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of the Forestry - Wood Chain

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PU	Public	
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RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

MANUAL FOR DATA COLLECTION FOR (REGIONAL) CASES

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INTRODUCTION

This paper is undertaken according to decisions by the Indicator Task Force at the meeting in Vienna, 23-24 August and Brussels 3-4 October 2007, in order to support participating EFORWOOD scientists in their data collection for regional cases.

SCOPE AND OBJECTIVE OF THE MANUAL

The manual is directed to the data collection groups on Energy, Environment, Socio-Economics, Transport and Waste in order to support their members to design data collection forms for the indicators to be considered in regional case studies. The main idea is to have a common format for each indicator regarding measurement units, boundaries, recommendation and sources and means to procure and calculate values on indicators. There are also spaces for module specific recommendations and key definitions that should be considered in order to have a defined data quality.

GENERAL APPROACH/RULES AND DEFINITIONS

In order to have a smooth operation of ToSIA, there are some general rules valid for data collection in general:

- One **measurement unit** per indicator and subclass per processes. All indicators included in the indicator framework have defined measurement units e.g. the measurement unit for the production cost indicator is **€.**
- One **reporting unit** per process. In M2 the indicators are reported per ha and year, and in M3 to M5 there are several reporting units (M2: ha*yr; M3-M5: m^3 or tons). The indicators are calculated per unit of input material flow (the so called **reporting unit)**. In ToSIA, indicators are linked to the material input flow of the process in the selected FWC to calculate the indicator value. E.g. The production cost indicator (subclass labour cost) is calculated for the process transportation of pellets to home scale use; - input material flow to this process = tons of pellets; - the measurement unit of the indicator = €;- the labour cost of transportation is 2,7 €/ton of pellets. The **reporting unit** in our example **per tons of pellets**
- Not explicitly covered in this protocol is the internal **reference unit** used in ToSIA is one ha for Module 2, forest resource management, and one ton of C content in the wood or wood product for all other processes of the project modules 3-5. The reference unit (ha in M2 and Tons of carbon in M3-M5) is the information carrier in ToSIA, is used internally by the application.
- As especially in M3-M5 the indicators may be reported with different reporting units (x/m3 or x/t of a product), **conversion factors** are required to convert the reporting units in the database to the reference unit "tons of C content" and vice versa. Each individual product needs a conversion factor.
- If data for a specific indicator is missing, set data availability **not applicable** in case the indicator does not make sense, (- example biodiversity in M4) or set a **zero (0)** value to indicator, if by a change of system (e.g. technical scenario) it could be something else than 0.
- If the indicator is relevant and exact data is missing, **a rough estimate** ("expert opinion") is to be preferred instead of a missing value.
- The presentation of Aske Skovmand Bosselmand available at the link below gives valuable advices for indicators (1), (2), (8), and (9) http://87.192.2.59/Eforwood/DesktopDefault.aspx?tabindex=-1&tabid=598

Many times there are data at hand, but the issue is rather to exercise priorities in procuring them. A practical way is to identify a dominant or comparable system, e.g. technical or biological, which usually have comprehensive data with defined origin and quality. The rationale for this consideration is the dominant or comparable system exists because it is economically, technically and socially viable. Competitive systems should have similar properties etc. that are satisfactory for the parties. In order to aid the EFORWOOD scientist in finding data, three clusters of data availability are exemplified and identified here below. These can be selected, individually per subclass, for

recommendations by the data collection groups or for data collection by the EFORWOOD scientist performing the collection.

A. Specific and empirical

- follow up routines from enterprises
- data from experiments or scientific measurements
- branch statistics.

B. Generic and derived

- official statistics
- weighting or scaling factors relevant for adaption of generic data to specific data for the actual case. E.g. average data of costs per cutting form (final felling/thinning) is adapted to the case in question with the aid of case specific shares of cutting forms.

C. Model-based and estimated

- modelling; e.g. harvest costs and time use model.
- experts' judgement.

The final procurement of data to indicators for a process, may involve a combination of cluster categories.

DATA COLLECTION PROTOCOL PER RELEVANT INDICATOR

(1) Gross value added

Full name of indicator (including subclasses):	Gross value added (GVA) at factor cost and contribution to gross domestic product
Name of subclass	1.1 Gross value added (at factor cost) by [processes within each module (M2-M5)]
Measurement units:	1.1 In € per reporting unit.
System Boundaries	Only prices of inputs and outputs used to produce the specified outputs of a given process are to be included, e.g. avoid including transportation if modeled independently in subsequent processes. This implicitly defines a system boundary.
Possible data source	Current situation (test chains): data collection by modules for each process. Future potential data providers: Eurostat, UN World bank, National Statistics Office. At process level: national organizations of foresters, industry, etc. at national level. In some cases, such organizations compile reliable statistics and estimates.
Calculation mode (incl. conversion factors)	GVA at factor cost = GVA at basic prices – taxes on production + subsidies on production Gross value added at factor cost can be derived from Gross Value Added at basic prices by subtracting indirect taxes and adding subsidies on producer's production. From the point of view of the producer, purchaser's prices for inputs and basic prices for outputs represent the prices actually paid and received. Gross value added is an unduplicated measure of output in which the values of the goods and services used as intermediate inputs are eliminated from the value of output. The production process itself can be described by a vector of the quantities of goods and services consumed or produced in which inputs carry a negative sign. By associating a price vector with this quantity vector, gross value added is obtained as the inner product of two vectors.

	Example: Let q = the N × 1 vector quantities consumed (negative sign) or produced p = the 1 × N vector of prices, Then, Gross Value Added (GVA) = pq (N × N) When p corresponds to basic prices – taxes on production + subsidies on production External effects (noise, GHG, waste, emissions to air) are not usually included in the GVA because they are not internalised by the companies. Externalities will be handled related to the relevant indicators in CBA separately. In addition, some externalities are covered in the environmental indicators. The value added from a company's point of view is in practice the sales revenue minus costs = the company's profits. As depreciation is not taken into account, the appropriate item would be the company's EBITDA (earnings before interest, tax, depreciation and amortization), found in P&L statement.
Module specifications / recommendations	For each process in the forest (M2) that hands over volume for harvesting in a subsequent harvesting process (M3), we do the following: In the M2-process *Report* as part of GVA an *income corresponding to stumpage value* of an output called 'Assigned for thinning' or 'Assigned for Final harvest' etc. In M3: The harvesting process *must report a corresponding cost* under 'GVA' and 'Production cost', where the cost represents raw material – wood – as an input (stumpage price reported in M2). In M3 an *income* is reported in the GVA once a transport process delivers the wood at mill, pulp factory or wood furnace. The benefits of this approach are: a) Stumpage value is reported by M2 reflecting the value added in this module, b) counting stumpage value as a cost happens only in one type of process (harvesting), c) price at mill etc may be different (usually higher) than stumpage price. This represents a value added produced by the re-allocation in space. With this approach, this value-added accrues to M3 as it should.

	Costs of planting, tending etc in M2 is otherwise accounted for usual in the relevant process. GVA in consumption: 0 GVA for wholesalers use EBITDA (earnings before interest, tax, depreciation and amortization), found in P&L statement. This should apply for wholesalers as well as anyone. The data for public wholesalers is publicly available e.g. in companies' web sites, from which a representative figure can be formed. For countries where there are no public wholesalers, the figures should be estimated using near by countries' figures. (See Calculation mode). For transport see annex 1.
Key definitions	**Value added at factor cost:** It can be calculated from turnover, plus capitalized production, plus other operating income, plus or minus the changes in stocks, minus the purchases of goods and services, minus other taxes on products which are linked to turnover but not deductible, minus the duties and taxes linked to production. **Turnover** comprises the totals invoiced by the observation unit during the reference period, and this corresponds to market sales of goods or services supplied in third parties. Turnover includes all duties and taxes on the goods or services invoiced by the unit with the exception of the VAT invoiced by the unit with the exception of the VAT vis-à-vis its customer and other similar deductible taxes directly linked to turnover. It also includes all other charges (transport, packaging, etc.) passed on the customer, even if theses charges are listed separately in the invoice. Reduction in prices rebates and discounts as well as the value of returned packing must be deducted. Income classified as other operating income, financial income and extra-ordinary income in company accounts is excluded from turnover. Operating subsidies received from public authorities or the institutions of the European Union are also excluded. (Eurostat definition) **Gross Value Added (GVA):** is defined as the value of all newly generated goods and services less the value of all goods and services consumed as intermediate consumption. The depreciation of fixed assets is not taken into account. (Eurostat definition)

Space for example

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(2) Production cost

Full name of indicator (including subclasses):	Average production cost and share of cost of wood-based materials
Name of subclass	2.1 Average cost [by processes within each Module (M2-M5).] 2.1.1. raw material from FWC 2.1.2. raw material from outside FWC 2.1.3. labour 2.1.4 energy (e.g. fuel costs in case of transportation) 2.1.5 other productive costs (maintenance, general industrial costs, administrative costs, sales expenditures, etc) 2.1.6 non-productive costs (corporate taxes, capital charges, VAT and any other taxes or charges) 2.2 Share of cost of wood-based materials
Measurement units:	2.1. In € per reporting unit 2.2. In % of average production cost
System Boundaries	• Marketed non-timber food products (NTFP) and marketed services (e.g. recreation)-only the most important ones should be included. See in addition the indicator *Total production(7)* • Insurance costs are of significant importance especially in M2 and M3. Therefore, they should be included provided they can be identified and their share in total costs is significant. • Non-operating costs, such as, administration costs, leasing rental fees, etc. are included. • The costs associated with the services and processes not directly related to a product (e.g. administration of companies, maintenance of machinery, etc.) should also be included.
Possible data source	Current situation (test chains): data collection by modules for each process Future potential data providers: data collection by modules for each process At process level, good information may also be found be the national organizations of foresters, industry, etc. at national level. In some cases, such organizations compile reliable statistics and estimates of e.g. production costs.

Calculation mode (incl. conversion factors)	Costs under items 2.1.1-2.1..5 should be excluding VAT and other indirect taxes, which are accounted for in (f). Possible deviations from the proposed method should be reported. All the costs should be reported in nominal values whenever possible. "Raw material costs" for services? - Zero, if no costs were incurred.
Module specifications / recommendations	M3: Transport cost is not isolated, but is allocated among different cost categories. The costs of fuel are counted as energy costs. For transport see Annex 1.
Key definitions	**Labour cost** is the cost incurred by the employer in the employment of labour. The statistical concept of labour cost comprises remuneration for work performed, payments in respect of time paid for but not worked, bonuses and gratuities, the cost of food, drink and other payments in kind, cost of workers' housing borne by employers, employers' social security expenditures, cost to the employer for vocational training, welfare services and miscellaneous items, such as transport of workers, work clothes and recruitment, together with taxes regarded as labour cost. (Source: ILO statistics at http://laborsta.ilo.org/applv8/data/c6e.html). Distinction between cost and price – in M3 the costs of cutting the wood is usually lower than the price of wood in the market. - Include the costs of cutting the wood. Reported price usually includes VAT, which is deductible by the next refiner in the chain (and the price-VAT becomes his/her cost). The next producer however actually pays a positive amount of VAT, provided that his/hers value added is positive. Only the last in the chain (consumer) actually pays all of the VAT, which is why his/hers costs should include VAT, i.e. the cost would be the price of the product sold by the previous producer.

Space for example

Remarks: See Annex 2.

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(4) Resource use, incl. recycled material

N.B - This indicator is not intended for data collection thus printed in grey!

Full name of indicator (including subclasses):	Use of renewable and non-renewable materials, classified by virgin and recycled material
Name of subclass	4.1. Volume of renewable materials in total, of which 4.1.1. Wood-based material in total, classified into 4.1.1.1. of virgin origin 4.1.1.2. of recycled origin 4.1.2. Other renewable materials in total, classified into 4.1.2.1. of virgin origin 4.1.2.2. of recycled origin 4.2 . Volume of non-renewable materials in total, of which: 4.2.1 of virgin origin 4.2.2 recycled origin
Measurement units:	Kg per reporting unit
System Boundaries	Forest nurseries are included
Possible data source	
Calculation mode (incl. conversion factors)	This indicator is calculated in ToSIA. Data collection needs are not part of indicator data reporting. Instead, ToSIA derives the necessary information from material flow at the M2/M3 boundary plus the input products entering the FWC from outside system boundaries in M3-M5. For the calculation of the indicator sub-classes in ToSIA it is essential that input products are classified according to the subclasses listed above.
Module specifications / recommendations	
Key definitions	**Recovery** is defined as any waste management operation that diverts a waste material from the waste stream and which results in a certain product with a potential economic or ecological benefit. Recovery mainly refers to the following operations: -material recovery, i.e. recycling -energy recovery, i.e. re-use a fuel -biological recovery, e.g. composting -re-use

	Direct recycling or reuse within industrial plants at the place of generation is excluded. (Eurostat/OECD Definition) **Recycling** is defined as any reprocessing of material in a production process that diverts it from the waste stream, except reuse as fuel. Both reprocessing as the same type of product, and for different purposes should be included. Direct recycling within industrial plants at the place of generation should be excluded. (Eurostat/OECD Definition) **Re-use** shall mean any operation by which end of life products and equipment (e.g. electrical and electronic equipment) or its components are used for the same purpose for which they were conceived. Direct reuse at the place of generation (i.e. establishment) is excluded. (Eurostat/OECD Definition)

Space for example

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(7) Total Production

N.B - This indicator is not intended for data collection thus printed in grey!

Full name of indicator (including subclasses):	Production of goods and services
Name of subclass	7.1 Goods classified by: 7.1.1. Volume 7.1.2. Value
Measurement units:	7.1.1. kg 7.1.2. in € (price)
System Boundaries	
Possible data source	
Calculation mode (incl. conversion factors)	
Module specifications / recommendations	
Key definitions	**Production** is an activity carried out under the control and responsibility of an institutional unit that uses input labour, capital and goods and services to produce goods and services. Production does not cover purely natural processes without any human involvement or direction, like the unmanaged growth of fish stocks in international waters (but fish farming is production). Production is an activity resulting in a product. It is used with reference to the whole range of economic activities. The term id not reserved for the agricultural, mining or manufacturing sectors. It is also used in relation to the service sector. More specific terms may be used to denote production: provision of services, processing, manufacturing, etc., depending on the branch of activity. Production may be measured in various ways either in physical terms or according to value. (Eurostat definition) **"Product"** is used to cover both goods and services. (Oslo Manual, 3rd edition, OECD/Eurostat 2005, p.32) **Product classification:)** **Goods:** (1) round wood - industrial wood in the rough (saw logs and veneer logs, pulpwood (round and split), others)

	- wood fuel (2) wood-based panels - plywood - particle board, especially oriented strand board (OSB) - fibreboard - veneer sheets (3) wood pulp (mechanical, semi-chemical, chemical, dissolving grades) (4) other pulp - pulp from fibres other than wood - recovered fibre pulp (5) paper and paperboard - newsprint - printing and writing papers (uncoated mechanical; coated mechanical; coated woodfree ; uncoated woodfree) - tissue - case materials (kraftliner, testliner, fluting medium) - carton-boards (SBS, FBB, WLC, LPB) - wrappings (sackkraft); - specialised papers (other) (6) secondary materials - building elements (windows, roof trusses, doors, flooring) - packaging: wooden pallets - recovered paper (7) others **Engineered products including wood composites**

Space for example

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SOCIAL INDICATORS

(8) Employment

Full name of indicator (including subclasses):	Number of persons employed in total and by gender
Name of subclass	8. Number of persons employed 8.1. employment in total; 8.2. classified by gender categories 8.2.1 Male 8.2.2 Female [Per process per Module (total as well as directly involved in processes)]
Measurement units:	8.1 Absolute number (in full-time equivalents in reference year) per reporting unit. 8.2.1 and 8.2.2. in % of total(8.1)
System Boundaries	Clarify in meta data section for which organizations employment was considered in order to avoid double-counting across modules (e.g. State Forestry in M2, M3)
Possible data source	Current situation (test chains): data collection by modules for each process Future potential data providers: Eurostat (Social Statistics, Community Labour force Survey), United Nations Industrial Development Organization (UNIDO, for data for ISIC 20 and 21, National Statistics Office, ILO data (Segregat data) http://laborsta.ilo.org
Calculation mode (incl. conversion factors)	**Summary**: We assess that the employment effect of activity in any specific process will come about by some measure of labor use per produced or handled unit (full-time equivalent/reporting unit). These data may come from more or less detailed insight into the productivity and functioning of the process. Therefore this measure can be reported with some reliability at process level. It is unlikely that data are available at process level concerning how many hours of work is typically made by a women/man or short-education/longer education type worker etc. Rather, information may be found at say sub-sector level on what the workforce in the sub-sector contains. For example, union data may be available that report the mix of women and men in the

	forest worker workforce in a given regional area (national perhaps). Or the mix of technicians, workers, administrative personnel in an industry. This kind of information from a higher level of aggregation may then be used in TOSIA to convert measures/reporting unit from relevant processes into full-time employment for women, men and various job categories. **Earlier thoughts for documentation:** 1. Allocation of time to different processes by a single employee? No. Better a technical approach calculating m^3/y in reference to the share of (wo)men of the workforce of that sector (for M3) 2. Disaggregation by process may be complicated: - data based on professions, not on activities or products - "work in forest" and "transport", no "wood transport" - data available for industry as a whole A very rough estimate is to use e.g. number of persons in "work in forest" per total country working people times persons in "transport" per total country working people. This would yield a section of these two groups, i.e. the statistical probability that a person working in forest and a person working in transport are actually the same person i.e. a wood transporter. This would be perhaps a too rough figure, but otherwise this info may be impossible to find, at least per country level. M1: The proposed solution on probabilities here will only work if workers are indeed counted twice or more in all sectors they can be associated to. And still there would be problems, because you give a probability only of association – not a measure of how much of the time he spend there. So, I don't think it will work. M1: This problem could be solved by explicitly defining the categories of employment for all processes and all modules (see discussion below). 3. The employee categories shall be explicitly defined for all processes and all modules.

	While inventorying this indicator it could be good to document which employment categories are actually covered for each process. This will in many cases (at least in M5 processes) not be the full picture of employee categories of a process. Therefore it would be good for interpretation or for future use of the dataset to document which employee categories the number of employees and the share of male/female corresponds to.
Module specifications / recommendations	
Key definitions	

Space for example

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(9) Wages and salaries

Full name of indicator (including subclasses):	Wages and salaries (gross earnings) classified by gender and in relative terms
Name of subclass	9.1. Wages and salaries [by processes within each Module (M2-M5)] classified by gender category 9.1.1. male 9.1.2 female 9.2 average wages & salaries per employee relative to 9.2.1 Country average 9.2.2 Weighted by purchasing power parity [Per process per Module (total as well as directly involved in processes)]
Measurement units:	9.1. In Euro per reporting unit 9.2. In % relative to 9.2 1. and 9.2.2
System Boundaries	
Possible data source	Current situation (test chains): data collection by modules for each process Future potential data providers (DS5): Eurostat (see Population and Social Conditions), National Statistics Office, ILO data (October Inquiry data) Alternative sources: scientific work on gender differences in salaries, if the official and reliable data is not available http://laborsta.ilo.org
Calculation mode (incl. conversion factors)	The wages and salaries should ideally be reported as gross earnings, i.e. before any deduction for tax or contributions to social security by the worker and the employer. Note that this indicator is intended to collect the data on the *total amount of money* spent on salaries and wages per gender, and not on the salary level of each gender. Note, that *Wages and salaries* indicator may be different from the indicator 2c - *Labour costs* (compare the definitions). Country average wages and PPP can be downloaded from OECD: (www.oecd.org) for OECD countries 1. Difficult to find data by gender - Use estimates from scientific studies. 2. Data available for professions, not for activities or products - Estimate the allocation to processes using the profession data

	Depending on the available data the indicator values can be computed in different ways. See examples below.
Module specifications / recommendations	
Key definitions	**Employees** are all persons who have a direct employment contract with the enterprise or local unit and receive remuneration, irrespective of the type of work performed or the number of hours worked. (Eurostat, http://europa.eu.int/estatref/info/sdds/en/earn/earn_ses_sm.htm) **Gross earnings** cover remuneration in cash paid directly by the employer, before deductions of tax and social security contributions. (Eurostat, http://europa.eu.int/estatref-/info/sdds/en/earn/earn_ses_sm.htm) **Wage or salary rates** are the rates paid for normal time of work, comprising: basic wages and salaries, cost-of-living allowances and other guaranteed and regularly paid allowances. The following should be excluded: overtime payments, bonuses and gratuities, family allowances, other social security payments made by the employer directly to employees and ex gratia payments in kind supplementary to normal wage and salary rates. ILO-definition (http://laborsta.ilo.org/applv8/data/tO1E.html#t1): **PPP**: Purchasing Power Parities (PPPs) are currency conversion rates that both convert to a common currency and equalise the purchasing power of different currencies. In other words, they eliminate the differences in price levels between countries in the process of conversion. (OECD Statistics Division)

Examples

These three examples are three possible ways of calculating the total money spent per reporting unit (not the salary level) for the "salary and wages" indicator in the process depending on the data available:

1. If the data that available is: the **salary level for male/female in EUR/time unit (e.g. hour)** and **the employment time for male/female** in certain **time units per reporting unit (**we use in this example time unit as hours, but this is just a simplification of the time unit, in the database is person year, for the reporting unit we used tons of pellets in the example**).**

CALCULATION PROCEDURE: First we would multiply the salary cost level for male/female by the employment time. Then we have to relate this to the reporting unit of the process (e.g. m3, tons of pellets…). This is done by dividing the previous result by the production in the process.

Example:
Salary level male in Eur per time- 10€/hour
Salary level female in Euros per time- 8 €/hour
Total time needed doing a ton of pellet is = 16.3 hours /ton of pellet
Employment time male 14.7 hours/ton pellet (this data is input to indicator (8) Employment)
Employment time female 1.6 hours/ton of pellet (this data is input to indicator (8) Employment)

To calculate the indicator to be reported in the client "wages and salaries male":
10€/hour * 14.7 hours/ton pellet = 147 €/ton of pellet (input to indicator (9))
To calculate the indicator to be reported in the client "wages and salaries female":
8€/hour * 1.6 hours/ton of pellet = 12,8 €/ton of pellet (input to indicator (9))

The sum of both salary costs giving the "wages and salaries indicator" = 159.8 €/ton of pellet which at the same time if we consider there are no other labour related costs, the labour costs in the Production cost indicator would be this value 159.8 €/ton of pellet.

2. If the data available is the total **salary expenditure paid to each one of the genders in EUR** in a certain time frame, and we have the **total production in this process** (in m3 or other units) for this time period.

   CALCULATION PROCEDURE: Then the calculation of the reported indicator is just to divide the total expenditure for each of the genders by the total production.

   Example:
   Total Expenditure on male salaries for a time period (e.g. in one year) - 147000 €
   Total Expenditure on female salaries for a time period (e.g. in one year)- 12800€
   Total production during the same time period of the salary expenditure (in the example on year)- 1000 tons of pellets

   To calculate the indicator (9) to be reported in the client "wages and salaries male": (147000€/year) / (1000 tons of pellets/year) = 147 €/ton of pellet
   To calculate the indicator to be reported in the client "wages and salaries female":
   (12800 €/year) / (1000 tons of pellets/year) = 12,8 €/ton of pellet

3. If the data that is available is: i) the total **salary expenditures paid to both genders in EUR, but not differentiated between genders**, ii) **the total production** in this

process for the same time than the total expenditure, and iii) **the employment time** for male/female in appropriate time units.

CALCULATION PROCEDURE: Then the estimation of the reported indicator per gender and per reporting unit is: first, divide the total expenditure in salaries by the total production; this gives us an average cost per reporting unit. Then we weight this average cost with the working time for each gender (i.e. multiply by the working time of one gender and divide by the total working time of both genders). IT HAS TO BE CLEAR THAT WE WOULD BE ASSUMING THE SAME SALARY LEVEL FOR BOTH GENDERS

Example:
We have the total Expenditure on male and female in salaries for a time period (e.g. in one year) - 159800 €
Total production during the same time period of the salary expenditure- 1000 tons of pellets
Employment time male 14.7 hours/ton pellet
Employment time female 1.6 hours/ton of pellet
Total time needed doing a ton of pellet is = 16.3 hours /ton of pellet

To calculate the indicator (9) to be reported in the client "wages and salaries male": (159800 € / 1000 tons of pellets)*(14.7 hours/ton of pellets) / (16.3 hours /tons of pellets) = 144,11 €/ ton of pellet

To calculate the indicator to be reported in the client "wages and salaries female":
(159800 € / 1000 tons of pellets)*(1.6 hours/ton of pellets) / (16.3 hours /tons of pellets) = 15,68 €/ ton of pellet

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(10) Occupational safety and health

Full name of indicator (including subclasses):	Frequency of occupational accidents and occupational diseases
Name of subclass	10.1 Occupational accidents [by processes within each module (M2-M5)] classified by: 10.1.1 Non-fatal occupational accidents 10.1.2 Fatal occupational accidents 10.2 Occupational diseases [by processes within each module (M2-M5)])
Measurement units:	10.1. absolute numbers per 1000 employees per reporting unit 10.2. frequency of cases in % per 1000 employees per reporting unit
System Boundaries	Administrative and management staff - Allocate professions to processes.
Possible data source	Current situation (test chains): data collection by modules for each process Future potential data providers: Eurostat (European Statistics on Accidents at Work), European Occupational Diseases Statistics (EODS), International Labour Organisation (ILO), National Statistics Office Extrapolation from public data (e.g. trade union data and possibly health insurance services)
Calculation mode (incl. conversion factors)	The estimations can be obtained using the ratio of accidents per e.g. pulp volume, and then multiplying the ratio by the volume of pulp produced.
Module specifications / recommendations	
Key definitions	**Absence from work of more than 3 working days**: ESAW considers only full working days of absence from work of the victim excluding the day of the accident. Consequently more than 2 days, means at least 4 days which implies only accidents with a resumption of work not before the fifth day after the day or the accident or later. (see http://ec.europa.eu/employment_-social/publications/2002/ke4202569_en.pdf9) **Fatal accident at work**: accidents at work leading to the

	death of the victim within a year (after the day) of the accident. (see: http://ec.europa.eu/employment_social/-publications/2002/ke4202569_en.pdf) **Occupational disease** is a case of disease recognised by the national authorities as being caused by a factor at work. (The EODS data collection covers two types of occupational diseases: a) An incident occupational disease is an occupational disease recognised for the first time as an occupational disease during the reference year. This excludes occupational diseases which had been recognised already earlier even if they became more severe during the reference year and were consequently recognised for a higher level of disability. B) A fatal occupational disease is a death recognised by the national authorities as due to an occupational disease during the reference year regardless of when the occupational disease had been recognised for the first time.) (see: European Occupational Diseases Statistics (EODS)

Space for example

Expert to contact in case of questions: Irina Prokofieva (Irina.Prokofieva@ctfc.es)

(11) Education and training

Full name of indicator (including subclasses):	Education levels and training
Name of subclass	11.1. Highest level of education of employees 11.1.1. up to lower secondary education 11.1.2. post secondary and tertiary education 11.2. Training time per employee
Measurement units:	11.1 Number of employees per class and reporting unit 11.1.1. ISCED classes 1-2 [compulsory education]; 11.1.2 CED classes 3-6 11.2. Average hours /year and reporting unit
System Boundaries	Education and training is considered to include the activities performed during the work time and directly related to the work. Thus, for example, the training of a harvester is included under this category. The basic education, driving licenses etc. are not included.
Possible data source	Current situation (test chains): data collection by modules for each process Future potential data providers: Eurostat (European Social Survey), Nations Education, Scientific and Cultural Organisation (UNESCO-UIS), organization for Economic Cooperation and Development (OECD), National Statistic Office
Calculation mode (incl. conversion factors)	Summary: We have simplified the reporting unit to focus on direct measures/reporting unit. Note that for 11.2 we have also converted from measuring unit/year and employee (which is not a reporting unit anywhere) and to average number of hours/year and reporting unit. Thus, if a forest worker is on average on training 20 out of 2000 hours/year, then we can use the productivity measures to calculate hours of training/year and reporting unit: Example: If in a process we use 0.5 hours/m3 produced, then the related training indicator is 20/2000* 0.5 hours/m3 = 0.005 hours/m3. A small number but it is there. And directly ready for multiplication with flow. Other comments from here. 1. If the employee is financing the education, should this really be included? - No, because this is a matter of individual choice. Only the education and training co-financed or fully financed by the

	employer should be counted. 2. If the company supports education for a driving licence, etc., should it be included? - M1 and M2: Include any kind of education/training co-financed or fully financed by the employer, since it may be hard to separate in the data and it is all likely to be more or less relevant to the needs of the job. M4: If the intention of this indicator is to show how much the industry is putting effort to keeping the know-how of the employers adequate, then it should exclude any other training, but include any such education, shall it be basic or additional. Of course there are some countries in which the public education for some sectors is far better than for some others, and the former sectors benefit from that. But perhaps at least part of the purpose of this indicator is to show just how much effort the industry itself has to put in education & training. Then we would just have to be careful not to misinterpret this indicator to e.g. be telling about the education needs and requirements of one particular industry.
Module specifications / recommendations	
Key definitions	The international classification of education, ISCED, is the basis for data collection on education. ISCED-97, which is the current ISCED, distinguishes between seven education levels, from ISCED 0, pre-primary education, to ISCED 6, second stage of tertiary education leading to an advanced research qualification. The full description of ISCED-97 is available on the Unesco Institute of Statistics website, address: http://www.uis.unesco.org/ev.php?ID=3813_201&ID2=DO_TOPIC **Educational categories** See: http://forum.europa.eu.int/irc/dsis/employment/info/data/eu_lfs/F_LFS_STATISTICAL_CLASSIFICATIONS.htm 0= not completed primary education 1= primary or first stage of basic education 2= lower secondary or second stage of basic education 3= upper secondary education 4= post secondary, non tertiary education

	5= first stage of tertiary education 6= second stage of tertiary education

Space for example

Expert to contact in case of questions: Irina Prokofieva (Irina.Prokofieva@ctfc.es)

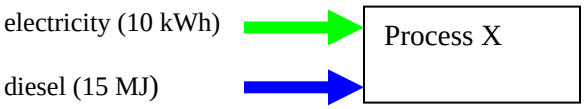
(12) Energy generation and use

Full name of indicator (including subclasses):	On-site energy generation (from renewables) and energy use classified by origin including the share of self-sufficiency
Name of subclass	12.1 On-site energy generation from renewables: 12.1.1 On-site *heat* generation from renewables classified by type: 12.1.1.1 from residues from process – inputs (wood processing residues and lignin) 12.1.1.2 from other wood biomass – (wood with the main purpose to be used for energy) (branches, small logs, tops, debris and other forest residues) 12.1.1.3Non-wood based renewable heat (other biomass, wind, solar, geothermal, hydropower etc.) 12.1.2 On-site *electricity* generation from renewables classified by type: 12.1.2.1 from residues from process – inputs (wood processing residues and lignin) 12.1.2.2 from other wood biomass – (wood with the main purpose to be used for energy) (branches, small logs, tops, debris and other forest residues) 12.1.2.3Non-wood based renewable electricity (other biomass, wind, solar, geothermal, hydropower etc.) 12.1.3 On-site *fuel* generation from renewables, excluding fuel used for mill site heat and electricity generation and excluding fuel that is used as a product further in the FWC classified by type: 12.1.3.1 from residues from process – inputs (wood processing residues and lignin) 12.1.2.2 from other wood biomass – (wood with the main purpose to be used for energy) (branches, small logs, tops, debris and other forest residues) 12.1.2.3 Non-wood based renewable fuel production (other biomass) 12.2. Energy use classified by origin: 12.2.1 *Heat* use classified by origin: 12.2.1.1. heat from renewable sources 12.2.1.2. heat from fossil sources 12.2.2 *Direct fuel* use (i.e. fuel used for generation of electricity and or heat in the process not included) classified by origin: 12.2.2.1. renewable fuel

	12.2.2.2. fossil fuel 12.2.3 *Electricit*y use 12.2.3.1. from 100% renewable sources 12.2.3.2. from 100% fossil sources 12.2.3.3. from the grid (external electricity; this may origin from renewable or non-renewable sources)
Measurement units:	- Electricity in kWh - Heat in MJ_h - Fuel in MJ
System Boundaries	All renewable energy that is produced in the process and all (renewable and non-renewable) energy that is used in the process. Remark concerning other indicators: The supply chains of energy to the FWC are included (see data collection protocol –system boundary remark).
Possible data source	Scientific studies, national or European associations, mill specific data, environmental reports, statistics, expert opinion.
Calculation mode (incl. conversion factors)	Secondary energy is reported in all cases, so no conversion to primary energy needed. 1 kWh = 3,6 MJ N.B. An overview of the characteristics (e.g. shares renewable and fossil) of grid electricity per country will be provided by the Energy group and included in ToSIA. Within ToSIA, electricity from the grid will then per country, be calculated into renewable and non-renewable shares.
Module specifications / recommendations	M4/M5 Energy that is produced within the FWC and sold to the grid, will leave the FWC with a 'rucksack' and this should be accounted for in your data reporting, in the same way as energy bought from the grid will come with a 'rucksack'.
Key definitions	Renewables energy sources are defined as renewable non-fossil energy sources: wind, solar, geothermal, wave, tidal, hydropower, biomass, landfill gas, sewage treatment plant gas and biogases. (Eurostat definition) Electricity produced from renewable energy sources comprises of the electricity generation from hydro plants (excluding pumping), wind, solar, geothermal and electricity from biomass/wastes. Biomass/wastes electricity comprises of electricity generated from wood/wood wastes and other solid wastes of renewable nature (straw, black liquor) burning, municipal solid waste incineration, biogas (incl. landfill, sewage, farm gas) and liquid biofuels. (EEA definition).

Space for example

A typical M2/M3/M5 example



12.1 Energy generation from renewables

12.1.1. Heat
- i. Process residues = 0
- ii. Other wood = 0
- iii. Non-wood = 0

12.1.2. Electricity
- i. Process residues = 0
- ii. Other wood = 0
- iii. Non-wood =0

12.1.3. Fuel
- i. Process residues = 0
- ii. Other wood = 0
- iii. Non-wood =0

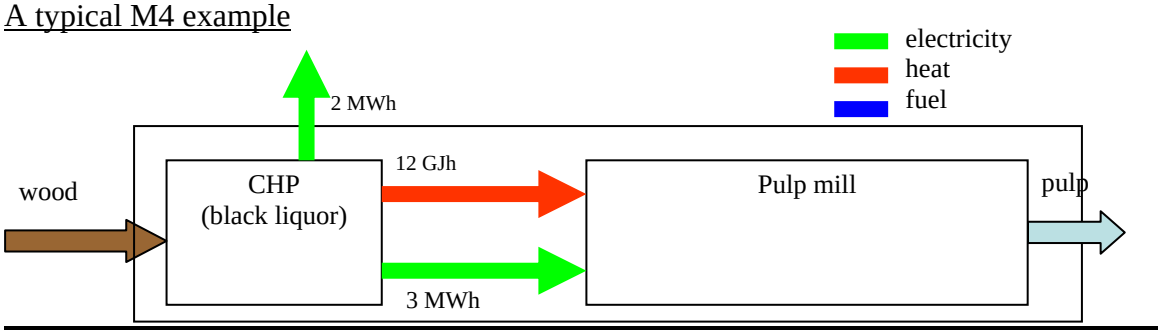
12.1 Energy use

12.1.1. Heat
- i. renewable = 0
- ii. fossil = 0

12.1.2. Fuel
- i. renewable = 0
- ii. fossil = 15 MJ

12.1.3. Electricity
- i. 100% renewable =0
- ii. 100% fossil = 0
- iii. Grid mix =10 kWh

A typical M4 example



12.1 Energy generation from renewables

12.1.1. Heat
- i. Process residues = 12000 MJh
- ii. Other wood = 0
- iii. Non-wood = 0

12.1.2. Electricity
- i. Process residues = 5000 kWh
- ii. Other wood = 0
- iii. Non-wood =0

12.1.3. Fuel
- i. Process residues = 0
- ii. Other wood = 0
- iii. Non-wood =0

12.1 Energy use

12.1.1. Heat
- i. renewable 12000 MJh
- ii. fossil = 0

12.1.2. Fuel
- i. renewable = 0
- ii. fossil = 0

12.1.3. Electricity
- i. 100% renewable = 3000 kWh
- ii. 100% fossil = 0
- iii. Grid mix =0

Expert to contact in case of questions: Jobien Laurijssen (J.Laurijssen@kcpk.nl)

(13) Greenhouse gas emissions and carbon stock

Full name of indicator (including subclasses):	Greenhouse gas emissions and carbon stock
Name of subclass	13.1. Greenhouse gas emissions in total (including carbon sequestration). 13.2. Carbon stock: 13.2.1 in living woody biomass above ground 13.2.2 in living woody biomass below ground 13.2.3 in dead wood 13.2.4 in soils of forest 13.2.5 in wood products 13.2.6 in landfill
Measurement units:	kg CO_2 equivalents Global Warming Potential (GWP) is calculated for 100 years.
System Boundaries	• between processes / Modules Boundary between M2 and M3: M2 considers ecosystem response while M3 considers machine emissions. All production processes that did take place in the past (e. g. planting of a stand) should be assessed as if the planting (or other processes) would take place in the reference year. • inside/outside FWC Since all renewable energy (heat, electricity, fuel) that is generated and all energy (heat, electricity, fuel), both non-renewable and renewable, that is used within the process is inside ToSIA system boundary, GHG emissions of the energy supply chains need to be collected. This includes for the energy used, both energy that is generated within the FWC and that is generated outside the FWC. The system boundary is narrow in regards to other materials, e.g. we are not taking into account machinery, ancillary materials (lubricants), chemicals, etc. Transport of workers or machinery to the production process is outside the FWC. GHG

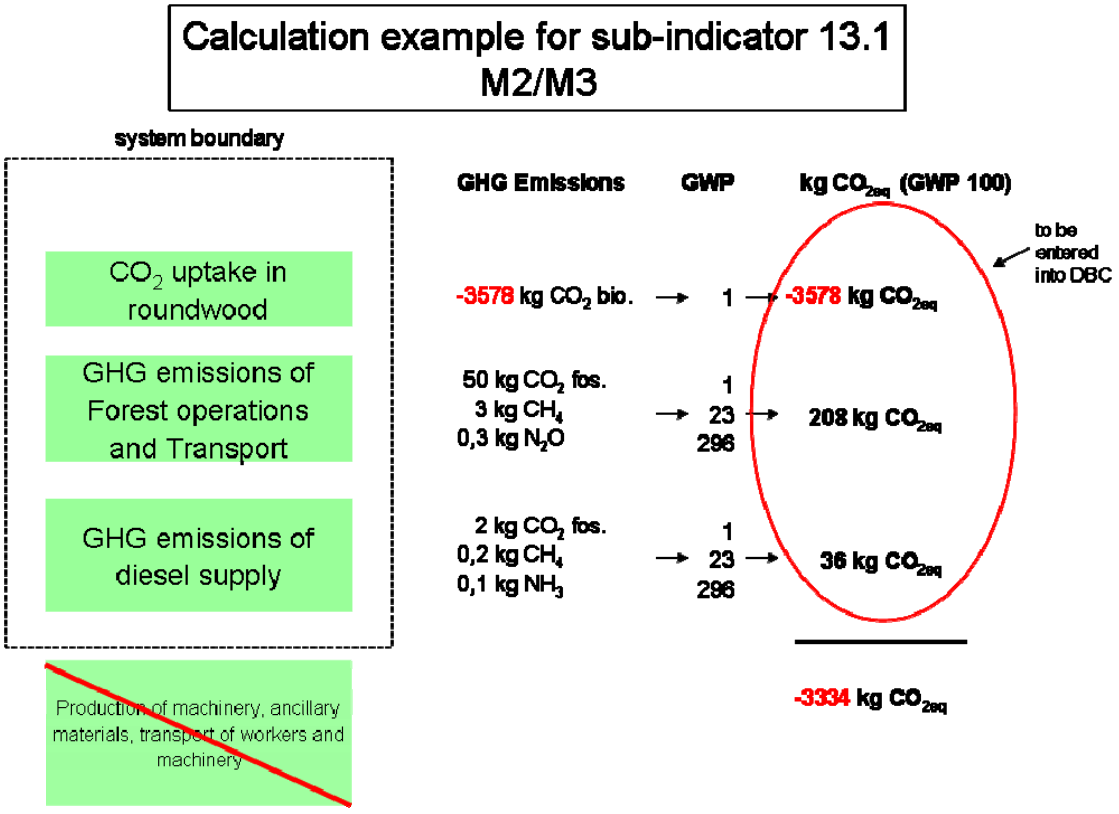
	emissions of these processes are not collected.
Possible data source	
Calculation mode (incl. conversion factors)	13.1: In order to show the uniqueness of the forest industry sector, data on biotic and fossil CO_2 will be collected. To distinguish biotic from fossil CO_2, the CO_2 uptake will be accounted for as a negative value. The release of biotic CO_2 at the end of life of a product will be accounted for as a positive value (cf. calculation example below). Hence, the amount of biotic CO_2 in any FWC is visible and at the end of life the account for biotic CO_2 is balanced. Biotic CO_2 emissions can be estimated in two ways described in LULUCF document Conversion factors for CO_2 uptake: 1000 kg_{bd} wood = 1851 kg CO_{2eq} 1000 kg C = 3702 kg CO_{2eq} 13.2: Carbon sequestration and stock by processes within each Module (M2-M5) on average for the reference year averaged over a period of 5 years for: can be evaluated by: Total volume of standing forest (net temporal carbon stock) - Soil-root sequestration (net temporal carbon stock) - Minus the reallocation of carbon into the atmosphere with the Tree Felling related to the chosen management regime Further information on calculation modes can be found here: http://www.joanneum.at/carboinvent/publication.php Total volume of carbon stored in wood products (net temporal carbon stock) The amount of biotic carbon released into the atmosphere at the Felling WFC-stage could be divided for a factor (years of the rotation/5 years). It should also be accounted for in 13.1.
Module specifications / recommendations	13.1: - For M2: Only CO_2, methane and nitrous oxide are

	relevant. - For M3: GHG emissions of road transport should be reported including backhaul. Since water content of wood is not considered as water use in indicator 10, water content should be reflected when calculating GHG emissions for transport (e. g. High water content = low mass of carbon per transport unit) 13.2: - For M4, M5: In order to calculate net volume of carbon stock in wood products, average lifetime of wood products need to be defined by M4, M5 experts and reported to ToSIA developers. - M5 experts have to decide on how to handle carbon stocks and methane release from landfill. If it is decided to account for carbon stocks in landfill, average biotic carbon dioxide/methane release from landfill need to be defined and reported. Biotic carbon dioxide as well as other biotic GHG (e. g. methane) needs to be accounted for in 13.1.
Key definitions	**Draft 2006 IPCC Guidelines** for National Greenhouse Gas Inventories: (http://www.ipcc-nggip.iges.or.jp/public/2006gl/ppd.htm) The following greenhouse gases are covered in the *2006 Guidelines*3: **GWP** • carbon dioxide (CO2) **1** • methane (CH4) **23** • nitrous oxide (N2O) **296** • hydrofluorocarbons (HFCs) **12 – 12.000** • perfluorocarbons (PFCs eg. CF4) **5.700** • sulphur hexafluoride (SF6) **22.200** • nitrogen trifluoride (NF3) • trifluoromethyl sulphur pentafluoride (SF5CF3) **18.000** • halogenated ethers (e.g. C4F9OC2H5 **55** (e.g. CHF2OCF2OC2F4OCHF2) **1.800** • and other halocarbons not covered by the Montreal Protocol including: CF3I **1** CH2Br2 **1** CHCl3 **30** CH3Cl **16**

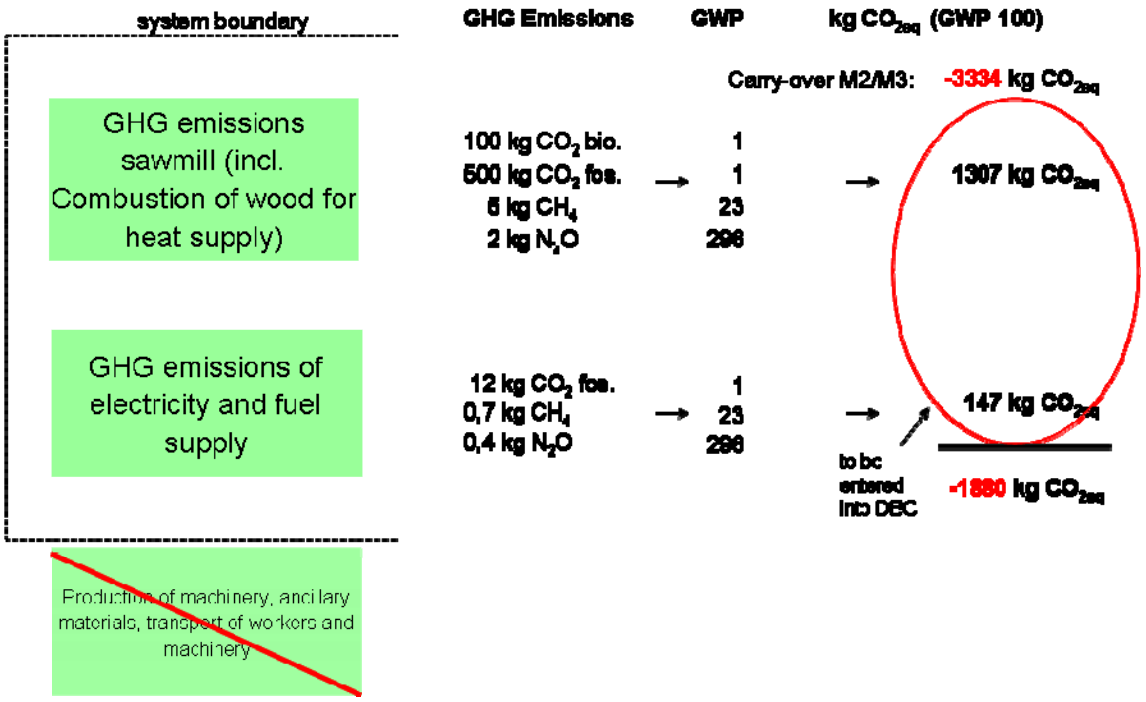
	CH2Cl2 **10** An extensive list of GWP conversions factors of greenhouse gases can be found here: http://www.grida.no/climate/ipcc_tar/wg1/248.htm **Carbon sequestration**: The active sequestration of atmospheric carbon in biomass **Carbon uptake**: Synonym for carbon sequestration **Carbon storage**: Storage of carbon in wood based products, soil and landfill

Space for example

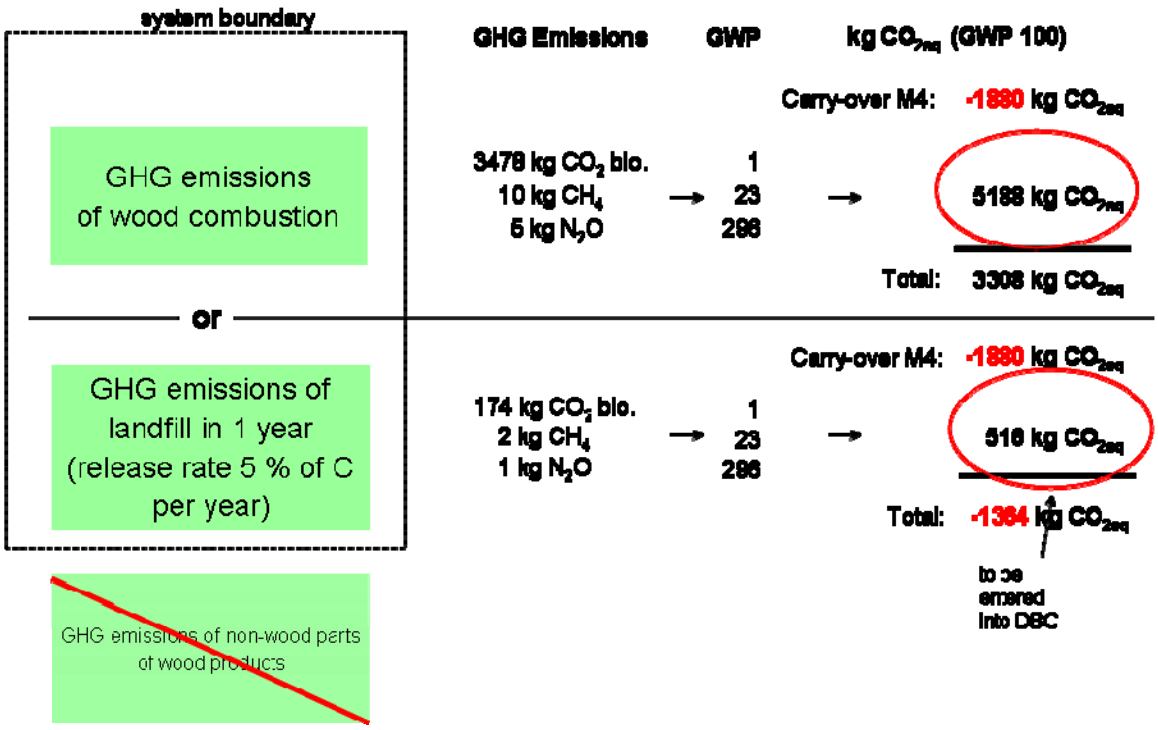
13.1: The following examples may help to calculate the GWP (100). Please notice that the figures used, are examples to show the calculation mode. They are not real:



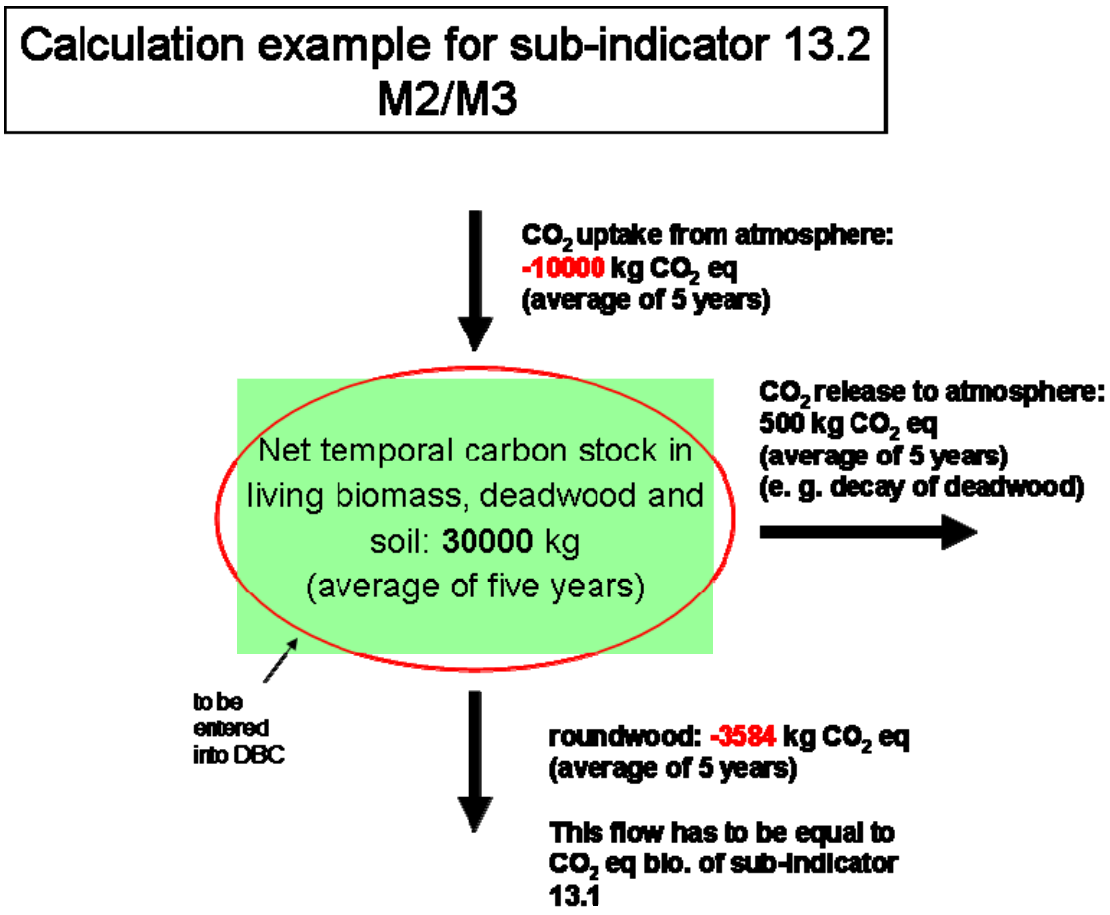
Calculation example for sub-indicator 13.1 M4

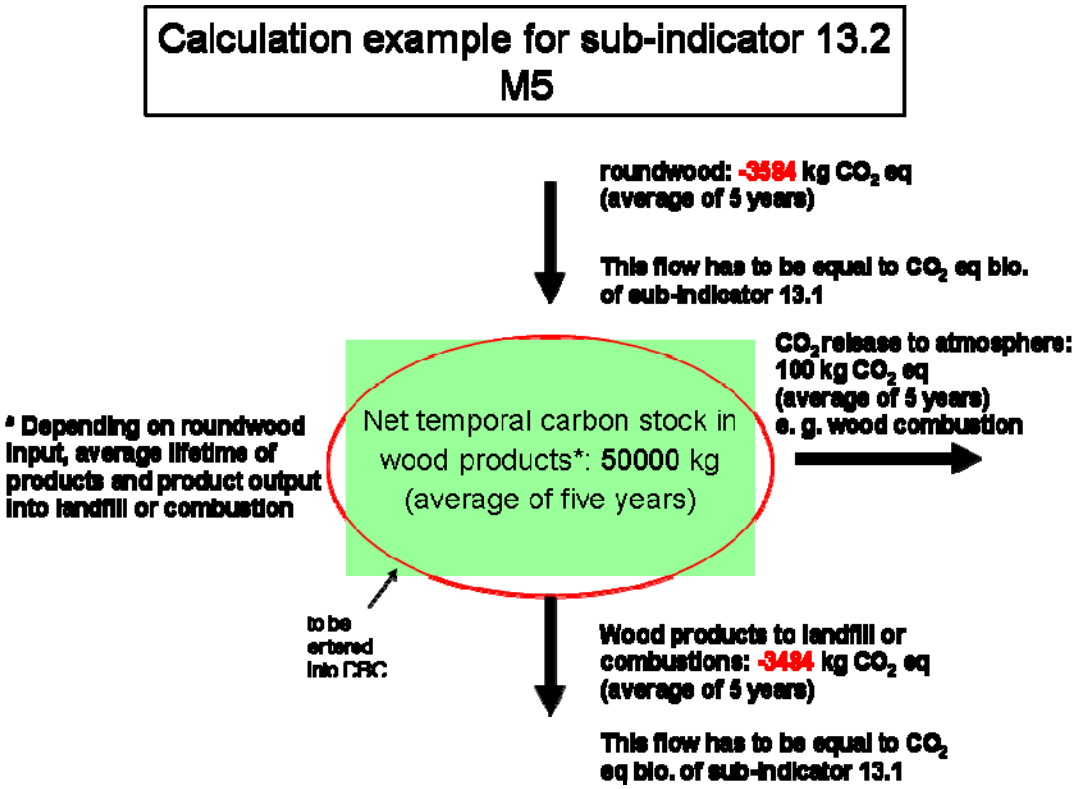


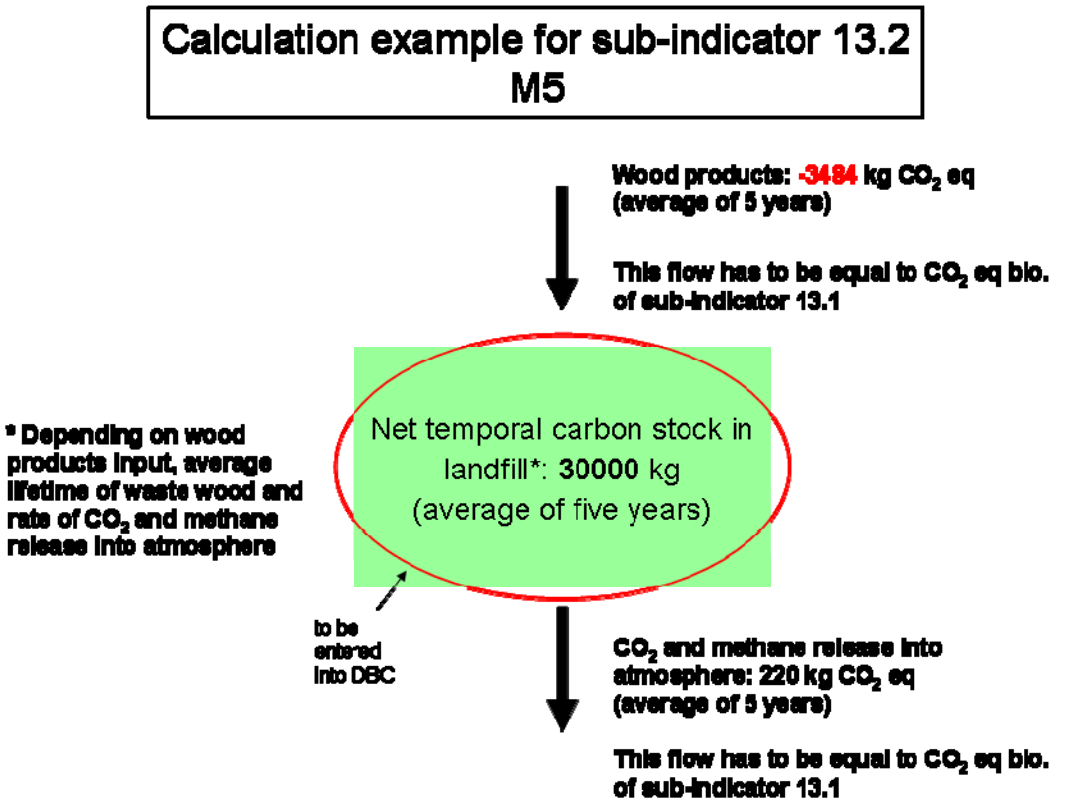
Calculation example for sub-indicator 13.1 M5



13.2: The following examples may help to calculate the GWP (100). Please notice that the figures used, are examples to show the calculation mode. They are not real:




Calculation example for sub-indicator 13.2 M5
roundwood: -3584 kg CO2 eq (average of 5 years)
This flow has to be equal to CO2 eq bio. of sub-indicator 13.1
CO2 release to atmosphere: 100 kg CO2 eq (average of 5 years) e. g. wood combustion
* Depending on roundwood input, average lifetime of products and product output into landfill or combustion
Net temporal carbon stock in wood products*: 50000 kg (average of five years)
to be entered into DBC
Wood products to landfill or combustions: -3484 kg CO2 eq (average of 5 years)
This flow has to be equal to CO2 eq bio. of sub-indicator 13.1


Calculation example for sub-indicator 13.2 M5
Wood products: -3484 kg CO2 eq (average of 5 years)
This flow has to be equal to CO2 eq bio. of sub-indicator 13.1
* Depending on wood products input, average lifetime of waste wood and rate of CO2 and methane release into atmosphere
Net temporal carbon stock in landfill*: 30000 kg (average of five years)
to be entered into DBC
CO2 and methane release into atmosphere: 220 kg CO2 eq (average of 5 years)
This flow has to be equal to CO2 eq bio. of sub-indicator 13.1

Expert to contact in case of questions:

13.1: Jörg Schweinle

13.2: M2

(14) Distance and modal indicator

Full name of indicator (including subclasses):	Distance and modal indicator
Name of subclass	14.1. Distance by mode (road, railways, inland waterways, maritime, air) 14.1.1 loaded 14.1.2 unloaded (for road mode only) 14.2. Freight per movement by mode
Measurement units[1]:	14.1.1. km 14.1.2. Km 14.2 Tons/vehicle
System Boundaries	**System boundaries: movements of what ?** – In EFORWOOD, the focus is on the FWC and its products, therefore, we work only on transport for **freight**. We integrate "loaded distance" and "unloaded" distance for road mode because they are important in the reality of FWC transport. It will be therefore possible to make sensitivity analyses with ToSIA concerning the impact of changed backhauling due to different logistics approaches and regulation changes. – Transport of worker(s) to and from the respective working places, as well as detours for lunch breaks are excluded. – For products integrating in the transport streams, see the blue line in the figure 2, page 5. **System boundaries for case studies: geographical** (see figure and examples) The incoming harbour in Europe is the system boundary. This indicator as others aims to cover "60-80% of the wood material flows". So less important movements, can be dropped under this above condition. For the BW case study, the region's system boundaries should be defined as the political borders of Baden-Württemberg. Import transport distance will be defined from the border to the location of processing or consumption. Export distance should be defined as the distance from the location of production to the BW border. For the different product classes the average distances will be considered.
Possible data source	Specific and empirical – Professional organisations (average distance, empty backhaulage, loaded capacity, …) – Enterprises information (origin/destination, average distance, empty backhaulage, loaded capacity, …) Generic and derived – Eurostat – http://epp.eurostat.ec.europa.eu - aggregated data by products. – CEMT/OECD (European Conference of Ministers of Transport http://www.cemt.org/ – National statistical offices – aggregated data by products. Model-based and estimates – Models (for distance matrix country x country, see for instance: http://www.cepii.org/anglaisgraph/bdd/distances.htm) – Expertises

[1] General rule: every (sub) indicator can only have ONE unit.

Calculation mode (incl. conversion factors)

Loaded km→tkm

a) Direct information from enterprises: we know exactly the km (origin-destination) within the European territory
b) Tkm information can be found also in Eurostat and National Data and are based on loaded movement and on inland streams. Average distance: this information can be estimated by enterprises, experts, professional organisations, Eurostat/National Data (we have tons and tkm so it is possible to deduce average km).
c) Additional information could be needed for maritime transport and for movements that are including in the case studies boundaries (cf. figure) and within European territory (intra-European flows).

Unloaded distance (km) : special work for road mode

1. Unloaded movements are important for road mode. This "burden" has to be integrated in the evaluation of this mode.
2. It is an additional information to integrate to existing statistics (Eurostat/National Data, usual information giving by enterprises and official organisation and even expertise) (Attention must be paid to avoid double counting that is to say having unloaded km twice).
3. Km = loaded (origin-destination) + % of empty backhaulage (by default % proposed by modules)

Import/export movements inside European area

1. Imports and exports in tons (conversion factors) from European harbour or extra-European border
2. Origin and destination (O/D) are know (from official statistics) but not transport mode in general
3. Distance can be estimated from O/D matrix in km
4. Transport mode are estimated.

Freight movement

This information aims to highlight regional specificities such as 60 tonnes trucks in Northern Europe versus "40 tonnes" in other countries. It is possible to get information per country for road (cf. table). We use:

- legal weight and load capacity (maximum weight of goods declared permissible by the competent authority of the country of registration of the vehicle; from UN Glossary for Transport Statistics)
- and not load factor - the ratio of the average load to total vehicle freight capacity, in tonnes or volume (vans, trucks, train wagons, ships and aircraft). As such data are not available for the whole EU for all modes (except for aviation), the load factor is defined as the number of tonne-km divided by the number of vehicle-km (TERM, EEA).

Conversion factor

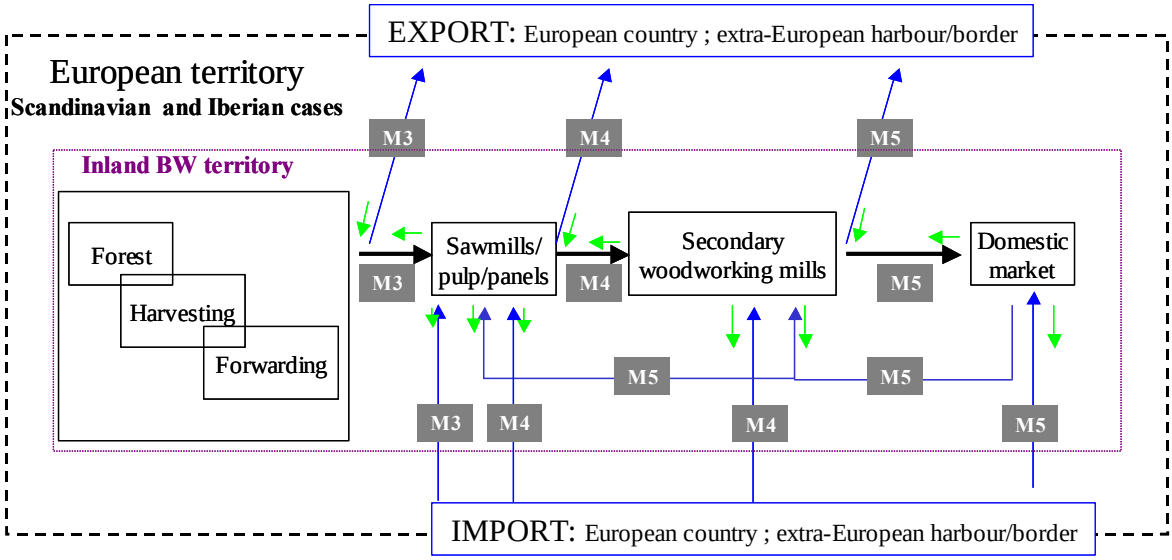
Roundwood[2]	**Kg/m^3**
Spruce	790
Douglas	710
Scots Pine	855
Maritime Pine	880
Black Pine	930
Aleppo Pine	970
Oak	950
Beech	1025
Poplar	790

	Spanish Chestnut: 850 **Chip:** 1 apparent m^3 of chip (in average, depends on tree species, humidity, compaction and the size of the chips): 250 *Note: Default values, use other if you have better.* **For M4/M5**, it is important to identify conversion factors from product to load weight or load volume by vehicle (ex. number of chairs/40 tonnes truck; volume of corrugated board/wagon). This work has to be done at case study level.
Module specifications / recommendations	**Subindicator 14.1** M2 It is optional and mainly for "cultivated forest": transport can be estimated for instance for the plantations. M3/ M4/M5 If there is not specific information available on backhaulage practices, we suggest using 45% for M3 and 25 % for M4-M5 by default. However, those % can be higher for Light Duty Vehicles (LDV)and Vans. The bounds between modules (who is responsible of a particular flow?) are determined in the figure. The general principle is that at the outward door flows belong to the next process. However, exchanging information between modules is of course of interest (some mills have information on their transport deliveries and distribution systems to their customers). **Subindicator 14.2** M3 Specific information required for wood due to the impact of equipment used and type of products (roundwood, long logs and chips) M4/M5 Generic information can be used
Key definitions	**Transport** 1/ is defined as any movement of goods (freight) and/or of passengers using a given network (Eurostat). **2/** any movement of goods (freight) using a given network **(EFORWOOD definition).** **Eforwood modal split** (% in total inland freight tonne-km): defined as the percentage share of each mode of transport in total *European territory* movements expressed in tonne-kilometre (tkm). It includes transport by road, rail, inland waterways and maritime movement between European countries (movements on national territory + movements to the extra-European import/export harbour and extra-European borders) (adjusted from Eurostat definition) **Extra-European** Flows (import and export) and associated transport (km) outside the European inland territory

System boundaries

GEOGRAPHIC

FLOWS for a specific FWC



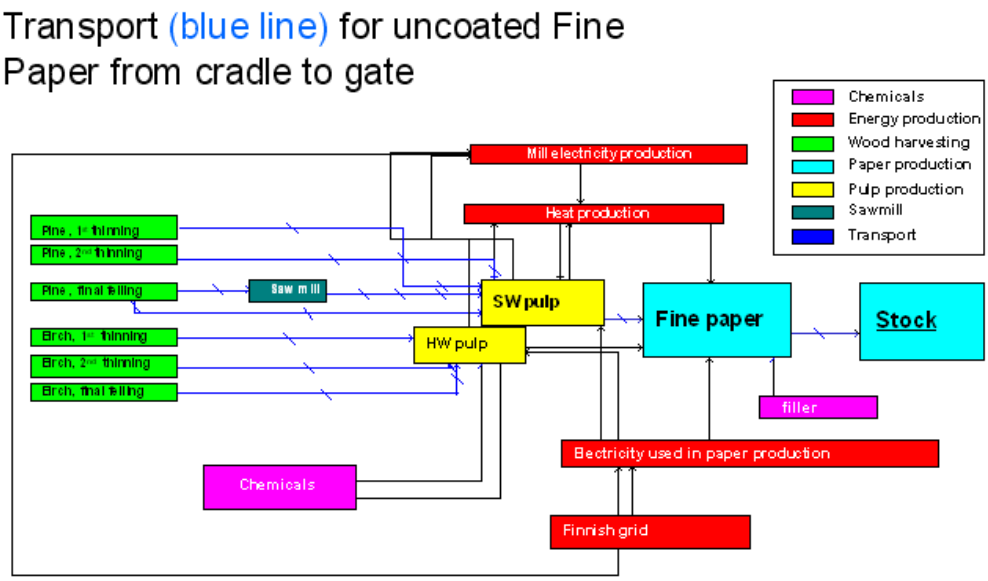
Mx Module responsibility on the stream

← Empty backhaulage flows for road mode only

PRODUCTS

The indicator aims to track the material flows of the FWC (wood/wooden inputs and FWC outputs).

For instance:



Source: from "Flowsheet example from KCL-ECO software".

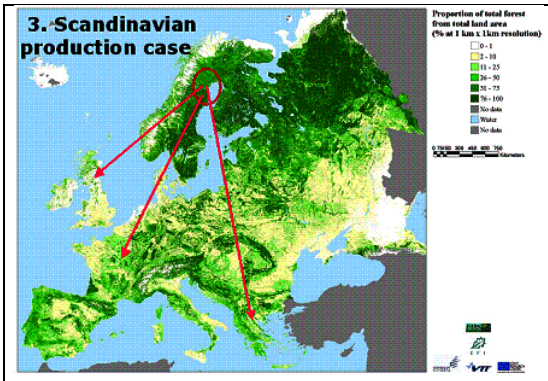
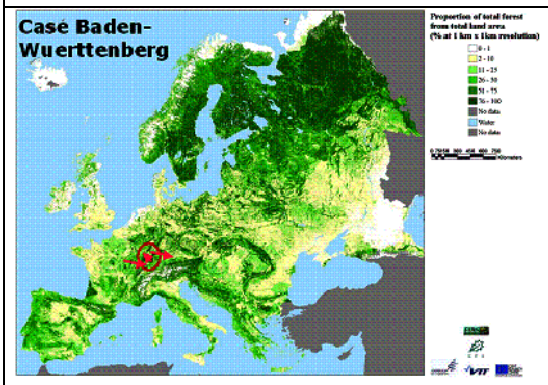
Examples

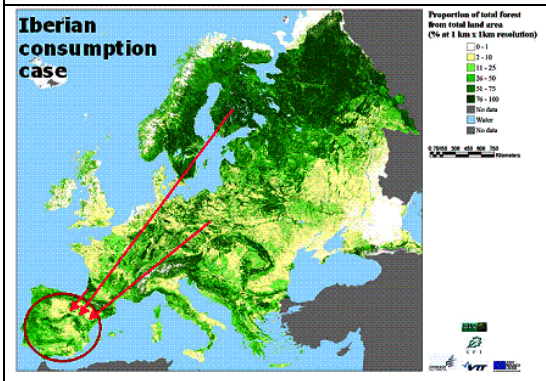
System boundaries

- import from Brazil (ship) is integrating in the system only from the European harbour to the final destination on the European territory (inland waterways, railways or truck).
- import from Russia (railways) is integrating in the system only when it crosses the European border (ex. Finnish border).

Total distance:

- *Example 1:* loaded km from forest to mill is 100 km. If we estimate that 75 % of the backhaulage distance is empty and link with the wood procurement, therefore the total distance of the analyzed flow is 100 + 75 = 175 km.
- *Example 2:* loaded km from mill to end customer is 100 km. If we do not have any information on specific backhaulage practices, we rely on general information: each loaded km generates 0.25 km empty backhaulage. Therefore, the total distance of the analysed flow is 100 + 25 = 125 km.

	**Km =** From the forest to the mill (truck – loaded 14.1 and empty backhaulage14.2) From the mill to the export harbour (train)	 70 km (loaded) 0,40*70 = 28 km (unloaded) Total km = 98 km 150 km
	Km = **Export** 1. From the forest to the mill (truck – loaded 14.1 and empty backhaulage14.2) 2. From the mill to the BW border (inland waterways) 3. From the border to the mill (not in BW): excluded Ex. 50 km from the BW border to the mill in an other German Lander (25 km)=excluded **Import** From the forest to the mill (truck – loaded 14.1 and empty	 **50 km** **0,5*50 km = 25 km** **Total = 75 km** **100 km**

	backhaulage14.2) = 150 km (total distance of the flow) ▪ In France: 75 km (loaded): subtracted ▪ From the German border to BW border: 10 km : subtracted	**From the BW border to the BW mill = 150-75-10 = 65 km (to be calculated), see if there is one transport mode or more**
	**Km =** **Import** 1. From the Swedish mill to the harbour (truck): 2. From the Swedish harbour the Spanish harbour (sea shipping) 3. From the harbour to the platform (railways) 4. From the platform to the shop (light duty truck) 5. From the shop to the final consumer (van)	 100 km loaded + 0.3*100km unloaded = 130 km 2 500 km 150 km 50 km 15 km

Put 0 or not applicable
0 when we know that it is not applicable at the moment: ex. Airways for roundwood (till now)
"Not applicable" as a choice means it does not make sense (ex. inland waterways where there is not river)

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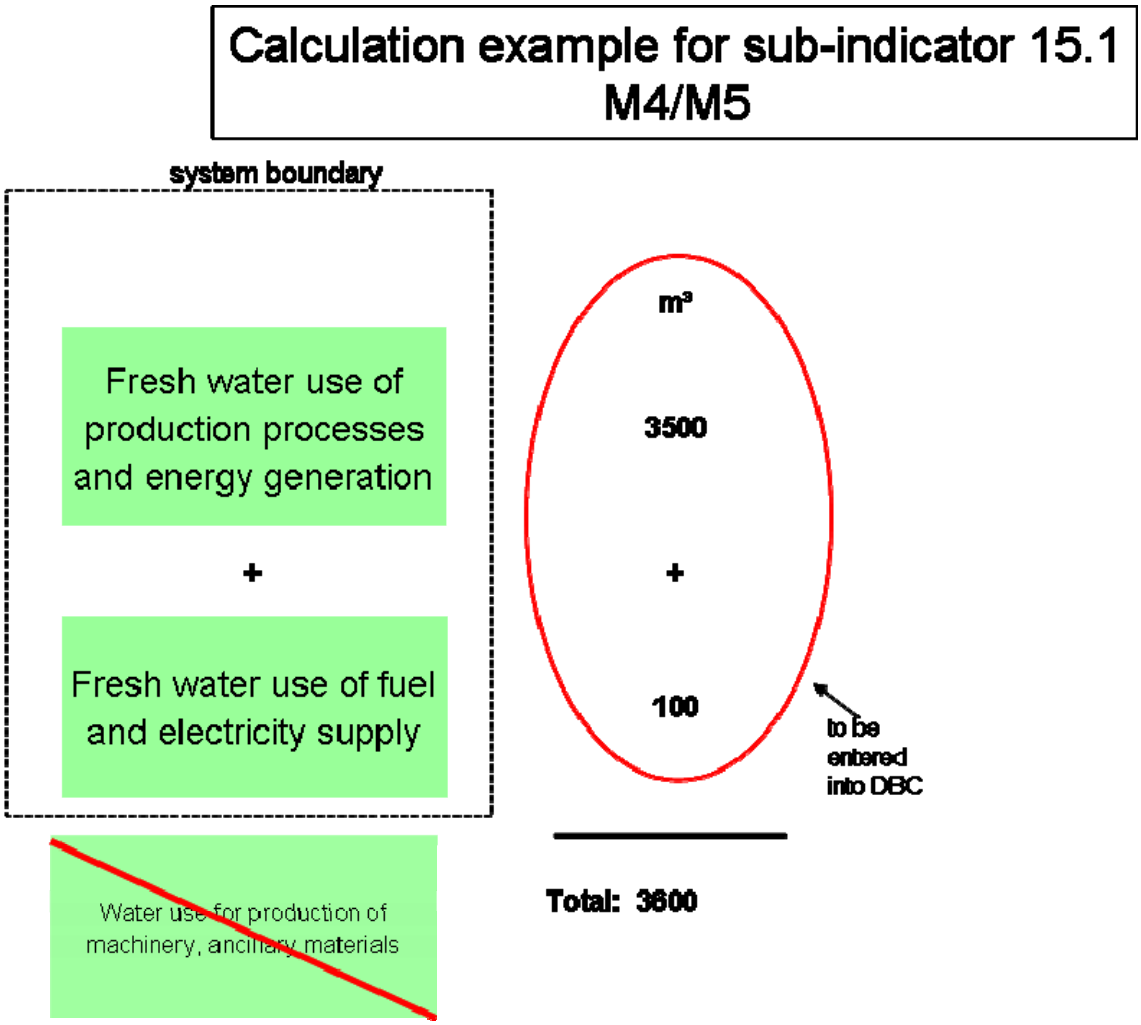
(15) Water Use

Full name of indicator (including subclasses):	Water use
Name of subclass	15.1 Water use (freshwater intake by industry) [relevant for industry] 15.2 Water use (of the forest ecosystem) 15.2.1 Evapotranspiration from the system 15.2.2 Groundwater recharge
Measurement units:	15.1: m^3 15.2: m^3m^{-2}
System Boundaries	• inside/outside FWC Data on water use related to energy generation and use as well as for the energy supply chains need to be collected. Water use related to other supply chains is outside the system boundary.
Possible data source	
Calculation mode (incl. conversion factors)	15.1: Data on total fresh water intake for each process in industry is needed. At this time there is no distinction made between different water qualities. Water pollution or emissions into water are covered by indicator 17 15.2.1: The loss of water from a given area during a specified time by evaporation from the soil and plant surface and by transpiration from plants. Process models may be used for management scenarios under defined site conditions. Literature sources. 15.2 2: Output of process models. Validity of estimates dependent on site conditions. Estimates will be good for conditions where surface runoff can be neglected.
Module specifications / recommendations	15.1: For M3: Water content of wood is not considered here (cf. indicator 14).
Key definitions	

Space for example

To be developed by data collection group (s)



(16) Forest Resources

Full name of indicator (including subclasses):	Forest Resources
Name of subclass	16.1. Forest and Other Wooded Land Area 16.2 Standing Volume or Growing Stock a) Total volume above ground with stump over-bark b) Total volume above ground with stump under-bark c) Total volume above ground without stump over-bark d) Total volume above ground without stump under-bark e) Commercial volume over-bark with a top diameter of di f) Commercial volume under-bark with a top diameter of di 16.3. Balance of afforestation and defforestation: a) Afforestation area b) Deforestation area 16.4. Balance of increments and fellings: a) Net annual increment b) Volume of felled trees 16.5. Age and/or diameter distribution: a) Age distribution: number of classes and coefficient of variation b) Diameter distribution: number of classes and coefficient of variation
Measurement units:	16.1 ha 16.2 $m^3.ha^{-1}$ 16.3 $ha.ha^{-1}$ 16.4 $m^3.ha^{-1}$ 16.5 not applicable
System Boundaries	Forest resources are specific to M2
Possible data source	NFI data, Forest Statistics and/or Forest Simulators (regional or european)

Calculation mode (incl. conversion factors)	16.1: Forest and Other Wooded Land Area Many forest inventories provide information regarding forest and other wooded land area. It can be obtained from aerial photo interpretation data if available for 2005. In case there is no data for the reference year this area must be estimated. 16.2: Standing Volume or Growing Stock With the data provided by the NFI, each regional case has to provide all volumes from a) to f), if possible, using allometric equations. In case there is no NFI data for the reference year volumes from a) to f) will have to be simulated. 16.4: Balance of increments and fellings Net Annual Increment is obtained subtracting total volume above ground with stump over-bark in years i and i-1 (V_i and V_{i-1}) and dividing it by the number of years between NFIs (n). This method requires two consecutive NFIs. $$NAI = (V_i - V_{i-1}) / n$$ In case there is no data available, increments will have to be simulated. The same goes for felled volume, however, this indicator can be obtained statistics. 16.5. Age and/or diameter distribution • Coefficient of variation (CV) The coefficient of variation represents the ratio of the standard deviation to the mean, and it is a useful statistic to measure the dispersion of data points around the mean. $$CV = \frac{standard\ deviation}{mean}$$ • Age distribution Different age classes for each forest specie

	• Diameter distribution Different diameter classes for each forest specie *Example*: *Classes interval: ≤ 10 cm; 11-20 cm; 21-30 cm; 31-40 cm; 41-50cm;51-60 cm; 61-70cm; 71-80cm; 81-90 cm; > 90cm* *In the case of Eucalyptus, the major number of trees are within the first class, diameter≤ 10 cm*
Module specifications / recommendations	
Key definitions	FAO, 2005. Forest Resources Assessment – Terms and definitions. • Forest Area - Forest Land: Land spanning more than 0.5 ha with trees higher than 5 m and a canopy cover of more than 10%, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agriculture or urban land use. (FRA – Terms and definitions) - Other Wooded Land: Land not classified as forest, spanning more than 0.5 ha with trees higher than 5 m and a canopy cover between 5% and 10%, or trees able to reach these thresholds *in situ* or with a combined cover of shrubs, bushes and trees above 10%. It does not include land that is predominantly under agriculture or urban land use. • Growing Stock Volume of all living trees more than X cm of d.b.h it may also include branches to a minimum diameter of Y cm. Includes the stem from ground level or stump height up to the tree top. • Commercial Growing Stock Volume of all living trees more than X cm of d.b.h it may also include branches to a minimum diameter of Y cm. Includes the stem from stump height level up to a tree top diameter of di cm that can vary according to the species and the country definitions.

	• Afforestation Establishment of forest plantations on land that, until then, was not classified as forest. Implies a land use change from non-forest to forest land. • Defforestation Conversion of forest to another land use or the long term reduction of the tree canopy cover below the minimum 10% threshold. Conversion implies a different use during at least 10 years • Net annual increment Is defined as the average annual volume of living trees above the minimum d.b.h. threshold over the given reference. • Fellings Is defined as the over-bark volume of all trees, living or dead, above a minimum d.b.h. threshold felled annually in forest or other wooded land, weather or not they are removed from the forest. It includes thinnings, pre-commercial thinnings and cleanings of trees left in the forest, and natural losses that are recovered.

Expert to contact in case of questions:

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(19) Generation of waste

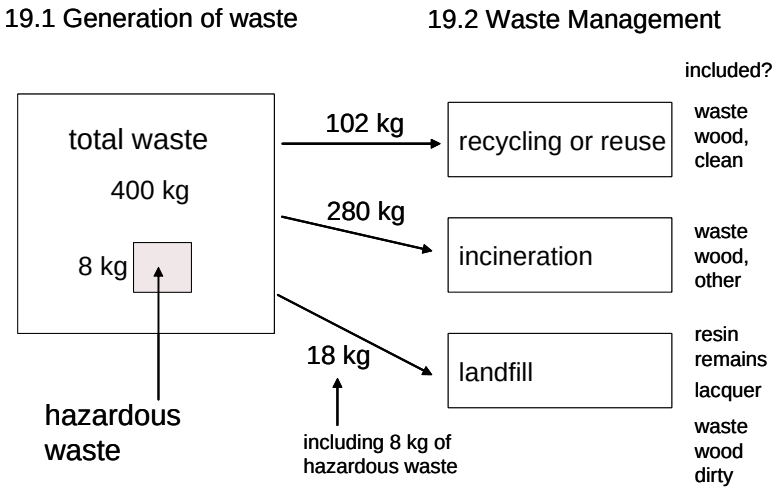
Full name of indicator (including subclasses):	Generation of waste: total, hazardous, and categorised by type of waste management
Name of subclass	19.1. Generation of waste 19.1.1. Not classified as hazardous waste 19.1.2. Classified as hazardous waste 19.2. Waste management 19.2.1. Waste to reuse or material recycling 19.2.2. Waste to incineration 19.2.3. Waste to landfill
Measurement units:	kg
System Boundaries	All waste generated should be accounted for. See Key definitions.. 19.1. All waste classified as hazardous waste (19.1.2) should be accounted for, independent of following treatment option. See Key definitions. 19.2. All waste which is directed to respective management option should be accounted for. In this indicator what is measured is waste directed towards a waste management option. It is not considered what will in the end be treated through this option (e.g. material losses in recycling processes are not considered). When the waste inventoried is "undefined" and the treatment option is not known an approximation could be the national average treatment, e.g. 10% to material recycling, 50% to incineration and 40% to landfilling.
Possible data source	19.1. Eurostat – have data on municipal waste generated, incinerated and landfilled on a national level. European Topic Centre on Waste and Material Flows (ETC/WMF) has compiled a list of national waste databases: http://waste.eionet.europa.eu/wastebase/national_databases. LCA-data in different databases. ISO certified enterprises, communes and county boards etc. ADEME (France) National statistical offices – probably aggregated data. Relevant conference proceedings Expert opinion
Calculation mode (incl. conversion factors)	19.1. Humidity of the waste (% of water present) should be noted in the Data Client when possible. 19.2. Note: All waste of wood and non-wood origin that is produced is divided between management options. If not known otherwise, hazardous

	waste is directed to landfill.
Module specifications / recommendations	19.1. M2/M4 - When biomass from forests is burned for energy ash is produced as a waste product. Depending on the concentration of problematic elements (often cadmium) or compounds such ash may be hazardous (19.1 b) or within subclass waste for recycling (19.2 a). M3 - For M3, 19.1 for Europe (in case of lack of national statistics)can be calculated using French data (annual quantities of waste per type of forest machine) gathered in the GEDEON project (see : ttp://www.afocel.fr/GEDEO/English/index.htm). The extrapolation to EU25 has been done through known machine fleet (the most accurate) and using wood harvest per country with estimation of mechanisation rate : logging operations in Europe produce between 25000 to 30000 tonnes of waste per year, of which 70 % are hazardous according to the European nomenclature (see : http://www.afocel.fr/gedeon/English/Collecte_Tri_dechets_France.htm) M4 and M5 - Process/Industry specific data should be used in M5 as far as possible. If not available sector averages or even national averages may be used. 19.2. M3 - The suggestion is to consider the generic data at the national level. M4 and M5 - Process/Industry specific data (e.g. LCA data, sustainability reports) should be used whenever possible. Regarding the waste streams (material recycling, incineration or landfill) sector averages are probably best available data. National averages for respective waste material could be used if sector averages are not available.
Key definitions	19.1. Based on Eurostat and OECD deinitions which can be found at: http://ec.europa.eu/eurostat/ramon/nomenclatures/index.cfm?TargetUrl=LST_NOM&StrGroupCode=CONCEPTS&StrLanguageCode=EN COM(2007) 59 final. Communication from the Commission to the council and the European Parliament on the Interpretative Communication on waste and by-products. (includes criteria for making the distinction between waste and by-products) Waste refers to materials that are not prime products (i.e. products produced for the market) for which the generator has no further use for own purpose of production, transformation or consumption, and which he discards, or intends or is required to discard. Waste may be generated during the extraction of raw materials during the processing of raw materials to intermediate and final products, during the consumption of final products, and during any other human activity. Excluded in this definition are: - Residuals directly recycled or reused at the place of generation (i.e. establishment);

	- Waste materials that are directly discharged into ambient water or air. (Eurostat / OECD definition) i.e. waste includes also waste that is later recovered through e.g. material recycling or energy recovery. Hazardous waste refers to the categories of waste to be controlled according to the Basel Convention on the control of trans-boundary movements of hazardous waste and their disposal (Article 1 and Annex I). (Eurostat / OECD definition) http://www.basel.int/text/documents.html 19.2 Re-use shall mean any operation by which end of life products and equipment (e.g. electrical and electronic equipment) or its components are used for the same purpose for which tey were conceived. Direct reuse at the place of generation (i.e. establishment) is excluded. (Eurostat/OECD Definition) Recycling is defined as any reprocessing of material in a production process that diverts it from the waste stream, except reuse as fuel. Both reprocessing as the same type of product, and for different purposes should be included. Direct recycling within industrial plants at the place of generation should be excluded. (Eurostat / OECD Definition) Incineration is the controlled burning of solid, liquid or gaseous waste materials at high temperatures. (Eurostat / OECD Definition) Landfill refers to the final placement of waste in or on the land in a controlled or uncontrolled way according to different sanitary, environmental protection and other safety requirements. (Eurostat / OECD Definition)

An example

The product used in an illustrative example (rough data) is a LVL beam used in construction. The total weight of the product is 400 kilograms. At demolition of a house, all of it becomes waste. This is partly hazardous (8 kg) because of the waste containing glue/resin and lacquer remains. All of the hazardous waste is taken to landfill and treated there. Also 10 kg of wood-based waste is taken to landfill, because it is of poor quality. Majority of the wood, 280 kg (70% of the total product mass) is taken to incineration and 102 kg of wood is recycled to make new wood products (e.g. panelboards). The total flow directed to waste management options: 102 + 280 + (8 + 10) = 400 kg. The moisture content of the wood is 13% - a note on this is made in the Data Client.



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Annex 1 Transport

Annex 1.1 - Transport: an indicator and a process

For the transport impacts (as a process), we work only on **loaded km or loaded tkm.**

The indicators of the transport

(1) Gross value added	Transport process
(2) Production cost	Transport process
(4) Resource use incl. recycled materiel	(calculated by Tosia) Not a transport process
(7) Total production	(calculated by Tosia) Not a transport process
(8) Employment	Transport process
(9) Wages and salaries	Transport process
(10) Occupational safety and health	Transport process
(11) Education and training	Transport process
(**12) Energy** generation and **use**	Transport process (for energy use)
(13) Greenhouse gas emissions and carbon stock	Transport process (for GHG)
(14) Transport	By definition
(15) Water use	Not a transport process
(19) Generation of waste	Not a transport process

Some propositions to calculate the indicators

(1) Gross value added	Ratio used on general official data on transport (share of tkm/total tkm)	By mode By country	Probably not direct information
(2) Production cost	Models/calculation Compute project information	By mode By country	For desegregation use national % if not direct information
(8) Employment	Ratio used on general official data on transport (share of tkm/total tkm) or FTE/tkm	By mode By country	For desegregation use national % if not direct information
(9) Wages and salaries	General official data on transport	By mode? By country	For desegregation use national % if not direct information
(10) Occupational safety and health	Ratio used on general official data on transport (share of tkm/total tkm)	By mode? If not, use modal split in total tkm By country	For desegregation use national % if not direct information
(11) Education and training	Ratio used on general official data on transport (share of tkm/total tkm)	By mode? If not, use modal split in total tkm By country	For desegregation use national % if not direct information
(12) Energy generation and use	Via fuel consumption by tkm (difference loaded and unloaded) For road mode: diesel for HDV and LDV and for Vans:	By mode By country	See tkm information (transport indicator)

	diesel or petrol (but diesel is the main energy use)		
(13) Greenhouse gas emissions and carbon stock	From energy use (12) For road mode: see share of Euro type of vehicle for road mode (if not, Euro 3 is dominating)	By mode By country	See the Indicator 13 Data Collection Protocol (calculation mode)

Some references

- **General**

  Eurostat (2007), "Panoroma of Transport"
  http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1073,46587259&_dad=portal&_schema=PORTAL&p_product_code=KS-DA-07-001

  UN Glossary for Transport Statistics (available in English and in French)
  http://www.cemt.org/online/glossaries/GloStat3e.pdf

  Bilan Carbone (in French) (equipments and energy consumption) (cf. in particular, Guide des facteurs d'émission - Edition janvier 2007 (V5))
  http://www2.ademe.fr/servlet/KBaseShow?sort=-1&cid=15729&m=3&catid=15736

- **On cost**

  COMPETE Project (2006), "Analysis of the contribution of transport policies to the competitiveness of the EU economy and comparison with the United States, October 2006 (Cf. annex 1 in particular;

  http://ec.europa.eu/ten/transport/studies/index_en.htm

- **On IWT (inland waterways transport)**

  PINE project (2004), "Prospect of Inland navigation within enlarged Europe"
  http://ec.europa.eu/ten/transport/studies/index_en.htm

  Knörr and Reuter (2005) (in German) for (load capacity)

Annex 1.2 – Freight equipments by mode

Road

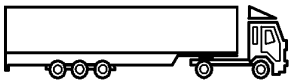
Decision of the transport group:

	Module 3[3]	Module 4	Module 5
Heavy duty vehicle	Roundwood Long logs Chips	Semi-trailer	Semi-trailer (Diesel)
Light duty vehicle	-	-	Delivery lorries (Diesel)
Vans	-	-	Diesel (mainly) vans

References:
M3: PD 3.3.2
M3/M4/M5: http://lipasto.vtt.fi/yksikkopaastot/freight_road.htm
M3/M4/M5: http://lca.jrc.ec.europa.eu/lcainfohub/datasetArea.vm

Heavy duty vehicle (22 tonnes of load or more), Euro classification 3
1. **M3** (3 types of truck: roundwood, long logs, chips), cf. PD. 3.3.2
2. **M4/M5**: 1 general type (cf. table 1 for permissible weight)

To illustrate, from LIPASTO for M4/M5



Semitrailer combination lorry *Gross vehicle mass 40t, pay load capacity 25t. This category includes e.g. MAN 18.372/25.372 and SISU SM372C. The figures have been given for highway and urban driving. Delivery driving emissions can be estimated by adjusting these with the appropriate highway driving percentage.*

Light duty vehicle (7t of load) for M4/M5

Delivery lorries *A lorry used for delivery without a trailer. At this moment there exists data of two different delivery lorries: small and big ones. Smaller one's gross weight is 6 tonnes and pay load capacity 3.5t. The gross weight of the bigger one is 15t, pay load capacity 9t. This category includes e.g. the Mercedes-Benz 1524, Scania G93-240 etc. The delivery lorries come in several types and sizes. In addition to the highway and urban driving figures, delivery-driving figures have also been represented with 30 % highway driving.*

Vans: for **M5** only (distribution to final consumer)
To illustrate, from LIPASTO:

Diesel vans *Gross vehicle mass 2.7t, pay load capacity 1.2t. This category includes e.g. the VOLKSWAGEN TRANSPORTER 2.5 TDI and FORD TRANSIT 2.5 D. There are so far no unit emission*

figures for gasoline powered vans as their share of the van fleet decreases continuously and their use in actual freight transportation is slight. In addition to the highway and urban driving figures, delivery-driving figures have also been defined for vans in order to represent typical van usage with 30 % highway driving.

Maximum Gross Vehicle Weight in tonnes

	Lorries		Road train		Articulated vehicles	
	2 axles	3 axles	4 axles	5 axles and more	5 axles and more	
BE	19	26	39	44	44	**BE**
CZ	18	25/26	36	42	42	**CZ**
DK	18/19	24/26	38	44/40	40/48	**DK**
DE	18	26	36	40	40	**DE**
EE	18	26	36	40	40	**EE**
EL	18	26	36	40	40	**EL**
ES	18	26	36	40	40	**ES**
FR	19	26	38	40	40	**FR**
IE	17	26	35	40	40	**IE**
IT	18	26	40	44	44	**IT**
CY						**CY**
LV	18	25	36	40	40	**LV**
LT	18	26	36	40	40	**LT**
LU	19	26		44	44	**LU**
HU	20	24	36	40	40	**HU**
MT			40	40	40	**MT**
NL	21.5	33	40	50	50	**NL**
AT	18	25	36	38	38	**AT**
PL	19.5	29.5	37	40	40	**PL**
PT	19	26	38	40	40	**PT**
SI	18	25		40	40	**SI**
SK	18	26	40	40	40	**SK**
FI	18	26	38	60	48	**FI**
SE	18	26		60	60	**SE**
UK	18	26	36	40	40	**UK**
BG	16	26	36	40	40	**BG**
RO	18	24	34	40	40	**RO**
HR			40	40	40	**HR**
MK			40	40	40	**MK**
TR	18	25	36	40	40	**TR**
IS	18	26	37	40	44	**IS**
NO		26		50	47	**NO**
CH	18	25	34	34	34	**CH**
LI	18	26	36	40	40	**LI**

Source : National sources, ECMT

Notes :

An articulated vehicle consists of a road tractor coupled to a semi-trailer. A road train is a goods road motor vehicle coupled to one or more trailers.

Many countries allow higher weight limits in certain circumstances: wheelbase, rear-axle spacing, double tyres, type of engine, type of road, type of load (containers).

DK: national / international

From ADEME – Bilan carbone (weight, emission for unloaded and loaded and max. loaded capacity)

PTAC	Emissions (kg équ. C/vehicule.km)		Charge utile maximale CU
	à vide (E_{vv})	A pleine charge (E_{vpc})	
< 1,5 t essence	0,062	0,062	0,40
< 1,5 t diesel	0,059	0,059	0,40
1,5 à 2,5 t essence	0,070	0,070	0,70
1,5 à 2,5 t diesel	0,068	0,068	0,70
2,51à 3,5 t essence	0,123	0,123	1,20
2,51 à 3,5 t diesel	0,088	0,088	1,20
3,5 t	0,101	0,101	1,40
3,51 à 5 t	0,136	0,196	2,37
de 5,1 t à 6 t	0,107	0,154	2,84
de 6,1 t à 10,9 t	0,158	0,228	4,69
de 11 t à 19 t	0,208	0,300	9,79
de 19,1 t à 21 t	0,240	0,346	11,62
21,1 à 32,6 tonnes	0,302	0,435	16,66
tracteurs routiers	0,252	0,363	25,00

Tableau 80 : Facteurs d'émission à vide et à pleine charge du transport de marchandises.

Train		
	Whole train	**Single wagon**
Modules	M3 to M5	M3
Size	M3 Scandinavia : 2 600 tonnes (70% for net load) For M4-M5 in Scandinavia: 1 250 tonnes (70% for net load) Otherwise in average : 900 tonnes (net load = 600) Baltic countries: average weight of goods is three times as much*	Cf. PD 3.3.2
Energy	Diesel / Electric**	

** =Eurostat (2007), "Rail freight transport 2005", Statistics in Focus, 16/2007.*

*** = Energy use will depend on locomotive and train size, . A generic value for Swedish system is value 0,23 Mj/tkm ref. "Lindholm, E-L., Berg, S. 2005. Energy requirement and environmental impact in timber transport. Scandinavian Journal of Forest Research, 20;184-191*

References:

M3: PD 3.3.2
M3/M4/M5: http://lca.jrc.ec.europa.eu/lcainfohub/datasetArea.vm
M3/M4/M5: UN Glossary for Transport Statistics
M3/M4/M5: ADEME – Bilan Carbone
M3/M4/M5: http://lca.jrc.ec.europa.eu/lcainfohub/datasetArea.vm

Sea shipping

- 15 000 and/or 9 000 dwt storo[4] or ro-ro ship for Baltic Sea/North Sea. The emissions, especially of sulphur is depending on which kind of fuel that are used. There are EU regulations for naval traffic on traffic close to coast states . Some basic technical information about (bunker) fuel qualities can be found at. http://www.bunkerworld.com/technical/tech_grades.htm. Energy use is depending on the size of the vessel and routes.
- For information on vessels: http://www.ctctimber.co.za/jit_default_783.html

References:

M3: PD 3.3.2
M3/M4/M5: http://lca.jrc.ec.europa.eu/lcainfohub/datasetArea.vm
M3/M4/M5: UN Glossary for Transport Statistics
M3/M4/M5: ADEME – Bilan Carbone

Definitions from UN Glossary :

- Deadweight (DWT) = The deadweight of a ship is the difference in tonnes between the displacement of a ship on summer load-line in water with a specific gravity of 1,025 and the total weight of the ship, i.e. the displacement in tonnes of a ship without cargo, fuel, lubricating oil, ballast water, fresh water and drinking water in the tanks, usable supplies as well as passengers, crew and their possessions.
- Gross tonnage (GT) = Gross tonnage is a measure of the size of a ship determined in accordance with the provisions of the International Convention on Tonnage Measurement of Ships, 1969.
- Tare Weight = The weight of a transport unit (e.g. containers, swap-bodies and pallets for containing goods as well as road goods vehicles, wagons or barges carried by sea) before any cargo is loaded.
- Storo= stowed cargo on roll off

Type of equipments

From UN Glossary- The principal categories are : i) Liquid bulk; ii) Dry bulk; iii) Containers; iv) Roll-on/Roll-off (self-propelled); v) Roll-on/Roll-off (non-self-propelled); vi) Other general cargo

From Ademe – Bilan Carbone (examples)

For container cargo: 1st column: 20 Foot ISO container (length of 20 feet and width of 8 feet) equivalent; 2nd column: capacity; 3: speed; 4 and 5: Energy consumption/day; 6: Emissions/day

Capacité en "équivalent vingt pied"	Capacité en m^3	Vitesse commerciale (nœuds)	Consommation en mer en tonnes de fioul lourd par jour	Consommation tertiaire en tonnes de gasoil par jour	Emissions par jour de mer en tonnes équivalent carbone
500	18 300	16	20	1,5	21,5
1 000	36 600	17,5	30	1,5	31,5
1 500	54 900	20	50	2	52
2 500	91 500	20,5	70	2	72
3 500	128 100	22,5	110	2	112
5 000	183 000	22,5	150	3	153

Tableau 100 : Facteurs d'émission des porte-conteneurs

For dry bulk (1st column: put into service year)

Modèle de navire	Années de mise en service	Port en lourd (tonnes)	vitesse (nœuds)	Tonnes de fioul brûlées par jour	Tonnes de gasoil brûlées par jour	parcours quotidien (km)	consommation par tonne.km (grammes)	émissions par tonne.km (kg. équ. C)
handysize	1970	20 000	13	30	1,5	578	2,7	0,00264
	1980	20 000	13	29	1,5	578	2,6	0,00255
	1990	20 000	13	21	1,5	578	1,9	0,00188
handymax	1980	40 000	15	30	1,5	667	1,2	0,00114
	1990	40 000	15	22,5	1,5	667	0,9	0,00087
panamax	1970	70 000	15	50	2	667	1,1	0,00108
	1980	70 000	15	36	2	667	0,8	0,00079
	1990	70 000	15	32	2	667	0,7	0,00070
capesize	1970	150 000	15	65	2	667	0,7	0,00065
	1980	150 000	15	50	2	667	0,5	0,00050
	1990	150 000	15	47,5	2	667	0,5	0,00048

Tableau 101 : Facteurs d'émission des vraquiers

Inlandwater ways

- Canal barges used in Germany for instance. Net load is ~4 000 tonnes.

References:

M3: PD 3.3.2
M3/M4/M5: http://lca.jrc.ec.europa.eu/lcainfohub/datasetArea.vm
M3/M4/M5: UN Glossary for Transport Statistics
M3/M4/M5: ADEME – Bilan Carbone
M3/M4/M5: PINE project

Definitions from UN Glossary :

C.II-21. Carrying capacity
Maximum permissible weight of goods, expressed in tonnes, which a vessel may carry in accordance with its documents.

Type of equipments

From Pine project (examples)

Vessel type	Dimensions (L x B)	Tonnage capacity at a draught of				
		1,50m	2,00m	2,50m	2,80m	3,50m
Large river motor ship	110,00 m x 11,40 m	600 t	1200 t	1800 t	2100 t	3000 t
Europe ship	85,00 m x 9,50 m	570 t	930 t	1350 t	-	-
'Johann Welker'**	80,00 m x 9,50 m	600 t	940 t	1280 t	-	-
'Gustav Koenigs' (extended)	80,00 m x 8,20 m	500 t	800 t	1100 t	-	-
'Gustav Koenigs'	67,00 m x 8,20 m	420 t	670 t	1000 t	-	-
'Kempenaar'	50,00 m x 6,60 m	400 t	600 t	650 t	-	-
Peniche	38,50 m x 5,00 m	250 t	300 t	400 t*	-	-
BM-500	56,50 m x 7,60 m	415 t	475 t	-	-	-

Table 6. Standard sizes of self-propelled river ships in Europe
**) with a maximum draught of 2.20 m*
***) names adopted in Germany, in other countries with high tradition in inland navigation similar size vessels are given other 'class notification' names*

Barge type	Dimensions (L x B)	Tonnage capacity at a draught of				Area of use
		2,00m	2,50m	2,80m	4,00m	River or corridor
Europe Type I	70,00 m x 9,50 m	940 t	1240 t	-	-	Rhine, MLK
Europe Type II	76,50 m x 11,40 m	1250 t	1660 t	1850 t	-	Rhine, MLK, Danube
Europe Type IIa	76,50 m x 11,40 m*	1140 t	1530 t	1800 t	2800 t	Rhine
Europe Type IIb	76,50 m x 11,00 m	1100 t	1500 t			Danube
GSP-54	54,00 m x 11,00 m	900 t				Elbe, Oder
SP-65	65,00 m x 8,20 m	900 t				Elbe, Oder
SP-35	32,50 m x 8,20 m	415 t				Elbe, Oder
LASH**	18,70 m x 9,50 m	250 t	335 t	385 t		Weser, Rhine
See-Bee**	29,75 m x 10,70 m	490 t	640 t	730 t		Weser, Rhine
Interlichter**	38,25 m x 11,40 m	585 t	775 t	900 t		Danube
OBP-500	45,50 m x 9,60 m	480 t	-	-	-	Oder

Table 7. Standard sizes of pushed barges in Europe
**) increased depth*
***) various special barges for combined overseas transport aboard a sea-going mother-ship*

From ADEME Bilan Carbone (for self propelled barge and self-propelled pusher barge) (examples)

		Consommation unitaire d'énergie (gep/t.km)	Facteurs d'émissions (gCO2/t.km)	Facteur d'émissions (Kg eqC/t.km)
Equipements				
Automoteurs	< 400t	14.0	44.3	0.0121
	400 – 650 t	13.8	43.4	0.0118
	650 – 1000 t	12.3	38.8	0.0106
	1000 – 1500 t	11.5	36.3	0.0099
	> 1500 t	9.5	30.0	0.0099
Pousseurs	295 – 590 kW	8.6	27.1	0.0074
	590 – 880 kW	7.8	24.4	0.0067
	> 880 kW	6.8	21.5	0.0059
Bassin				
Seine		9.5	30.1	0.0082
Rhône		9.3	29.4	0.0080
Nord Pas de Calais		13.6	42.9	0.0117
Rhin		11.5	36.2	0.0099
Moselle		12.0	37.9	0.0103
Interbassin		12.1	38.2	0.0104
Total		**10.8**	**34.0**	**0.0093**

Tableau 102 : Indicateurs de consommation énergétique et facteurs d'émission. Données agrégées par type d'équipement et par bassin de navigation. (ADEME, VNF, T&L Associés, 2005)

Annex 2 Socio Economic

Production cost

1. Shouldn't the NTFP and marketed services be included as processes/process-chains? - If in M2 we have processes defining a silvicultural system, these processes should include also income and costs from NTFP's where important, e.g. hunting rents, berries, etc.
2. How should the costs associated with the services and processes not directly related to a product (e.g. administration of companies, maintenance of machinery, etc.) be related to the process (monetary value, production in tonnes, other?) - Costs are monetary values. An approximation could be that selling and administrative costs were some percentage of the turnover, e.g. 10%, because that method would yield to a some extent a fair estimate. This would add no segregation between the processes, but would be needed to come up with realistic "gross value added". The maintenance costs are typically included in reported production costs, but that may of course vary depending on the source, and that should be checked prior to using the data source.

Investment and research & development

1. Gross fixed capital formation can be estimated in country by level for forest, pulp and paper, but data is not public. More rough estimates can also be made for e.g. pellet and chair, etc. sub-modes. Actual data strictly speaking does not exist, as assets are depreciated according to each company's own customs. Estimated data on the asset base by age and volume should be gathered (not publicly available), and uniform depreciation should be applied to yield current capital employed in fixed assets.

   Future data provider: Capital employed could be assumed to stay the same year after year, as new capacity can be assumed to replace obsolete capacity 1- to- 1 at least in medium term (implying that the industry structure does not change).

2. If the change in the industry structure is to be measured, what about the future data provider?

   New investments at least for pulp, paper and to some extent to pellets, panels, sawlogs etc. should be public. So this data could be gathered to keep track on that in the future. But the problem is that the equipment are also upgraded gradually, and this amount of money shows only in the companies' annual reports as capital expenditure. And if it is a multiproduct company, the allocation of capital expenditure on the specific business is very hard and time consuming.

   One solution could be to choose a group of preferably public companies, the capital expenditure levels of which would be kept track on (these should be cleaned from acquisition expenditures, though). Then if it would show that e.g. 2012 the capital expenditure have been only 70% of that of in year 2011, the gross fixed capital formation would be lowered in the following way: Assume assets

are depreciated in 15 years. If the initial gross fixed capital formation is 100, then a depreciation corresponding to one year is 100/15. If the capital expenditure stays the same as it has been for recent years, then the next year's gross fixed capital formation would still be 100. But now that it has been decreased by 30% during one year, the net depreciation would be 0,3*100/15, so that the gross fixed capital formation for 2012 would be 100-0,3*100/15=98.

If this approach was to be used, the tracked companies should be agreed upon, or this information could be gathered via expert opinion (the group of leading indicator companies could change over time). A yet better way would be is there existed a statistic on the industry investments, which could then be used instead, as described above.See also remark 3.

3. The capital within companies is allocated to different assets according to the assets' actual "replacement" cost, that is, what it would cost to replace the existing machines, buildings etc. by others of equal condition. This is called the book value of the assets. On top of this, according to IFRS, a current market value has to be assigned to the assets. The difference of these values is written into company's assets as goodwill, and it changes when the market value of the assets change.

   Both book value and goodwill are depreciated, but separately. And what matters in our analysis is the book value part, because it is intended to compensate for the required maintenance caused by the wearing out of the machines, buildings etc. The custom of how an individual company depreciates its assets is to some extent up to the company's internal decision, and it often ends up being one that e.g. minimizes taxes. Thus the reported depreciation does not necessarily be an accurate description of the assets' wearing out.

   So if we knew the depreciation (from the company's annual financial statement), we could very roughly estimate the book value of capital employed. But as is questioned, allocation of thus estimated capital to different operations within an individual company is not doable if the operations are not divided into separately reported divisions, which sometimes is the case, but sometimes is not. Due to the several difficulties related to the depreciation based approach described above, it may not be optimal way of doing the assessment. Furthermore, if the depreciation for the company's assets is stated somewhere (e.g. annual report), so should be the value of fixed assets as well.

   There are basically two ways how the gross capital formation can be estimated for the sectors in scrutiny. The compromise that has to be made when deciding which one to use has to do with **estimation difficulty** and **co-measurability of the results between different sectors along the chain**. The two alternatives are:

   a) From the annual report of Company X, take the 'Magazine Papers', 'Newsprint', 'Wood Products' etc. divisions 'Capital employed', 'Total assets' or 'Fixed assets' (The company may report which ever of these, but normally just one of these, so we would have to settle for what ever is reported). Thus e.g. for 'Newsprint' we would get 'Capital Employed' = 1878 MEUR. From the Company X's annual report (or from the company's web

pages) we would also see that the newsprint capacity for Company X is some 2 400 000t/a. Thus we would get that Capital employed per tonne of newsprint would be 1 878 000 000EUR / 2 400 000t = 783 EUR/t. We would use this number as the reference for all newsprint in Europe. So for a given area, which has production of newsprint of, say, 10 000 000t, the estimated gross fixed capital formation would be 10 000 000t * 783 EUR/t = 7 830 000 000EUR. The same procedure would be made for all the products in the chain, and it could be done provided that there were a (preferably) listed company that reports its divisional figures in its annual report. This would be the easier way, but the problem would then be the co-measurability at least with forestland's figures; The above procedure would result in a figure describing the book value of assets (explained earlier). For forestland, there exists no easy way of telling the book value. What can be done there is to estimate the market value e.g. by selecting a reference amount of m3 per hectare for a reference wood species and multiplying this by the wood's price (EUR/m3). But, as the market value would (typically) be higher than the book value (sometimes it's quite equal but sometimes very much above), we would end up showing that forestland had much more gross fixed capital formation than other sectors, even though this would necessarily not be the case, and the results would be somewhat skewed to disfavour forestland.

b) The second somewhat more demanding method would then be to use the marker value for all the sectors. The difficulty is that it is not reported anywhere separately for different divisions (i.e. Newsprint, wood products etc.). But it could be estimated by first calculating the market value of some company, e.g. now Company X, and then allocating the market value according to the book values of different divisions. The market value (or enterprise value) of a listed company (it cannot be calculated for unlisted company) is the *share price * number of shares + net debt*. For the Company X it would be something like 17 000 MEUR. The total capital employed for Company X is roughly 12 000 MEUR. Thus for Newsprint division we would get a market value of assets/tonne to be (17 000/12 000)* 783 EUR/t = 1110 EUR/t. So 40% higher than by the first method above. But now it would be commeasurable with the forestland figures.

In either case, if there is a listed company that has only one product, using that company as the reference company would be recommendable, as then one could directly use the company total figures without the need to allocate the items to the divisions.
But all in all, it should be decided which one of the proposed approaches will be used.

4. What happens if the budget is in Country A and the research in country B? See definition: **R&D expenditures** include all expenditures for R&D performed within the business enterprise sector (BERD) on the national territory during a given period, regardless of the source of funds.

5. If R&D is performed by an external R&D company in another country, this expenditure will be set to zero? According to the current definition, in this case it will be counted as R&D in another country.

Annex 3 PPP and Earnings Indicator 9.2

EUROSTAT - Purchasing power parities (PPP) and comparative price level indices, national currency, for the ESA 95 aggregates

Date of extraction: Tue, 29 Jan 08 04:07:28
Last update: Tue Dec 18 16:54:36 MET 2007

eu27	European Union (27 countries)	1
be	Belgium	1,07162
bg	Bulgaria	0,718807
cz	Czech Republic	16,0709
dk	Denmark	10,5642
de	Germany	1,05952
ee	Estonia	8,90135
ie	Ireland	1,25119
gr	Greece	0,848398
es	Spain	0,89818
fr	France	1,07132
it	Italy	1,05742
cy	Cyprus	0,513092
lv	Latvia	0,346422
lt	Lithuania	1,66434
lu	Luxembourg (Grand-Duché)	1,12364
hu	Hungary	144,357
mt	Malta	0,297757
nl	Netherlands	1,04286
at	Austria	1,0342
pl	Poland	2,21414
pt	Portugal	0,867277
ro	Romania	1,72537
si	Slovenia	0,745804
sk	Slovakia	19,3431
fi	Finland	1,22917
se	Sweden	11,0581
uk	United Kingdom	0,76506
hr	Croatia	4,70814
mk	Macedonia, the former Yugoslav Republic of	23,8675
tr	Turkey	1,05303
is	Iceland	118,396
no	Norway	11,367
ch	Switzerland	2,16703
al	Albania	58,455
ba	Bosnia and Herzegovina	0,895817
me	Montenegro	0,491915
rs	Serbia	34,0134

Purchasing Power Parities (PPPs) are currency conversion rates that both convert to a common currency and equalise the purchasing power of different currencies. In other words, they eliminate the differences in price levels between countries in the process of conversion.

EUROSTAT- Average Wages 2005

Average gross annual earnings in industry and services of full-time employees in enterprises with 10 or more employees (ECU/EUR)	2005		
EU (27 countries)	29246.8		
Belgium	36672.7		
Bulgaria	1977.7		
Czech Republic	7404.5		
Denmark	47529.3		
Germany	41694.0		
Estonia	:	no data	
Ireland	:	no data	
Greece	:	data for 2003 only	16738.5
Spain	20438.8		
France	30520.9		
Italy	:	no data	
Cyprus	20548.5		
Latvia	4246.0		
Lithuania	:	data for 1999 only	3016.9
Luxembourg	42135.0		
Hungary	7797.8		
Malta	11180.3		
Netherlands	38700.0		
Austria	36032.0		
Poland	6269.9		
Portugal	14715.0		
Romania	3155.0		
Slovenia	:	no data	
Slovakia	6373.6		
Finland	33290.0		
Sweden	34049.3		
United Kingdom	42866.3		
Iceland	:	data for 2003 only	36764.2
Norway	45485.2		
Switzerland	:	data for 2004 only	45759.8

source: EUROSTAT

http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996,45323734&_dad=portal&_schema=PORTAL&screen=welcomeref&open=/C/C4/C43&language=de&product=Yearlies_new_population&root=Yearlies_new_population&scrollto=0