Chain Analysis Spantech - PVC

1 Introduction

Spantech has conducted a chain analysis of its two main Scope 3 carbon emissions as part of achieving Level 4 and 5 on the CO_2 Performance Ladder.

This report describes the supply chain analysis of PVC from cradle to grave.

A supply chain analysis involves calculating the CO_2 emissions of a specific product or service across the entire supply chain. This includes the full life cycle of the product: from raw material extraction to waste processing (or recycling).

For over 20 years, Spantech has been designing, building, and installing modular structures worldwide. With its expertise in modular building solutions, Spantech built a reputation as specialists in design and construction. It uses the latest technologies to offer a comprehensive turnkey service, managing everything from design to installation, ensuring an end-to-end service tailored to your needs.

Spantech is part of the modular construction sector and contributes to circular building practices for a greener future. With over 125 employees, over 100 projects annually, and a presence on three continents, Spantech continues to grow and innovate within the construction industry.

The Spantech Group, headquartered in Belgium, employs 125 staff across more than seven countries.

For more information about our CO_2 Performance Ladder initiatives and sustainability efforts, visit our website: https://span-tech.com/CO₂-ladder/.

2 Change log

Date	Revision	Remarks
20/01/2024	00	First version

3 Organizational and operational boundaries

The CO2 Performance Ladder management system applies to the following companies:

- Spantech International, Belgium
- Spantech Manufacturing Deutschland GmbH, Germany
- Spantech Poland
- Spantech France SAS
- Polytent SA (emissions included in Spantech International's total)
- ST Services (emissions included in Spantech Poland's total)

These entities' activities are providing temporary building solutions for the following industries:

- Entertainments
  - Film & TV production
  - Live entertainment
  - Event & expo
- Sports & Esports
  - Sport arena
  - Training facility
  - E-sports stadium
- Aviation
  - MRO Hangar
  - Airport
- Industry
  - Warehousing
  - Offices
  - Custom building

This chain analysis was conducted based on CO2 data of the calendar year 2023.

4 Content

5 The supply chain of PVC

5.1 General description of the PVC supply chain

In this chain analysis the supply chain is investigated starting from its life cycle stages according to NBN EN 15804 'Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products' (NBN EN, 2012) as shown in Figure 1.

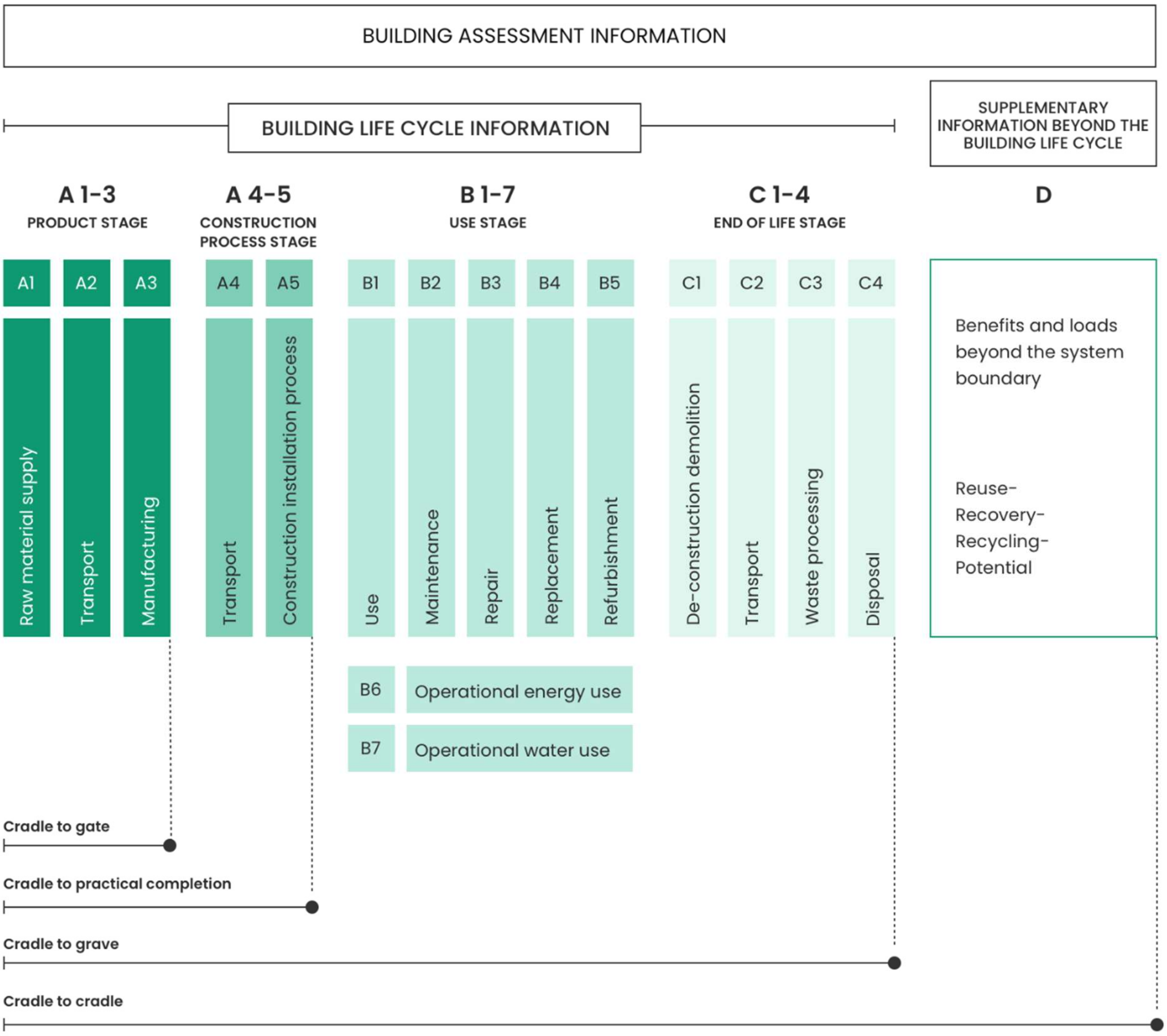

Figure 1 Life stages of material according tot EN Standards (One Click LCA, 2025)

The PVC supply chain is a complex network of processes that spans from raw material extraction to end-of-life management. This chain can be broken down into several key stages.

- Raw Material Extraction (LCA stage A1 to A3) : The process begins with the extraction of fossil fuels, primarily crude oil and natural gas, which serve as the primary sources of petrochemicals essential for PVC production (Tracextech, 2023).
- Petrochemical Production: Crude oil and natural gas are refined to produce ethylene and other petrochemicals. Salt is also a crucial raw material, providing chlorine for PVC production (Tracextech, 2023).
- Polymerization: Ethylene is combined with chlorine to produce vinyl chloride monomer (VCM), which is then polymerized to form PVC resin (Lewandowski & Skórczewska, 2022).
- Compounding: PVC resin is mixed with various additives such as stabilizers, plasticizers, and pigments to achieve desired properties for specific applications (Lewandowski & Skórczewska, 2022).
- Manufacturing: The compounded PVC is processed into finished products using techniques like injection molding, extrusion, and thermoforming (Tracextech, 2023).
- Distribution and Use: PVC products are distributed through various channels and used in sectors such as construction, healthcare, and consumer goods (Lewandowski & Skórczewska, 2022).
- End-of-Life Management: This stage involves the collection, sorting, and recycling of PVC waste. Mechanical recycling is the most recommended method, where PVC waste is ground, washed, and reprocessed into new products (Lewandowski & Skórczewska, 2022) (recycling, 2024).

The PVC industry has been working towards improving sustainability throughout the supply chain:

- Circular Economy: The VinylPlus 2030 Commitment aims to scale up PVC supply chain circularity, focusing on controlled-loop management of PVC from circular product design to advanced recycling technologies (Recovynil, 2011) / (Vynil Plus, 2021).
- Carbon Neutrality: The industry is advancing towards carbon neutrality by reducing the environmental footprint of PVC production and products (Recovynil, 2011) / (Vynil Plus, 2021).
- Global Partnerships: VinylPlus is building global coalitions and partnering with various stakeholders to promote sustainable practices and contribute to the UN Sustainable Development Goals (Recovynil, 2011) / (Vynil Plus, 2021)..
- Recycling Targets: The European PVC industry has set a goal to recycle 900,000 tonnes of PVC per year by 2025 and 1 million tonnes by 2030 (UN Department of Economic and Social Affairs, 2024).

The industry's efforts to enhance recycling rates, develop efficient waste management systems, and innovate sustainable uses for recovered PVC materials, are ongoing and vital for the future of PVC production and its use (Whitfield R., 2022) / (Recovynil, 2011) / (Vynil Plus, 2021).

5.2 The PVC supply chain at Spantech

Figure 2 illustrates the PVC supply chain at Spantech. PVC is primarily delivered to the German and Polish subsidiary. From there it is either directly supplied to construction sites or first transported to Belgium for assembly, before being sent to the construction sites.

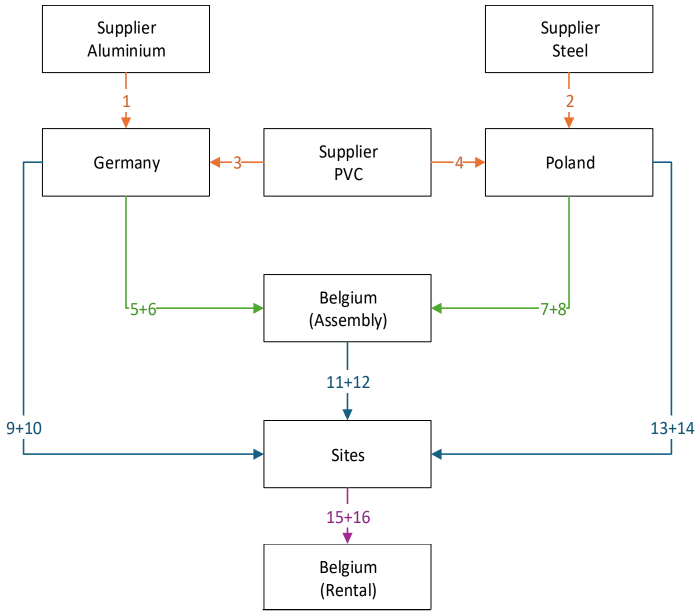

Figure 2 The PVC Chain at Spantech

Table 1 listst the direct chain partners, both internal and external, that Spantech interacts with for its main supplies. The steps correspond to the numbers in the diagram shown in Figure 2, with steps 3 to 14 refer tot the PVC supply chain.

Table 1 Chain partners directly involved in Spantechs PVC supply chain

Steps	Chain partner
1	Supplier Alu
2	Supplier Steel
3	Supplier PVC to Germany
4	Supplier PVC to Poland
5	Own transport Germany - Belgium
6	Subcontracted transport Germany - Belgium
7	Own transport Poland - Belgium
8	Subcontracted transport Poland - Belgium
9	Own transport Germany - Projects
10	Subcontracted transport Germany - Projects
11	Own transport Belgium - Projects
12	Subcontracted transport Belgium - Projects
13	Own transport Poland - Projects
14	Subcontracted transport Poland - Projects
15	Own transport Projects - Belgium (rentals coming back)
16	Subcontracted transport Projects - Belgium (rentals coming back)

Figure 3 provides an overview of Spantech products.

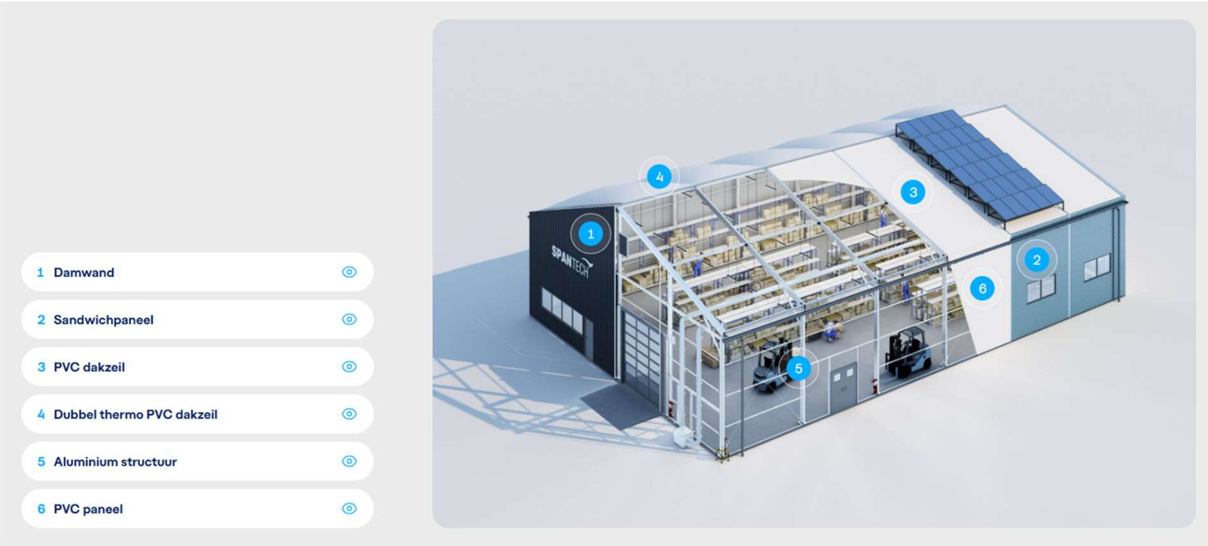

Figure 3. Products of Spantech NV

5.3 Analysis of chain partners

Table 2 provides an overview of the (potential) chain partners for each LCA phase.

Table 2 Chain analysis partners per LCA stage.

LCA stage	LCA Sub stage	LCA Sub stage description	Potential Chain Partners
Production stage	A1	Raw material supply	PVC raw material producers; Legislators/government
	A2	Upstream Transport Raw materials	Transport companies; Legislators/government
	A3	Manufacturing	PVC manufacturers; Legislators/government
Construction stage	A4	Upstream transport products	Transport companies (on behalf of manufacturers); Customers; Waterway managers; Legislators/government
	A5	Construction/installation process	Customers; Contractors; Legislators/government
Use stage	B1	Use	Users of PVC products; Owners of construction projects; Private individuals; Authorities (managers); Legislators
	B2	Maintenance	Owners of construction projects; Private individuals; Authorities (managers); Legislators
	B3	Repair	Repair companies; Authorities (managers); Legislators
	B4	Replacement	Contractors; Authorities (managers); Legislators

LCA stage	LCA Sub stage	LCA Sub stage description	Potential Chain Partners
	B5	Refurbishment	Contractors; Authorities (managers); Legislators
	B6	Operational energy use	Energy producers; Owners of construction projects; Authorities for energy; Private individuals; Legislators
	B7	Operational water use	Water producers; Owners of construction projects; Authorities for water management; Private individuals; Legislators
End off life stage	C1	De-construction and demolition	Owners of construction projects; Authorities for waste and materials; Contractors; Legislators
	C2	Downstream transport of waste	Contractors; Transport companies; Waste handlers; Legislators
	C3	Waste treatment	Contractors; Waste processors; Legislators
	C4	Waste disposal	Disposal facility operators; Legislators
Beyond the system boundaries	D	Benefits and load beyond the system boundaries: reuse, recovery and/or recycling potential.	Contractors; PVC recyclers; Waste processors; Legislators; Manufacturers using recycled or recovered PVC

6 PVC related Scope 3 emissions

6.1 Data sources and emission factors

Fout! Verwijzingsbron niet gevonden. gives an overview of primary and secondary data sources used in the calculation of the carbon footprint.

Table 3. Data sources of emission factors and data typology.

Nr	Bron	Primaire data	Secundaire data
[1]	EPD Renolit PVC for CO2 emissions factors for LCA stage A1-A3; A5; C1-C4; D (Renolit, 2023)	X	
[2]	Value of invoiced PVC (financial data Spantech)	X	
[3]	Average PVC tonnage / value (estimates Spantech)		X
[4]	Distance suppliers to the receiving companies (data Spantech)	X	
[5]	Distance inter-company transport (google maps)	X	
[6]	Distance delivery to projects (estimates Spantech)		X
[7]	Emission factors for transport of goods on www.emissiefactoren.nl (referred to from www.emissionfactoren.be) (CO2 Logic & Energie Idee, 2023)		X
[8]	Handboek CO2 prestatieladder 3.1 (SKAO, 2020)		X

6.2 Carbon footprint

6.2.1 Carbon emissions stage A1-A3; A5; C1-C4 and D

Emission factors from one of the supplier's Environmental Product Declarations (EPD) were utilized [1] (Renolit, 2023). Calculations were performed using the Global Warming Potential (GWP-GHG) emission factors provided in the EPD.

Table 4. Emission factors used for stage A1-A3; A5; C1-C4 and D.

Environmental impact indicators	Module	Manufacture	Installation		End of life				
	Unit	A1 - A3	A4	A5	C1	C2	C3	C4	D
EN 15804 +A2									
Global warming potential (GWP) - GHG	[kg CO2 eq.]	2,76E+00	1,06E-01	5,62E-01	0,00E+00	3,40E-02	2,95E-02	1,20E-01	-2,33E-01
Global warming potential (GWP) - Total	[kg CO2 eq.]	2,57E+00	1,04E-01	5,45E-01	0,00E+00	3,36E-02	2,95E-02	1,20E-01	-2,86E-02
Global warming potential (GWP) - fossil	[kg CO2 eq.]	2,76E+00	1,05E-01	5,62E-01	0,00E+00	3,37E-02	2,95E-02	1,20E-01	-2,32E-01
Global warming potential (GWP) - biogenic	[kg CO2 eq.]	-1,93E-01	-1,45E-03	-1,70E-02	0,00E+00	-4,27E-04	5,03E-06	-4,23E-06	2,04E-01
Global warming potential (GWP) - luluc	[kg CO2 eq.]	1,51E-03	9,57E-04	6,48E-05	0,00E+00	3,02E-04	2,25E-06	1,07E-05	-2,84E-04

The declared unit of the EPD is defined as "1 m2 of RENOLIT ALKORPLAN F plastic sheet for roof waterproofing for a reference service life of 30 years. Conversion factor to convert declared unit in surface to a declared unit in mass: 1,5 kg/m²".

To calculate CO_2 emissions, the annual tonnage of PVC [2]/[3] in 2023 was divided by 1.5 kg/m² to derive a virtual total surface area of the product. This value was then multiplied by the respective emission factors. In 2023, 27 tonnes of PVC were supplied via the German subsidiary and 62 tonnes via the Polish subsidiary [2]/[3]. Table 5 presents the emissions derived solely from these data.

Table 5. Emissions solely based on EPD data.

Ton PVC	M² PVC	Unit	A1-A3 emissions	A4 emissions	A5 emissions	C1 emissions	C2 emissions	C3 emissions	C4 emissions	D - emissions	Cradle To Practical completion A1-A5 - emissions	Cradle to Grave A1-C4 - emissions	Cradle to Cradle A1-D - emissions
27 via Germany	18 000	T CO2e	4,63E+01	1,87E+00	9,81E+00	0,00E+00	6,05E-01	5,31E-01	2,16E+00	-5,15E-01	5,79E+01	**6,12E+01**	6,07E+01
62 via Poland	41 333	T CO2e	1,06E+02	4,30E+00	2,25E+01	0,00E+00	1,39E+00	1,22E+00	4,96E+00	-1,18E+00	1,33E+02	**1,41E+02**	1,39E+02

The emissions for stage A4 are recalculated below using primary data in § 6.2.2. Table 6 provides the emissions from stages A1-A5; C1-C3 and D, excluding the data for stage A4.

Table 6. Emission based on EPD data with stage A4 omitted.

Ton PVC	M² PVC	Unit	A1-A3 emissions	A4 emissions	A5 emissions	C1 emissions	C2 emissions	C3 emissions	C4 emissions	D - emissions	Cradle To Practical completion A1-A5 - emissions	Cradle to Grave A1-C4 - emissions	Cradle to Cradle A1-D - emissions
27 via Germany	18 000	T CO2e	4,63E+01		9,81E+00	0,00E+00	6,05E-01	5,31E-01	2,16E+00	-5,15E-01	5,61E+01	**5,94E+01**	5,89E+01
62 via Poland	41 333	T CO2e	1,06E+02		2,25E+01	0,00E+00	1,39E+00	1,22E+00	4,96E+00	-1,18E+00	1,29E+02	**1,36E+02**	1,35E+02

6.2.2 Carbon emissions stage A4

6.2.2.1 Supplies to the subsidiaries

The PVC products are transported from the supplier to subsidiaries in Poland and Germany. Distances and tonnages of the transports are documented.

In 2023, 27 tons of PVC products were supplied to the German subsidiary and 62 tons to the Polish subsidiary. For each supply, the ton-kilometers (ton.km) were calculated. These data were summarized, resulting in 8 289 ton.km for the German subsidiary and 63 011 ton.km for the Polish subsidiary, totaling 71 300 ton.km.

The national emission factors of the Netherlands, obtained from CO2emissiefactoren.nl (referenced by the Belgian emission factors at CO2emissiefactoren.be), were applied. Since individual supplies ranged from 0,5 tons to 9 tons, the emission factor for a truck <10 tons was selected: 0,363 kg CO_2e/ton.km.

Based on this, the emissions associated with the transported PVC products are calculated as follows:

$$71\,300 \text{ ton.km} \times 0{,}363 \text{ kg } CO_2e/\text{ton.km} = 25{,}88 \text{ tons } CO_2e.$$

6.2.2.2 Internal transport

A share of the PVC products is transported internally to other Spantech plants. The transport is done with as well internal as external transporters. In this chain analysis there is no

From the Polish plant:

- 85 % or 52,8 tons transported to Belgium
- 12 % or 7,43 tons transported to Germany
- 3 % or 1,7 tons transported to construction sites

From the German plant:

- 52 % or 14,09 tons transported to Belgium
- 48 % or 12,91 tons transported to construction sites

The total weight of each transport is known. By calculating the percentage weight of each specific transport relative to the total transported weight (including PVC and other materials) and applying this percentage to the PVC weights, an estimate of the PVC transported per transport was obtained. Based on this estimate, combined with the transport distances, the ton-kilometers (ton.km) for PVC were calculated.

The national emission factors of the Netherlands, sourced from CO2emissiefactoren.nl (referenced by the Belgian emission factors at CO2emissiefactoren.be), were applied. Since individual shipments ranged from 0,5 tons to 50 tons, the emission factor for a truck < 10 tons (0,363 kg CO_2e/ton.km) was used for all transports up to 10 ton, and the emission factor for a heavy truck with trailer (0,088 kg CO_2e/ton.km) was used for all transports over 10 tons.

Table 7 presents the CO2 emissions corresponding with the internal transports.

Table 7. Emission from internal transport.

From	To	Ton.km	Means of transport	EF Unit	WTW	WTT	TTW	Emissions (T CO2e)
Spantech GmbH, Germany	Spantech International, Belgium	3219,0	Heavy truck+trailer	Kg CO2e/Ton.km	0,088	0,067	0,021	0,28
Spantech GmbH, Germany	Spantech International, Belgium	9477,6	vrachtwagen < 10T	Kg CO2e/Ton.km	0,363	0,275	0,088	3,44
Spantech Poland	Spantech International, Belgium	29771,2	Heavy truck+trailer	Kg CO2e/Ton.km	0,088	0,067	0,021	2,62
Spantech Poland	Spantech International, Belgium	25743,8	vrachtwagen < 10T	Kg CO2e/Ton.km	0,363	0,275	0,088	9,35
Spantech Poland	Spantech GmbH, Germany	4075,7	Heavy truck+trailer	Kg CO2e/Ton.km	0,088	0,067	0,021	0,36
Spantech Poland	Spantech GmbH, Germany	756,8	vrachtwagen < 10T	Kg CO2e/Ton.km	0,363	0,275	0,088	0,27

Total CO2 emissions from internal transport: 16,32 Ton CO2e.

6.2.2.3 Supplies to the construction sites

Each subsidiary transports PVC products to construction sites.

From the Polish plant:

- 3 % of the transported weight or 1,7 tons are transported to construction sites

From the German plant:

- 48 % of the transported weight or 12,91 tons transported to construction sites

From the Belgian plant:

- 66,89 tons is transported tot construction sites
    - 52,8 tons received from the Polish plant is transported to construction sites
    - 14,09 tons received from the German plant is transported to construction sites
    - 33% or 21,90 tons are distributed with own transport
    - 66% or 44,99 tons are distributed with external parties

The national emission factors of the Netherlands, sourced from CO2emissiefactoren.nl (referenced by the Belgian emission factors at CO2emissiefactoren.be), were applied. Since individual shipments ranged from 0,5 tons to 50 tons, the emission factor for a truck < 10 tons (0,363 kg CO_2e/ton.km) was used for all transports up to 10 ton, and the emission factor for a heavy truck with trailer (0,088 kg CO_2e/ton.km) was used for all transports over 10 tons.

Table 8 presents the CO2 emissions corresponding with the deliveries at project sites.

Table 8. Emission from deliveries at project sites.

From	To	Ton.km	Means of transport	EF Unit	WTW	WTT	TTW	Emissions (T CO2e)
Spantech GmbH, Germany	Projects	5358,8	Heavy truck+trailer	Kg CO2e/Ton.km	0,088	0,067	0,021	0,47
Spantech GmbH, Germany	Projects	3209,8	Truck < 10T	Kg CO2e/Ton.km	0,363	0,275	0,088	1,17
Spantech Poland	Projects	1093,8	Heavy truck+trailer	Kg CO2e/Ton.km	0,088	0,067	0,021	0,10
Spantech Poland	Projects	458,5	Truck < 10T	Kg CO2e/Ton.km	0,363	0,275	0,088	0,17
Spantech International, Belgium with external transport	Projects	1622,0	Heavy truck+trailer	Kg CO2e/Ton.km	0,088	0,067	0,021	0,14
Spantech International, Belgium with external transport	Projects	17462,3	Truck < 10T	Kg CO2e/Ton.km	0,363	0,275	0,088	6,34
Spantech International, Belgium with internal transport	Projects	4078,6	Heavy truck+trailer	Kg CO2e/Ton.km	0,088	0,067	0,021	0,36

Total CO2 emissions from delivery of PVC products to project sites: 8,74 Ton CO2e.

6.2.2.4 Supplies of rented material

Some PVC products are transported from the supplier to subsidiaries in Poland and Germany. Distances and tonnages of the transports are documented.

Based on the total shipped out freight weight in 2023, and the total supplied of PVC in 2023, an estimate of the mass % of PVC in the final product could be obtained. Based on this mass-% and the weight shipped out for rental with internal and external transport, the weight of PVC in each transport was obtained. Table 9 provides an overview of the data used to calculate the estimated weight of PVC in rental.

Table 9. Estimated weights of PVC in rental.

Item	Value	Unit
Total weight shipped out to clients	2438,96	Ton
Total weight PVC received at Spantech	89	Ton
Mass % PVC in end product	3,65%	%
Shipped out in rental	1134,2	Ton
Shipped PVC out, in rental (based in %PVC)	41,39	Ton
Shipped by own transport (%)	20%	%
Shipped by external transport (%)	80%	%
Shipped PVC by own transport (T)	8,14	Ton
Shipped PVC by external transport (T)	33,25	Ton

In combination with the registered distances of each transport, the ton.km applicable for PVC, for each transport could be calculated.

The national emission factors of the Netherlands, sourced from CO2emissiefactoren.nl (referenced by the Belgian emission factors at CO2emissiefactoren.be), were applied. Since more than 99% of all ton.km where performed with transports from over 10 ton, the emission factor for a heavy truck with trailer (0,088 kg CO_2e/ton.km) was used for all transports.

Since the tented goods need to return to Spantech, a factor 2 was used to calculated total emissions including the return of the goods.

Table 10 presents the calculated CO2 emissions from PVC in rental of Spantech products.

Table 10. Emissions from transport of PVC in rental of Spantech products.

From	To	Ton.km	Means of transport	EF Unit	WTW	WTT	TTW	Emissions (T CO2e)
Spantech location (with own transport)	Rental Project	1043,5	Heavy truck+trailer	Kg CO2e/Ton.km	0,088	0,067	0,021	0,09
Spantech location (with external transport)	Rental Project	19527,4	Heavy truck+trailer	Kg CO2e/Ton.km	0,088	0,067	0,021	1,72
Rental Project (with own transport)	Spantech location	1043,5	Heavy truck+trailer	Kg CO2e/Ton.km	0,088	0,067	0,021	0,09
Rental Project (with external transport)	Spantech location	19527,4	Heavy truck+trailer	Kg CO2e/Ton.km	0,088	0,067	0,021	1,72

Total CO2 emissions from delivery of PVC products to rental project and the return:
3,62 Ton CO2e.

6.2.2.5 Overview of CO2 emissions from transport (LCA Stage A4)

Table 11 presents the total emissions from transport.

Table 11. Overview of CO2 emissions from transport (LCA stage A4)

Item	Value	Unit
§ 6.2.2.1. Supplies to the subsidiaries	25,88	Ton CO2e
§ 6.2.2.2. Internal transport	16,32	Ton CO2e
§ 6.2.2.3. Supplies to the construction sites	8,74	Ton CO2e
§ 6.2.2.4. Supplies of rented material	3,62	Ton CO2e
§ 6.2.2.5. Overview of CO2 emissions from transport (LCA Stage A4)	54,56	Ton CO2e

6.2.3 Overview of total CO2 emissions in the PVC supply chain

Table 12 and Figure 4 represent the total CO2 emissions in the supply chain of PVC products of Spantech.

Table 12. Emission based on EPD data with stage A4 omitted.

Item	Unit	A1-A3 emissions	A4 emissions	A5 emissions	C1 emissions	C2 emissions	C3 emissions	C4 emissions	D - emissions	Cradle To Practical completion A1-A5 - emissions	Cradle to Grave A1-C4 - emissions	Cradle to Cradle A1-D - emissions
27 Ton PVC via Germany based on EPD, A4 excluded	T CO2e	4,63E+01	Omitted	9,81E+00	0,00E+00	6,05E-01	5,31E-01	2,16E+00	-5,15E-01	5,61E+01	**5,94E+01**	5,89E+01
62 Ton PVC via Poland based on EPD, A4 Excluded	T CO2e	1,06E+02	Omitted	2,25E+01	0,00E+00	1,39E+00	1,22E+00	4,96E+00	-1,18E+00	1,29E+02	**1,36E+02**	1,35E+02
SOM based on EPD for A,-A3; A5; C1-C4; D; A4 substituted with Spantech transport in the PVC Chain	T CO2e	1,52E+02	5,46E+01	3,23E+01	0,00E+00	2,00E+00	1,75E+00	7,12E+00	-1,70E+00	2,39E+02	**2,50E+02**	2,48E+02
SOM based on EPD for A,-A3; A5; C1-C4; D; A4 substituted with Spantech transport in the PVC Chain	T CO2e	152	54,6	32,3	0,00	2,00	1,75	7,12	-1,70	239	**250**	248
SOM based on EPD for A,-A3; A5; C1-C4; D; A4 substituted	% distribution over LCA	61%	22%	13%	0%	0,8%	0,7%	2,8%	-0,7%	96%	**100%**	99%

with Spantech transport in the PVC Chain

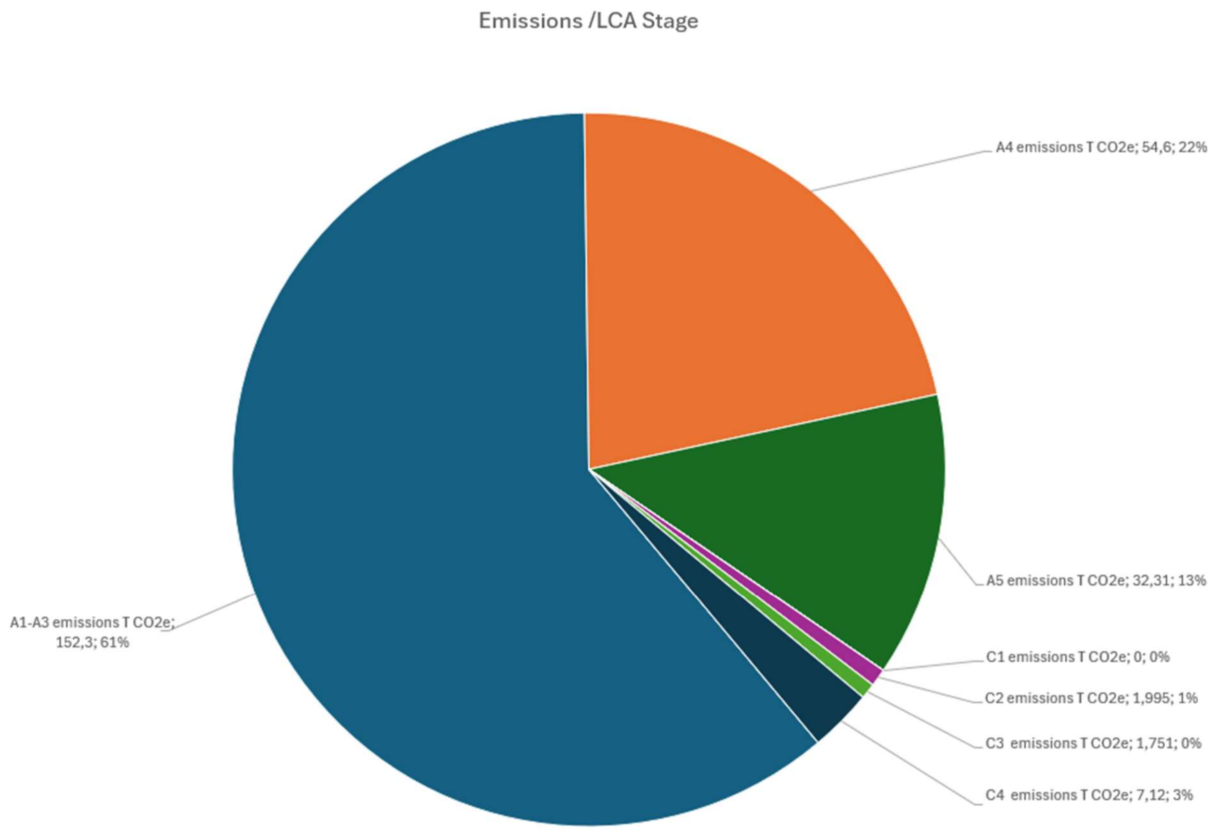

Figure 4. CO2 Emission in Spantechs supply chain of PVC of products.

7 Reduction potential and chances for initiatives

7.1 Raw Material Extraction (A1)

- Reduction Potential: 10-15% reduction in CO2 emissions.
- Actions Required:
    - Transition to bio-based or recycled raw materials.
    - Partner with suppliers to increase renewable energy use during petrochemical production.
- Key Chain Partners:
    - Raw material suppliers (e.g., petrochemical companies).
    - PVC manufacturers.
- Engagement Strategies:
    - Long-term contracts with incentives for lower carbon materials.
    - (Joint) investments in renewable energy projects.

7.2 Upstream Transport of Raw Materials (A2)

- Reduction Potential: 10-15% reduction in CO2 emissions.
- Actions Required:
    - Optimize transportation logistics to minimize travel distances.
    - Use lower-emission transport modes (e.g., rail or maritime shipping).
    - Provide and use sustainable fuels (emission of HVO are 80% lower compared to standard diesels.)
- Key Chain Partners:
    - Logistics providers.
    - Fuel providers.
- Engagement Strategies:
    - Collaborate on supply chain mapping and route optimization.
    - Encourage adoption of electric or hybrid vehicles.

7.3 Manufacturing (A3)

- Reduction Potential: 10-15% reduction in CO2 emissions.
- Actions Required:
    - Shift to energy-efficient manufacturing technologies.
    - Replace fossil fuels with renewable energy at production sites.
- Key Chain Partners:
    - PVC manufacturers.
- Engagement Strategies:
    - Co-develop cleaner production methods with manufacturers.
    - Provide financial support for renewable energy transitions.

7.4 Product Transport (A4)

- Reduction Potential: 10-15% reduction in CO2 emissions.
- Actions Required:
    - Consolidate shipments to reduce the frequency of transport.

  - Use low-carbon transport modes (e.g., EV trucks, green hydrogen trucks, HVO).
- Key Chain Partners:
  - Transport companies.
  - Fuel providers
- Engagement Strategies:
  - Negotiate contracts prioritizing green logistics.
  - Explore shared logistics partnerships to reduce empty return trips.

7.5 Construction/Installation (A5)

- Reduction Potential: 5-10% reduction in CO2 emissions.
- Actions Required:
  - Electrification
  - Transition to green energy
  - Waste reduction programs
  - Optimize on-site energy usage with renewable sources.
- Key Chain Partners:
  - Energy provider
  - Waste handlers
- Engagement Strategies:
  - Promote green construction practices.
  - Provide training and guidelines for low-carbon installations.

7.6 Use Phase (B1-B7)

- Reduction Potential: Variable depending on application and energy use.
- Actions Required:
  - Improve the durability of PVC products to extend service life.
  - Design products for energy-efficient use, daylight optimization,
- Key Chain Partners:
  - R&D
  - End-users.
- Engagement Strategies:
  - Develop and share user guides emphasizing energy efficiency.
  - Offer maintenance and refurbishment services to extend product life.

7.7 End-of-Life Management (C1-C4)

- Reduction Potential: 10-20% reduction in CO2 emissions.
- Actions Required:
  - Implement advanced recycling techniques such as chemical recycling.
  - Promote collection programs to maximize material recovery.
- Key Chain Partners:
  - Waste processors.
  - Recycling facilities.
- Engagement Strategies:
  - Establish partnerships with local recyclers.
  - Collaborate on take-back schemes with end-users and customers.

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