</b>							
Recovered wood for material & energy use	(P)			4%	2 051	(C)	Power and heat
<b>Supply processed wood fuel:</b>							
Processed wood fuel	(P+I-X)	1 218	2%	8%	3 855	(C)	Industrial internal
				17%	8 538	(C)	Private households
				6%	3 020	(C)	Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	52 041	<b>Difference</b>	49 098	<b>Σ TOTAL USE</b>
		2 942		

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



<b>Wood supply and use - Austria (2005)</b>			
<b>Wood supply:</b>			
Σ Woody biomass forest & outside	37 805	73%	
Σ Co-products	13 017	25%	
Σ Recovered wood			
Σ Processed wood fuel	1 218	2%	
<b>Wood use:</b>			
64%	31 635		Σ Material use
36%	17 463		Σ Energy use

Austria (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
27.3	-	31.3	-

**Belgium****2005**

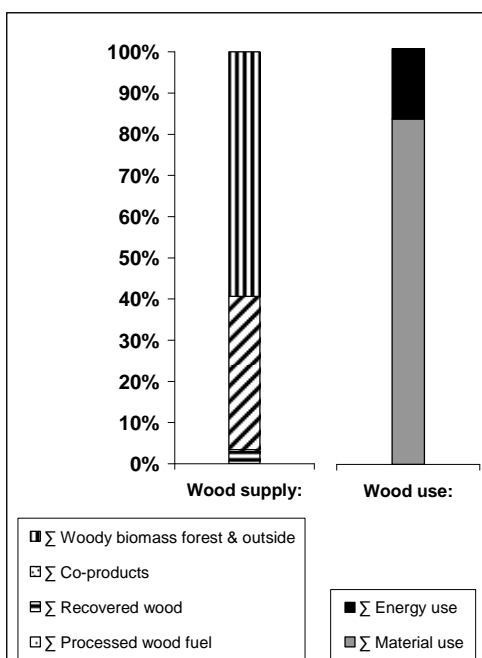
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1.000 m <sup>3</sup>	%				
Industrial Roundwood - JFSQ	(P+I-X)	6 408	54%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			16%	2 120	(C)	Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	634	5%	25%	3 272	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			42%	5 394	(C)	Pulp industry
Bark	(P)					(C)	Processed wood fuel industry
Used logging residues	(P)					(C)	Other physical utilization
Woody biomass outside the forest	(P)						
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	1 601	14%				
Pulp production co-products	(P)	2 805	24%				Energy use:
<b>Supply recovered wood:</b>							
Recovered wood for material & energy use	(P)	410	3%			(C)	Power and heat
<b>Supply processed wood fuel:</b>							
Processed wood fuel	(P+I-X)			17%	2 193	(C)	Industrial internal Private households Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	11 859	<b>Difference</b>	12 979	<b>Σ TOTAL USE</b>
		1 119		

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

**Wood supply and use - Belgium (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	7 043	59%	83%	10 786	Σ Material use
Σ Co-products	4 407	37%	17%	2 193	Σ Energy use
Σ Recovered wood	410	3%			
Σ Processed wood fuel					

**Belgium (million m<sup>3</sup> o.b.):**

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

1990	1995	2000	2005
5.2	-	5.3	5.3

**Bulgaria 2005**

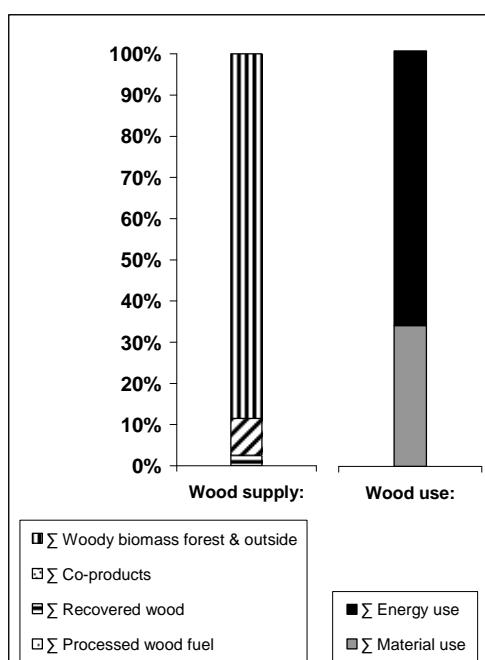
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	2 798	36%						
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)			8%	474	(C)			Pulp industry
Bark	(P)					(C)			Processed wood fuel industry
Used logging residues	(P)					(C)			Other physical utilization
Woody biomass outside the forest	(P)								
<b>Supply by-products:</b>									
Chips, particles & wood residues	(P+I-X)	449	6%						
Pulp production co-products	(P)	246	3%						
<b>Supply recovered wood:</b>									
Recovered wood for material & energy use	(P)	196	3%			(C)			Power and heat
<b>Supply processed wood fuel:</b>									
Processed wood fuel	(P+I-X)			66%	3 852	(C)			Undifferentiated energy use

Σ SUPPLY TOTAL	7 742	<b>Difference</b>	5 832	Σ TOTAL USE
		1 909		

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



Wood supply and use - Bulgaria (2005)					
<b>Wood supply:</b>			<b>Wood use:</b>		
Σ Woody biomass forest & outside	6 851	88%	34%	1 980	Σ Material use
Σ Co-products	695	9%	66%	3 852	Σ Energy use
Σ Recovered wood	196	3%			
Σ Processed wood fuel					

Bulgaria (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
11.2	-	13.6	14.1

**Cyprus****2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	6	35%					Material use:
Industrial Roundwood - JFSQ	(P+I-X)	6	35%					
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	3	17%	100%	7	(C)		Sawmill industry
Fuelwood - JFSQ	(P+I-X)	4	25%				(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)						(C)	Pulp industry
Bark	(P)						(C)	Processed wood fuel industry
Used logging residues	(P)						(C)	Other physical utilization
Woody biomass outside the forest	(P)							

Supply by-products:

Chips, particles & wood residues	(P+I-X)	4	23%					
Pulp production co-products	(P)							Energy use:

Supply recovered wood:

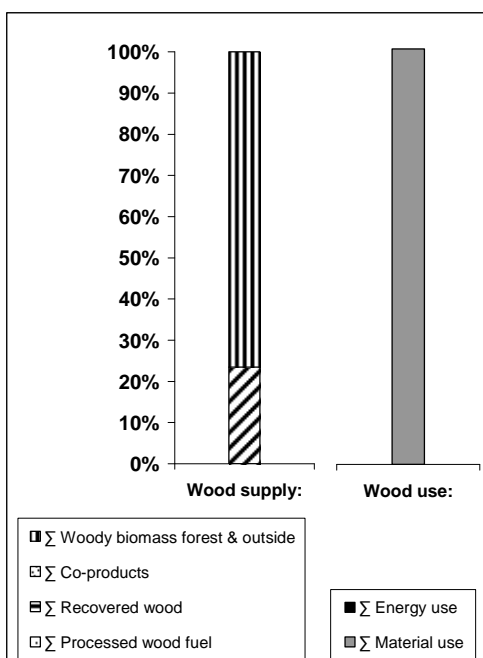
Recovered wood for material & energy use	(P)						(C)	Power and heat
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Supply processed wood fuel:

Processed wood fuel	(P+I-X)						(C)	Private households
							(C)	Undifferentiated energy use

$\Sigma$ SUPPLY TOTAL		17		<b>Difference</b>		7		$\Sigma$ TOTAL USE
				10				

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

**Wood supply and use - Cyprus (2005)**

Wood supply:			Wood use:		
$\Sigma$ Woody biomass forest & outside	13	77%	100%	7	$\Sigma$ Material use
$\Sigma$ Co-products	4	23%		0	$\Sigma$ Energy use
$\Sigma$ Recovered wood					
$\Sigma$ Processed wood fuel					

Cyprus (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
0.0	-	0.0	0.0

**Czech Republic****2005**

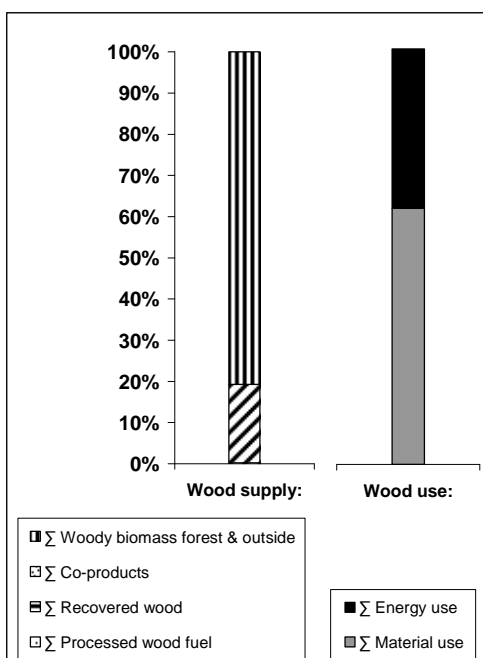
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	12 490	57%				
Industrial Roundwood - JFSQ	(P+I-X)	12 490	57%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			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)			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%				
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	2 356	11%				
Pulp production co-products	(P)	1 851	8%				
<b>Supply recovered wood:</b>							
Recovered wood for material & energy use	(P)			3%	538	(C)	Power and heat
<b>Supply processed wood fuel:</b>							
Processed wood fuel	(P+I-X)	40	0%	11%	2 270	(C)	Industrial internal
				25%	5 131	(C)	Private households
				0%	29	(C)	Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	<b>22 077</b>	<b>Difference</b>	<b>20 777</b>	<b>Σ TOTAL USE</b>
		<b>1 299</b>		

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

**Wood supply and use - Czech Republic (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	17 829	81%	62%	12 809	Σ Material use
Σ Co-products	4 207	19%	38%	7 968	Σ Energy use
Σ Recovered wood					
Σ Processed wood fuel	40	0%			

**Czech Republic (million m<sup>3</sup> o.b.):**

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

1990	1995	2000	2005
17.0	-	19.8	20.5



**Denmark****2005**

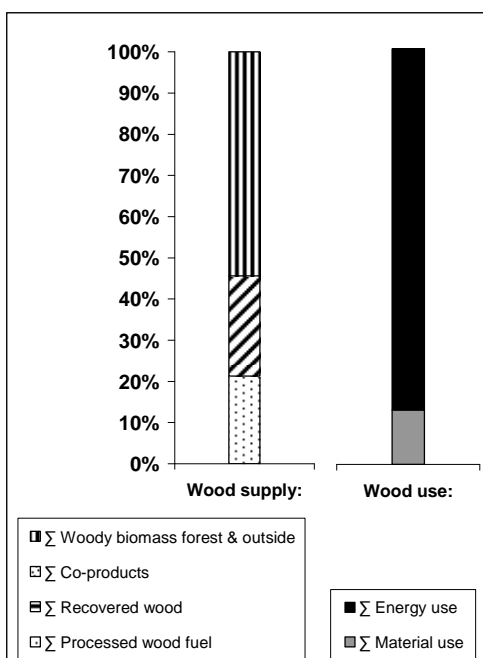
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1 885	30%						
Industrial Roundwood - JFSQ	(P+I-X)	1 885	30%						
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			4%	324	(C)			Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	1 549	25%	5%	345	(C)			Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)					(C)			Pulp industry
Bark	(P)			4%	333	(C)			Processed wood fuel industry
Used logging residues	(P)					(C)			Other physical utilization
Woody biomass outside the forest	(P)								
<b>Supply by-products:</b>									
Chips, particles & wood residues	(P+I-X)	1 535	24%						
Pulp production co-products	(P)								Energy use:
<b>Supply recovered wood:</b>									
Recovered wood for material & energy use	(P)					(C)			Power and heat
<b>Supply processed wood fuel:</b>									
Processed wood fuel	(P+I-X)	1 347	21%	87%	6 646	(C)			Industrial internal
									Private households
									Undifferentiated energy use

Σ SUPPLY TOTAL	6 316	<b>Difference</b>	7 649	Σ TOTAL USE
		1 333		

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

**Wood supply and use - Denmark (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	3 434	54%	13%	1 003	Σ Material use
Σ Co-products	1 535	24%	87%	6 646	Σ Energy use
Σ Recovered wood					
Σ Processed wood fuel	1 347	21%			

Denmark (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
4.6	-	4.8	5.2

**Estonia 2005**

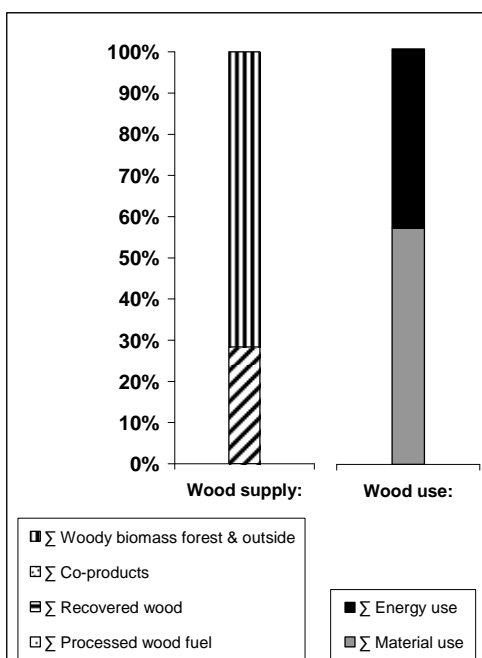
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	4 527	59%					
Industrial Roundwood - JFSQ	(P+I-X)	4 527	59%					
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			46%	3 923	(C)	Material use:	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	933	12%	8%	668	(C)		Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			3%	235	(C)		Pulp industry
Bark	(P)					(C)		Processed wood fuel industry
Used logging residues	(P)					(C)		Other physical utilization
Woody biomass outside the forest	(P)							
<b>Supply by-products:</b>								
Chips, particles & wood residues	(P+I-X)	1 991	26%					
Pulp production co-products	(P)	168	2%				Energy use:	
<b>Supply recovered wood:</b>								
Recovered wood for material & energy use	(P)					(C)		Power and heat
<b>Supply processed wood fuel:</b>								
Processed wood fuel	(P+I-X)			43%	3 660	(C)		Undifferentiated energy use

Σ SUPPLY TOTAL	7 618	<b>Difference</b>	8 486	Σ TOTAL USE
		867		

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



Wood supply and use - Estonia (2005)					
<b>Wood supply:</b>			<b>Wood use:</b>		
Σ Woody biomass forest & outside	5 460	72%	57%	4 826	Σ Material use
Σ Co-products	2 158	28%	43%	3 660	Σ Energy use
Σ Recovered wood					
Σ Processed wood fuel					

**Estonia (million m<sup>3</sup> o.b.):**

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

1990	1995	2000	2005
10.2	-	11.4	11.0

**Finland****2005**

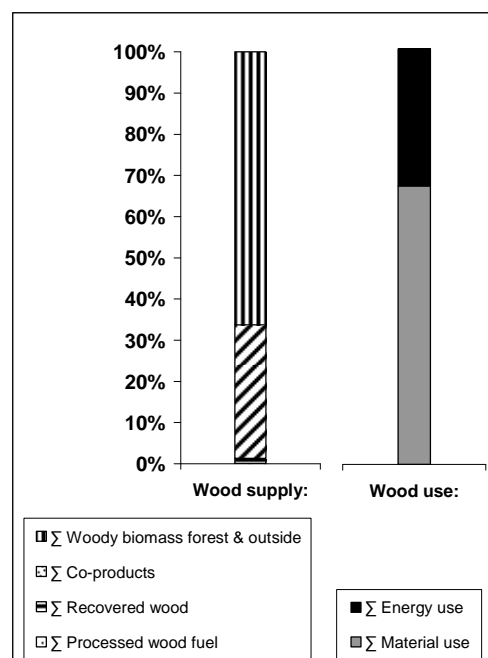
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1.000 m <sup>3</sup>	%				
Industrial Roundwood - JFSQ	(P+I-X)	62 399	54%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			23%	23 901	(C)	Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	5 310	5%	4%	4 586	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			39%	41 322	(C)	Pulp industry
Bark	(P)	7 625	7%	0%	392	(C)	Processed wood fuel industry
Used logging residues	(P)	1 825	2%	0%	321	(C)	Other physical utilization
Woody biomass outside the forest	(P)						
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	18 027	15%				
Pulp production co-products	(P)	19 699	17%				Energy use:
<b>Supply recovered wood:</b>				10%	10 399	(C)	Power and heat
Recovered wood for material & energy use	(P)	1 488	1%	18%	18 596	(C)	Industrial internal
<b>Supply processed wood fuel:</b>				5%	5 724	(C)	Private households
Processed wood fuel	(P+I-X)	98	0%	0%	0	(C)	Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	116 470	<b>Difference</b>	105 241	<b>Σ TOTAL USE</b>
		11 230		

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



Wood supply and use - Finland (2005)						
<b>Wood supply:</b>			<b>Wood use:</b>			
Σ Woody biomass forest & outside	77 158	66%	67%	70 522	Σ Material use	
Σ Co-products	37 726	32%	33%	34 719	Σ Energy use	
Σ Recovered wood	1 488	1%				
Σ Processed wood fuel	98	0%				

Finland (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
76.0	-	79.4	92.9

**France 2005**

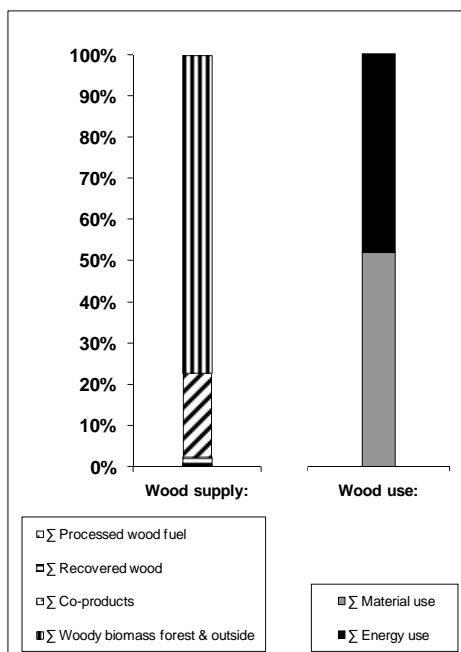
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)						
Industrial Roundwood - JFSQ	(P+I-X)	26.735	32%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			22%	20.140	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	24.104	29%	9%	8.480	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	1.482	2%	10%	9.273	(C)	Pulp industry
Bark	(P)			0%	250	(C)	Processed wood fuel industry
Used logging residues	(P)	3.440	4%	10%	8.802	(C)	Other physical utilization
Woody biomass outside the forest	(P)	8.700	10%				
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	12.429	15%				
Pulp production co-products	(P)	4.622	6%				
<b>Supply recovered wood:</b>							
Recovered wood for material & energy use	(P)	1.700	2%	1%	945	(C)	Power and heat
<b>Supply processed wood fuel:</b>							
Processed wood fuel	(P+I-X)	333	0%	9%	7.875	(C)	Industrial internal
				37%	33.030	(C)	Private households
				2%	1.661	(C)	Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	<b>83.546</b>	<b>Difference</b>	<b>90.455</b>	<b>Σ TOTAL USE</b>
		<b>6.910</b>		

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



<b>Wood supply and use - France (2005)</b>			
<b>Wood supply:</b>			
Σ Woody biomass forest & outside	64.461	77%	
Σ Co-products	17.051	20%	
Σ Recovered wood	1.700	2%	
Σ Processed wood fuel	333	0%	
<b>Wood use:</b>			
52%	46.945		Σ Material use
48%	43.511		Σ Energy use

France (milli€)

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

1990	1995	2000	2005
84,1	-	97,6	102,5

**Germany****2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1.000 m <sup>3</sup>	%		1.000 m <sup>3</sup>	(C)	Material use:
Industrial Roundwood - JFSQ	(P+I-X)	47 091	44%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	6 582	6%	33%	36 434	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	6 387	6%	19%	20 500	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	1 057	1%	9%	10 320	(C)	Pulp industry
Bark	(P)	2 520	2%	0%	333	(C)	Processed wood fuel industry
Used logging residues	(P)	9 900	9%	2%	1 889	(C)	Other physical utilization
Woody biomass outside the forest	(P)	283	0%				

Supply by-products:

	(P+I-X)	1.000 m <sup>3</sup>	%		1.000 m <sup>3</sup>	(C)	Energy use:
Chips, particles & wood residues	(P+I-X)	15 570	15%				
Pulp production co-products	(P)	4 267	4%				

Supply recovered wood:

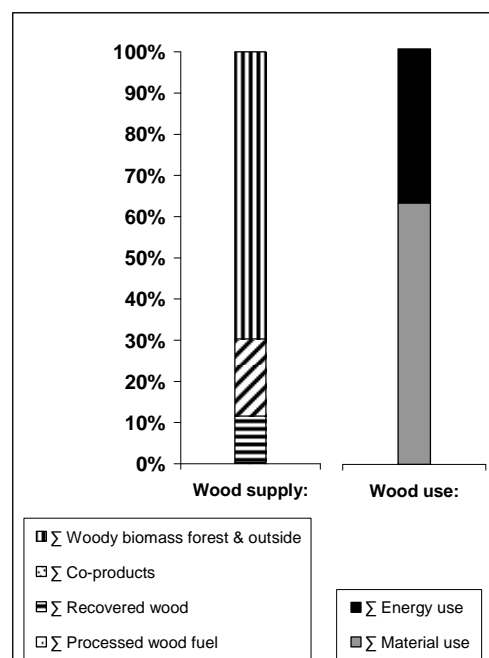
	(P)	1.000 m <sup>3</sup>	%		1.000 m <sup>3</sup>	(C)	Energy use:
Recovered wood for material & energy use	(P)	11 924	11%	14%	15 364	(C)	Power and heat

Supply processed wood fuel:

	(P+I-X)	1.000 m <sup>3</sup>	%		1.000 m <sup>3</sup>	(C)	Energy use:
Processed wood fuel	(P+I-X)	333	0%	4%	4 800	(C)	Industrial internal
				19%	20 700	(C)	Private households
				0%	0	(C)	Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	<b>105 914</b>	<b>Difference</b>	<b>110 340</b>	<b>Σ TOTAL USE</b>
		<b>4 426</b>		

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

**Wood supply and use - Germany (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	73 820	70%	63%	69 476	Σ Material use
Σ Co-products	19 837	19%	37%	40 864	Σ Energy use
Σ Recovered wood	11 924	11%			
Σ Processed wood fuel	333	0%			

Germany (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
-	-	122.0	122.0

**Greece****2005**

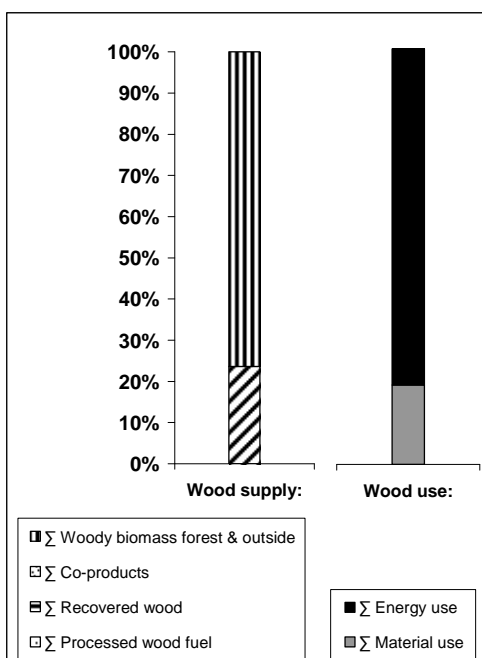
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1.000 m <sup>3</sup>	%		%	1.000 m <sup>3</sup>	
Industrial Roundwood - JFSQ	(P+I-X)	637	29%				Material use:
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			5%		306 (C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	1 034	47%	14%		870 (C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)					(C)	Pulp industry
Bark	(P)					(C)	Processed wood fuel industry
Used logging residues	(P)					(C)	Other physical utilization
Woody biomass outside the forest	(P)						
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	518	24%				Energy use:
Pulp production co-products	(P)						
<b>Supply recovered wood:</b>							
Recovered wood for material & energy use	(P)					(C)	Power and heat
<b>Supply processed wood fuel:</b>							
Processed wood fuel	(P+I-X)			81%		4 961 (C)	Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	<b>2 188</b>	<b>Difference</b>	<b>6 137</b>	<b>Σ TOTAL USE</b>
		<b>3 949</b>		

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

**Wood supply and use - Greece (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	1 671	76%	19%	1 176	Σ Material use
Σ Co-products	518	24%	81%	4 961	Σ Energy use
Σ Recovered wood					
Σ Processed wood fuel					

Greece (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
3.8	-	-	-

**Hungary**
**2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1.000 m <sup>3</sup>	%		%	1.000 m <sup>3</sup>	(C)	Material use:
Industrial Roundwood - JFSQ	(P+I-X)	2 170	33%					
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	646	10%	5%		344	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	3 003	46%	12%		804	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)						(C)	Pulp industry
Bark	(P)						(C)	Processed wood fuel industry
Used logging residues	(P)						(C)	Other physical utilization
Woody biomass outside the forest	(P)							

Supply by-products:

	(P+I-X)	1.000 m <sup>3</sup>	%		%	1.000 m <sup>3</sup>	(C)	Energy use:
Chips, particles & wood residues	(P+I-X)	652	10%					
Pulp production co-products	(P)							

Supply recovered wood:

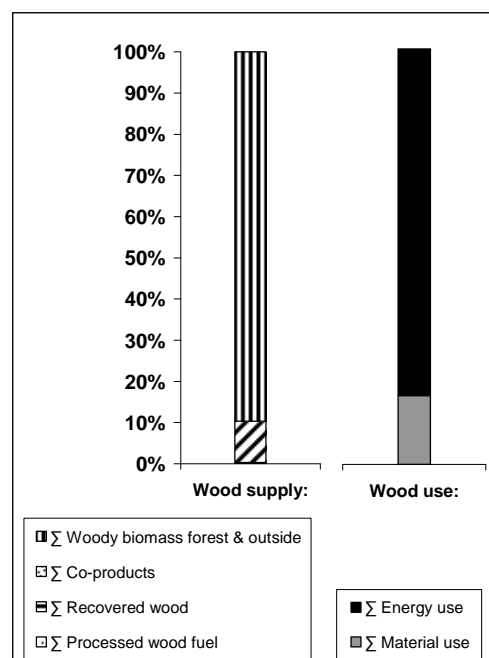
	(P)	1.000 m <sup>3</sup>	%		%	1.000 m <sup>3</sup>	(C)	Energy use:
Recovered wood for material & energy use	(P)	19	0%				(C)	Power and heat

Supply processed wood fuel:

	(P+I-X)	1.000 m <sup>3</sup>	%		%	1.000 m <sup>3</sup>	(C)	Energy use:
Processed wood fuel	(P+I-X)			83%		5 765	(C)	Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>		<b>6 490</b>		<b>Difference</b>		<b>6 913</b>		<b>Σ TOTAL USE</b>
				<b>423</b>				

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


**Wood supply and use - Hungary (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	5 819	90%	17%	1 148	Σ Material use
Σ Co-products	652	10%	83%	5 765	Σ Energy use
Σ Recovered wood	19	0%			
Σ Processed wood fuel					

 Hungary (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
11.0	-	11.7	12.9

**Ireland**
**2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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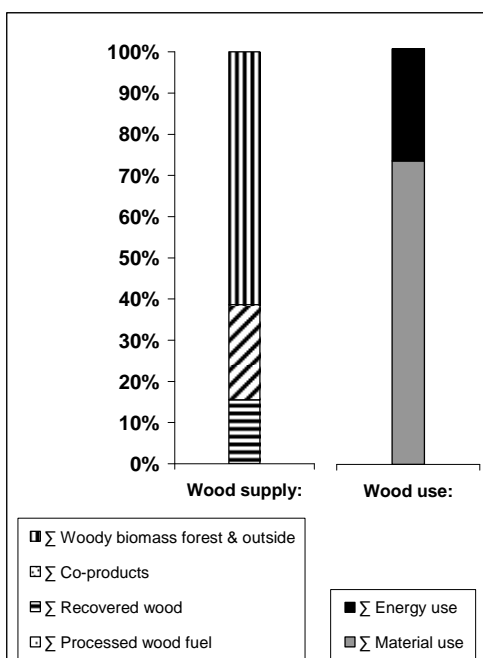
Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	2 524	61%				
Industrial Roundwood - JFSQ	(P+I-X)	2 524	61%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			41%	1 692	(C)	Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	19	0%	32%	1 332	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)					(C)	Pulp industry
Bark	(P)					(C)	Processed wood fuel industry
Used logging residues	(P)					(C)	Other physical utilization
Woody biomass outside the forest	(P)						
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	955	23%				
Pulp production co-products	(P)						Energy use:
<b>Supply recovered wood:</b>							
Recovered wood for material & energy use	(P)	646	16%			(C)	Power and heat
<b>Supply processed wood fuel:</b>							
Processed wood fuel	(P+I-X)			27%	1 115	(C)	Industrial internal Private households Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>		4 144	<b>Difference</b>	4 138	<b>Σ TOTAL USE</b>
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6

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


**Wood supply and use - Ireland (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	2 543	61%	73%	3 023	Σ Material use
Σ Co-products	955	23%	27%	1 115	Σ Energy use
Σ Recovered wood	646	16%			
Σ Processed wood fuel					

 Ireland (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
-	-	-	-



**Italy**
**2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1.000 m <sup>3</sup>	%		1.000 m <sup>3</sup>	%	Material use:
Industrial Roundwood - JFSQ	(P+I-X)	7 758	28%				
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%	37%	7 882	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			6%	1 255	(C)	Pulp industry
Bark	(P)			1%	283	(C)	Processed wood fuel industry
Used logging residues	(P)					(C)	Other physical utilization
Woody biomass outside the forest	(P)						

Supply by-products:

	(P+I-X)	1.000 m <sup>3</sup>	%		1.000 m <sup>3</sup>	%	Energy use:
Chips, particles & wood residues	(P+I-X)	4 784	17%				
Pulp production co-products	(P)	240	1%				

Supply recovered wood:

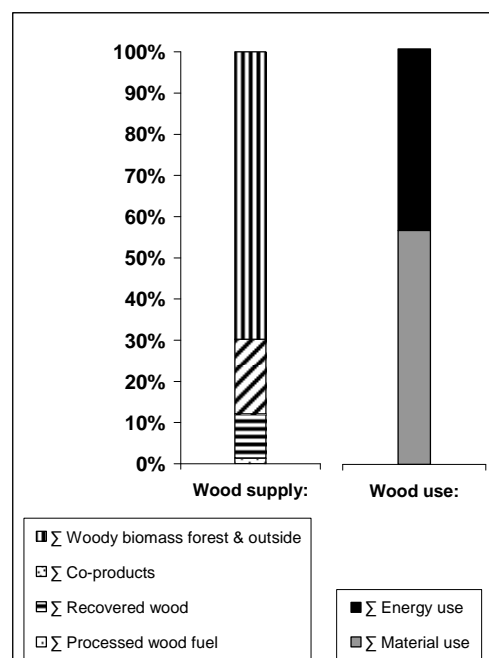
	(P)	1.000 m <sup>3</sup>	%		1.000 m <sup>3</sup>	%	Energy use:
Recovered wood for material & energy use	(P)	2 963	11%				(C) Power and heat

Supply processed wood fuel:

	(P+I-X)	1.000 m <sup>3</sup>	%		1.000 m <sup>3</sup>	%	Energy use:
Processed wood fuel	(P+I-X)	383	1%	44%	9 279	(C)	Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>		<b>27 698</b>		<b>Difference</b>		<b>21 266</b>		<b>Σ TOTAL USE</b>
				<b>6 432</b>				

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


**Wood supply and use - Italy (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	19 327	70%	56%	11 987	Σ Material use
Σ Co-products	5 024	18%	44%	9 279	Σ Energy use
Σ Recovered wood	2 963	11%			
Σ Processed wood fuel	383	1%			

**Italy (million m<sup>3</sup> o.b.):**

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

1990	1995	2000	2005
26.3	-	31.8	38.3

**Latvia****2005**

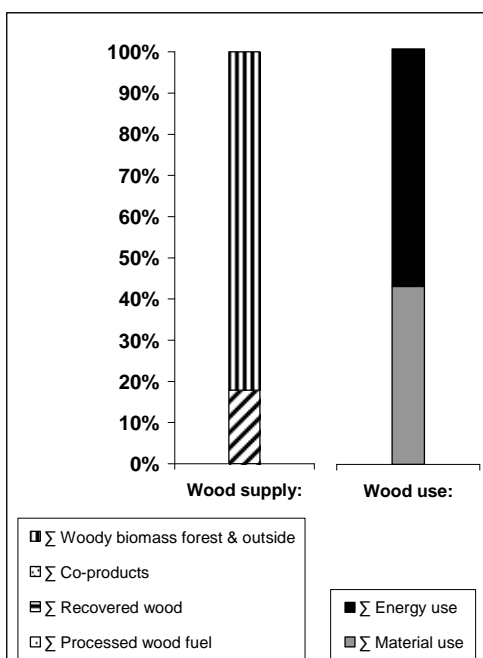
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	9 056	77%				
Industrial Roundwood - JFSQ	(P+I-X)	9 056	77%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			38%	6 940	(C)	Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	608	5%	4%	798	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)					(C)	Pulp industry
Bark	(P)					(C)	Processed wood fuel industry
Used logging residues	(P)					(C)	Other physical utilization
Woody biomass outside the forest	(P)						
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	2 109	18%				
Pulp production co-products	(P)						Energy use:
<b>Supply recovered wood:</b>							
Recovered wood for material & energy use	(P)					(C)	Power and heat
<b>Supply processed wood fuel:</b>							
Processed wood fuel	(P+I-X)			57%	10 301	(C)	Industrial internal Private households Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	11 772	<b>Difference</b>	18 039	<b>Σ TOTAL USE</b>
		6 266		

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

**Wood supply and use - Latvia (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	9 664	82%	43%	7 738	Σ Material use
Σ Co-products	2 109	18%	57%	10 301	Σ Energy use
Σ Recovered wood					
Σ Processed wood fuel					

Latvia (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
16.5	-	16.5	16.5

**Lithuania 2005**

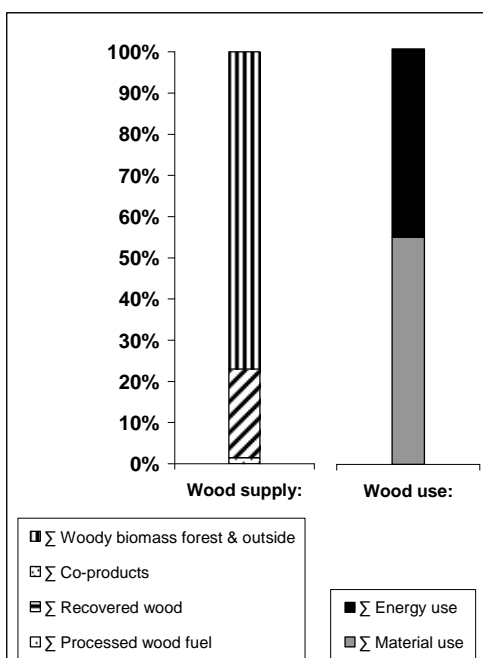
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1.000 m <sup>3</sup>	%		%	1.000 m <sup>3</sup>	(C)	
Industrial Roundwood - JFSQ	(P+I-X)	4 043	43%					Material use:
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	1 027	11%	37%		3 000	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	1 118	12%	7%		586	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	298	3%				(C)	Pulp industry
Bark	(P)	704	7%	4%		352	(C)	Processed wood fuel industry
Used logging residues	(P)	65	1%	6%		494	(C)	Other physical utilization
Woody biomass outside the forest	(P)							
<b>Supply by-products:</b>								
Chips, particles & wood residues	(P+I-X)	2 027	22%					Energy use:
Pulp production co-products	(P)							
<b>Supply recovered wood:</b>								
Recovered wood for material & energy use	(P)			10%		775	(C)	Power and heat
				5%		422	(C)	Industrial internal
<b>Supply processed wood fuel:</b>								
Processed wood fuel	(P+I-X)	141	1%	25%		2 012	(C)	Private households
				6%		458	(C)	Undifferentiated energy use

∑ SUPPLY TOTAL	9 423	<b>Difference</b>	8 098	∑ TOTAL USE
		1 324		

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

**Wood supply and use - Lithuania (2005)**

Wood supply:			Wood use:		
∑ Woody biomass forest & outside	7 254	77%	55%	4 432	∑ Material use
∑ Co-products	2 027	22%	45%	3 666	∑ Energy use
∑ Recovered wood					
∑ Processed wood fuel	141	1%			

Lithuania (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
-	-	9.0	9.9

**Luxembourg 2005**

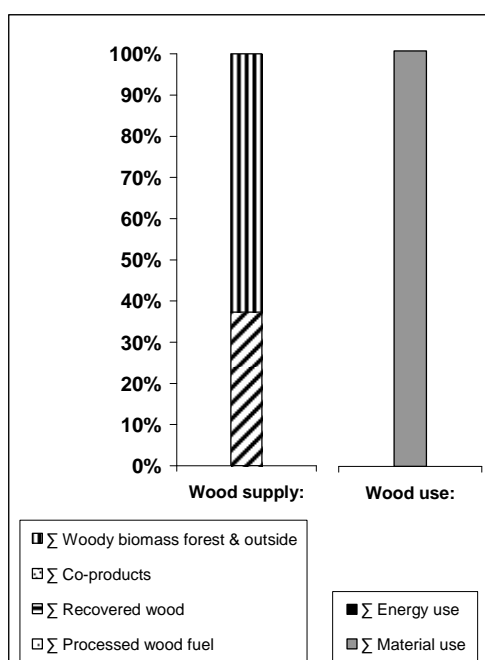
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	350	61%						
Industrial Roundwood - JFSQ	(P+I-X)	350	61%						
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	12	2%	56%	899	(C)			Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)			44%	709	(C)			Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)					(C)			Pulp industry
Bark	(P)					(C)			Processed wood fuel industry
Used logging residues	(P)					(C)			Other physical utilization
Woody biomass outside the forest	(P)								
<b>Supply by-products:</b>									
Chips, particles & wood residues	(P+I-X)	216	37%						
Pulp production co-products	(P)								Energy use:
<b>Supply recovered wood:</b>									
Recovered wood for material & energy use	(P)					(C)			Power and heat
<b>Supply processed wood fuel:</b>									
Processed wood fuel	(P+I-X)					(C)			Industrial internal
						(C)			Private households
						(C)			Undifferentiated energy use

Σ SUPPLY TOTAL	578	<b>Difference</b>	1 608	Σ TOTAL USE
		1 030		

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

**Wood supply and use - Luxembourg (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	363	63%	100%	1 608	Σ Material use
Σ Co-products	216	37%		0	Σ Energy use
Σ Recovered wood					
Σ Processed wood fuel					

Luxembourg (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
0.7	-	0.7	0.7

**Malta 2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

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

Supply by-products:

	(P+I-X)			Energy use:
Chips, particles & wood residues	(P+I-X)			
Pulp production co-products	(P)			

Supply recovered wood:

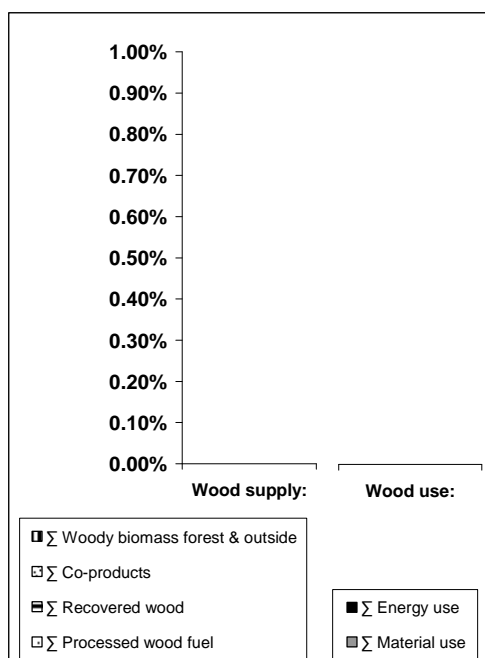
	(P)		(C)	Power and heat
Recovered wood for material & energy use	(P)		(C)	Industrial internal

Supply processed wood fuel:

	(P+I-X)		(C)	Private households
Processed wood fuel	(P+I-X)		(C)	Undifferentiated energy use

$\Sigma$ SUPPLY TOTAL	0	Difference	0	$\Sigma$ TOTAL USE
		0		

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

**Wood supply and use - Malta (2005)**

Wood supply:

$\Sigma$ Woody biomass forest & outside	#####
$\Sigma$ Co-products	#####
$\Sigma$ Recovered wood	#####
$\Sigma$ Processed wood fuel	#####

Wood use:

#####	0	$\Sigma$ Material use
#####	0	$\Sigma$ Energy use

Malta (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
-	-	-	-

**Netherlands**
**2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	750	16%				
Industrial Roundwood - JFSQ	(P+I-X)	750	16%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			6%	475	(C)	Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	263	6%	0%	22	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			6%	463	(C)	Pulp industry
Bark	(P)	125	3%	2%	180	(C)	Processed wood fuel industry
Used logging residues	(P)			9%	714	(C)	Other physical utilization
Woody biomass outside the forest	(P)						

Supply by-products:

Chips, particles & wood residues	(P+I-X)	1 928	40%				
Pulp production co-products	(P)	226	5%				Energy use:

Supply recovered wood:

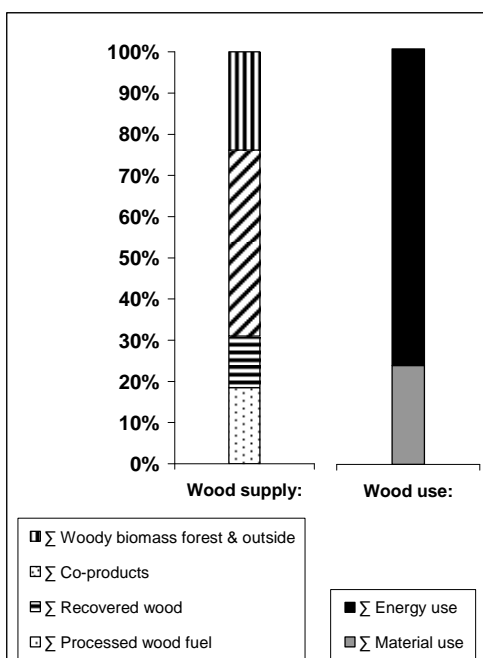
Recovered wood for material & energy use	(P)	600	13%	18%	1 400	(C)	Power and heat
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Supply processed wood fuel:

Processed wood fuel	(P+I-X)	880	18%	2%	150	(C)	Industrial internal
				5%	412	(C)	Private households
				51%	3 958	(C)	Undifferentiated energy use

Σ SUPPLY TOTAL	4 772	<b>Difference</b>	7 774	Σ TOTAL USE
		3 002		

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


**Wood supply and use - Netherlands (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	1 139	24%	24%	1 854	Σ Material use
Σ Co-products	2 154	45%	76%	5 920	Σ Energy use
Σ Recovered wood	600	13%			
Σ Processed wood fuel	880	18%			

**Netherlands (million m<sup>3</sup> o.b.):**

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

1990	1995	2000	2005
2.2	-	2.2	2.2

**Norway**
**2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)						
Industrial Roundwood - JFSQ	(P+I-X)	11 111	56%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			27%	5 139	(C)	Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	1 287	7%	4%	823	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	1 753	9%	37%	7 167	(C)	Pulp industry
Bark	(P)			0%	71	(C)	Processed wood fuel industry
Used logging residues	(P)			2%	336	(C)	Other physical utilization
Woody biomass outside the forest	(P)						

Supply by-products:

Chips, particles & wood residues	(P+I-X)	3 193	16%				
Pulp production co-products	(P)	2 016	10%				Energy use:

Supply recovered wood:

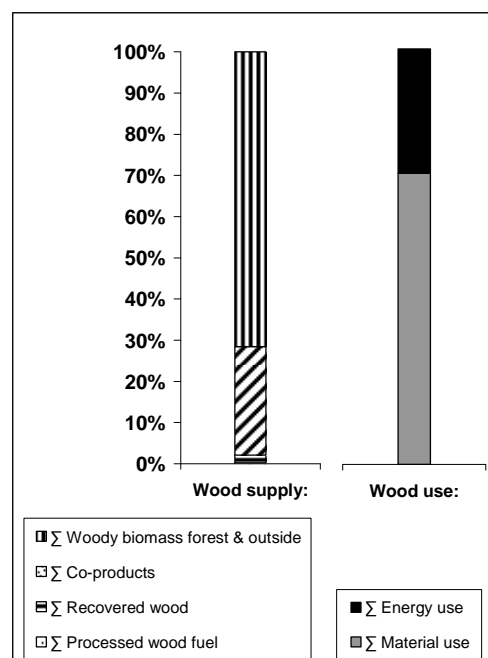
Recovered wood for material & energy use	(P)	369	2%	3%	595	(C)	Power and heat
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Supply processed wood fuel:

Processed wood fuel	(P+I-X)	41	0%	16%	3 167	(C)	Private households
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<b>Σ SUPPLY TOTAL</b>		<b>19 770</b>		<b>Difference</b>	<b>19 308</b>		<b>Σ TOTAL USE</b>
				<b>462</b>			

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


**Wood supply and use - Norway (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	14 151	72%	70%	13 535	Σ Material use
Σ Co-products	5 209	26%	30%	5 773	Σ Energy use
Σ Recovered wood	369	2%			
Σ Processed wood fuel	41	0%			

**Norway (million m<sup>3</sup> o.b.):**

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

1990	1995	2000	2005
20.1	-	22.7	24.0

**Poland****2005**

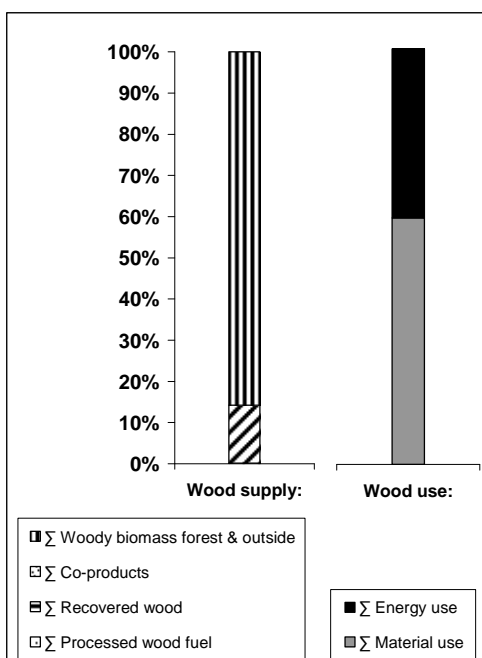
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)							
Industrial Roundwood - JFSQ	(P+I-X)	29 982	73%					
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	1 194	3%	32%	17 500	(C)	Material use:	
Fuelwood - JFSQ	(P+I-X)	3 404	8%	18%	9 837	(C)	Sawmill industry	
Fuelwood - Maximum difference unreported to JFSQ	(P)			7%	3 847	(C)	Panel industry	
Bark	(P)			1%	333	(C)	Pulp industry	
Used logging residues	(P)	227	1%	2%	987	(C)	Processed wood fuel industry	
Woody biomass outside the forest	(P)	636	2%				Other physical utilization	
<b>Supply by-products:</b>								
Chips, particles & wood residues	(P+I-X)	3 916	9%					
Pulp production co-products	(P)	1 888	5%					
<b>Supply recovered wood:</b>								
Recovered wood for material & energy use	(P)	31	0%	5%	2 885	(C)	Power and heat	
<b>Supply processed wood fuel:</b>								
Processed wood fuel	(P+I-X)	17	0%	9%	4 800	(C)	Industrial internal	
				1%	525	(C)	Private households	
				26%	14 076	(C)	Undifferentiated energy use	

<b>Σ SUPPLY TOTAL</b>	41 294	<b>Difference</b>	54 790	<b>Σ TOTAL USE</b>
		13 496		

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



<b>Wood supply and use - Poland (2005)</b>			
<b>Wood supply:</b>		<b>Wood use:</b>	
Σ Woody biomass forest & outside	35 442	86%	59%
Σ Co-products	5 804	14%	41%
Σ Recovered wood	31	0%	
Σ Processed wood fuel	17	0%	
			Σ Material use
			Σ Energy use

Poland (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
-	-	-	67.6



**Portugal 2005**

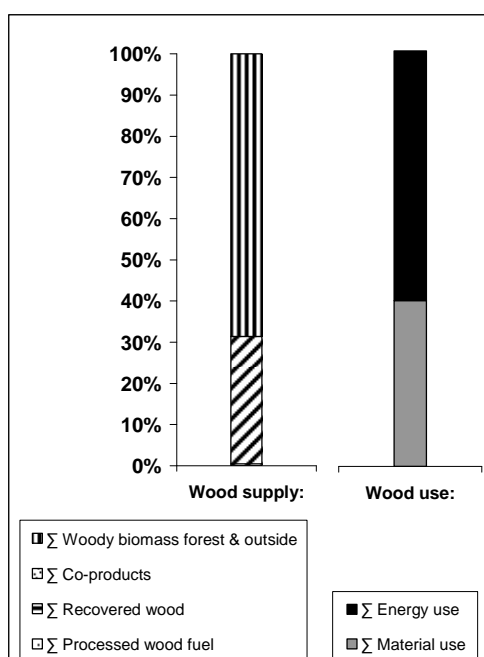
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1.000 m <sup>3</sup>	%		%	1.000 m <sup>3</sup>	
Industrial Roundwood - JFSQ	(P+I-X)	9 234	64%				Material use:
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			7%		1 673 (C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	595	4%	8%		1 793 (C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			25%		5 881 (C)	Pulp industry
Bark	(P)					(C)	Processed wood fuel industry
Used logging residues	(P)					(C)	Other physical utilization
Woody biomass outside the forest	(P)						
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	1 685	12%				
Pulp production co-products	(P)	2 749	19%				Energy use:
<b>Supply recovered wood:</b>							
Recovered wood for material & energy use	(P)	61	0%			(C)	Power and heat
<b>Supply processed wood fuel:</b>							
Processed wood fuel	(P+I-X)			60%		14 075 (C)	Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	14 325	<b>Difference</b>	23 421	<b>Σ TOTAL USE</b>
		9 097		

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



Wood supply and use - Portugal (2005)			
<b>Wood supply:</b>			
Σ Woody biomass forest & outside	9 829	69%	
Σ Co-products	4 434	31%	
Σ Recovered wood	61	0%	
Σ Processed wood fuel			
<b>Wood use:</b>			
40%	9 347	Σ Material use	
60%	14 075	Σ Energy use	

 Portugal (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
-	-	12.9	-

**Romania****2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	11 787	66%					Material use:
Industrial Roundwood - JFSQ	(P+I-X)	11 787	66%					
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	241	1%	27%	7 021	(C)		Sawmill industry
Fuelwood - JFSQ	(P+I-X)	2 662	15%	6%	1 629	(C)		Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			2%	565	(C)		Pulp industry
Bark	(P)	869	5%			(C)		Processed wood fuel industry
Used logging residues	(P)					(C)		Other physical utilization
Woody biomass outside the forest	(P)							

Supply by-products:

Chips, particles & wood residues	(P+I-X)	1 920	11%					
Pulp production co-products	(P)	294	2%					Energy use:

Supply recovered wood:

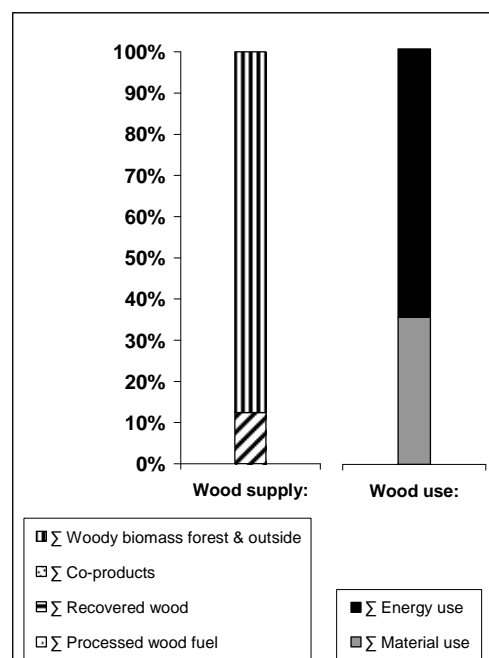
Recovered wood for material & energy use	(P)					(C)		Power and heat
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Supply processed wood fuel:

Processed wood fuel	(P+I-X)			64%	16 739	(C)		Undifferentiated energy use
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<b>Σ SUPPLY TOTAL</b>		<b>17 773</b>		<b>Difference</b>	<b>25 954</b>			<b>Σ TOTAL USE</b>
				<b>8 181</b>				

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

**Wood supply and use - Romania (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	15 559	88%	36%	9 215	Σ Material use
Σ Co-products	2 214	12%	64%	16 739	Σ Energy use
Σ Recovered wood					
Σ Processed wood fuel					

Romania (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
32.1	-	34.6	34.6

**Slovakia 2005**

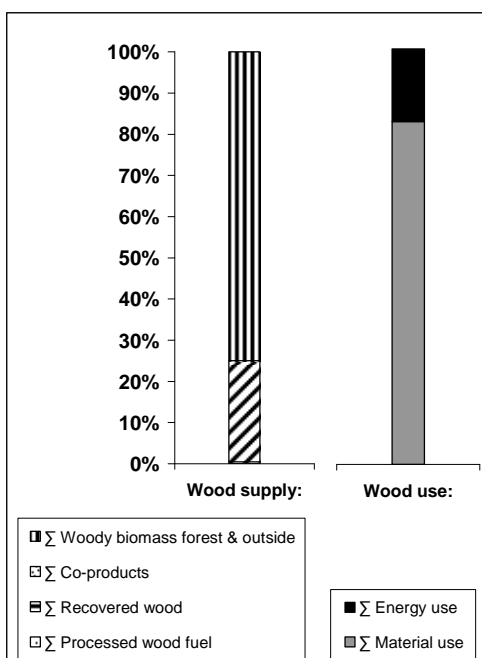
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	7 369	71%				
Industrial Roundwood - JFSQ	(P+I-X)	7 369	71%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			43%	4 302	(C)	Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	178	2%	14%	1 381	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			26%	2 593	(C)	Pulp industry
Bark	(P)	150	1%	0%	40	(C)	Processed wood fuel industry
Used logging residues	(P)	10	0%			(C)	Other physical utilization
Woody biomass outside the forest	(P)	30	0%				
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	2 055	20%				
Pulp production co-products	(P)	470	5%				Energy use:
<b>Supply recovered wood:</b>							
Recovered wood for material & energy use	(P)	50	0%			(C)	Power and heat
<b>Supply processed wood fuel:</b>							
Processed wood fuel	(P+I-X)			17%	1 760	(C)	Industrial internal Private households Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	10 313	<b>Difference</b>	10 076	<b>Σ TOTAL USE</b>
		237		

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

**Wood supply and use - Slovakia (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	7 737	75%	83%	8 316	Σ Material use
Σ Co-products	2 526	24%	17%	1 760	Σ Energy use
Σ Recovered wood	50	0%			
Σ Processed wood fuel					

Slovakia (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
10.2	-	11.7	12.0

**Slovenia 2005**

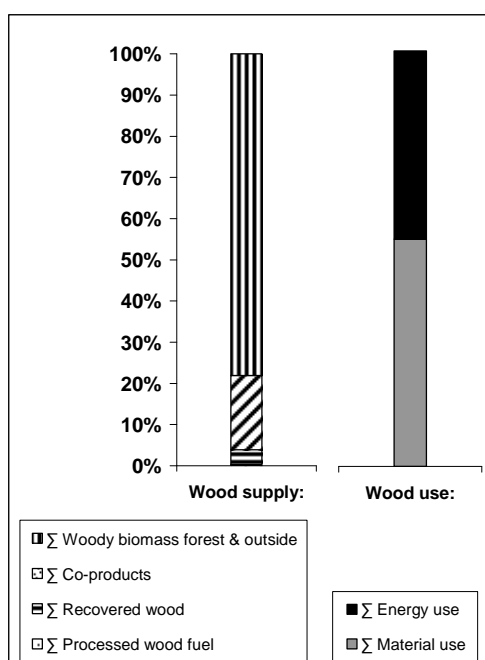
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1 924	46%						
Industrial Roundwood - JFSQ	(P+I-X)	1 924	46%						
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	85	2%	26%	1 410	(C)			Sawmill industry
Fuelwood - JFSQ	(P+I-X)	808	19%	15%	786	(C)			Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			11%	565	(C)			Pulp industry
Bark	(P)			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%						
<b>Supply by-products:</b>									
Chips, particles & wood residues	(P+I-X)	456	11%						
Pulp production co-products	(P)	294	7%						
<b>Supply recovered wood:</b>									
Recovered wood for material & energy use	(P)	149	4%	1%	28	(C)			Power and heat
<b>Supply processed wood fuel:</b>									
Processed wood fuel	(P+I-X)	12	0%	10%	531	(C)			Industrial internal
				31%	1 655	(C)			Private households
				4%	218	(C)			Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>		4 163		<b>Difference</b>		5 367		<b>Σ TOTAL USE</b>
				1 204				

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



Wood supply and use - Slovenia (2005)					
<b>Wood supply:</b>			<b>Wood use:</b>		
Σ Woody biomass forest & outside	3 252	78%	55%	2 935	Σ Material use
Σ Co-products	750	18%	45%	2 431	Σ Energy use
Σ Recovered wood	149	4%			
Σ Processed wood fuel	12	0%			

Slovenia (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
5.1	-	6.5	7.3

**Spain**
**2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	16 788	57%				
Industrial Roundwood - JFSQ	(P+I-X)	16 788	57%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			17%	7 116	(C)	Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	2 105	7%	17%	7 260	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			14%	6 104	(C)	Pulp industry
Bark	(P)			0%	33	(C)	Processed wood fuel industry
Used logging residues	(P)					(C)	Other physical utilization
Woody biomass outside the forest	(P)						

Supply by-products:

Chips, particles & wood residues	(P+I-X)	5 454	19%				
Pulp production co-products	(P)	2 880	10%				Energy use:

Supply recovered wood:

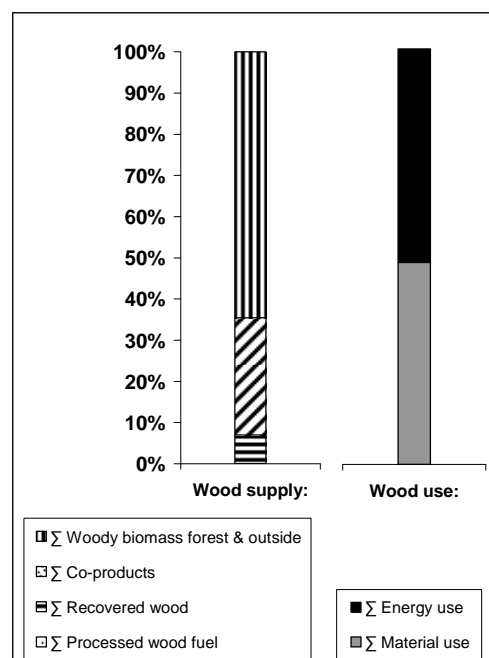
Recovered wood for material & energy use	(P)	2 040	7%			(C)	Power and heat
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Supply processed wood fuel:

Processed wood fuel	(P+I-X)			51%	21 649	(C)	Undifferentiated energy use
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<b>Σ SUPPLY TOTAL</b>		<b>29 267</b>		<b>Difference</b>	<b>42 162</b>		<b>Σ TOTAL USE</b>
				<b>12 895</b>			

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


**Wood supply and use - Spain (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	18 893	65%	49%	20 514	Σ Material use
Σ Co-products	8 334	28%	51%	21 649	Σ Energy use
Σ Recovered wood	2 040	7%			
Σ Processed wood fuel					

 Spain (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
-	-	28.6	-

**Sweden 2005**

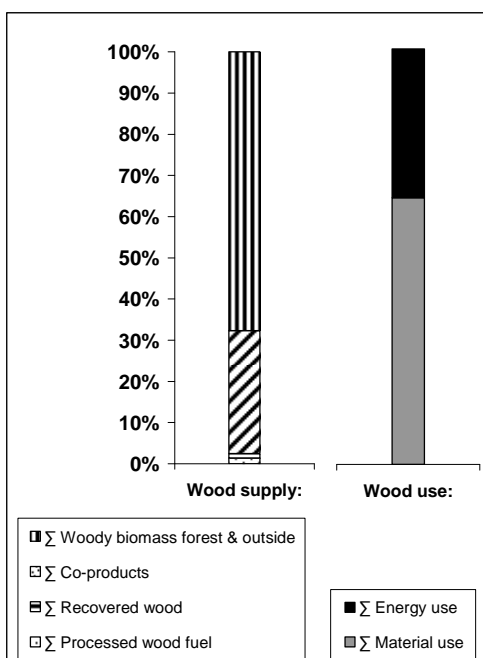
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1.000 m <sup>3</sup>	%		1.000 m <sup>3</sup>	(C)	Material use:
Industrial Roundwood - JFSQ	(P+I-X)	69 276	51%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			27%	36 000	(C)	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	6 135	5%	1%	1 113	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			35%	46 605	(C)	Pulp industry
Bark	(P)	9 699	7%	1%	1 600	(C)	Processed wood fuel industry
Used logging residues	(P)	6 000	4%			(C)	Other physical utilization
Woody biomass outside the forest	(P)						
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	18 920	14%				
Pulp production co-products	(P)	21 325	16%				
<b>Supply recovered wood:</b>							
Recovered wood for material & energy use	(P)	1 450	1%	8%	10 995	(C)	Power and heat
				15%	19 458	(C)	Industrial internal
<b>Supply processed wood fuel:</b>							
Processed wood fuel	(P+I-X)	1 836	1%	7%	8 923	(C)	Private households
				6%	8 313	(C)	Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	134 642	<b>Difference</b>	133 008	<b>Σ TOTAL USE</b>
		1 634		

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



Wood supply and use - Sweden (2005)						
<b>Wood supply:</b>			<b>Wood use:</b>			
Σ Woody biomass forest & outside	91 110	68%	64%	85 318	Σ Material use	
Σ Co-products	40 245	30%	36%	47 690	Σ Energy use	
Σ Recovered wood	1 450	1%				
Σ Processed wood fuel	1 836	1%				

Sweden (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
90.2	-	90.7	91.4

**Switzerland**
**2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)						
Industrial Roundwood - JFSQ	(P+I-X)	2 824	42%				
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			30%	2 642	(C)	Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	1 219	18%	17%	1 487	(C)	Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			10%	897	(C)	Pulp industry
Bark	(P)	210	3%			(C)	Processed wood fuel industry
Used logging residues	(P)	500	8%	0%	29	(C)	Other physical utilization
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	(P)	334	5%				Energy use:

Supply recovered wood:

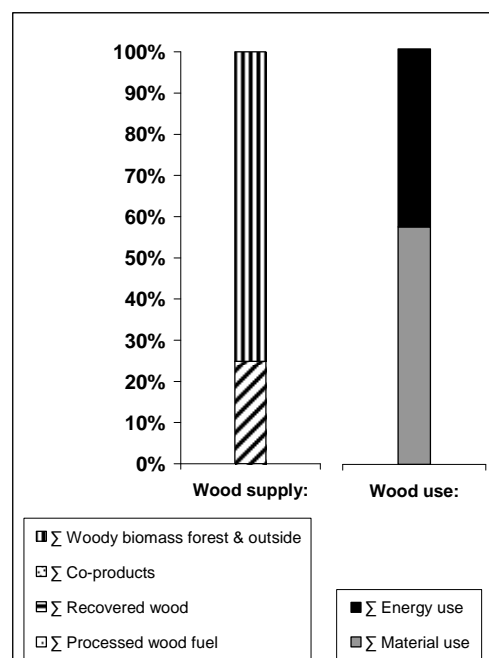
Recovered wood for material & energy use	(P)			26%	2 268	(C)	Power and heat
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Supply processed wood fuel:

Processed wood fuel	(P+I-X)			3%	224	(C)	Industrial internal
				15%	1 293	(C)	Private households
				0%	0	(C)	Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>		<b>6 646</b>		<b>Difference</b>		<b>8 840</b>	<b>Σ TOTAL USE</b>
				<b>2 194</b>			

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


**Wood supply and use - Switzerland (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	4 993	75%	57%	5 056	Σ Material use
Σ Co-products	1 654	25%	43%	3 785	Σ Energy use
Σ Recovered wood					
Σ Processed wood fuel					

**Switzerland (million m<sup>3</sup> o.b.):**

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

1990	1995	2000	2005
-	-	9.0	-

## United Kingdom 2005

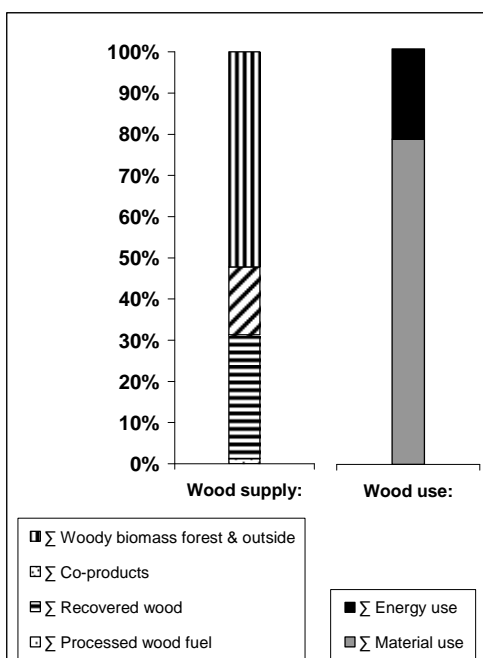
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

Industrial Roundwood - JFSQ	(P+I-X)	8 122	50%			Material use:	
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			37%	5 250		(C) Sawmill industry
Fuelwood - JFSQ	(P+I-X)	126	1%	30%	4 229		(C) Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	1	0%	6%	814		(C) Pulp industry
Bark	(P)	200	1%	1%	200		(C) Processed wood fuel industry
Used logging residues	(P)			3%	466		(C) Other physical utilization
Woody biomass outside the forest	(P)						
<b>Supply by-products:</b>							
Chips, particles & wood residues	(P+I-X)	2 677	17%			Energy use:	
Pulp production co-products	(P)						
<b>Supply recovered wood:</b>							
Recovered wood for material & energy use	(P)	4 872	30%	2%	258	(C) Power and heat	
<b>Supply processed wood fuel:</b>							
Processed wood fuel	(P+I-X)	200	1%	4%	491	(C) Industrial internal	
				5%	684	(C) Private households	
				11%	1 610	(C) Undifferentiated energy use	

<b>Σ SUPPLY TOTAL</b>		16 198	<b>Difference</b>	14 003	<b>Σ TOTAL USE</b>
			2 195		

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



### Wood supply and use - United Kingdom (2005)

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	8 449	52%	78%	10 960	Σ Material use
Σ Co-products	2 677	17%	22%	3 043	Σ Energy use
Σ Recovered wood	4 872	30%			
Σ Processed wood fuel	200	1%			

**United Kingdom (million m<sup>3</sup> o.b.):**

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

1990	1995	2000	2005
18.0	-	20.7	20.7



## **Wood resource balances from Serbia and Turkey**

The authors would like to express their gratitude to country correspondents from Serbia and Turkey for sending a complete national wood resource balance 2005 during the review process.

Each of the two countries' balances is based upon a single estimate. This contrasts with all other countries' balances which are based upon a common selection of energy and forestry statistics' databases. Due to different underlying data framework these balances can not be included in the overall presentation and assessment of the report. Further the dataset has not been subject to any consistency check and is published as submitted by correspondents.

The presented balances are excellent food for thought for launching discussion on wood flows at national level. It is an excellent starting point for assessing the "real" situation of wood supplies and uses at national level.

Subsequent discussions should involve stakeholders from forestry and energy sector and should take all viewpoints of the cross-sectoral issue into consideration. Empiric research (e.g. households' surveys) will help finding or improving information on weak or blank areas (post consumer recovered wood, fuelwood use by private households).

The authors would like to encourage other countries of the UNECE region to draft national wood resource balances to improved discussion between all sectors involved.

**Serbia****2005**

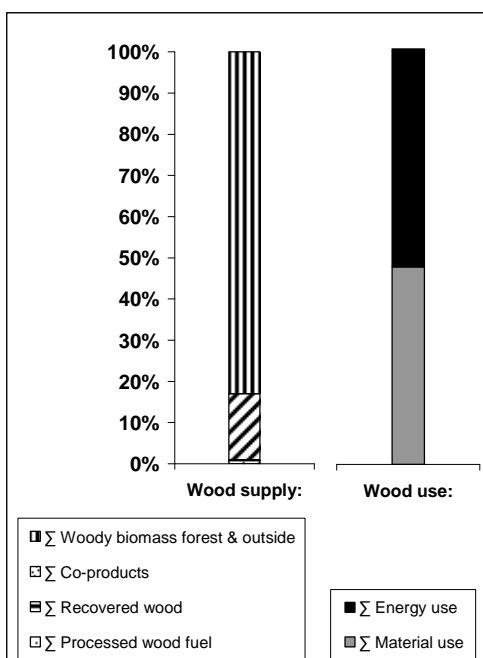
1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)	1 168	30%						
Industrial Roundwood - JFSQ	(P+I-X)	1 168	30%						
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)			32%	976	(C)			Material use: Sawmill industry
Fuelwood - JFSQ	(P+I-X)	1 589	41%	3%	94	(C)			Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)			4%	123	(C)			Pulp industry
Bark	(P)	98	3%	1%	38	(C)			Processed wood fuel industry
Used logging residues	(P)	330	9%	7%	210	(C)			Other physical utilization
Woody biomass outside the forest	(P)	15	0%						
<b>Supply by-products:</b>									
Chips, particles & wood residues	(P+I-X)	507	13%						
Pulp production co-products	(P)	111	3%						Energy use:
<b>Supply recovered wood:</b>									
Recovered wood for material & energy use	(P)	10	0%			(C)			Power and heat
<b>Supply processed wood fuel:</b>									
Processed wood fuel	(P+I-X)	29	1%	52%	1 589	(C)			Industrial internal Private households Undifferentiated energy use

<b>Σ SUPPLY TOTAL</b>	<b>3 857</b>	<b>Difference</b>	<b>3 030</b>	<b>Σ TOTAL USE</b>
		<b>827</b>		

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

**Wood supply and use - Serbia (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	3 200	83%	48%	1 441	Σ Material use
Σ Co-products	618	16%	52%	1 589	Σ Energy use
Σ Recovered wood	10	0%			
Σ Processed wood fuel	29	1%			

**Serbia (million m<sup>3</sup> o.b.):**

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

1990	1995	2000	2005
5.6	-	5.2	5.2

**Turkey**
**2005**

1.000 m <sup>3</sup>	%	%	1.000 m <sup>3</sup>
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Supply from forest &amp; woody biomass outside the forest:

	(P+I-X)							
Industrial Roundwood - JFSQ	(P+I-X)	26 320	66%					
Industrial Roundwood - Maximum difference unreported to JFSQ	(P)	700	2%	28%	8 578	(C)	Material use:	Sawmill industry
Fuelwood - JFSQ	(P+I-X)	5 319	13%	25%	7 536	(C)		Panel industry
Fuelwood - Maximum difference unreported to JFSQ	(P)	3 510	9%	4%	1 094	(C)		Pulp industry
Bark	(P)					(C)		Processed wood fuel industry
Used logging residues	(P)			6%	1 700	(C)		Other physical utilization
Woody biomass outside the forest	(P)	1 300	3%					

Supply by-products:

Chips, particles & wood residues	(P+I-X)	2 992	7%					
Pulp production co-products	(P)						Energy use:	

Supply recovered wood:

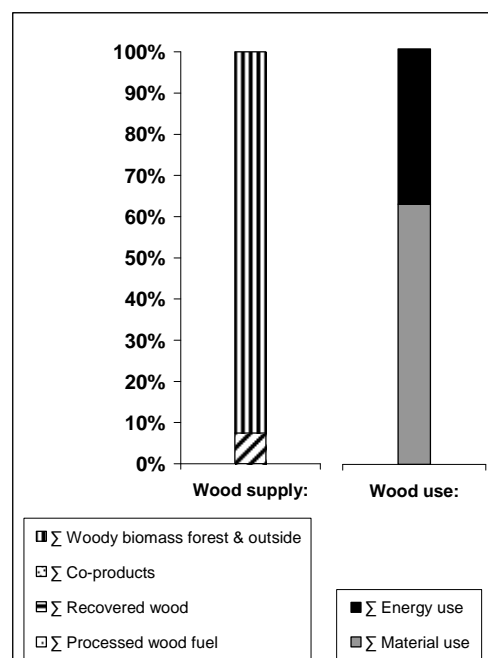
Recovered wood for material & energy use	(P)					(C)	Power and heat
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Supply processed wood fuel:

Processed wood fuel	(P+I-X)			37%	11 270	(C)	Undifferentiated energy use
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<b>Σ SUPPLY TOTAL</b>		<b>40 141</b>		<b>Difference</b>	<b>30 178</b>		<b>Σ TOTAL USE</b>
				<b>9 963</b>			

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


**Wood supply and use - Turkey (2005)**

Wood supply:			Wood use:		
Σ Woody biomass forest & outside	37 149	93%	63%	18 908	Σ Material use
Σ Co-products	2 992	7%	37%	11 270	Σ Energy use
Σ Recovered wood					
Σ Processed wood fuel					

 Turkey (million m<sup>3</sup> o.b.):

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

1990	1995	2000	2005
32.7	-	35.0	36.6