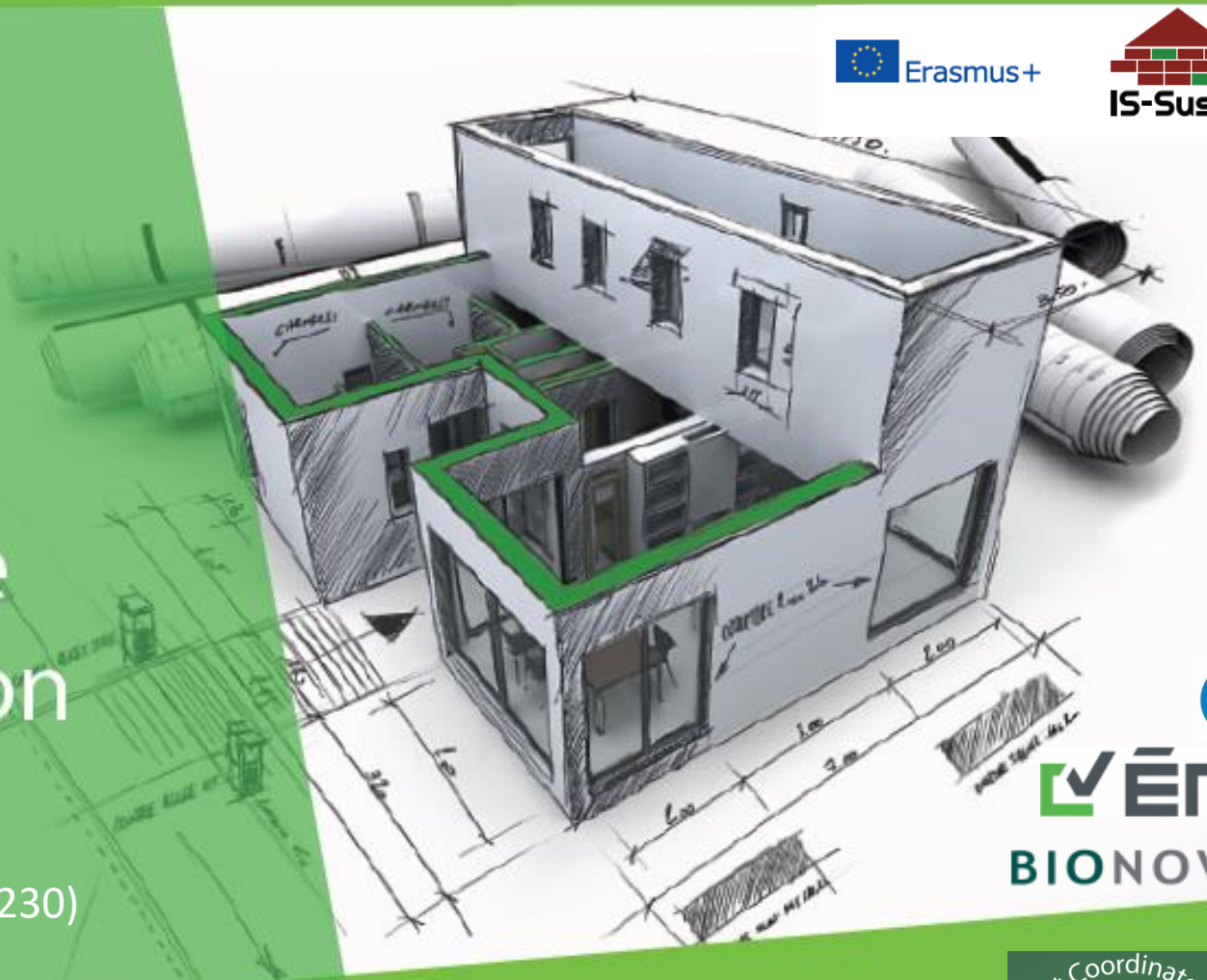
Spread of Innovative Solution for SUStainable CONstruction (IS-SusCon)

(2019-1-HU01-KA204-061230)



Erasmus+

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ÉMI

BIONOVA

Project Coordinator: LCA CENTER LCA Center Hungary Association

Környezeti lábnyom a mindennapokban

Környezeti lábnyomok, életciklus szemlélet, LCA

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Környezeti lábnyom életciklus szemlélettel

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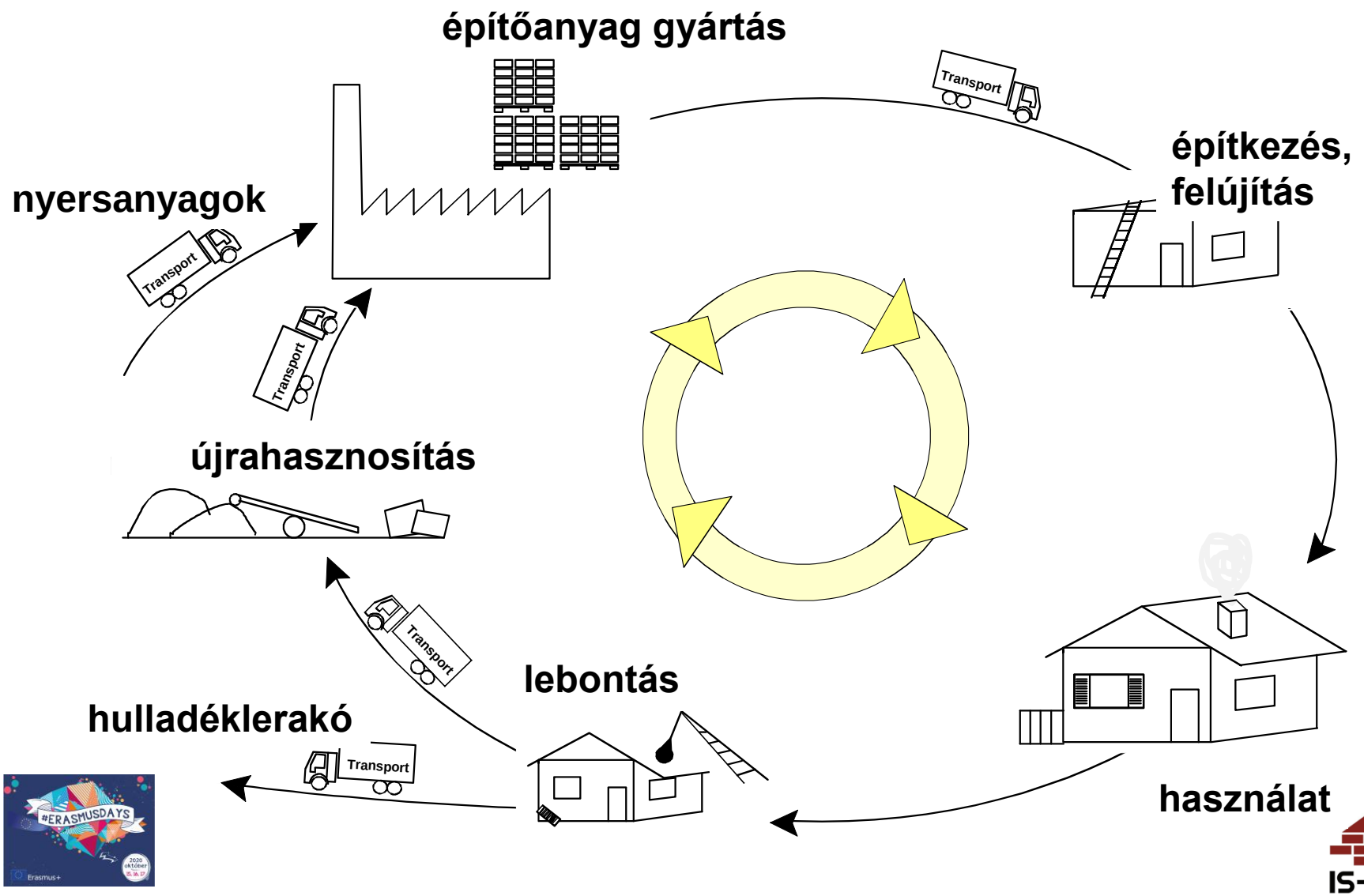

Életciklus szemlélet az IS-SusCon kézikönyvben

- Hogyan tudjuk számszerűsíteni a környezeti lábnyomunkat életciklus szemlélettel
- **LCA (Life Cycle Assessment)**
- LCA az építőiparban és az EU politikában
- LCA alapú szabványok, programok: építőanyagok környezeti termék nyilatkozatai **EPD (Environmental Product Declaration)**

EPD – Environmental Product Declaration

ENVIRONMENTAL PR
as per ISO 14025

Owner of the Declaration
Programme holder
Publisher
Declaration number
Issue date
Valid to

Decorative High-Pressure
International Commit
Industry (ICDLI)

www.bau-umwelt.com

ICDLI
International Committee of the Decorative Laminates Industry

Application

High-pressure decorative laminates can be used for private and residential housing, hospitals and laboratories, public buildings, railway stations, airport terminals/infrastructure, transportation, hotels, education, retail and commercial buildings, sport & recreation centers and industrial buildings.

The performance properties of HPL make them suitable for use in a wide variety of interior applications such as: wall cladding, falling infill panels, furniture, tables, desks, column cladding and lab equipment, cubicles, ceilings, window sills, worktops, counter tops, wash basins, etc.

Technical Data

An extract of the technical properties of HPL according to EN 438 part 3 and part 4 are given in the following tables.

For horizontal grade thin HPL used in general purpose products, and for general purpose compact HPL used in products without flame retardants, the following properties are given:

Property	Test Method	Unit	Value for Thin HPL	Value for Compact HPL
Resistance to surface wear	EN 438-2:10	Revolutions	IP ≥ 150	
Resistance to impact	EN 438-2:20	N	≥ 20	n/a
Resistance to scratching	EN 438-2:25	Rating	≥ 3	≥ 2 (smooth) ≥ 3 (textured)
Resistance to dry heat	EN 438-2:16	Rating	≥ 3 (gloss) ≥ 4 (other)	
Resistance to cigarette burns	EN 438-2:30	Rating	≥ 3	
Resistance to wet heat	EN 12721	Rating	≥ 3 (gloss) ≥ 4 (other)	
Resistance to water vapour	EN 438-2:14	Rating	≥ 3	n/a
Light fastness (xenon arc)	EN 438-2:27	grey scale	≥ 4	

3 LCA: Calculation rules

Declared unit

The declared unit is 1 m^2 of HPL product with 8 mm thickness for Compact HPL product and 0.8 mm thickness for Thin HPL product with a density of at least 1350 kg/m^3. The declared unit refers to the HPL products manufactured with phenolic impregnated kraft paper core and melamine impregnated decor paper and produced with batch press technology. Special decors, fire retardants or alternative core production technologies are not included. The declared unit refers to the average HPL products manufactured by ICDLI members (weighted average).

System boundaries

Type of EPD: Cradle to gate with options.

Raw material extraction and transportation, manufacture of product and packaging materials are declared in the modules A1-A3. Modules A1-A3 also include the manufacturing and supply of energy.

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4 LCA: Scenarios and additional tec

The following technical information is a basis for the declared modules. This information can also be used for developing specific scenarios in the context of a building assessment for modules that are not declared (MND).

Transport to the construction site (A4)

Mode	Euro truck
Transport distance	100 km
(Scale linearly depending on the distance)	
Capacity load utilisation (including empty runs)	85 %
Gross density of products transported	1350 kg/m^3
Capacity utilisation volume factor	100 %

5 LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X=I

PRODUCT STAGE			CONSTRUC-TION PROCESS STAGE		USE ST			
Raw material supply	Transport	Manufacturing	Transport	Construction installation process	Use	Maintenance	Repair	Replacement
A1	A2	A3	A4	A5	B1	B2	B3	B4
x	x	x	x	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPAC

		HPL thin					
		Manufacturing	Transport	End of life			
Parameter	Unit	A1-A3	A4	C2	C3	C4	D
GWP	[kg CO_2-Equ.]	3,34	2,25E-02	1,84E-02	1,09		
ODP	[kg CFC11- Equ.]	1,75E-07	4,55E-11	3,72E-11	4,80E-10		
AP	[kg SO_2- Equ.]	1,50E-02	1,10E-04	9,01E-05	4,72E-04		
EP	[kg PO_4^{3-} Equ.]	2,64E-03	2,53E-05	2,08E-05	1,19E-04		
POCP	[kg Ethen Equ.]	1,62E-03	1,26E-05	1,04E-05	3,00E-05		
ADPE*	[kg Sb Equ.]	1,26E-06	4,81E-10	3,93E-10	1,70E-06		
ADPF*	[MJ]	66,9	0,32	0,26	0,44		
Caption	GWP = Global warming potential; ODP = (Stratospheric) Ozo... phication potential; POCP = Formation potential of tropospher... resources; ADPF = Ab...						

* Quantified based on CML characterisatoin factors (updated in 2009)

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RESULTS OF THE LCA – RESOURCE USE: 1 m² HPL Standard

		HPL thin						HPL compact					
		Manufacturing	Transport	End of life				Manufacturing	Transport	End of life			
Parameter	Unit	A1-A3	A4	C2	C3	C4	D	A1-A3	A4	C2	C3	C4	D
PERE	[MJ]	17,9	-	-	-	-	-	250	-	-	-	-	-
PERM	[MJ]	11,6	-	-	-	-	-	117	-	-	-	-	-
PERT	[MJ]	29,7	4,24E-04	3,49E-04	2,84E-03	1,79E-02	-0,21	378	4,24E-05	3,49E-03	2,84E-02	1,79E-01	-2,13
PENRE	[MJ]	61,1	-	-	-	-	-	723	-	-	-	-	-
PENRM	[MJ]	9,02	-	-	-	-	-	90,2	-	-	-	-	-
PENRT	[MJ]	75,2	0,32	0,26	0,45	0,63	-7,49	866	3,17	2,59	4,53	6,26	-74,90
SM	[kg]	0	-	-	-	-	-	0	-	-	-	-	-
RSF	[MJ]	1,66E-04	0	0	7,50E-06	0	0	2,02E-03	0	0	7,50E-07	0	0
NRSF	[MJ]	5,66E-04	0	0	2,52E-07	0	0	6,77E-03	0	0	2,52E-06	0	0
FW	[m³]	7,56E-02	2,34E-06	1,91E-06	8,25E-04	2,22E-04	-3,04E-04	0,84	2,34E-05	1,91E-05	8,25E-03	2,22E-03	-3,04E-03
Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials; PENRM = Use of non renewable primary energy resources used as raw materials; PENRT = Total use of non renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Use of net fresh water												

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m² HPL Standard

		HPL thin						HPL compact					
		Manufacturing	Transport	End of life				Manufacturing	Transport	End of life			
Parameter	Unit	A1-A3	A4	C2	C3	C4	D	A1-A3	A4	C2	C3	C4	D
HWD	[kg]	6,24E-03	0	0	6,66E-03	0	0	6,09E-02	0	0	6,66E-02	0	0
NHWD	[kg]	4,34	7,99E-04	6,53E-04	1,36E-01	6,50E-02	-0,58	48,2	7,99E-03	6,53E-03	1,36E-01	6,50E-01	-5,83
RWD	[kg]	2,17E-03	5,69E-07	4,65E-07	5,95E-06	2,07E-05	-4,43E-04	2,09E-02	5,69E-06	4,65E-06	5,95E-05	2,07E-04	-4,43E-03
CRU	[kg]	-	-	-	-	-	-	-	-	-	-	-	-
MFR	[kg]	-	-	-	-	-	-	-	-	-	-	-	-
MER	[kg]	-	-	-	-	-	-	-	-	-	-	-	-
EE [Power]	[MJ]	-	-	-	0,37	0,49	-	-	-	-	3,73	4,96	-
EE [Steam]	[MJ]	-	-	-	0	3,95	-	-	-	-	0	39,5	-
Caption	HWD = Hazardous waste disposed; NHWD = Non hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EE = Exported energy per energy carrier												

6 LCA: Interpretation

Most of the environmental impacts evaluated are associated with the product stage. For the GWP impact the HPL manufacturing is a dominant source of the greenhouse gas emissions. Raw material production is contributing much less due to the carbon uptake in paper production chain. The End of Life scenario also plays an important role in GWP due to the release of embodied carbon. The carbon offsets were substracted from the greenhouse gas emissions; however the total offset carbon dioxide is less than 1% of the A1-A3 GWP.

In the product stage the manufacturing of HPL dominates most of the other stages for all environmental impacts. This is mainly due to the production of energy consumed in this stage. This is followed by the production of the raw materials such as paper and main resin precursors.

LCA results can vary significantly between HPL manufacturers with up to 50% variance from the average (average across all environmental impact indicators). The variance is connected to the variable material and energy efficiencies of the HPL production process as well as to the different sources of energy.

The environmental impacts of the HPL product change linearly with the change in thickness of the product.

Környezeti lábnyomok, életciklus szemlélet, LCA

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