



## General information

**Product:**

Accoya Wood

**Program operator:**

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**Declaration number:**

FOUØH11 E3 GEP

**ECO Platform reference number:**

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**This declaration is based on Product Category Rules:**

CEN Standard EN 15804 serves as core PCR  
PCR 015 Rev1

**Statement of liability:**

The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

**Declared unit:**

1 m3 of Accoya decking, cladding and planed timber

**Declared unit with option:****Functional unit:****Verification:**

The CEN Norm EN 15804 serves as the core PCR. Independent verification of the declaration and data, according to ISO14025:2010

internal  external

Third party verifier:



Harry van Ewijk

(Independent verifier approved by EPD Norway)

**Owner of the declaration:**

Accsys Technologies PLC  
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**Manufacturer:**

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e-mail: [info@accvoja.com](mailto:info@accvoja.com)

**Place of production:**

Arnhem, the Netherlands with warehouse in Oslo

**Management system:**

Chain of Custody certification for sustainable forestry following FSC-STD-40 and PEFC ST 2002:2013

**Organisation no:**

809527.790.801

**Issue date:**

FI EFGDFI

**Valid to:**

FI EFGDFE

**Year of study:**

2015

**Comparability:**

EPD of construction products may not be comparable if they do not comply with EN 15804 and are seen in a building context.

**The EPD has been worked out by:**

Joost Vogtlander



Approved



Håkon Hauan  
Managing Director of EPD-Norway

## Product

### Product description:

Accoya® wood is the result of decades of research and development that has brought together a long-established and extensively proven wood modification technique – acetylation – and leading-edge patented technology to create a high performance wood. It has a class 1 durability according to EN 350-1 (= highest durability class) and exceptional dimensional stability. The durability translates to an expected service life of 60 years for external cladding and decking more than 20 cm above the ground. Moreover, the Accoya® wood production process does not compromise the wood's strength or machinability. These properties make it well suited for challenging external applications such as windows and doors, cladding, decking, outdoor furniture and when stress graded for structural applications such as bridges.

For more information on the product, the production process, certifications acquired, and examples of international projects, see [www.accoya.com](http://www.accoya.com)

### Product specification:

Accoya is available in several dimensions in various grades:

A1 : 4 sides primarily clear

A2 : 3 sides primarily clear

A3 : 1 side primarily clear

see available dimensions in table below

dimensions Accoya wood (mm)	
25x100	50x100
25x125	50x125
25x150	50x150
25x200	50x200
32x100	63x100
32x125	63x125
32x150	63x150
32x200	63x200
38x100	75x100
38x125	75x125
38x150	75x150
38x200	75x200

standard lengths: 2.4 m, 3.0 m, 3.6 m, 4.2 m, 4.8 m.

### Technical data:

The average properties of Accoya® wood made from Radiata pine and has been compiled using data extracted from official test reports, copies of which are available upon request. If different from Radiata Pine, data for Accoya made from Scots Pine (SP) respectively Beech (B) are added in brackets.

- Durability class 1 (EN 350, EN 113, ENV 807)
  - Density (ISO 3131): 510 kg/m<sup>3</sup> (SP: 540 kg/m<sup>3</sup>, B: 755 kg/m<sup>3</sup>)
  - Equilibrium moisture content 3-5 % (65% rel. humidity, 20°C)
  - Swelling (oven dry - wet) Radial 0,7% Tangential 1.5% (SP: 0,9%, 1,5% B: 1,3%, 2,2%)
  - Bending strength (EN 310): 80 N/mm<sup>2</sup> (SP: 85 N/mm<sup>2</sup>, B: 155 N/mm<sup>2</sup>)
  - Bending stiffness (EN 310): 8790 N/mm<sup>2</sup> (SP: 9000 N/mm<sup>2</sup>, B: 12150 N/mm<sup>2</sup>)
  - Hardness (Janka, ASTM D143) Side 4100 N, End grain 6600 N (SP: Side 2800 N, End n.a.; B: Side 7870 N, End 10660 N)
  - Thermal Conductivity = 0.12 Wm-1K-1 via EN 12667
- more info see Accoya Wood Information Guide  
<http://www.accoya.com/wp-content/uploads/2015/09/Wood-Information-Guide-English.pdf>

### Certificates

The production facility and its products have been granted various certificates:

FSC Chain of Custody Certificate, PEFC Chain of Custody, Cradle to Cradle (C2C) Gold Certificate, RAL Certificate, 3 Part Spec for NA Architects, Certificate of Thermal Performance by IFT, KOMO® product Certificate and many more: see <http://www.accoya.com/resource-centre/certifications-registrations/> for a full overview of current certificates

### Market:

Worldwide

## LCA: Calculation rules

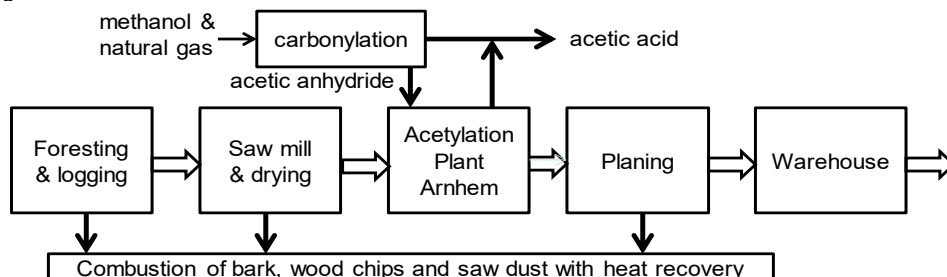
### Declared unit:

The declared unit is 1 m<sup>3</sup> of Accoya planed timber (PCR 015 Rev1, section 6.3.1 page 15), which can be used directly as decking or cladding or can be used as input for various other applications such as joinery, shutters and even structural applications. For overview of available dimensions is referred to the datasheet available on [http://www.accoya.com/wp-content/uploads/2015/09/DS\\_EU-English.pdf](http://www.accoya.com/wp-content/uploads/2015/09/DS_EU-English.pdf)

### System boundary:

The flowchart of the cradle to gate system (A1-A3) is shown in Fig. 1.

Figure 1.



### Data quality:

Data have been derived from the ERP system in Arnhem for the period april 2014 - may 2015. Data of background processes are from Ecoinvent V3.1 ("Recycled Content"). Calculations have been made in Simapro 8.0.5.13

### Cut-off criteria:

All major raw materials and all the essential energy is included. The production process for raw materials and energy flows that are included with very small amounts (<1%) are not included. This cut-off rule does not apply for hazardous materials and substances.

### Allocation:

The allocation is made in accordance with the provisions of EN 15804.

Wood waste of the saw mill (bark, chips and dust), as well as the planing site, is used for pulp, wood products and combustion. In this LCA, this flow is calculated as 100% combustion with heat recovery, transformed into energy output, applying the Lower Heating Value of the material (i.e 20 MJ/kg dry wood, 17,3 MJ/kg when the moisture content is 12%). This is allocated directly to the process, which procedure is according to section 4.3.3.1. of ISO 14044, and section 6.4.3.1 of the EN 15804.

With regard to allocation of the by-product Acetic Acid, economic allocation been applied according to EN 15804, Section 6.4.3.2: the cradle to gate eco-burden including the acetylation plant in Arnhem is divided between Accoya and acetic acid in the same proportion as the economic value of both products for the production period of 1st of April 2014 to 31st of March 2015.

The production of Accoya wood is a form of industrial symbiosis with the combined production of acetic anhydride and acetic acid (see Fig. 1). From a scientific point of view, it might be argued that system expansion is more appropriate in this case (according to ISO 14044, section 4.3.4.2, Step1 point 2). Since the reader might be interested in the effects of such an alternative calculation system, the LCA results in the case of system expansion are presented under "Additional Environmental Information".

## Carbon Sequestration

The carbon sequestration has been taken into account of the finished product: 1.85 kg CO<sub>2</sub> per kg Accoya wood (corresponding to 944 kg CO<sub>2</sub> per m<sup>3</sup> Radiata pine, 999 kg CO<sub>2</sub> per m<sup>3</sup> Scots pine and 1397 kg CO<sub>2</sub> per m<sup>3</sup> Beech).

## LCA: Scenarios and additional technical information

The results are given for 3 Accoya products per m<sup>3</sup>:

- Accoya from Radiata pine from New Zealand (510 kg/m<sup>3</sup>)
- Accoya from Scots pine from Sweden (540 kg/m<sup>3</sup>)
- Accoya from Beech from Germany (Schwarzwald) (755 kg/m<sup>3</sup>)

## LCA: Results

This LCA is Cradle to Gate where the gate is not the gate at the production site in Arnhem, **but the gate of the warehouse in Norway**: module A1 – A3, see Fig. 1.

### System boundaries (X=included, MND= module not declared, MNR=module not relevant)

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries	
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential	
																	A1
x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

### Economic allocation according EN 15804, section 6.4.3.2 (module A1 - A3)

Parameter	Unit	Accoya from Radiata Pine	Accoya from Scots Pine	Accoya from Beech
GWP	kg CO <sub>2</sub> -eqv	-4,33E+02	-7,41E+02	-1,01E+03
ODP	kg CFC11-eqv	1,43E-04	1,25E-04	1,74E-04
POCP	kg C <sub>2</sub> H <sub>4</sub> -eqv	3,68E+00	1,97E+00	2,39E+00
AP	kg SO <sub>2</sub> -eqv	1,12E+00	9,83E-01	1,03E+00
EP	kg PO <sub>4</sub> <sup>3-</sup> -eqv	1,77E-01	1,23E-01	1,60E-01
ADPM	kg Sb-eqv	2,73E-03	3,04E-03	4,19E-03
ADPE	MJ	1,53E+04	1,43E+04	1,97E+04

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

Economic allocation according EN 15804, section 6.4.3.2 (module A1 - A3)

Parameter	Unit	Accoya from Radiata Pine	Accoya from Scots Pine	Accoya from Beech
RPEE	MJ	847	932	1256
RPEM	MJ	6574	10372	7596
TPE	MJ	7421	11304	8852
NRPE	MJ	14559	13137	18069
NRPM	MJ	2549	2939	4028
TRPE	MJ	17108	16076	22097
SM	kg	0	0	0
RSF	MJ	0	0	0
NRSF	MJ	0	0	0
W	m <sup>3</sup>	242	147	189

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water

Reading example: 9,0 E-03 =  $9,0 \cdot 10^{-3}$  = 0,009

Waste module A1 - A3 for economic allocation (waste flows for 1 m3 Accoya)

parameter	unit	Accoya from Radiata Pine	Accoya from Scots Pine	Accoya from Beech
HW	kg	0,02	0,02	0,02
NHW	kg	60,20	71,16	122,67
RW	kg	0,02	0	0,01

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

End of life - Output flow (waste flows for 1 m3 Accoya)

parameter	unit	Accoya from Radiata Pine	Accoya from Scots Pine	Accoya from Beech
CR	m3	1	1	1
MR	m3	0,00	0	0
MER	m3	0	0	0
EEE	MJ	0	0	0
ETE	MJ	0	0	0

CR Components for reuse; MR Materials for recycling; MER Materials for energy recovery; EEE Exported electric energy; ETE Exported thermal energy

## Additional Norwegian requirements

### Greenhouse gas emission from the use of electricity in the manufacturing phase

Hydro power is applied for the acetylation plant (A3); for the planing, electricity from the national grid (NL) is applied

Data source	Amount	Unit
Ecoinvent v3.1 (jan 2015) for hydropower	0,0057	CO <sub>2</sub> -eqv/kWh
Ecoinvent v3.1 (jan 2015) for national grid (NL)	0,666	CO <sub>2</sub> -eqv/kWh

### Dangerous substances

- The product contains no substances given by the REACH Candidate list or the Norwegian priority list
- The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskiften, Annex III), see table.

### Indoor environment

The product meets the requirements for low emissions (M1) according to EN15251: 2007 Appendix E. there are no emissions which are toxic

## Additional Environmental Information

Avoiding economic allocation by "substitution", also called "system expansion" is the preferred method in ISO 14044, section 4.3.4.2, Step1 point 2. The by-product acetic acid will replace in this approach acetic acid made from fossil feedstock. In fact, this method is in line with the way to model the industrial symbiosis of Fig 1.

The results of "system expansion" are provided in the tables below.

### system-expansion/substitution according to ISO 14044 section 4.3.4.2, step 1.2 (module A1 - A3)

Parameter	Unit	Accoya from Radiata Pine	Accoya from Scots Pine	Accoya from Beech
GWP	kg CO <sub>2</sub> -eqv	-7,09E+02	-1,13E+03	-1,54E+03
ODP	kg CFC11-eqv	1,67E-04	1,40E-04	1,95E-04
POCP	kg C <sub>2</sub> H <sub>4</sub> -eqv	3,04E+00	5,29E-01	3,27E-01
AP	kg SO <sub>2</sub> -eqv	1,21E+00	9,90E-01	9,45E-01
EP	kg PO <sub>4</sub> <sup>3-</sup> -eqv	-7,13E-02	-1,89E-01	-2,67E-01
ADPM	kg Sb-eqv	1,68E-03	1,80E-03	2,51E-03
ADPE	MJ	9,92E+03	7,03E+03	9,79E+03

GWP Global warming potential; ODP Depletion potential of the stratospheric ozone layer; POCP Formation potential of tropospheric photochemical oxidants; AP Acidification potential of land and water; EP Eutrophication potential; ADPM Abiotic depletion potential for non fossil resources; ADPE Abiotic depletion potential for fossil resources

### system-expansion/substitution according to ISO 14044 section 4.3.4.2 (module A1 - A3)

Parameter	Unit	Accoya from Radiata Pine	Accoya from Scots Pine	Accoya from Beech
RPEE	MJ	745	800	1071
RPEM	MJ	6574	10372	7596
TPE	MJ	7319	11172	8667
NRPE	MJ	8654	5210	7289
NRPM	MJ	2549	2939	4028
TRPE	MJ	11203	8149	11316
SM	kg	0	0	0
RSF	MJ	0	0	0
NRSF	MJ	0	0	0
W	m <sup>3</sup>	178	199	258

RPEE Renewable primary energy resources used as energy carrier; RPEM Renewable primary energy resources used as raw materials; TPE Total use of renewable primary energy resources; NRPE Non renewable primary energy resources used as energy carrier; NRPM Non renewable primary energy resources used as materials; TRPE Total use of non renewable primary energy resources; SM Use of secondary materials; RSF Use of renewable secondary fuels; NRSF Use of non renewable secondary fuels; W Use of net fresh water





### Waste module A1 - A3 for system expansion/substitution

parameter	unit	Accoya from Radiata Pine	Accoya from Scots Pine	Accoya from Beech
HW	kg	0,02	0,02	0,03
NHW	kg	50,03	59,96	115,16
RW	kg	0,02	-0,01	-0,02

HW Hazardous waste disposed; NHW Non hazardous waste disposed; RW Radioactive waste disposed

## Bibliography

ISO 14025:2010	<i>Environmental labels and declarations - Type III environmental declarations - Principles and procedures</i>
ISO 14044:2006	<i>Environmental management - Life cycle assessment - Requirements and guidelines</i>
EN 15804:2012+A1:2013	<i>Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products</i>
ISO 21930:2007	<i>Sustainability in building construction - Environmental declaration of building products</i>
LCA	Joost Vogtlander, 2015. <i>Accoya wood - cladding, decking and planed timber for joinery applications. Report nr. 1</i> , Accsys Technologies PLC
NPRC 015 rev1	Wood and wood-based products for use in construction

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