

## Fresh Sawn Softwood

### Key Information

**General Process Description** 1 m<sup>3</sup> of fresh sawn softwood based on the UK consumption mix

**Reference Flow/Declared Unit** 1 m<sup>3</sup> of fresh sawn softwood, 60% moisture content (dry basis), average product density of 672 kg/m<sup>3</sup>

**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

Fresh sawn 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. Spruce and pine were also used in import statistics compiled by Timbertrends to categorise softwood imports into the UK, along with a third unspecified “coniferous wood” category [Timbertrends 2012]. This unspecified coniferous wood from a country was allocated to either pine or spruce based on the relative production of pine or spruce reported in that country.

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 green softwood consumed in the UK [UNECE 2013]. From these statistics and discussions with industry partners, it was concluded that only very small quantities of fresh (i.e. undried) softwood were imported into the UK. For the small fraction of imported fresh sawn wood, research compiled by Timbertrends on wood imports into the UK for 2012 was used to determine the countries of origin for imported softwood.

The statistical analysis outlined above concluded that 97.3% of fresh sawn softwood consumed in the UK came from the UK, with 2.7% from imports (see table).

Forestry practice 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%.

Origin/Species	Percentage of Consumption Mix
<b>UK Pine</b>	<b>30.8%</b>
<b>UK Spruce</b>	<b>66.5%</b>
<b>Imported Pine</b>	<b>1.0%</b>
<i>Of which:</i>	
<i>Sweden</i>	<i>0.5%</i>
<i>Finland</i>	<i>0.2%</i>
<i>Russia</i>	<i>0.1%</i>
<i>Latvia</i>	<i>0.1%</i>
<b>Imported Spruce</b>	<b>1.7%</b>
<i>Of which:</i>	
<i>Sweden</i>	<i>0.8%</i>
<i>Latvia</i>	<i>0.2%</i>
<i>Ireland</i>	<i>0.2%</i>
<i>Finland</i>	<i>0.2%</i>
<i>Germany</i>	<i>0.1%</i>

A mean transport distance of 101 km from forest to sawmill is modelled 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<sup>3</sup> of sawn wood.

Average splits of sawn wood, woodchips, sawdust and bark were also

provided by UK producers. Sawmill energy, fuel and material 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. It is assumed that the average moisture content of the final product leaving the sawmill is 60%.

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 1849 km by sea and 796 km by road. For imported spruce, average transport is 1099 km by sea and 685 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 work 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.	-713	8.21
Ozone Depletion Potential	kg CFC11 eq.	1.93E-09	8.56E-12
Acidification Potential	kg SO2 eq.	0.348	0.0305
Eutrophication Potential	kg PO4 eq.	0.066	0.00545
Photochemical Ozone Creation Potential	kg Ethene eq.	0.0189	-0.00635
Abiotic Depletion Potential (Elements)	kg Sb eq.	1.51E-06	1.11E-07
Abiotic Depletion Potential (Fossil)	MJ	934	109

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	34.2	0.483
Use of renewable primary energy resources used as raw materials	MJ, net calorific value	8090	0
Total use of renewable primary energy resources	MJ, net calorific value	8120	0.483
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value	1040	109
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	1040	109
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 <sup>3</sup>	0.128	7.41E-04

Other environmental information describing waste categories	Units	Production (A1-A3)	Distribution and Installation (A4-A5)
Hazardous waste disposed	kg	0.0469	1.17E-04
Non-hazardous waste disposed	kg	0.906	0.00161
Radioactive waste disposed	kg	0.0453	1.04E-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.	810	-11	812	-566	935	-77.6
Ozone Depletion Potential	kg CFC11 eq.	3.39E-10	-3E-10	3.41E-10	-2.4E-08	4.96E-10	-4.6E-09
Acidification Potential	kg SO2 eq.	0.061	-0.0552	0.798	-1.47	1.53	-0.266
Eutrophication Potential	kg PO4 eq.	0.00993	-0.0102	0.157	-0.131	0.143	-0.0223
Photochemical Ozone Creation Potential	kg Ethene eq.	0.00255	-0.00268	0.0785	-0.091	0.228	-0.0151
Abiotic Depletion Potential (Elements)	kg Sb eq.	5.19E-07	-2.2E-07	5.44E-07	-1.4E-05	9.18E-06	-2.3E-06
Abiotic Depletion Potential (Fossil)	MJ	361	-143	393	-7890	959	-991

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	6.12	-4.62	8100	-374	31.3	-71.7
Use of renewable primary energy resources used as raw materials	MJ, net calorific value	-8090	0	-8090	0	0	0
Total use of renewable primary energy resources	MJ, net calorific value	-8080	-4.62	6.15	-374	31.3	-71.7
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, net calorific value	380	-159	412	-9270	985	-1260
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	380	-159	412	-9270	985	-1260
Use of secondary material	kg	0	672	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 <sup>3</sup>	0.0313	-0.0184	0.523	-1.55	-0.634	-0.297

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	0.00808	-0.00696	0.00811	-0.593	0.022	-0.114
Non-hazardous waste disposed	kg	0.0655	-0.132	0.0656	-2.24	395	-0.363
Radioactive waste disposed	kg	0.00775	-0.0067	0.00778	-0.571	0.0104	-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	672	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	500	0
Exported energy from Thermal Energy	MJ	0	0	2600	0	0	0

\*Represents use of secondary material in next product system

## References

BRE 2013	Anderson, J., Adams, K. and Shiers, D., 2013. Personal communication: Survey of UK Construction Waste Sites. BRE, Watford, UK
CORRIM 2012	CORRIM, 2012. Multiple documents: <i>Cradle to Gate Life Cycle Assessment of Softwood Lumber Production from the Inland Northwest/Northeast-North Central/Pacific Northwest/Southeast.</i>
DfT 2005	Department for Transport, 2005. Continuous Survey of Road Goods Transport. Department for Transport, London, UK.
Eunomia 2011	Eunomia Research & Consulting 2011. <i>Inventory Improvement Project – UK Landfill Methane Emissions Model: Final Report to DEFRA.</i> Eunomia Research and Consulting Ltd., Bristol, UK.
LBP 2011	LBP, 2011. Forestry practice and tree growth as modelled in GaBi database for PE International: Original research by University of Stuttgart, Life Cycle Engineering department (LBP). LBP, Stuttgart, Germany.
Natural Resources Canada 2010	Natural Resources Canada, 2010. <i>Status of Energy Use in Canadian Wood Products Sector</i>
PE International 2013	PE International, 2012. <i>GaBi 6 Software and Database for Life Cycle Engineering.</i> LBP, University of Stuttgart and PE International, Stuttgart, Germany
Sawmill DB 2014	The Sawmill Database. <a href="http://www.sawmilldatabase.com">www.sawmilldatabase.com</a> , last accessed February 2014.
Timbertrends 2012	Timbertrends, 2012. <i>Timber Products - Imports and Exports.</i> Statistics compiled by Timbertrends for 2012 production. Timbertrends, Alicante, Spain
TRADA 2013	TRADA, 2013. <i>Wood species Database.</i> <a href="http://www.trada.co.uk/techinfo/tsg/">www.trada.co.uk/techinfo/tsg/</a> . Last Accessed, December 2013.
UNECE 2013	UNECE, 2013. <i>UNECE Timber Forecast Questionnaire (Roundwood).</i> UNECE, Geneva, Switzerland.