Life Cycle Assessment for Nuxe flex, produced by Decospan

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Summary and status

Decospan NV (Decospan) producer of veneer products has asked SGS INTRON to produce a life cycle assessment (LCA) of wood veneer products. The full study, A146440/R20231430, performed by SGS in cooperation with Decospan NV, is independently reviewed by A.K. Jeeninga of Advieslab VOF and is available on request.

The conclusion of this review on 10-10-2024 is:

The methodology and data collection comply with the requirements set out in EN 15804: 2019, and therefore also meet ISO 14040/44 [11].

1. General

Decospan produces veneered products, wooden floors, acoustic products, furniture components, and much more. This study focusses on veneered products. Wood veneer products are used for interior design. The veneered products consist of a carrier on which a veneer layer is applied on one or both sides.

1.1 Objective

The objective of this study is to evaluate the environmental impacts associated with all stages of the below mentioned products and to identify opportunities for reducing environmental burdens and improving sustainability. This study allows to communicate reliable and accurate quantitative environmental data of building materials, building products, and building elements. The target group of the EPD is business-to-business (B2B).

In this study the following products are included: **Veneer (0,6 mm) on paper backing - Nuxe flex**

1.2 Procedure

This study has been produced according to the principles and requirements in EN 15804+A2 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products [1]. Regarding the objective of this study also the requirements and guidelines of IBU's Product Category Rules for Building-Related Products and Services Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019 [2] and Part B: Requirements on the EPD for Wood based panels [3].

This means that also ISO 14040 "Environmental management – Life cycle analysis – Principles and framework" [4], ISO 14044 "Environmental management. Life cycle assessment – Requirements and Guidelines" [5] and ISO 21930 "Sustainability in building construction – Environmental declaration of building products" [6] have been respected.

2. Subject of the study

This chapter describes the subject of study. The content of this chapter covers the reference unit, the description of the product including a materials list, the life cycle stages and system boundaries, data collection, validation and quality of the data used and the allocation.

2.1 Reference unit

In this study only the production and the end-of-life (EoL) of the veneered product is included. Therefore, the reference unit is a declared unit:

"1 m^2 of wood veneer product"

The reference service life of wood veneer products depends on the type and application. The service life of the products will be specified informatively in accordance with the Bundesinstitut fûr Stadt- und Raumforschung (BBSR), table "Service lives of components for life cycle assessment according to Bewertungssystem Nachhaltiges Bauen (BNB).

Table 1 "Service lives of components for life cycle assessment according to Bewertungssystem Nachhaltiges Bauen (BNB)

	340 Innenwände	345 Innenwandbekleidungen	Bekleidung	Service life (years)
345.311			Bekleidungen: Holz, Holzwerkstoff und Mehrschichtleichtbauplatten, Aluminium, Stahl, Kupfer, Zink, Naturstein, Kunststein, keramische Fliesen und Platten, Feinsteinzeug, Steinzeug, Steingut und Spaltplatten, Glasmosaik	≥ 50
345.411	-	-	Holzdecken: Massivholzdecke, Holzbalkendecke, Holz-Fertigteilelemente, Holz-Beton-Verbunddecke	≥ 50

2.2 Product description

Wood veneer products consists of wood veneer pressed onto a carrier. Veneered panels are covered by harmonised standard, EN 13986:2004+A1:2015 and are intended for indoor use, as non-structural components, in dry conditions – service class 1. Veneered products can be applied for both private and commercial use. The installation must be carried out in accordance with the installation instructions, the rules of the trade and the state of the art.

Table 2 Composition of 1m² veneered product

Material	Unit	Veneer (0,6 mm) on paper backing - Nuxe flex
Major components		
Veneer	kg	0.325
Carrier	Type	Paper
Carrier weight	kg	0.075
Carrier thickness	mm	0.1
Minor components		
Glue	kg	-
Varnish	kg	-
Packaging (PE-foil)	kg	-
Packaging (PE stretch foil)	kg	-
Packaging (Cardboard)	kg	0.0971
Product weight	kg	0.40

Table 3 Technical properties of the product in this study

Name	Standard	Veneer (0,6 mm) on paper backing Nuxe flex	Unit
Mean density		750	kg/m^3
Total thickness		0.6	mm
Carrier		Paper	mm
Bending strength	EN 310	N.A.	N/mm^2
Internal bond	EN 319	N.A.	N/mm^2
Reaction to fire	EN 13501-1	D-s_2,d_0	Class
Formaldehyde emission	EN 717-1	E1	Class
Content of PCP	EN 13986	< 5	Ppm
Biological durability	EN 335	1	Class

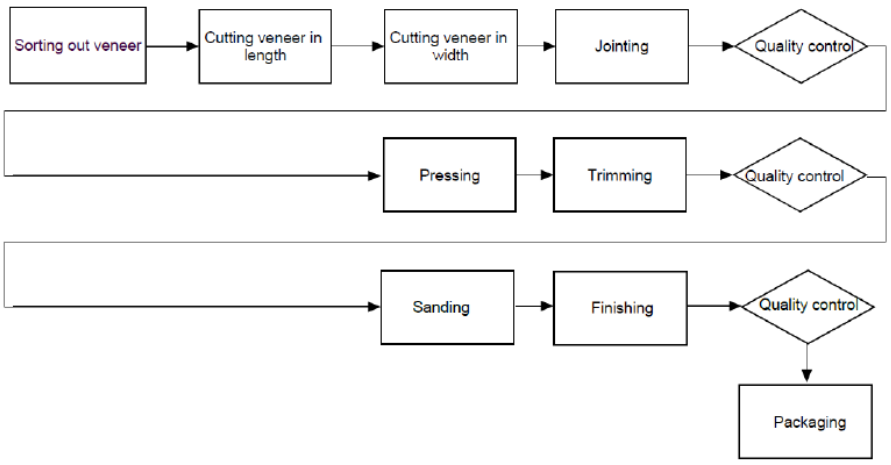
2.3 Stages of the life cycle and system boundaries

The life cycle phases that have been modelled are confined by so called system boundaries. The system boundaries determine which stages (modules) and processes in the life cycle are included in the LCA. This LCA is cradle-to-gate with options, module C1-4 and module D. The following table summarises the modules that are included and excluded in the LCA.

Table 4 Overview of included and excluded modules

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	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
X	X	X	ND	ND	ND							X	X	X	X	X

Figure 1 Overview of the most important processes in the production of veneered products



Production stage A1-3

The veneered product consists of a paper support on which a veneer top layer (0.6 mm) is applied. The application of the layer of wood to the base is called the pressing process. This pressing is achieved by means of pressure, temperature and time. The veneered products are then trimmed and may undergo sanding.

Raw materials (A1)

The raw materials to produce 1 m^2 of product is given in Table 2. The specified amounts (in kg/m^2) are the amounts in the product thus excluding the production waste. For each raw material, Decospan inventoried the average loss factor. These factors are used to calculate the gross amounts of raw materials used and the waste treatment of production waste. None of these materials are secondary materials. The use of packaging materials have also been inventoried.

Transport to Decospan (A2)

The raw materials are transported to Decospan by truck. Decospan inventoried the suppliers and the transport distance to the production site. For reasons of confidentiality, the names and locations of suppliers are not mentioned. These are included in the LCA questionnaire.

Production process (A3)

Decospan inventoried the energy use for the production processes for the veneered products. Part of the electricity is generated on site with solar panels. The generated electricity used by Decospan also was included in the calculation. The amount of electricity that is injected in the grid was not included in the LCA calculations. The reference year for the grid mix is 2019. Emissions for the combustion of natural gas are included via the Ecoinvent data.

In products with UF glue there is a process specific emission to be expected of formaldehyde. The exact emission is included based on the Ecoinvent process for MDF production. *MDF {RER}| MDF production | Cut-off*. In that process the formaldehyde emission is 0,15% of the amount of UF glue used. The same assumption is applied on the Decospan process.

Decospan inventoried the amount of production waste generated by the production of the products in this study. The amounts have been averaged over the total production. All wastes are transported 30 km to a waste treatment company. This transport, by truck, was also included in the LCA calculations.

The followed approach regarding the treatment of production waste and co-products means that allocation is avoided. All processes described in this LCA are allocated to the products in this study. No environmental burdens have been allocated to co-products or other Decospan products.

Transport to construction (A4)
This module is not in the scope of this LCA.

Construction process (A5)
This module is not in the scope of this LCA.

Use phase (B)
This module is not in the scope of this LCA. However, the emissions to indoor air will be mentioned informatively on the EPD.

Demolition C1
Veneered products are typically removed from the building in a manual process. It is anticipated that the environmental impact from this process is neglectable.

Transport to waste treatment C2

After the products are removed from the application, they are transported to a waste treatment facility. In the waste treatment scenario in this LCA a transport distance of 50 km is assumed (Ecoinvent: Transport, freight, lorry, unspecified {GLO}| market group for transport, freight, lorry, unspecified | Cut-off). Additionally, 50 km by truck from the waste treatment plant to the waste incinerator has been included. These distances are based on the scenario in [9]

Waste processing (C3)

The waste treatment scenario in this study assumes that, at the waste treatment facility the veneered products are chipped into wood chips. The following Ecoinvent process is used: *Wood chipping, industrial residual wood, stationary electric chipper {GLO}| market for wood chipping, industrial residual wood, stationary electric chipper | Cut-off*.

Final waste treatment (C4)

The waste treatment scenario in this study assumes that that the wood chips are used for incineration with energy recovery. It is assumed that this is a worst case approach that part of this type of waste could be used for recycling a worst case approach was used since there is no specific quantitative data is available for the waste treatment methods of veneered products that describe the European average situation.

Furthermore, it is assumed that the energy efficiency of energy recovery is 18% electric and 31% thermal2. Since this efficiency is <60% is the incineration process is included in module C4 .

Module D

The benefit of the recuperation of electricity and heat that often occurs in waste incineration plants was included in module D. The avoided production of electricity from primary sources is based on: Electricity, high voltage {NL}| heat and power co-generation, natural gas, combined cycle power plant, 400MW electrical | Cut-off. The avoided production of heat from primary sources is based on: Heat, district or industrial, natural gas {Europe without Switzerland}| heat production, natural gas, at industrial furnace >100kW | Cut-off.

For the electrical and thermal efficiency of the waste to energy plant we calculated with 18% and 31% respectively. For the heat of combustion of products (wood) the lower heating value was used:

Wood: 13,99 MJ/kg

Biogenic carbon in product and packaging

The EPD also includes the amount of biogenic carbon (C) in the product and packaging (per declared unit). The amount of biogenic C in the product has been calculated using the mass of veneer and carriers in the products.

Table 5 Inventory kg C in product

Product	Biogenic C in veneer (kg/m^2)	Biogenic C in carrier (kg/m^2)	Total (kg/m^2)
Veneer (0,6 mm) on paper backing - Nuxe flex	0.133	0.010	0.144

The cardboard packaging includes biogenic C. According to the Ecoinvent process used the amount is 0.450 kg biogenic C / kg cardboard. This value is multiplied with the amount of cardboard per product to produce the numbers in the following table.

Table 6 Inventory kg C in cardboard packaging

Product	Biogenic C in cardboard packaging (kg/m^2)
Veneer (0,6 mm) on paper backing - Nuxe flex	0.0437

2.4 Data quality and validation of economic flows

Decospan collected data on the production of veneered products for a full production year: 2022. More specifically:

- Raw material use and transport to the production location.
- Decospan contacted important suppliers if primary data was available for their product.
- Energy use
- Emissions
- Production waste

For background processes the Ecoinvent database v3.9.1 (allocation cut-off) has been used

2.5 Data quality and validation of environmental inventories

Since the LCA is based on production information from a full production year it is expected that mass and energy balance is in close proximity to complete as no materials or processes have been excluded. The cut-off criteria are well below 1 %. The cumulative cut-off criteria are well below 5 %.

The inventories considered and a simple mass balance for each product, is included in the full LCA study. For the LCA calculations the following methods have been used: Simapro's LCA method: "EN 15804+A2" via Bepalingsmethode 'set 1', 'set2' & param (NMD 3.4) (see appendix C).

The substances that come up in the life cycle inventory but are not defined in the relevant LCA-method are stated in Appendix E. SGS INTRON has checked potential uncharacterised substances. This check is part of the validation of environmental inventories.

2.6 Calculation procedures

The following calculation procedures have been used in the LCA:

1. Where Ecoinvent processes have been used, the infrastructure processes have been included in the LCA calculations.
2. Where Ecoinvent processes have been used, the "long-term emissions" have been excluded from the LCA calculations.

3. Results

In paragraph 3.1 the environmental profiles of products in this study The results have been calculated with Simapro's LCA method: "EN 15804+A2" via determination methods 'set 1', 'set2' & param (NMD 3.4) (see appendix D). The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks Paragraph 3.2 includes an analysis of the major contributions to the environmental profiles.

3.1. Environmental profiles

The tables below include the environmental indicators of the life cycle of the products (relevant modules only).

Table 7 Environmental indicators of 1m^2, veneered (0,6 mm) paper - Nuxe flex

Indicator	UNIT	A1-A3	A4	A5	B	C1	C2	C3	C4	D	Total
GWP-total	kg CO2 eq	4,41E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,60E-03	5,38E-03	6,29E-01	-2,48E-01	1,08E+00
GWP-fossil	kg CO2 eq	1,02E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,55E-03	5,29E-03	8,56E-03	-2,00E-02	1,04E+00
GWP-biogenic	kg CO2 eq	-5,81E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,99E-05	7,96E-05	6,21E-01	0,00E+00	3,95E-02
GWP-luluc	kg CO2 eq	3,96E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,70E-05	1,06E-05	2,28E-06	-2,14E-04	4,00E-03
ODP_A2	kg CFC11 eq	2,96E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,31E-10	4,13E-11	1,58E-10	-3,13E-09	2,99E-08
AP_A2	mol H+ eq	5,05E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,53E-05	2,53E-05	7,96E-05	-7,29E-04	5,19E-03
EP-freshwater	kg P eq	4,65E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,34E-08	2,87E-07	1,10E-07	-3,53E-06	4,70E-05
EP-marine	kg N eq	1,62E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,34E-05	4,49E-06	3,79E-05	-2,12E-04	1,68E-03
EP-terrestrial	mol N eq	1,73E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,43E-04	5,01E-05	3,99E-04	-3,55E-03	1,78E-02
POCP_A2	kg NMVOC eq	5,28E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,89E-05	1,51E-05	1,01E-04	-6,17E-04	5,45E-03
ADP-minerals&metals	kg Sb eq	5,47E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,31E-08	6,16E-09	1,35E-08	-5,18E-08	5,51E-06
ADP-fossil	MJ	2,04E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,06E-01	7,20E-02	6,46E-02	-2,28E-01	2,06E+01
WDP[2]	m3 depriv.	7,26E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,56E-04	9,04E-04	-3,88E-03	-1,91E-03	7,24E-01
PM	disease inc.	8,58E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,94E-10	2,05E-10	7,68E-10	-9,98E-09	8,74E-08
IRP[1]	kBq U-235 eq	1,14E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,12E-05	3,58E-04	3,18E-05	-4,86E-04	1,14E-01
ETP-fw[2]	CTUe	4,64E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,03E-02	1,02E-02	8,15E-02	-4,11E-01	4,81E+00
HTP-c[2]	CTUh	1,80E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,91E-12	2,13E-12	2,37E-11	-6,93E-11	1,83E-09
HTP-nc[2]	CTUh	1,42E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,10E-10	5,08E-11	1,09E-09	-2,99E-09	1,55E-08
SQP[2]	Pt	8,68E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,34E-02	1,15E-02	2,19E-02	-1,52E+01	8,69E+01
PERE	MJ	9,33E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,49E-03	9,86E-03	1,67E-03	-3,62E+00	9,34E+00
PERM	MJ	9,93E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,93E+00
PERT	MJ	1,93E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,49E-03	9,86E-03	1,67E-03	-3,62E+00	1,93E+01
PENRE	MJ	2,16E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,12E-01	7,63E-02	7,00E-02	-2,42E-01	2,19E+01
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	2,16E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,12E-01	7,63E-02	7,00E-02	-2,42E-01	2,19E+01

Indicator	UNIT	A1-A3	A4	A5	B	C1	C2	C3	C4	D	Total
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	1,94E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,68E-05	3,49E-05	-6,30E-05	-8,57E-05	1,94E-02
HWD	kg	7,26E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,74E-07	1,12E-07	3,26E-07	-1,25E-06	7,37E-05
NHWD	kg	2,02E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,98E-03	4,86E-04	7,24E-03	-8,82E-03	2,16E-01
RWD	kg	9,46E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,42E-08	2,53E-07	2,06E-08	-3,52E-07	9,49E-05
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	1,23E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,23E-01
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,01E+00	0,00E+00	1,01E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,73E+00	0,00E+00	1,73E+00

[1] This impact category deals mainly with the eventual impact of low dose ionizing adiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

[2] The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

3.2. Major contribution analysis

To visualize which materials and processes give the largest contribution to the environmental indicators a major contributions analysis has been included. In the graph below the total value of each indicator has been set to 100%. The colours indicate which part of the environmental effects are caused by the different materials and processes in the life cycle of the veneered products.

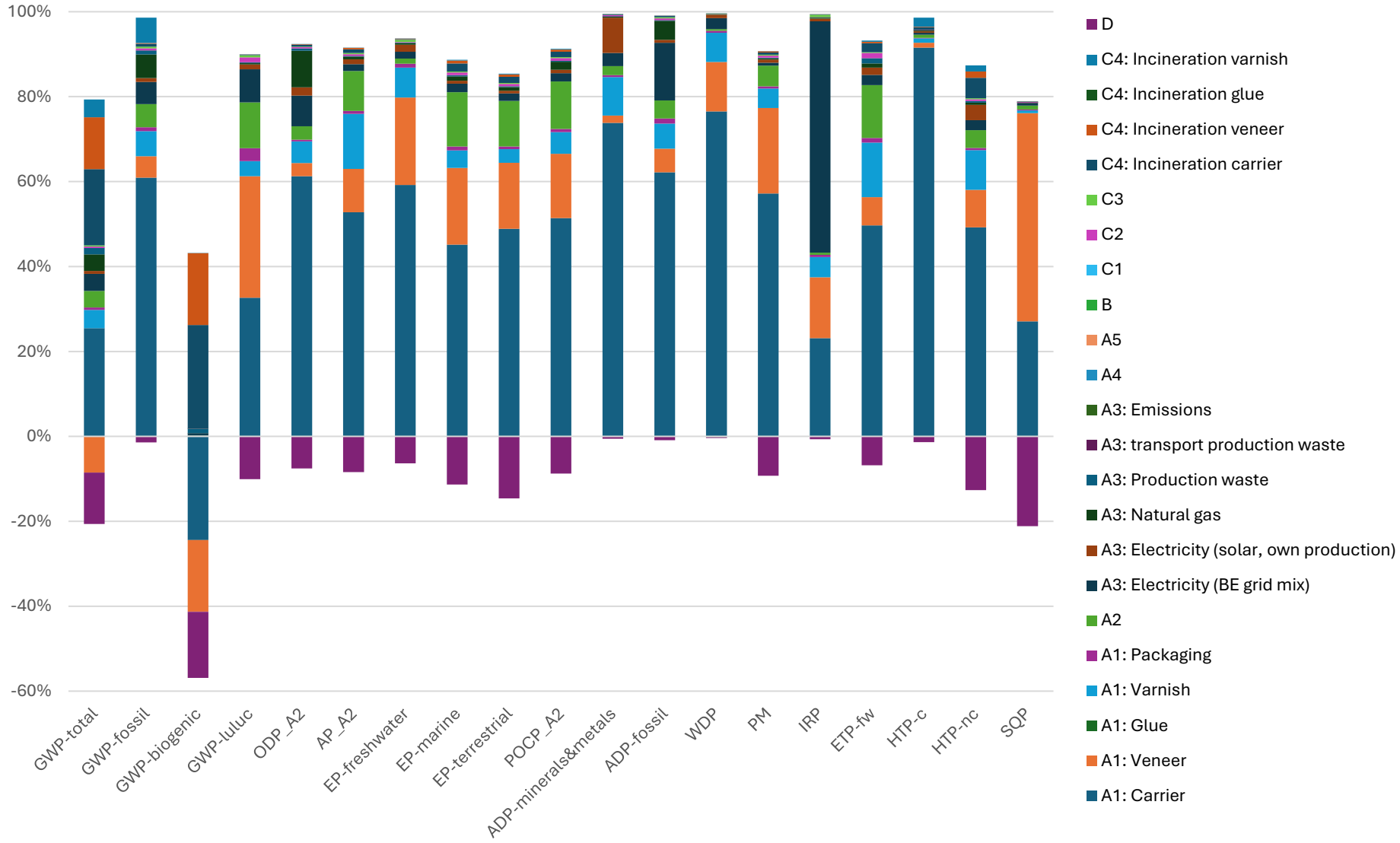
This analysis has been included in the figure 2 for veneer (0,6 mm) on paper backing - Nuxe flex

The production of the carrier gives the largest contribution to most of the environmental indicators. The exceptions are GWP where the incineration of wood (waste end-of-life) gives the largest contribution.

3.3. Sensitivity analysis

In this LCA only specific products from a single production location are included. No sensitivity analysis is needed regarding temporal or geographic issues.

Figure 2 Major contributions to the environmental profile of veneer (0,6 mm) on paper backing - Nuxe flex



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