clarus

VERIFIED by SCS GLOBAL SERVICES
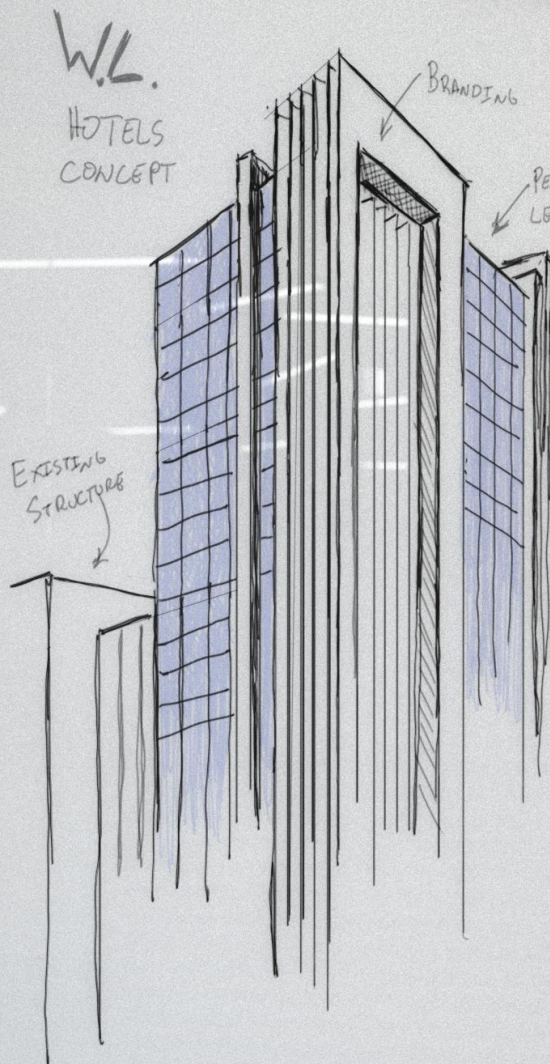ENVIRONMENTAL PRODUCT DECLARATION
BASED ON LCA

Declaration Owner
Clarus
7537 Jack Newell Blvd N
Fort Worth, TX 76118
469.400.7472 | www.clarus.com

Product
Go! Mobile glassboards

Functional Unit
1 m² of writing surface for 10 years of use

EPD Number and Period of Validity
SCS-EPD-04993
EPD Valid May 31, 2018 through May 30, 2023

Product Category Rule
Product Category Rules in Accordance with ISO 14025. Product Group: UN CPC 3812 & 3814. Other Furniture used in Offices and Other Furniture N.E.C.. Version 1.2. International EPD System. 2018.

Program Operator
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SCSglobal SERVICES

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Disclaimers: This EPD conforms to ISO 14025, 14040, and ISO 14044.

Scope of Results Reported: The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.

Accuracy of Results: Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.

Comparability: The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.

PCR review, was conducted by	The Technical Committee of the International EPD® System. Chair: Massimo Marino Contact via info@environdec.com.
Approved Date: May 31, 2018 through May 30, 2023	
Independent verification of the declaration and data, according to ISO 14025:2006	☐ internal ☑ external
Third party verifier	Tom Gloria, Ph.D., Industrial Ecology Consultants

ABOUT CLARUS

Clarus is the pioneer and innovator of the glassboard. As the world's largest glassboard manufacturer, Clarus' modern and minimalist dry-erase solutions have literally and visually transformed strategic, interpersonal communication. Established in 2009, Clarus has experienced explosive growth, requiring the company to relocate to larger facilities 5 times in 9 years. The Clarus design team invents new ways to use the most basic form of written communication in the most modern ways. Clarus leads the Architecture and Design industry by working with the most prestigious brands across the globe and inspiring collaboration in corporate, government, healthcare, and educational settings.

PRODUCT DESCRIPTION

go! Mobile is a magnetic, back-painted glassboard on wheels. With a double-sided glassboard that can move with you from room to room, go! Mobile offers its user the ultimate collaboration tool and the ability to bring it with them wherever needed. In the modern office, mobile collaboration tolls are essential. go! Mobile is both elegant and supremely customizable, making it a favorite of Fortune 500 companies and most major universities.

PRODUCT SPECIFICATIONS

Table 1. *Surface Area, and weight per area, for go! Mobile glassboard products assessed in EPD.*

| Product name	Surface Area (m^2)	kg/m^2
go! Mobile - Wood, Magnetic	1.88	34.5
go! Mobile - Wood, Non-magnetic	1.88	32.6
go! Mobile - Steel frame, Magnetic	1.88	33.5
go! Mobile - Steel Frame, Non-magnetic	1.88	31.1

MATERIAL COMPOSITION

Table 2. *Material and packaging composition for go! Mobile. Results are shown on a mass basis per square meter and as a perfect of total.*

Material	go! Mobile with Wood Frame; Magnetic	go! Mobile with Wood Frame; Non-magnetic	go! Mobile with Steel Frame; Magnetic	go! Mobile with Steel Frame; Non-magnetic
PRODUCT				
Glass	19 55%	19 58%	19 57%	19 61%
Steel	10 29%	7.8 24%	12 37%	10 33%
Wood	3.4 9.8%	3.9 12%	- -	- -
Paint	0.38 1.1%	0.38 1.2%	0.38 1.1%	0.38 1.2%
Magnet; Plastic; Wood	0.14 0.42%	- -	0.14 0.43%	- -
Other	0.16 0.46%	8.0×10^{-2} 0.24%	0.16 0.48%	8.0×10^{-2} 0.26%
Plastic	0.38 1.1%	0.38 1.2%	0.38 1.1%	0.38 1.2%
Product Total	***35*** ***100%***	***33*** ***100%***	***33*** ***100%***	***31*** ***100%***
PACKAGING				
Lumber	22 69%	22 69%	22 69%	19 80%
OSB	9.6 31%	9.6 31%	9.6 31%	4.8 20%
Stretch Wrap	9.6×10^{-2} 0.31%	9.6×10^{-2} 0.31%	9.6×10^{-2} 0.31%	4.8×10^{-2} 0.20%
Foam Pads	1.9×10^{-2} 0.06%	1.9×10^{-2} 0.06%	1.9×10^{-2} 0.06%	9.6×10^{-3} 0.04%
Packaging Total	***31*** ***100%***	***31*** ***100%***	***31*** ***100%***	***24*** ***100%***

LIFE CYCLE ASSESSMENT STAGES

The system boundary is cradle-to-grave and includes resource extraction and processing, product manufacture and assembly, distribution/transport, use and maintenance, and end-of-life. The diagram below illustrates the life cycle stages included in this EPD.
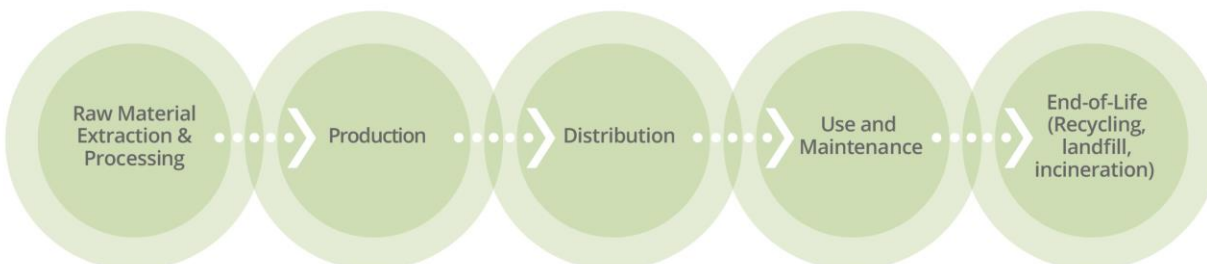
PRODUCT LIFE CYCLE FLOW DIAGRAM

The diagram below is a representation of the most significant contributions to the life cycle of go! Mobile glassboards.
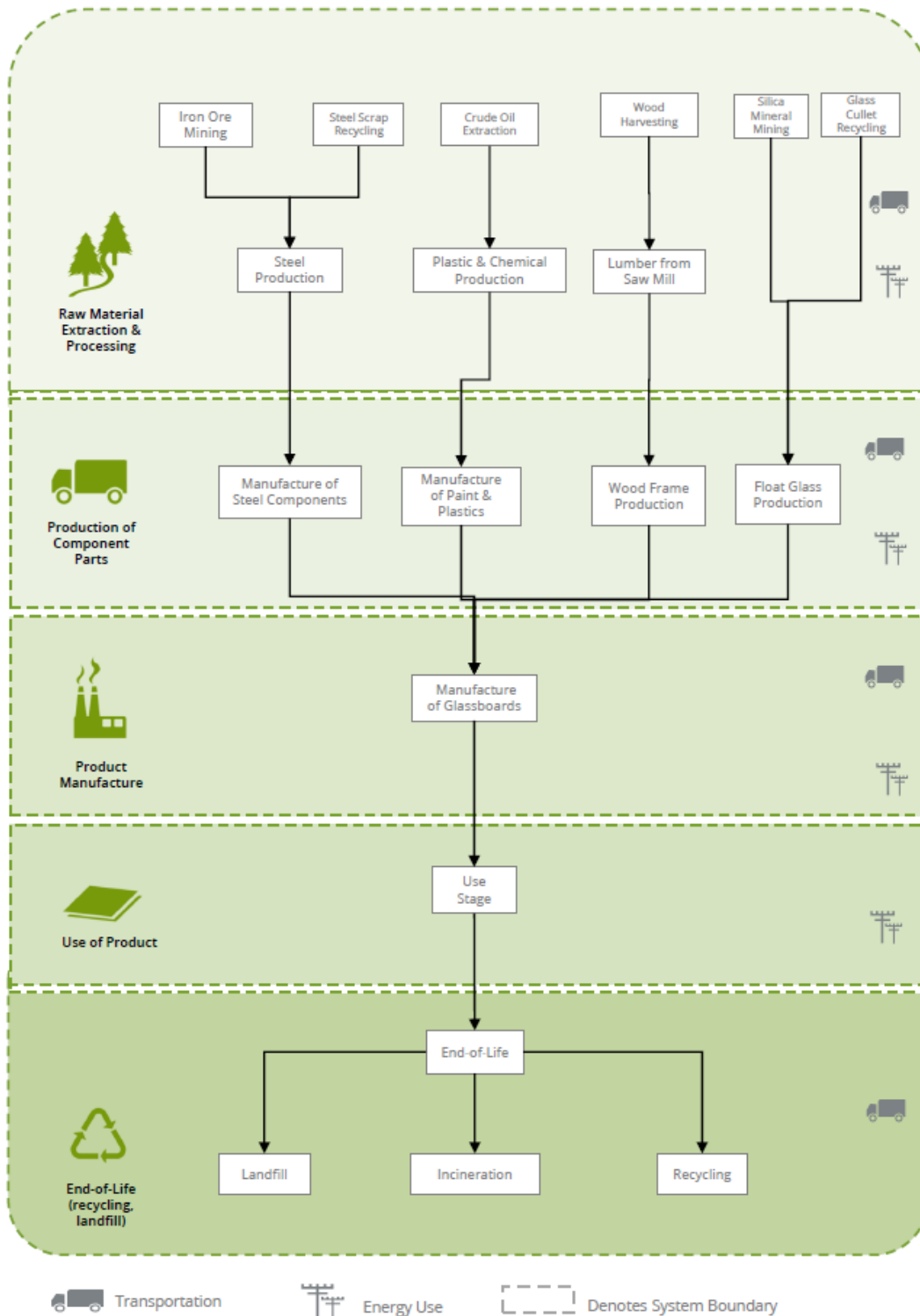
LIFE CYCLE IMPACT ASSESSMENT

Impact category indicators are calculated using the CML-IA and TRACI 2.1 characterization methods. CML-IA impact category indicators include global warming potential (100 years), acidification potential, eutrophication potential, Photochemical Ozone Creation potential, ozone depletion potential, fossil fuel abiotic resource depletion, human toxicity, and ecotoxicity, in accordance with the PCR. In addition, an estimate of the impacts from land use is reported (based on ReCiPe methodology).

Table 3. *Life cycle impact assessment results for the go! Mobile magnetic glassboards with wood frame. Results are shown per 1 m^2 of product.*

Impact category	Unit	Total	Raw Material Extraction & Processing (Upstream Module)	Production (Core Module)	Distribution, Use & End-of-Life (Downstream Module)
LCIA Results - TRACI					
Global warming	kg CO_2 eq	150	74	55	21
	%	100%	49%	37%	14%
Acidification	kg SO_2 eq	0.84	0.44	0.35	5.3×10^{-2}
	%	100%	52%	41%	6.3%
Eutrophication	kg N eq	0.74	0.30	0.30	0.15
	%	100%	40%	40%	20%
Smog	kg O_3 eq	8.9	5.2	2.5	1.2
	%	100%	59%	28%	14%
Ozone depletion	kg CFC-11 eq	1.0×10^{-5}	6.3×10^{-6}	2.2×10^{-6}	2.0×10^{-6}
	%	100%	60%	21%	19%
LCIA Results - CML					
Global warming (GWP100a)	kg CO_2 eq	150	75	57	23
	%	100%	48%	37%	15%
Acidification potential	kg SO_2 eq	0.85	0.44	0.37	4.5×10^{-2}
	%	100%	51%	44%	5.3%
Eutrophication potential	kg PO_4^{3-} eq	0.33	0.15	0.13	6.0×10^{-2}
	%	100%	44%	38%	18%
Photochemical oxidation	kg C_2H_4 eq	5.1×10^{-2}	2.8×10^{-2}	1.9×10^{-2}	4.1×10^{-3}
	%	100%	54%	38%	8.0%
Ozone layer depletion (ODP)	kg CFC-11 eq	1.1×10^{-5}	6.3×10^{-6}	2.2×10^{-6}	2.0×10^{-6}
	%	100%	60%	21%	19%
Abiotic depletion	kg Sb eq	5.4×10^{-4}	4.8×10^{-4}	3.0×10^{-5}	3.1×10^{-5}
	%	100%	89%	5.6%	5.8%
Abiotic depletion (fossil fuels)	MJ	1,800	920	750	170
	%	100%	50%	41%	9.4%
LCIA Results - Other					
Ecotoxicity	CTUe	1.0	0.43	0.22	0.38
	%	100%	42%	21%	37%
Human toxicity, cancer	CTUh	2.0×10^{-8}	5.8×10^{-9}	1.3×10^{-8}	1.1×10^{-9}
	%	100%	30%	65%	5.5%
Human toxicity, non-cancer	CTUh	5.8×10^{-10}	3.3×10^{-10}	1.9×10^{-10}	5.5×10^{-11}
	%	100%	58%	32%	9.6%
Land occupation	species.yr	2.5×10^{-6}	2.8×10^{-7}	2.2×10^{-6}	2.3×10^{-8}
	%	100%	11%	88%	0.91%

Table 4. *Life cycle impact assessment results for the go! Mobile non-magnetic glassboards with wood frame. Results are shown per 1 m^2 of product.*

Impact category	Unit	Total	Raw Material Extraction & Processing (Upstream Module)	Production (Core Module)	Distribution, Use & End-of-Life (Downstream Module)
LCIA Results - TRACI					
Global warming	kg CO_2 eq	140	62	53	20
	%	100%	46%	39%	15%
Acidification	kg SO_2 eq	0.75	0.37	0.33	5.0×10^{-2}
	%	100%	50%	44%	6.6%
Eutrophication	kg N eq	0.67	0.23	0.29	0.15
	%	100%	35%	43%	22%
Smog	kg O_3 eq	8.1	4.6	2.4	1.1
	%	100%	56%	30%	14%
Ozone depletion	kg CFC-11 eq	8.9×10^{-6}	4.9×10^{-6}	2.1×10^{-6}	1.9×10^{-6}
	%	100%	55%	24%	21%
LCIA Results - CML					
Global warming (GWP100a)	kg CO_2 eq	140	63	54	22
	%	100%	45%	39%	16%
Acidification potential	kg SO_2 eq	0.77	0.37	0.36	4.3×10^{-2}
	%	100%	48%	46%	5.6%
Eutrophication potential	kg PO_4^{3-} eq	0.30	0.12	0.12	6.0×10^{-2}
	%	100%	40%	41%	20%
Photochemical oxidation	kg C_2H_4 eq	4.5×10^{-2}	2.3×10^{-2}	1.8×10^{-2}	4.0×10^{-3}
	%	100%	51%	40%	8.8%
Ozone layer depletion (ODP)	kg CFC-11 eq	9.0×10^{-6}	4.9×10^{-6}	2.2×10^{-6}	1.9×10^{-6}
	%	100%	55%	24%	21%
Abiotic depletion	kg Sb eq	4.3×10^{-4}	3.7×10^{-4}	3.0×10^{-5}	3.0×10^{-5}
	%	100%	86%	6.9%	6.8%
Abiotic depletion (fossil fuels)	MJ	1,600	750	710	160
	%	100%	46%	44%	10%
LCIA Results - Other					
Ecotoxicity	CTUe	0.78	0.18	0.22	0.38
	%	100%	23%	28%	49%
Human toxicity, cancer	CTUh	1.8×10^{-8}	4.7×10^{-9}	1.3×10^{-8}	1.0×10^{-9}
	%	100%	26%	69%	5.5%
Human toxicity, non-cancer	CTUh	4.3×10^{-10}	2.0×10^{-10}	1.8×10^{-10}	5.4×10^{-11}
	%	100%	47%	41%	12%
Land occupation	species.yr	2.5×10^{-6}	2.9×10^{-7}	2.2×10^{-6}	2.2×10^{-8}
	%	100%	11%	88%	0.86%

Table 5. *Life cycle impact assessment results for the go! Mobile magnetic glassboards with steel frame. Results are shown per 1 m² of product.*

Impact category	Unit	Total	Raw Material Extraction & Processing (Upstream Module)	Production (Core Module)	Distribution, Use & End-of-Life (Downstream Module)
LCIA Results - TRACI					
Global warming	kg CO$_2$ eq	160	82	54	20
	%	100%	53%	34%	13%
Acidification	kg SO$_2$ eq	0.87	0.48	0.34	5.1×10^{-2}
	%	100%	55%	39%	5.9%
Eutrophication	kg N eq	0.76	0.34	0.29	0.13
	%	100%	45%	38%	17%
Smog	kg O$_3$ eq	9.2	5.6	2.4	1.2
	%	100%	61%	26%	13%
Ozone depletion	kg CFC-11 eq	1.1×10^{-5}	6.7×10^{-6}	2.2×10^{-6}	1.9×10^{-6}
	%	100%	62%	20%	18%
LCIA Results - CML					
Global warming (GWP100a)	kg CO$_2$ eq	160	83	56	22
	%	100%	52%	34%	14%
Acidification potential	kg SO$_2$ eq	0.88	0.48	0.36	4.4×10^{-2}
	%	100%	54%	41%	5.0%
Eutrophication potential	kg PO$_4^{3-}$ eq	0.35	0.17	0.12	5.3×10^{-2}
	%	100%	49%	36%	15%
Photochemical oxidation	kg C$_2$H$_4$ eq	5.3×10^{-2}	3.1×10^{-2}	1.9×10^{-2}	4.0×10^{-3}
	%	100%	58%	35%	7.4%
Ozone layer depletion (ODP)	kg CFC-11 eq	1.1×10^{-5}	6.7×10^{-6}	2.2×10^{-6}	1.9×10^{-6}
	%	100%	62%	20%	18%
Abiotic depletion	kg Sb eq	6.1×10^{-4}	5.5×10^{-4}	3.0×10^{-5}	3.0×10^{-5}
	%	100%	90%	4.9%	4.9%
Abiotic depletion (fossil fuels)	MJ	1,900	1,000	730	170
	%	100%	53%	38%	8.8%
LCIA Results - Other					
Ecotoxicity	CTUe	1.0	0.41	0.22	0.38
	%	100%	40%	22%	38%
Human toxicity, cancer	CTUh	2.0×10^{-8}	6.4×10^{-9}	1.3×10^{-8}	9.9×10^{-10}
	%	100%	32%	63%	4.9%
Human toxicity, non-cancer	CTUh	5.9×10^{-10}	3.5×10^{-10}	1.8×10^{-10}	5.4×10^{-11}
	%	100%	60%	31%	9.2%
Land occupation	species.yr	2.3×10^{-6}	1.1×10^{-7}	2.2×10^{-6}	2.2×10^{-8}
	%	100%	4.6%	94%	0.95%

Table 6. *Life cycle impact assessment results for the go! Mobile non-magnetic glassboards with steel frame. Results are shown per 1 m^2 of product.*

Impact category	Unit	Total	Raw Material Extraction & Processing (Upstream Module)	Production (Core Module)	Distribution, Use & End-of-Life (Downstream Module)
LCIA Results - TRACI					
Global warming	kg CO_2 eq	140	70	47	19
	%	100%	51%	35%	14%
Acidification	kg SO_2 eq	0.76	0.41	0.30	4.8×10^{-2}
	%	100%	54%	39%	6.3%
Eutrophication	kg N eq	0.65	0.28	0.24	0.12
	%	100%	43%	38%	19%
Smog	kg O_3 eq	8.0	5.0	2.0	1.1
	%	100%	62%	25%	14%
Ozone depletion	kg CFC-11 eq	8.9×10^{-6}	5.3×10^{-6}	1.8×10^{-6}	1.8×10^{-6}
	%	100%	60%	20%	20%
LCIA Results - CML					
Global warming (GWP100a)	kg CO_2 eq	140	71	49	21
	%	100%	50%	35%	15%
Acidification potential	kg SO_2 eq	0.78	0.41	0.32	4.1×10^{-2}
	%	100%	53%	42%	5.3%
Eutrophication potential	kg PO_4^{3-} eq	0.30	0.14	0.10	5.1×10^{-2}
	%	100%	48%	35%	17%
Photochemical oxidation	kg C_2H_4 eq	4.6×10^{-2}	2.6×10^{-2}	1.6×10^{-2}	3.8×10^{-3}
	%	100%	56%	35%	8.3%
Ozone layer depletion (ODP)	kg CFC-11 eq	8.9×10^{-6}	5.3×10^{-6}	1.8×10^{-6}	1.8×10^{-6}
	%	100%	59%	20%	20%
Abiotic depletion	kg Sb eq	4.9×10^{-4}	4.4×10^{-4}	2.3×10^{-5}	2.8×10^{-5}
	%	100%	90%	4.6%	5.7%
Abiotic depletion (fossil fuels)	MJ	1,600	830	630	160
	%	100%	51%	39%	9.6%
LCIA Results - Other					
Ecotoxicity	CTUe	0.69	0.15	0.16	0.38
	%	100%	22%	23%	55%
Human toxicity, cancer	CTUh	1.4×10^{-8}	5.3×10^{-9}	7.9×10^{-9}	8.8×10^{-10}
	%	100%	38%	56%	6.2%
Human toxicity, non-cancer	CTUh	4.2×10^{-10}	2.2×10^{-10}	1.5×10^{-10}	5.2×10^{-11}
	%	100%	52%	35%	12%
Land occupation	species.yr	1.8×10^{-6}	8.9×10^{-8}	1.7×10^{-6}	2.1×10^{-8}
	%	100%	4.8%	94%	1.1%

Resource Use

The PCR requires that several parameters be reported in the EPD, including resource use, waste categories and output flows, and other environmental information. The results for these parameters per declared unit presented below

Table 7. *Life cycle inventory results for the go! Mobile magnetic glassboards with wood frame. Results are shown per 1 m² of product.*

Impact category	Unit	Total	Raw Material Extraction & Processing (Upstream Module)	Production (Core Module)	Distribution, Use & End-of-Life (Downstream Module)
Resources					
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ eq.	1,100	170	940	4.0
	%	100%	15%	84%	0.36%
Use of renewable primary energy resources used as raw materials	MJ	0.0	0.0	0.0	0.0
Total use of renewable primary energy resources	MJ eq.	1,100	170	940	4.0
	%	100%	15%	84%	0.36%
Use of nonrenewable primary energy excluding nonrenewable primary energy resources used as raw materials	MJ eq.	INA	INA	INA	INA
Use of nonrenewable primary energy resources used as raw materials	MJ eq.	INA	INA	INA	INA
Total use of nonrenewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ eq.	2,000	980	850	180
	%	100%	49%	43%	8.9%
Use of secondary materials	kg	10	10	0.0	0.0
	%	100%	100%	0.0	0.0
Use of renewable secondary fuels	MJ eq.	Negligible	Negligible	Negligible	Negligible
Use of nonrenewable secondary fuels	MJ eq.	Negligible	Negligible	Negligible	Negligible
Net use of fresh water	m³	4.6	3.1	1.4	0.17
	%	100%	67%	29%	3.7%
Wastes					
Hazardous waste disposed	kg	3.1×10^{-3}	2.0×10^{-3}	9.7×10^{-4}	1.2×10^{-4}
	%	100%	65%	31%	3.7%
Radioactive Waste disposed	kg	5.7×10^{-3}	3.0×10^{-3}	1.5×10^{-3}	1.1×10^{-3}
	%	100%	53%	27%	20%
Nonhazardous waste disposed	kg	77	17	28	33
	%	100%	22%	36%	42%
Components for re-use	kg	0.0	0.0	0.0	0.0
Materials for recycling	kg	Negligible	Negligible	Negligible	Negligible
Materials for energy recovery	kg	Negligible	Negligible	Negligible	Negligible
Exported energy	MJ	Negligible	Negligible	Negligible	Negligible

INA = Indicator Not Assessed

Table 8. *Life cycle inventory results for the go! Mobile non-magnetic glassboards with wood frame. Results are shown per 1 m² of product.*

Impact category	Unit	Total	Raw Material Extraction & Processing (Upstream Module)	Production (Core Module)	Distribution, Use & End-of-Life (Downstream Module)
Resources					
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ eq.	1,100	170	940	3.7
	%	100%	15%	84%	0.34%
Use of renewable primary energy resources used as raw materials	MJ	0.0	0.0	0.0	0.0
Total use of renewable primary energy resources	MJ eq.	1,100	170	940	3.7
	%	100%	15%	84%	0.34%
Use of nonrenewable primary energy excluding nonrenewable primary energy resources used as raw materials	MJ eq.	INA	INA	INA	INA
Use of nonrenewable primary energy resources used as raw materials	MJ eq.	INA	INA	INA	INA
Total use of nonrenewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ eq.	1,800	790	810	170
	%	100%	45%	46%	9.5%
Use of secondary materials	kg	9.9	9.9	0.0	0.0
	%	100%	100%	0.0	0.0
Use of renewable secondary fuels	MJ eq.	Negligible	Negligible	Negligible	Negligible
Use of nonrenewable secondary fuels	MJ eq.	Negligible	Negligible	Negligible	Negligible
Net use of fresh water	m³	3.9	2.4	1.3	0.16
	%	100%	62%	33%	4.2%
Wastes					
Hazardous waste disposed	kg	2.7×10^{-3}	1.6×10^{-3}	9.3×10^{-4}	1.1×10^{-4}
	%	100%	61%	35%	4.1%
Radioactive Waste disposed	kg	5.0×10^{-3}	2.5×10^{-3}	1.5×10^{-3}	1.1×10^{-3}
	%	100%	50%	29%	21%
Nonhazardous waste disposed	kg	73	15	27	31
	%	100%	20%	37%	43%
Components for re-use	kg	0.0	0.0	0.0	0.0
Materials for recycling	kg	Negligible	Negligible	Negligible	Negligible
Materials for energy recovery	kg	Negligible	Negligible	Negligible	Negligible
Exported energy	MJ	Negligible	Negligible	Negligible	Negligible

INA = Indicator Not Assessed

Table 9. *Life cycle inventory results for the go! Mobile magnetic glassboards with steel frame. Results are shown per 1 m² of product.*

Impact category	Unit	Total	Raw Material Extraction & Processing (Upstream Module)	Production (Core Module)	Distribution, Use & End-of-Life (Downstream Module)
Resources					
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ eq.	1,000	72	940	4.0
	%	100%	7.1%	93%	0.40%
Use of renewable primary energy resources used as raw materials	MJ	0.0	0.0	0.0	0.0
Total use of renewable primary energy resources	MJ eq.	1,000	72	940	4.0
	%	100%	7.1%	93%	0.40%
Use of nonrenewable primary energy excluding nonrenewable primary energy resources used as raw materials	MJ eq.	INA	INA	INA	INA
Use of nonrenewable primary energy resources used as raw materials	MJ eq.	INA	INA	INA	INA
Total use of nonrenewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ eq.	2,100	1,100	830	170
	%	100%	52%	40%	8.3%
Use of secondary materials	kg	10	10	0.0	0.0
	%	100%	100%	0.0	0.0
Use of renewable secondary fuels	MJ eq.	Negligible	Negligible	Negligible	Negligible
Use of nonrenewable secondary fuels	MJ eq.	Negligible	Negligible	Negligible	Negligible
Net use of fresh water	m³	5.0	3.5	1.3	0.17
	%	100%	70%	27%	3.4%
Wastes					
Hazardous waste disposed	kg	3.4×10^{-3}	2.4×10^{-3}	9.5×10^{-4}	1.1×10^{-4}
	%	100%	69%	28%	3.3%
Radioactive Waste disposed	kg	5.8×10^{-3}	3.2×10^{-3}	1.5×10^{-3}	1.1×10^{-3}
	%	100%	55%	25%	19%
Nonhazardous waste disposed	kg	77	19	27	31
	%	100%	24%	36%	40%
Components for re-use	kg	0.0	0.0	0.0	0.0
Materials for recycling	kg	Negligible	Negligible	Negligible	Negligible
Materials for energy recovery	kg	Negligible	Negligible	Negligible	Negligible
Exported energy	MJ	Negligible	Negligible	Negligible	Negligible

INA = Indicator Not Assessed

Table 10. *Life cycle inventory results for the go! Mobile non-magnetic glassboards with steel frame. Results are shown per 1 m² of product.*

Impact category	Unit	Total	Raw Material Extraction & Processing (Upstream Module)	Production (Core Module)	Distribution, Use & End-of-Life (Downstream Module)
Resources					
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ eq.	800	59	730	3.8
	%	100%	7.4%	92%	0.47%
Use of renewable primary energy resources used as raw materials	MJ	0.0	0.0	0.0	0.0
Total use of renewable primary energy resources	MJ eq.	800	59	730	3.8
	%	100%	7.4%	92%	0.47%
Use of nonrenewable primary energy excluding nonrenewable primary energy resources used as raw materials	MJ eq.	INA	INA	INA	INA
Use of nonrenewable primary energy resources used as raw materials	MJ eq.	INA	INA	INA	INA
Total use of nonrenewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ eq.	1,800	880	730	160
	%	100%	50%	41%	9.1%
Use of secondary materials	kg	9.8	9.8	0.0	0.0
	%	100%	100%	0.0	0.0
Use of renewable secondary fuels	MJ eq.	Negligible	Negligible	Negligible	Negligible
Use of nonrenewable secondary fuels	MJ eq.	Negligible	Negligible	Negligible	Negligible
Net use of fresh water	m³	4.1	2.8	1.1	0.16
	%	100%	69%	27%	3.9%
Wastes					
Hazardous waste disposed	kg	2.9×10^{-3}	2.0×10^{-3}	8.1×10^{-4}	1.1×10^{-4}
	%	100%	68%	28%	3.7%
Radioactive Waste disposed	kg	5.0×10^{-3}	2.7×10^{-3}	1.2×10^{-3}	1.0×10^{-3}
	%	100%	54%	25%	21%
Nonhazardous waste disposed	kg	67	16	22	29
	%	100%	24%	32%	43%
Components for re-use	kg	0.0	0.0	0.0	0.0
Materials for recycling	kg	Negligible	Negligible	Negligible	Negligible
Materials for energy recovery	kg	Negligible	Negligible	Negligible	Negligible
Exported energy	MJ	Negligible	Negligible	Negligible	Negligible

INA = Indicator Not Assessed

SUPPORTING TECHNICAL INFORMATION

Unit processes are developed with SimaPro 8.3 software, drawing upon data from multiple sources. Primary data were provided by Clarus for their manufacturing processes. The primary sources of secondary LCI data are from Ecoinvent Database.

Table 11. *Data sources used for the LCA study.*

Component	Material Dataset	Processing Dataset	Data Source	Publication Date
Product Materials				
Steel	Steel, low-alloyed {GLO}| market for	Alloc Rec	Metal working, average for steel product manufacturing {GLO}| market for	Alloc Rec	EI v3.3	2016
Nylon	Nylon 6 {GLO}| market for	Alloc Rec	Injection moulding {GLO}| market for	Alloc Rec	EI v3.3	2016
Glass	Flat glass, uncoated {GLO}| market for	Alloc Rec; Glass cullet, sorted {GLO}| glass cullet, sorted, Recycled Content cut-off	Alloc Rec, U	Included with material dataset	EI v3.3	2016
Wood	Sawnwood, board, hardwood, dried (u=10% planed {GLO}	market for	Alloc Rec	Included with material dataset	EI v3.3	2016
Low-VOC Paint	Chemical, organic {GLO}| market for	Alloc Rec; Titanium dioxide {RoW}| market for	Alloc Rec; Carbon black {GLO}| market for	Alloc Rec	Included with material dataset	EI v3.3	2016
Magnets; Adhesive tape	Neodymium oxide {GLO}| market for	Alloc Rec; Acrylic binder, without water, in 34% solution state {GLO}| market for	Alloc Rec		Industry data 2.0	2015
Manufacturing				
Electricity	Electricity, medium voltage, at grid/ERCT 2015	n/a	EI v2.2; SCS	2015
Heat	Heat, central or small-scale, natural gas {GLO}	market group for	Alloc Rec	n/a	EI v3.3	2016
Combustion	Petrol, unleaded, burned in machinery {GLO}	market for petrol, unleaded, burned in machinery	Alloc Rec	n/a	EI v3.	2016
Packaging				
Foam Pads	Polyurethane, flexible foam {GLO}	market for	Alloc Rec	Negligible	EI v3.3	2016
OSB	Oriented strand board {GLO}	market for	Alloc Rec	Included with material dataset	EI v3.3	2016
Stretch Wrap	Packaging film, low density polyethylene {GLO}	market for	Alloc Rec	Included with material dataset	EI v3.3	2016
Lumber	Sawnwood, board, softwood, raw, dried (u=20%) {GLO}	market for	Alloc Rec	Included with material dataset	EI v3.3	2016
Transportation				
Diesel Truck	Transport, freight, lorry 16-32 metric ton, EURO4 {GLO}	market for	Alloc Rec	n/a	EI v3.3	2016

Data Quality

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 10 years old (typically 2016). All of the secondary data used represented an average of at least one year's worth of data collection, and up to three years in some cases. Manufacturer-supplied data (primary data) are based on annualized production for 2017.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. Electricity use for product manufacture is modeled using representative data for the Texas (ERCT) electricity grid mix. Surrogate data used in the assessment are representative of North American or global operations. Data representative of global operations are considered sufficiently similar to actual processes. Data representing product disposal are based on US statistics.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative datasets are used to represent the actual processes, as appropriate.
Precision: Measure of the variability of the data values for each data expressed	Precision of results are not quantified due to a lack of data. Secondary data for operations are typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	The LCA model included all known mass and energy flows for production of the assessed products. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded. In total, these missing data represent less than 5% of the mass or energy flows.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	Data used in the assessment represent typical or average processes as currently reported from multiple data sources, and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used; with a bias towards Ecoinvent v3.3 data where available. Different portions of the product life cycle are equally considered; however, it must be noted that final disposition of the product is based on assumptions of current average practices in the United States.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the Data: Description of all primary and secondary data sources	Data representing energy use at Clarus' Ft. Worth, TX facility represent an annual average and are considered of medium to high quality due to the length of time over which these data are collected for the existing production processes. For secondary LCI datasets, Ecoinvent v3.3 LCI data are used.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the glassboard products and packaging is low. Actual supplier data for upstream operations was not available and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years), but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment method required by the PCR includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

Allocation

Resource use at the Fort Worth, Texas facility (e.g., water and energy) was allocated to the product based on the product mass as a fraction of the total facility production volume.

The glassboard products include recycled materials, which are allocated using the recycled content allocation method (also known as the 100-0 cut off method). Using the recycled content allocation approach, system inputs with recycled content do not receive any burden from the previous life cycle other than reprocessing of the waste material. At end of life, materials which are recycled leave the system boundaries with no additional burden.

Impacts from transportation were allocated based on the mass of material and distance transported.

System Boundaries

The system boundary of the life cycle assessment for the glassboards was cradle-to-grave. A description of the system boundaries for this study is as follows:

- **Raw Material Extraction and Processing –** This stage includes extraction of virgin materials and reclamation of non-virgin feedstock. This includes the extraction of all raw materials, including the transport to the manufacturing site. Resource use and emissions associated with both the extraction of the raw materials used in the products and packaging, as well as those associated with the processing of raw materials and glassboard component manufacturing, are included. Impacts associated with the transport of the processed raw materials to manufacturing facilities (upstream transport) are also included in this stage.

- **Production –** This stage includes all the relevant manufacturing processes and flows, excluding production of capital goods, infrastructure, production of manufacturing equipment, and personnel-related activities. This stage includes the impacts from energy use and emissions associated with the processes occurring at the manufacturing facility. Energy use at the facility is excluded unless used directly for the manufacturing process.

- **Distribution, Use, and End-of-Life –** This stage includes the delivery of the product to the point of use (downstream transportation) and the use, cleaning and maintenance of the product for a period of 10 years. Also included are is product disposal, which includes transport of the product to material reclamation or waste treatment facilities. Emissions from disposal of workplace product components in a landfill or from incineration are included.

Cut-off criteria

According to the PCR, cumulative omitted mass or energy flows within the product boundary shall not exceed 5%. In the present study, except as noted, all known materials and processes were included in the life cycle inventory.

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