

# **ENVIRONMENTAL PRODUCT DECLARATION**

in accordance with ISO 14025, ISO 21930 and EN 15804

epd-norge.no

Owner of the declaration:	
Program operator:	
Publisher:	
Declaration number:	

ECO Platform reference number: Issue date: Valid to: Accsys Technologies PLC The Norwegian EPD Foundation The Norwegian EPD Foundation NEÚÖ-3Ĩ Î -2Î 2-NO Á

€€€€€€G H FÌÈFCÈ€€FÍ FÌÈFCÈ€€€€€

# Accoya Wood - decking, cladding and planed timber for joinery applications

# Accsys Technologies PLC

# www.epd-norge.no







General information	
Product	Owner of the declaration:
Accova Wood	Accsvs Technologies PLC
	Contact person: Pablo van der Lugt
	Phone: +31263201400
	e-mail:
rogram operator:	Manufacturer:
he Norwegian EPD Foundation	Accsys Technologies PLC
ost Box 5250 Majorstuen, 0303 Oslo, Norway	Westervoortsedijk 73. PO Box 2147. 6802 CC Arnhem the
hone: (+47) 23 08 82 92	Phone: +31263201441
-mail: post@epd-porge po	e-mail: info@accova.com
eclaration number:	Place of production:
	Arnham the Netherlands with warehouse in Oals
	Arment, the Nethenands with warehouse in Osio
CO Platform reference number:	Management system:
EEEEG H	Chain of Custody certification for sustainable forestry
	following FSC-STD-40 and PEFC ST 2002:2013
	······································
his declaration is based on Product Category Rules:	Organisation no:
EN Standard EN 15804 serves as core PCR	809527.790.801
PCR 015 Rev1	
statement of liability:	Issue date:
he owner of the declaration shall be liable for the underlying	FÌÈFGÈGEFÍ
nformation and evidence. EPD Norway shall not be liable	
vith respect to manufacturer information. life cycle	
ssessment data and evidences.	
	Valid to:
	The deede
Declared unit:	Year of study:
m3 of Accoya decking, cladding and planed timber	2015
And the state of t	Comparability
Declared unit with option:	
	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:
	loost Vootlander
	AIMING C
	BETTER D
	accelerating processes
/erification:	
erification: he CEN Norm EN 15804 serves as the core PCR. Independent	
erification: he CEN Norm EN 15804 serves as the core PCR. Independent erification of the declaration and data, according to	
<b>Verification:</b> The CEN Norm EN 15804 serves as the core PCR. Independent erification of the declaration and data, according to SO14025:2010	
Verification: The CEN Norm EN 15804 serves as the core PCR. Independent erification of the declaration and data, according to SO14025:2010	
Verification: The CEN Norm EN 15804 serves as the core PCR. Independent erification of the declaration and data, according to SO14025:2010 ☐ internal ☑ external	Approved
Verification: The CEN Norm EN 15804 serves as the core PCR. Independent erification of the declaration and data, according to SO14025:2010 internal vertext according to External	Approved
Verification:         The CEN Norm EN 15804 serves as the core PCR. Independent erification of the declaration and data, according to SO14025:2010         Image: Im	Approved
Verification:         The CEN Norm EN 15804 serves as the core PCR. Independent erification of the declaration and data, according to SO14025:2010         Image: Internal i	Approved
Merification:         he CEN Norm EN 15804 serves as the core PCR. Independent erification of the declaration and data, according to SO14025:2010         □ internal       ☑ external         Third party verifier:	Approved Hakan Harray
Verification:         The CEN Norm EN 15804 serves as the core PCR. Independent erification of the declaration and data, according to SO14025:2010         Image: Internal i	Approved Hakon Hauan Håkon Hauan

# 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

#### **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 Acco	oya 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/m3 (SP: 540 kg/m3, B: 755 kg/m3)

- 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/mm2 (SP: 85 N/mm2, B: 155 N/mm2)

- Bending stiffness (EN 310): 8790 N/mm2 (SP: 9000 N/mm2, B: 12150 N/mm2)

- 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/resourcecentre/certifications-registrations/ for a full overview of current

certificates



# LCA: Calculation rules

### Declared unit:

The declared unit is 1 m3 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

#### 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".

#### System boundary:

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

#### **Carbon Sequestration**

The carbon sequestration has been taken into account of the finished product: 1.85 kg CO2 per kg Accoya wood (corresponding to 944 kg CO2 per m3 Radiata pine, 999 kg CO2 per m3 Scots pine and 1397 kg CO2 per m3 Beech).

# LCA: Scenarios and additional technical information

The results are given for 3 Accoya products per m3:

- Accoya from Radiata pine from New Zealand (510 kg/m3)
- Accoya from Scots pine from Sweden (540 kg/m3)
- Accoya from Beech from Germany (Schwarzwald) (755 kg/m3)

# 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.

Syst	em bo	ounda	ries (>	<pre>&lt;=included</pre>	, MNE	)= moo	dule no	t dec	lared,	MNR=r	nodule i	not relev	/ant)			
Pro	oduct st	age	Asse	emby stage				Use st	age			En	d of life	e stage	9	Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	AldmassA	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery- Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
х	x	x	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 kg PO<sub>4</sub><sup>3-</sup>-eqv EP 1,77E-01 1,23E-01 1,60E-01 ADPM kg Sb-eqv 2,73E-03 3.04E-03 4.19E-03 ADPE 1,97E+04 MJ 1,53E+04 1,43E+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 al	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 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; NRSF Use of non renewable secondary fuels; W Use of net fresh water

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

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

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

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

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

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

#### **Dangerous substances**

If 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-expa	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 PO₄ <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	2 <mark>939</mark>	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 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; NRSF Use of non renewable secondary fuels; W Use of net fresh water

Waste module A1 - A3 for system expansion/subsitution				
		Accoya from Radiata Pine	Accoya from Scots Pine	Accoya from Beech
parameter	unit			
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	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
ISO 14044:2006	Environmental management - Life cycle assessment - Requirements and guidelines
EN 15804:2012+A1:2013	Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products
ISO 21930:2007	Sustainability in building construction - Environmental declaration of building products
LCA	Joost Vogtlander, 2015. Accoya wood - cladding, decking and planed timber for joinery applications. Report nr. 1, Accsys Technologies PLC
NPRC 015 rev1	Wood and wood-based products for use in construction

Cond parga pa	Program operator	Phone:	ÉIÏÁGHÆÌÂIGÁIG
epa-norge.no	V@°Á¤[¦,^*ãæ),ÁÒÚÖÁ2[ĭ}åæaãį}		
The Norwegian EPD Foundation	Ú[•cÁÓ[¢ÁľGÍ€ÁTæbþ¦•č^}ÊÉEH€HÁU•∥[	e-mail:	] [ • O ^] åË [ ¦* ^È [
0	Þ[¦, æ	web	, , , È) å跱[ \* ^跱[
Cond paras po	Publisher	Phone:	+47 23 08 82 92
epu-norge.no	The Norwegian EPD Foundation		
The Norwegian EPD Foundation	Post Box 5250 Majorstuen, 0303 Oslo	e-mail:	post@epd-norge.no
<u>®</u>	Norway	web	www.epd-norge.no
	Owner of the declaration	Phone:	+31263201400
ACCSYS TECHNOLOGIES	Accsys Technologies PLC	Fax	
	Westervoortsedijk 73, PO Box 2147	e-mail:	info@accoya.com
	6802 CC Arnhem the Netherlands	web	www.accoya.com
	Author of the Life Cycle Assessment	Phone:	31654220688
	Joost Vogtlander	Fax	
BEITER		e-mail:	jg.vogtlander@aimingbetter.nl
accelerating processes		web	www.ecocostsvalue.com

**ENGROS**