Planed Softwood

Key Information

General Process Description	1 m^3 of planed kiln dried softwood based on the UK consumption mix
Reference Flow/Declared Unit	1 m^3 of planed kiln dried softwood, 15% moisture content (dry basis), average product density of 482 kg/m^3
Reference Year	2013

Methodological Approach

This generic dataset has been developed with reference to CEN/TR 15941:2010 *Environmental product declarations — Methodology for selection and use of generic data* and has made use of data from existing databases and EPD, compensated with data from UK industry and national statistics for the specific situation related to UK consumption of timber products. With regard to methodology, the datasets are in line with the core Product Category Rules given in EN 15804+A1: 2013 *Environmental product declarations — Core rules for the product category of construction products*, and further detailed in FprEN 16485:2013 *Round and sawn timber — Environmental Product Declarations — Product category rules for wood and wood-based products for use in construction* and the draft EN 16449, *Wood and wood-based products — Calculation of sequestration of atmospheric carbon dioxide*.

The generic dataset is intended for use as upstream data for UK consumed timber products within EPDs and building level LCA assessments to EN 15978:2011 *Assessment of environmental performance of buildings — Calculation method.*

Modelling & Assumptions

Planed kin dried softwood is modelled as being produced from two species – Scots pine and European spruce. Other species are known to form part of the UK softwood consumption mix, but these two were chosen as representative species with other pine and spruce/fir species modelled as these two wood types.

Data for 2012 provided to the United Nations Economic Commission for Europe's (UNECE) Timber Forecast Questionnaire were used to determine the split between UK produced and imported softwood consumed in the UK [UNECE 2013]. Research compiled by Timbertrends on wood imports into the UK for 2012 was used to determine the countries of origin for imported softwood [Timbertrends 2012].

Spruce and pine were used in the import statistics along with a third unspecific “coniferous wood” category. Unspecified coniferous wood was split between pine and spruce based on the species split for the nation in question for wood where the species was declared. These statistics also segregated imported softwood into planed and non-planed wood allowing for separate import mixes for planed softwood and non-planed softwood to be calculated.

For reasons of practicality, only countries representing a cumulative total of more than 95% of imported planed softwood for spruce and pine were included in the import mix. These figures were scaled up to 100% to account for production in the countries below the 5% cut-off (see Table). For pine products, production from Sweden, Finland, Russia, Latvia, Germany and Canada accounted for 97.6% of imported pine with seven other countries accounting for the remaining 2.4%. For spruce products, production from Sweden, Latvia, Ireland, Finland, Germany and Estonia accounted for 96.8% of imported spruce with nine other countries accounting for the remaining 3.2%.

Origin/Species	Percentage of Consumption Mix
UK Pine	**12.8%**
UK Spruce	**27.8%**
Imported Pine *Of which:*	**17.1%**
Sweden	*12.2%*
Latvia	*1.5%*
Russia	*1.2%*
Germany	*1.0%*
Finland	*0.6%*
Canada	*0.6%*
Imported Spruce *Of which:*	**42.3%**
Sweden	*24.4%*
Ireland	*4.9%*
Latvia	*4.7%*
Germany	*4.0%*
Finland	*3.1%*
Estonia	*1.2%*

Forestry practices and tree growth was modelled based on research by the Life Cycle Engineering department (LBP) of the University of Stuttgart and represents typical conditions in Western Europe [LBP 2013]. These generic data were adapted with country-specific energy and fuel inputs. Wood transported from the forest to sawmill was assumed to have an average moisture content of 79%.

A mean transport distance of 101 km from forest to sawmill is included for UK produced wood based on data from UK producers. For imported products a transport distance of 100 km from forest to sawmill has been assumed.

Information from Wood First’s industrial partners was used to model UK sawmills. This included information on the average consumption of power, thermal energy and fuel use per m^3 of sawn wood. Sawmills were split into mills with outputs greater than 50,000 m^3, which account for 76% of UK production and mills with production of less than 50,000 m^3, which account for the remaining 24%, with lower production mills modelled as having lower biomass energy usage than larger mills.

Average splits of sawn wood, woodchips, sawdust and bark were also provided by UK producers. Sawmill inputs and outputs were allocated to individual sawmill products on the basis of price, with price ranges provided based on research into UK sawmills. Feedstock energy (the inherent energy contained in the wood) and sequestered carbon are allocated on a physical basis to the wood.

For imported products, sawmill data for European mills compiled by PE International [PE International 2013] were used alongside data for production in Canada [Natural Resources Canada 2010] and data from CORRIM for the United States [CORRIM 2012]. Splits of sawn wood, woodchips, sawdust and bark were gathered from the same sources.

The density of the final product has been calculated from information related to wood densities of the relevant species at 15% moisture content [TRADA 2013], which have been adapted to reflect the moisture content of the final product.

Data on the average energy demand and energy mix for kilning were provided by UK producers. These data were used to model the average drying energy consumption for UK produced wood. For imported wood kilning data for European, Canadian and US production were used [PE International 2013][Natural Resources Canada 2010][CORRIM 2012]. It has been assumed that wood enters the kiln with a moisture content of 60% and is kiln dried to 15%. Any further drying that may take place after kiln drying has not been modelled.

Planing data were based on information on planing for European, Canadian and US production [PE International 2013][Natural Resources Canada 2010][CORRIM 2012] with energy and fuel inputs adapted to the country of production to reflect the fuel mix used.

Transport to customer from UK mills was 130 km based on data on the transport of timber construction products [DfT 2005]. For imported products, transport to UK customers was calculated based on:

- Truck transport from one of the country's largest sawmills listed in the online Sawmill Database [Sawmill DB 2014] to a large national port or where no sawmill is listed, from a heavily forested region in the country to a large national port.
- Sea transport from the designated port to Hull, Felixstowe, Southampton or Liverpool (dependent on country of origin)
- Transport of 130 km from port to customer [DfT 2005]

For imported pine average transport is 1658 km by sea and 815 km by road. For imported spruce, average transport is 1037 km by sea and 698 km by road.

Product use and maintenance have not been included due to the wide range of potential uses and consequently the high level of uncertainty surrounding this stage of the lifecycle.

End-of-life data are provided for three scenarios: 100% of wood waste to recycling, 100% of wood waste to incineration with energy recovery and 100% of wood waste to landfill. Wood transport distances to landfill and recycling of 25km and 21km were taken from survey data related to construction end of life practices in the UK compiled by BRE [BRE 2013]. Transport to wood energy recovery plants was estimated to be 46km based on average transport to one of an estimated 25 suitable biomass or waste-to-energy plants.

Landfill gas production is modelled based on the MELMod model for landfill emissions in the UK. The values used in this project take into account improvements to the assumptions regarding organic carbon degradation suggested by Eunomia as a result of their review of MELMod for DEFRA [Eunomia 2011]. Using typical values for cellulose, hemicellulose and lignin, an organic carbon conversion of 38.5% has been calculated. The landfill gas is assumed to have a 50:50 methane to carbon dioxide ratio by volume. The landfill is assumed to be a modern "Type 3" landfill (large modern landfill with comprehensive gas collection) with a landfill gas extraction efficiency of 50%.

Wood waste sent for recycling is assumed to be used as woodchips and is assigned credits related to the avoided production of woodchips from virgin softwood.

Environmental Parameters Derived from the LCA

Production & Distribution (Cradle-to-Site)

Parameters describing environmental impacts	Units	Production *(A1-A3)*	Distribution and Installation *(A4-A5)*
Global Warming Potential	kg CO2 eq.	-646	21.8
Ozone Depletion Potential	kg CFC11 eq.	4.06E-09	7.6E-11
Acidification Potential	kg SO2 eq.	0.755	0.218
Eutrophication Potential	kg PO4 eq.	0.131	0.0306
Photochemical Ozone Creation Potential	kg Ethene eq.	0.0638	-0.0152
Abiotic Depletion Potential (Elements)	kg Sb eq.	1.05E-05	6.2E-07
Abiotic Depletion Potential (Fossil)	MJ	1750	290

Parameters describing primary energy	Units	Production *(A1-A3)*	Distribution and Installation *(A4-A5)*
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value	1060	6.51
Use of renewable primary energy resources used as raw materials	MJ, net calorific value	8080	0
Total use of renewable primary energy resources	MJ, net calorific value	9140	6.51
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value	2130	291
Use of non-renewable primary energy resources used as raw materials	MJ, net calorific value	0	0
Total use of non-renewable primary energy resources	MJ, net calorific value	2130	291
Use of secondary material	kg	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0
Net use of fresh water	m^3	0.801	0.00516

Other environmental information describing waste categories	Units	Production *(A1-A3)*	Distribution and Installation *(A4-A5)*
Hazardous waste disposed	kg	0.162	4.87E-04
Non-hazardous waste disposed	kg	2.14	0.0202
Radioactive waste disposed	kg	0.155	3.39E-04

Other environmental information describing output flows	Units	Production *(A1-A3)*	Distribution and Installation *(A4-A5)*
Components for re-use	kg	0	0
Materials for recycling	kg	0	0
Materials for energy recovery	kg	0	0
Exported energy	MJ per energy carrier	0	0

Environmental Parameters Derived from the LCA

End-of-Life

Parameters describing environmental impacts	Units	100% Recycling		100% Energy Recovery		100% Landfill	
		End-of-Life Processing (C1-C4)	Material and Energy Credits (D)	End-of-Life Processing (C1-C4)	Material and Energy Credits (D)	End-of-Life Processing (C1-C4)	Material and Energy Credits (D)
Global Warming Potential	kg CO2 eq.	802	-11	803	-565	938	-79.5
Ozone Depletion Potential	kg CFC11 eq.	2.43E-10	-3E-10	2.44E-10	-2.4E-08	3.56E-10	-4.8E-09
Acidification Potential	kg SO2 eq.	0.0438	-0.0551	0.778	-1.47	1.52	-0.273
Eutrophication Potential	kg PO4 eq.	0.00712	-0.0102	0.154	-0.13	0.106	-0.0229
Photochemical Ozone Creation Potential	kg Ethene eq.	0.00183	-0.00267	0.0783	-0.0908	0.229	-0.0155
Abiotic Depletion Potential (Elements)	kg Sb eq.	3.72E-07	-2.2E-07	3.90E-07	-1.4E-05	6.59E-06	-2.3E-06
Abiotic Depletion Potential (Fossil)	MJ	259	-143	282	-7870	688	-1020

Parameters describing environmental impacts	Units	100% Recycling		100% Energy Recovery		100% Landfill	
		End-of-Life Processing (C1-C4)	Material and Energy Credits (D)	End-of-Life Processing (C1-C4)	Material and Energy Credits (D)	End-of-Life Processing (C1-C4)	Material and Energy Credits (D)
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ, net calorific value	4.39	-4.61	8080	-374	22.5	-73.5
Use of renewable primary energy resources used as raw materials	MJ, net calorific value	-8080	-8080	-8080	0	0	0
Total use of renewable primary energy resources	MJ, net calorific value	-8070	-4.61	4.41	-374	22.5	-73.5
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value	273	-159	295	-9260	707	-1290
Use of non-renewable primary energy resources used as raw materials	MJ, net calorific value	0	0	0	0	0	0
Total use of non-renewable primary energy resources	MJ, net calorific value	273	-159	295	-9260	707	-1290
Use of secondary material	kg	0	482	0	0	0	0
Use of renewable secondary fuels	MJ, net calorific value	0	0	0	0	0	0
Use of non-renewable secondary fuels	MJ, net calorific value	0	0	0	0	0	0
Net use of fresh water	m^3	0.0224	-0.0184	0.513	-1.55	-0.45	-0.304

Parameters describing environmental impacts	Units	100% Recycling		100% Energy Recovery		100% Landfill	
		End-of-Life Processing (C1-C4)	Material and Energy Credits (D)	End-of-Life Processing (C1-C4)	Material and Energy Credits (D)	End-of-Life Processing (C1-C4)	Material and Energy Credits (D)
Hazardous waste disposed	kg	0.00565	-0.00695	0.00567	-0.592	0.0154	-0.113
Non-hazardous waste disposed	kg	0.0458	-0.132	0.0458	-2.24	193	-0.362
Radioactive waste disposed	kg	0.00542	-0.00669	0.00544	-0.57	0.0073	-0.109

Parameters describing environmental impacts	Units	100% Recycling		100% Energy Recovery		100% Landfill	
		End-of-Life Processing (C1-C4)	Material and Energy Credits (D)	End-of-Life Processing (C1-C4)	Material and Energy Credits (D)	End-of-Life Processing (C1-C4)	Material and Energy Credits (D)
Components for re-use	kg	0	0	0	0	0	0
Materials for recycling	kg	482	0	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0
Exported energy from Electricity	MJ	0	0	2600	0	499	0
Exported energy from Thermal Energy	MJ	0	0	2600	0	0	0

*Represents use of secondary material in next product system

References

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