

OTIS GEN2 LIFE

Environmental Product Declaration

In accordance with ISO 14025:2006
and EN 15804:2012+A2:2019 for:

OTIS Gen2 Life

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OTIS

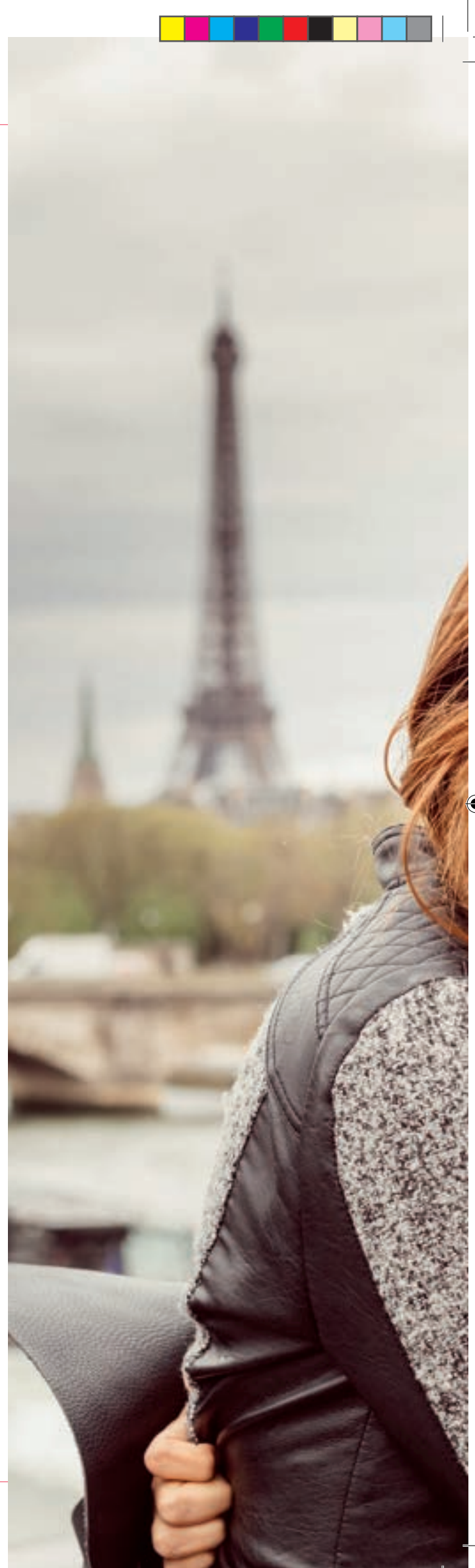


About OTIS

Otis gives people freedom to connect and thrive in a taller, faster, smarter world. The global leader in the manufacture, installation and servicing of elevators and escalators, we move 2 billion people a day and maintain approximately 2.2 million customer units worldwide – the industry’s largest Service portfolio. You’ll find us in the world’s most iconic structures, as well as residential and commercial buildings, transportation hubs and everywhere people are on the move.

Headquartered in Connecticut, USA, Otis is 69,000 people strong, including 41,000 field professionals, all committed to meeting the diverse needs of our customers and passengers in more than 200 countries and territories.

To learn more, visit <https://www.OTIS.com> and follow us on LinkedIn, Instagram, Facebook and Twitter @OtisElevatorCo





Gen2 Life

INTRODUCTION

The new Gen2 Life elevator blends convenience, style and performance to deliver a concierge-like experience that makes something routine, exceptional. The Gen2 Life elevator puts a highperforming, energy-efficient technology at a tenant's beck and call, while providing information that educates, entertains and directs.

Together, these connected conveniences create an upscale, conciergelike experience that keeps everyone productive and on the move. The Gen2 technology replace conventional steel ropes with polyurethane coated flat steel belts that eliminates the noise-creating effects of metal-to-metal contact.

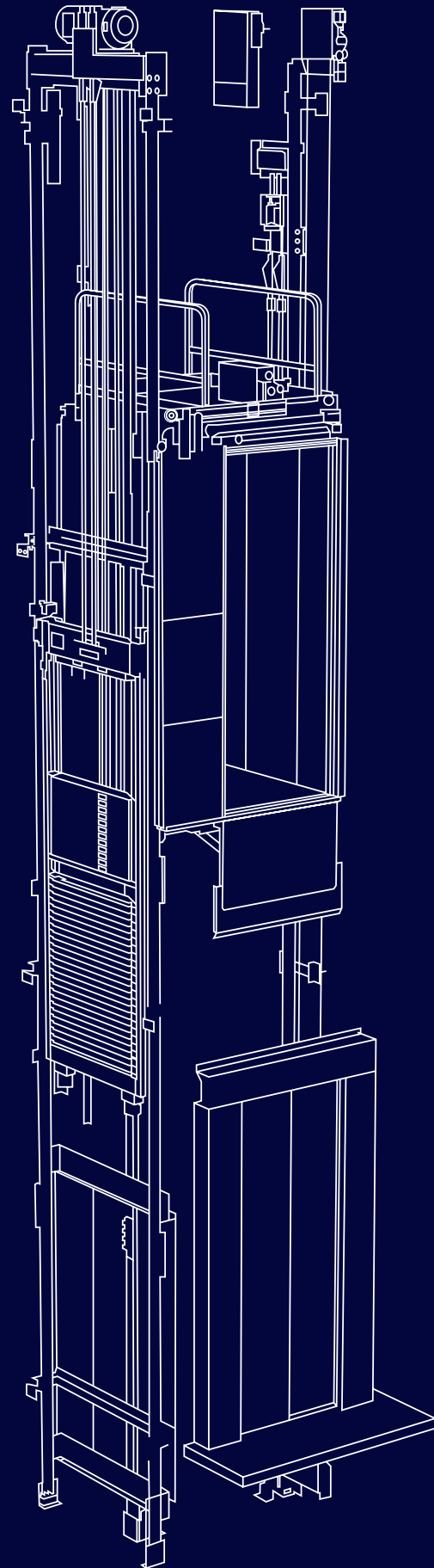
The Gen2 Life elevator is tailored to match needs of most residential buildings and low rise commercial buildings.

MAIN CHARACTERISTICS

UP TO 1 000 KG OF DUTY LOAD

UP TO 1,6 M/S OF SPEED

UP TO 45 M / 14 STOPS



For illustration purpose only

PRODUCT INFORMATION

This Environmental Product Declaration for the Gen2 Life range is developed according to the ISO 14040/44 & ISO 14025 guidelines and to the calculation rules specified in the new C-PCR for Lifts «C-PCR-008 Lifts (to PCR 2019:14), version 2020-10-30”, thereby providing full compliance with the CEN standard EN 15804:2012 + A2:2019 (as the core PCR), as well as the PCR 2019:14 Construction products, version 1.1. The General Program Instructions of the International EPD System apply for the current EPD development too. We covered the whole life cycle of the Gen2 Life lift, manufactured both in Gien (France) and Madrid (Spain) OTIS facilities, from the preparation of raw materials, its transport to manufacturing site and the manufacturing of the lift’s components, through its installation, maintenance and use until each component end-of-life treatment. As specified in the C-PCR, the mandatory information of the Gen2 Life lift is presented in the following table. The figures correspond to a typical configuration, being the representative unit of the complete range of the Gen2 Life lifts.

INDEX	VALUES	REPRESENTATIVE VALUES CHOSEN IN CASE OF DECLARATION OF RANGES
Commercial Name	Gen2 Life	
Segment	Residential	
Type of installation	New generic lift	
Main purpose	Transport of passengers	
Type of lift	Electric	
Type of drive system	Gearless traction	
Capacity rated load (fixed or range)	320 - 1 000 kg	630 kg
Rated speed (fixed or range)	1.0 - 1.6 m/s	1.0 m/s
Number of stops (fixed or range)	Up to 14	5
Travelled height (fixed or range)	Up to 45 m	11 m
Number of operating days per year (fixed or range)	365	
Applied Usage Category (UC) according to ISO 25745-2	UC1...UC6	UC2
Designed Reference Service Life (RSL)	25 years	
Geographic region or intended installation region	Europe + Asia + Australia + Central and South America	Europe
Recommended application (main market) Building rise (typical) / Building type	Recommended building type in Table A.1, Annex A, ISO25745-2 Mainly dedicated to residential and small scale commercial buildings	
Optional Equipment	EN81-77, EN81-70, EN81-58	

Table 1. Gen2 Life lift mandatory information required in the C-PCR.

The LCA was conducted for a lift with a lifetime of 25 years, without considering a modernization, installed in a 5-floors building, having a speed of 1.0 m/s and a travelling distance of 11 m. The number of trips per day for a lift with **Usage Category 2** is 125, which was obtained from ISO 25745-2.

The designed reference service life considered for the LCA study is a typical data. Depending on maintenance and modernization activities, the usage phase of a lift can be up to 25-30 years.

Comparability between EPDs based on this c-PCR-008 (to PCR 2019:14) is only achievable, if the following performance characteristics are equivalent: Functional unit, Reference Service Lifetime, Usage Category, travel height, number of stops, rated load, rated speed and geographic region). A European grid mix average (reference year 2018) was used to model power consumption by the elevator in the use phase.

Results Interpretation

The mandatory environmental impact indicators used and the associated impact methods listed in Annex C of EN 15804+A2 (CEN, 2019) (p. 60ff.) are declared. Optional indicators have been calculated and presented in the LCA background report, they are not published in this EPD.

The characterization methodology referenced in the EN15804+A2 is used for the calculation. Long-term emissions (> 100 years) are not accounted for in the impact assessment. The following table shows the mandatory environmental impact indicators declared:

CORE ENVIRONMENTAL IMPACT INDICATORS	UNIT	REFERENCE
Global Warming Potential total (GWP-total)	kg CO ₂ eq.	IPCC 2013 AR5
Global Warming Potential fossil fuels (GWP-fossil)	kg CO ₂ eq.	IPCC 2013 AR5
Global Warming Potential biogenic (GWP-biogenic)	kg CO ₂ eq.	IPCC 2013 AR5
Global Warming Potential land use and land use change (GWP-lluc)	kg CO ₂ eq.	IPCC 2013 AR5
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	WMO (2014) + integrations
Acidification potential, Accumulated Exceedance (AP)	mol H ⁺ eq.	Seppälä et al. (2006); Posch et al. (2008)
Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater)	kg PO ₄ eq.	EUTREND model (Struijs et al, 2009b) as implemented in ReCiPe 2008
Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine)	kg N eq.	EUTREND model (Struijs et al, 2009b) as implemented in ReCiPe 2008
Eutrophication potential, accumulated Exceedance (EP-terrestrial)	mol N eq.	Seppälä et al. (2006); Posch et al. (2008)
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq.	LOTOS-EUROS model (Van Zelm et al, 2008) as implemented in ReCiPe 2008
Abiotic depletion potential for non-fossil resources (ADP minerals&metals)	kg Sb eq.	van Oers et al. (2002) (based on Guinée et al. 2002)
Abiotic depletion for fossil resources potential (ADP-fossil) ¹	MJ, net calorific value	van Oers et al. (2002)
Water (user) deprivation potential, deprivation-weighted water consumption (WDP) ¹	m ³ world eq. deprived	Available WAtER REMaining (AWARE) Boulay et al. (2016)

The pattern of results for the Gen2 Life is comparable to those of the previous product generation of Gen2 Life elevators.

For impact category GWP, the life cycle performance of the elevator is dominated **by the materials manufacturing in the upstream section (module A1)**.

Second most relevant – and for most of the indicators, the life cycle performance of the elevator is dominated by **the energy consumption from operation of the elevator (module B6)**.

ENERGY EFFICIENCY ISO25745 CLASSIFICATION OF THE GEN2 LIFE

The Use phase is the longest phase in the life cycle of the lift, 25 years for the Gen2 Life, and the B6 Energy Consumption module is one of the most relevant stage impacting the environment.

It's therefore important for OTIS to continuously improve the energy efficiency of the elevators, and help our customers reduce the amount of the electricity used.

Therefore, our lifts are designed to achieve an A-class energy efficiency classification, according to ISO 25745 standard.

ENERGY EFFICIENCY CLASS (ISO25745)	ENERGY CONSUMPTION	
	DAILY	ANNUAL
A	1,4 kWh	504 kWh

Table 2. Energy Efficiency Class of the Gen2 Life according to table Table 7 - ISO 25745-2

THE ENERGY CONSUMPTION
PER DAY OF THE DECLARED
GEN2 LIFE IS **1,38KWH**,
CORRESPONDING TO A
CLASS EFFICIENCY FROM
ISO 25745-2

IN MORE DETAIL,

PRODUCT STAGE – MODULE A1:

RAW MATERIAL SUPPLY

The impacts for the Gen2 Life are driven primarily by materials manufacturing of ferrous and electronic components, which created approx. 48% of Climate change "GWP total" and 36% of ADP and fossil "ADPF" and 65% of AP, 48% of EP terrestrial-marine and 55% of POCP.

PRODUCT STAGE – MODULE A3:

MANUFACTURING AT OTIS FACTORY

In all impact categories, the manufacturing has a minor contribution to the impact categories.

This limited impact from the manufacturing part is widely due to the continuous efforts to reduce its environmental footprint over the year through multi-channel initiatives such as: considering reusable and recyclable package for the components, eliminating the painting and welding operations, having a positive impact on greenhouse gas emissions and wastes (1).

From year 2010 till 2020, Gien (France) and Madrid (Spain) factories did a total reduction of 10% in greenhouse gases emissions.

As well, energy consumption has been dramatically decreased by the use of LED lights and more effective boilers in Otis facilities (2).

USE STAGE – MODULE B6:

OPERATIONAL ENERGY USE

The impacts are driven primarily by the electricity consumption during use stage (25 years), creating approximately 38% of GWP and 51% of ADP of fossil "ADPF", and almost 20-25% of AP, EP terrestrial-marine and POCP.

TRANSPORT

Last, the importance of the A4 Transport from manufacturing to building site stage is minor, less than 1% of impact categories GWP and ADPF.

In terms of waste production, the amount of hazardous waste disposed is negligible and will occur during materials manufacturing.

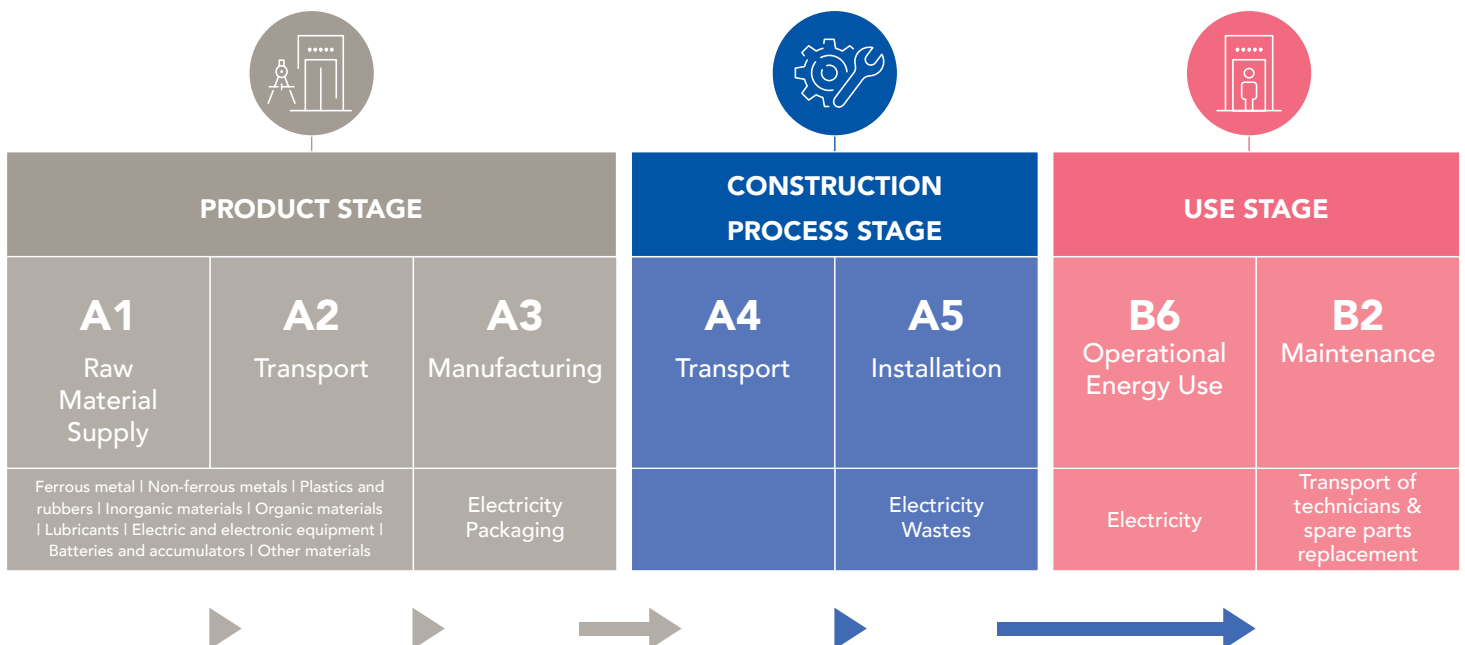
Life Cycle Approach

We design our lifts with a life-cycle approach and ensure continual improvements by reducing their potential environmental impacts at each life cycle stage.

The study scope is a typical "cradle to grave" assessment, from the raw material needed to build up the lift up to its end of life where the lift is removed and disposed. The C-PCR focuses on five main stages:

- ▶ **The Product stage (A1-A3)** includes the raw material extraction and production, transport to the manufacturing site, and manufacturing and assembly of components, considering the demand of energy, auxiliary and operational materials and packaging.
- ▶ **The Construction process stage (A4-A5)** includes the transportation to the installation site by mainly truck and the installation, considering the energy demand and auxiliary material
- ▶ **The Use stage (B1-B7)** includes the maintenance, considering the transportation of employees to the installation site and auxiliary materials, including preventive maintenance parts production and energy use during operation and standby. All other modules are not relevant and modernization is not part of this stage.
- ▶ **The End-of-life stage (C1-C4)** includes the deconstruction, considering the energy demand and auxiliary materials, the transportation by mainly truck to waste processing facilities, the waste processing, considering sorting, and the waste disposal, considering a scenario with recycling, incineration and landfill.
- ▶ **Finally, the benefits** and loads beyond the system boundaries stage (D) includes the potential for recycling by substitution of primary material and energy recovery.

The following picture summarizes the modules covered in the LCA calculation according to c-PCR 008 Lifts requirements. **This is a "cradle-to-grave" assessment plus module D (A+B+C+D)**, wherein the construction and maintenance of capital equipment and indirect activities are excluded from the system boundary:



The quality and cut-off criteria were considered, as per the EN 15804:2012+A2:2019. Therefore, the total mass of the Gen2 Life Lift materials considered equals the total mass of the lift. All inflows and outflows, for which data are mandatory, are included in the LCA calculations.

Elevator components are either manufactured at OTIS owned and operated sites in Germany, France and in Spain, or purchased from a Tier 1 supplier. The Gen2 Life is then assembled by OTIS manufacturing sites, packed and sent to installation sites around Europe.

In Otis sites, it only takes place the manufacturing of components, no pure material production applies.

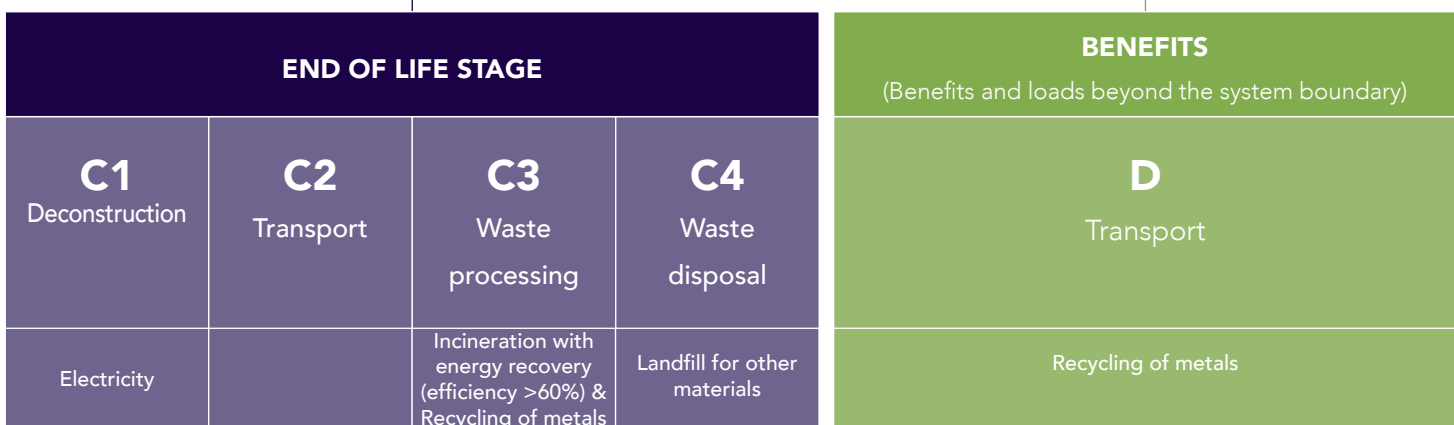
The Gen2 Life can be installed in different locations around Europe. For this reason, the European grid mix (2018) has been used to simulate the energy associated to installation and maintenance works as well as for the energy used during the 25 years of service life considered.

In order to consider a general scenario possible for the end-of-life of the lift's components, for the calculation of the results metals have been considered as "recycled" and landfilling or incineration for the rest of the materials.

The GaBi 2022 LCI database provides the life cycle inventory data for several of the raw and process materials obtained from the background system.

LIFE CYCLE STAGE	INFORMATION MODULE	COMMENT	SPECIFIC DATA USED	VARIATION PRODUCTS	
A1-A3* Product Stage (France, Germany, Spain)	A1	Raw material supply	X	>99%	-11% (The results of this EPD represent the worst case)
	A2	Transport	X		
	A3	Manufacturing	X		
A4-A5 Construction Process (EU27)	A4	Transport	X	-	-
	A5	Installation	X	-	-
B1-B7 Use Stage (EU27)	B1	Use	ND	-	-
	B2	Maintenance	X	-	-
	B3	Repair	ND	-	-
	B4	Replacement	ND	-	-
	B5	Refurbishment	ND	-	-
	B6	Operational energy use	X	-	-
	B7	Operational water use	ND	-	-
C1-C4 End-of-life Stage (EU27)	C1	Deconstruction	X	-	-
	C2	Transport	X	-	-
	C3	Waste processing	X	-	-
	C4	C4 Waste disposal	X	-	-
D Benefits and loads beyond the system boundary (EU27)	D	Reuse, recovery, recycling, potential	X	-	-

* The share of the GWP-GHG indicator results in A1-A3 (A1-A5 for services) is from product-specific LCI data, ">90%". (A1-A5 for services) is from product-specific LCI data, ">90%".



Our major customers and as importantly Governments care about how the lifts are manufactured and are becoming more conscious about the energy performance and the environmental protection. The reduction of energy consumption during in-house manufacturing through **ISO 50001** is continuously supporting our energy efficiency during operations.

Within our European facilities we are also certified **ISO 45001 Occupational Health and Safety Management Standard**, to ensure our employee's health and safety, which is one of our core values at Otis. The implementation of the standard helps us to protect our employees against possible occupational risks and to reduce the likelihood of accidents in the workplace along with improving the safety performance of our products and protect all those that are using our equipment.

The certifications are publicly available on OTIS website.

Therefore, calculation of TP for obtaining of the results per FU is 290 tkm.

FUNCTIONAL UNIT (FU) AND TRANSPORTATION PERFORMANCE (TP)

The function of a lift is the transportation of persons, freights or both. Based on this, the FU is defined as

the transportation of a load over a distance, expressed as one tonne [t] transported over one kilometre [km], i.e. tonne-kilometre [tkm] over a vertical (or inclined) trajectory.

TP shall be calculated according to the formulas and predetermined parameters shown below. As also indicated in the C-PCR, most of the predetermined parameters used are defined in ISO 25745-2. This standard is selected as the valid reference at international level for both the estimation of the lifts' energy consumption and for the calculation of TP. It gives tables of parameters for average distance travelled and average weight transported.

According to the underlying C-PCR, for the defined representative unit and a lifetime of 25 years, the TP evaluated for this study is calculated as follows:

the average car load $\%Q$ [tonnes] times the distance travelled by the lift during the service life s_{RSL} [km]

$$TP = \%Q \times s_{RSL}$$

The average car load was calculated for the Gen2 Life using table 3 in ISO 25745-2:

$$\%Q = Q/1000 \times [\text{Percentage from Table 3 of ISO 25745 - 2}] = 4,73\%$$

where Q is the lift rated load, 630 [kg]

The distance travelled over the designed service life of 25 years (RSL) is:

$$s_{RSL} = s_{av}/1000 \times n_d \times d_{op} \times RSL = 6\,137 \text{ [km]}$$

where s_{av} is the one-way average travel distance, 5,38 [m], n_d is the number of trips per day according to the selected usage category (defined in Table 1 of ISO 25745-2) and d_{op} is the number of operating days per year (see Table 1).



Content Declaration

The tables below show a material summary of the Gen2 Life studied and its packaging, as delivered and installed in a building. Data are provided by OTIS according to the cut-off rules described in Section 4.5 of the C-PCR.

MATERIAL	MASS [kg]	MASS [%]
Ferrous metals (zinc coated steel, stainless steel, cast iron)	1659	63,6
Non-ferrous metals (aluminum, copper)	76	2,9
Plastics & rubbers	46	1,8
Inorganic materials (concrete, glass)	804	30,8
Organic materials (paper, wood, cardboard)	3	0,1
Lubricants (oils, greases), paintings, coatings, adhesives and fillers (glues)	1	0,05
Electric & Electronic Equipment	19	0,7
Batteries & accumulators	1	0,05
Other materials	0,3	0,0
Total mass	2609	100
Mass per 1 tkm	9	

- **Ferrous metals**
- Inorganic materials
- Non-ferrous metals
- Plastic & Rubbers
- Electric & Electronic equipment
- Lubricants, paintings, coatings, adhesives and fillers
- Batteries & Accumulators
- Organic materials
- Other materials

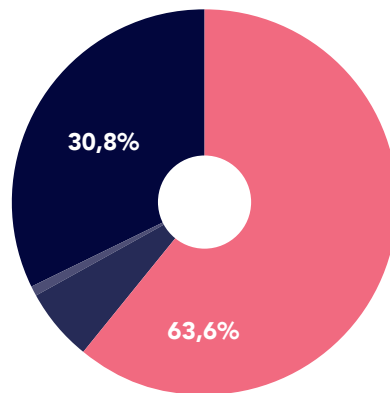
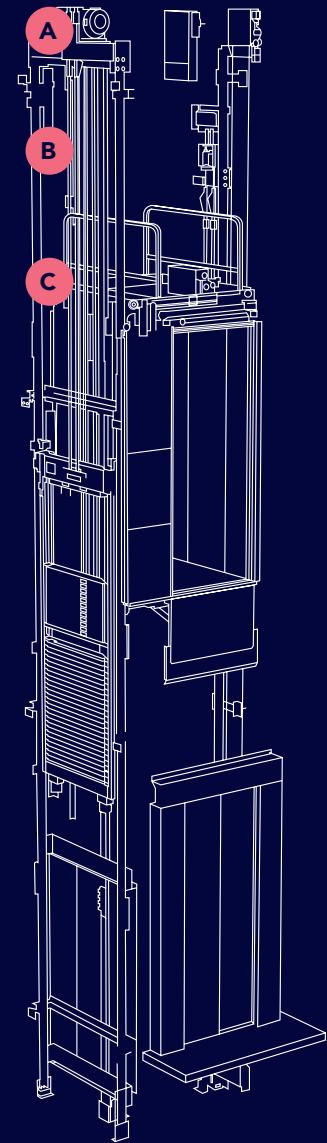


Table 4. Gross weight of the Gen2 Life material as one unit of product.

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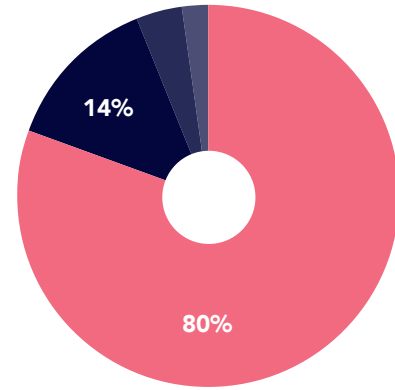


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- +** **A.** Gearless machine (energy efficient, no lubricant, space-saver)
- +** **B.** Polyurethane coated flat steel belts (no lubricant)
- +** **C.** Regen Drive technology (electricity generation)
- +** LED lighting: Car Operating Panel / Cabine ceiling

ENVIRONMENTAL PRODUCT DECLARATION

MATERIAL	MASS [kg]	MASS [%]
Wood	215	80
Corrugated Cardboard	36	13
Plastic PE (Low-density)	11	4
Strapping (Polystyrene)	6	3
Total mass	268	100
Mass per 1 tkm	0,9	



- Wood
- Cardboard
- Plastic PE
- Strapping PS

Table 5. Gross weight of the Gen2 Life packaging material for one unit of product.

All Gen2 Life is packed and delivered with:

- cardboard boxes having **FSC** labeling (Forest Stewardship Council)
- wood made pallets having **PEFC** certification (Program for the Endorsement of Forest Certification)



Environmental Performance

The results for the complete service lifetime of the Gen2 Life were calculated according to the C-PCR and presented per functional unit (tkm). Assumptions are presented in the verified LCA Background report. The definition of the listed impact categories is given in the Glossary section of this declaration.

The EPD has been updated with the following considerations:

Compliance with the c-PCR for Lifts, Updated production data, Update Gabi Database

CORE ENVIRONMENTAL IMPACT INDICATORS UC2 PER TKM

EN 15804 IMPACT CATEGORY	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE		END-OF-LIFE STAGE		NET BENEFITS
	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	D
GWP - total (kg CO2 eq.)	2,25E+01	6,56E-01	1,93E+00	2,81E+00	1,79E+01	1,40E-01	6,95E-01	6,54E-01	4,16E-02	-1,11E+01
GWP - fossil [kg CO2 eq.]	2,37E+01	6,49E-01	5,65E-01	2,80E+00	1,79E+01	1,38E-01	6,65E-01	6,38E-01	4,15E-02	-1,11E+01
GWP - biogenic [kg CO2 eq.]	-1,17E+00	2,71E-03	1,36E+00	7,94E-03	1,06E-02	1,07E-03	3,08E-02	1,62E-02	2,30E-06	1,49E-02
GWP - luluc [kg CO2 eq.]	1,18E-02	4,44E-03	2,30E-03	3,51E-03	1,16E-03	9,51E-04	8,64E-06	2,97E-05	7,66E-05	-5,05E-03
ODP [kg CFC-11 eq.]	1,63E-10	6,46E-14	6,26E-13	2,72E-11	1,77E-10	1,39E-14	4,29E-14	1,75E-12	9,75E-14	9,17E-12
AP [Mole of H+ eq.]	1,02E-01	2,24E-03	1,87E-03	1,30E-02	2,63E-02	6,33E-04	5,02E-03	3,81E-04	2,94E-04	-4,61E-02
EP - freshwater [kg P eq.]	3,00E-05	2,35E-06	1,47E-06	4,97E-06	8,04E-06	5,04E-07	1,41E-07	3,65E-07	7,03E-08	-4,54E-06
EP - marine [kg N eq.]	1,61E-02	1,02E-03	8,23E-04	2,36E-03	7,19E-03	3,00E-04	2,52E-03	1,12E-04	7,52E-05	-6,60E-03
EP - terrestrial [Mole of N eq.]	1,73E-01	1,15E-02	9,40E-03	2,55E-02	7,68E-02	3,34E-03	2,77E-02	1,32E-03	8,26E-04	-7,16E-02
POCP [kg NMVOC eq.]	5,24E-02	2,01E-03	1,85E-03	6,75E-03	2,03E-02	6,50E-04	4,70E-03	2,99E-04	2,29E-04	-2,16E-02
ADPF [MJ]	2,95E+02	8,64E+00	6,12E+00	3,85E+01	3,80E+02	1,85E+00	9,47E+00	2,23E+00	5,43E-01	-1,05E+02
ADPE [kg Sb eq.]	9,98E-04	6,63E-08	4,66E-08	2,48E-04	2,13E-06	1,42E-08	2,87E-08	3,30E-08	4,25E-09	-3,96E-04
WDP [m³ world equiv.]	5,95E+00	7,36E-03	1,75E-01	5,14E-01	1,34E+00	1,58E-03	1,30E-03	9,35E-02	4,55E-03	-1,15E+00

Caption: GWP - total = global warming potential; GWP - fossil = global warming potential (fossil fuel only); GWP - biogenic = global warming potential (biogenic); GWP - luluc = global warming potential (land use only); ODP = ozone depletion; AP = acidification terrestrial and freshwater; EP - freshwater = eutrophication potential (freshwater); EP - marine = eutrophication potential (marine); EP - terrestrial = eutrophication potential (terrestrial); POCP = photochemical ozone formation; ADPE = abiotic depletion potential (element), ADPF = abiotic depletion potential (fossil) WDP = water scarcity. Regarding the indicators ADP-minerals&metals, ADP-fossil, WDP : The results of this environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicators.

INDICATORS DESCRIBING RESOURCE USE UC2 PER TKM

In the LCA, impact assessment method CML 2001 (January 2016) and its related characterization factors were employed at the midpoint level as requested in the PCR for Lifts version 1.0.

The table 7 displays the results of the environmental impact assessment per tkm.

EN 15804	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			USE STAGE			END-OF-LIFE STAGE			NET BENEFITS
	IMPACT CATEGORY	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	D		
PERE [MJ]	4,13E+01	5,99E-01	1,34E+01	5,04E+00	5,49E+01	1,28E-01	3,58E-02	1,17E+00	8,16E-02	-8,05E+00			
PERM [MJ]	1,29E+01	0,00E+00	-1,29E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00			
PERT [MJ]	5,42E+01	5,99E-01	5,65E-01	5,04E+00	5,49E+01	1,28E-01	3,58E-02	1,17E+00	8,16E-02	-8,05E+00			
PENRE [MJ]	2,89E+02	8,67E+00	8,71E+00	3,86E+01	3,80E+02	1,86E+00	9,49E+00	5,98E+00	5,44E-01	-1,06E+02			
PENRM [MJ]	6,31E+00	0,00E+00	-2,57E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-3,75E+00	0,00E+00	0,00E+00			
PENRT [MJ]	2,96E+02	8,67E+00	6,14E+00	3,86E+01	3,80E+02	1,86E+00	9,49E+00	2,23E+00	5,44E-01	-1,06E+02			
SM [kg]	2,18E+00	0,00E+00	0,00E+00	8,71E-02	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]	1,68E-01	6,92E-04	4,62E-03	1,48E-02	8,31E-02	1,48E-04	5,40E-05	2,67E-03	1,38E-04	-5,44E-02			

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

ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES AND OUTPUT FLOWS

EN 15804	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			USE STAGE			END-OF-LIFE STAGE			NET BENEFITS
	IMPACT CATEGORY	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	D		
HWD [kg]	9,89E-07	4,59E-11	1,82E-10	1,44E-07	2,72E-08	9,84E-12	3,13E-11	1,95E-10	2,79E-11	2,58E-09			
NHWD [kg]	1,76E+00	1,41E-03	4,39E-02	1,51E-01	8,07E-02	3,03E-04	8,89E-04	6,80E-02	2,78E+00	-7,61E-01			
RWD [kg]	9,43E-03	1,61E-05	1,39E-04	2,05E-03	6,31E-02	3,45E-06	1,04E-05	3,25E-04	6,05E-06	-1,12E-03			
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]	0,00E+00	0,00E+00	0,00E+00	3,40E-01	0,00E+00	0,00E+00	0,00E+00	5,86E+00	0,00E+00	0,00E+00			
MER [kg]	0,00E+00	0,00E+00	0,00E+00	4,01E-02	0,00E+00	0,00E+00	0,00E+00	1,69E-01	0,00E+00	0,00E+00			
EEE [MJ]	0,00E+00	0,00E+00	2,21E+00	2,76E-01	0,00E+00	0,00E+00	0,00E+00	9,70E-01	0,00E+00	0,00E+00			
EET [MJ]	0,00E+00	0,00E+00	3,99E+00	5,45E-01	0,00E+00	0,00E+00	0,00E+00	1,86E+00	0,00E+00	0,00E+00			

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; EEE = Exported electrical energy; EET = Exported thermal energy

BIOGENIC CARBON CONTENT OF PRODUCT AND PACKAGING

IMPACT CATEGORY	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			USE STAGE			END-OF-LIFE STAGE			NET BENEFITS
	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	D			
BIOG. C IN PACKAGING [KG]	3,58E-01	0,00E+00	0,00E+00	1,41E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	
BIOG. C IN PRODUCT [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	0,00E+00	0,00E+00	

ADDITIONAL GWP INDICATOR ACCORDING TO PCR FOR CONSTRUCTION PRODUCTS

IMPACT CATEGORY	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			USE STAGE			END-OF-LIFE STAGE			NET BENEFITS
	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	D			
IPCC AR5 GWP100, EXCL BIOGENIC CARBON [KG CO2 EQ.]	2,35E+01	6,49E-01	5,66E-01	2,79E+00	1,79E+01	1,38E-01	6,64E-01	6,38E-01	4,13E-02	-1,10E+01			

Caption: Biog. C in packaging = Biogenic carbon content in packaging; Biog. C in product = Biogenic carbon content in product

And Figure 2 show the graphic results FOR GWP INDICATOR

● GWP (kg CO2 eq.)

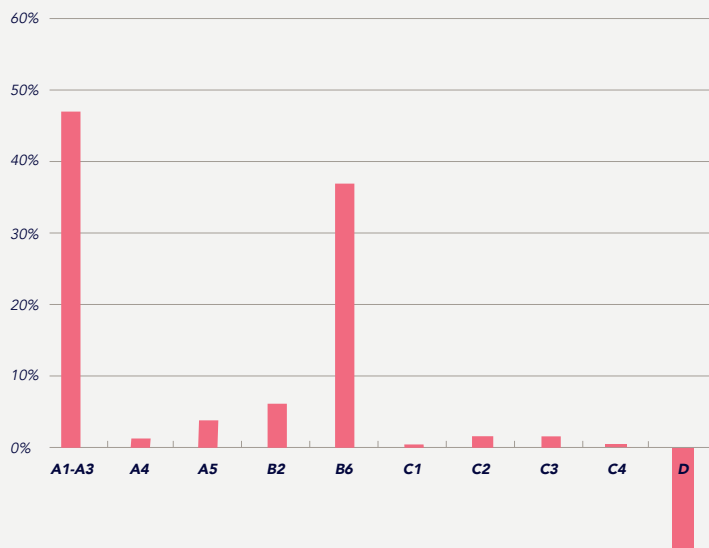


Figure 2.
GWPtotal results for the Gen2 Life lift per tkm

ADDITIONAL INFORMATION

Substances and emissions

During the development phase as well as for the industrialization, there is a high focus on the limited use of chemicals. Our engineers are referring to REACH, RoHS regulations to avoid substances which impact the environment and the human health (i.e. Methylene Chloride (Dichloromethane) use is eliminated at OTIS facilities).

Furthermore, the Gen2 Life emit no VOCs or other harmful substances once installed. The car panels are tested for VOC emissions according to the requirements of the French legislation (order of April 2011) concerning the labelling of construction products or coverings of walls or floors and paint and varnishes on their emissions of volatile pollutants.

Sampling, testing and evaluation are performed according to ISO 16000 (Part 11, 9 and 3) in its latest versions. Our suppliers are delivering the testing reports justifying products VOC emission class

* Statement on level of emission of volatile substances in indoor air posing a toxic threat during inhaling - on a scale from A+ (very low-emission) to C (high-emission).

Picture 3. Class A+ label on car panel



French VOC label
Since January 1st 2012, construction products, decoration and furnishing products to be traded in France for the first time, are emission wise to be classified and labelled with the new French label. This is stated in the decree of the Ministry of Ecology, Sustainable Development, Transport and Housing.



SCENARIOS

The following scenarios have been considered in this EPD.
The EN 15804:2012+A2:2019 standard requires to present this information.

TRANSPORT TO BUILDING SITE

SCENARIO INFORMATION	UNIT (PER FU)
FUEL TYPE AND CONSUMPTION OF VEHICLE OR VEHICLE TYPE USED FOR TRANSPORT E.G. LONG DISTANCE TRUCK, BOAT ETC	Fuel type: diesel 0,02l/FU/100km
DISTANCE	1.000 km
CAPACITY UTILISATION (INCLUDING EMPTY RETURNS)	85%
BULK DENSITY OF TRANSPORTED PRODUCTS	Non applicable
VOLUME CAPACITY UTILISATION COEFFICIENT	Non applicable

Transportation of the installation team is included in module A5. The following distance is considered : 600km





INSTALLATION OF THE PRODUCT IN THE BUILDING

SCENARIO INFORMATION	UNIT (PER FU)
ANCILLARY MATERIALS FOR INSTALLATION (SPECIFIED BY MATERIAL)	0,00069 kg of glue /FU 0,0052 kg of cleaning agent /FU
WATER USE	Non applicable
OTHER RESOURCE USE	Non applicable
QUANTITATIVE DESCRIPTION OF ENERGY TYPE (REGIONAL MIX AND CONSUMPTION DURING THE INSTALLATION PROCESS)	0,248 MJ of electricity /FU
WASTE MATERIALS ON THE BUILDING SITE BEFORE WASTE PROCESSING, GENERATED BY THE PRODUCT'S INSTALLATION (SPECIFIED BY TYPE)	Packaging materials treatment (thermal treatment): 0,125kg carboards/FU 0,741kg pallets/FU 0,059kg plastics/FU
OUTPUT MATERIALS (SPECIFIED BY TYPE) AS RESULT OF WASTE PROCESSING AT THE BUILDING SITE E.G. OF COLLECTION FOR RECYCLING, FOR ENERGY RECOVERY, DISPOSAL (SPECIFIED BY ROUTE)	Non applicable
DIRECT EMISSIONS TO AMBIENT AIR, SOIL AND WATER	Non applicable

USE STAGE RELATED TO THE BUILDING FABRIC

SCENARIO INFORMATION	UNIT (PER FU)
MAINTENANCE PROCESS	Various parts are replaced within the planned maintenance of the lifts. Transportation of the maintenance team is included in module B2. The following distance is considered : 600km
MAINTENANCE CYCLE	Some parts are replaced every 5 years, 10 years or 20 years.
ANCILLARY MATERIALS FOR MAINTENANCE, E.G. CLEANING AGENT, SPECIFY MATERIALS	0,392 kg metals parts/FU/ RSL 0,040 kg plastic parts/FU/ RSL 0,024 kg electronic parts/FU/ RSL 0,0328 kg cardboard /FU/ RSL For replacement part transportation (module B2), a distance of 1.000 km by truck has been assumed for all materials.
WASTE MATERIAL RESULTING FROM MAINTENANCE (SPECIFY MATERIALS)	0,456kg of replaced parts/ FU/ RSL
NET FRESH WATER CONSUMPTION DURING MAINTENANCE	Non applicable
ENERGY INPUT DURING MAINTENANCE, E.G. VACUUM CLEANING, ENERGY CARRIER TYPE, E.G. ELECTRICITY, AND AMOUNT, IF APPLICABLE AND RELEVANT	3,59 MJ of electricity /FU / RSL



SYSTAINABLE LIFE CYCLE OF THE ELEVATOR

As essential mobility enabler the elevator plays a critical role in our society. The table below showcases the running supply of energy and water according to the EPD's requirements.

USE OF ENERGY AND USE OF WATER

SCENARIO INFORMATION	UNIT (PER FU)
ANCILLARY MATERIALS SPECIFIED BY MATERIAL	Non applicable
NET FRESH WATER CONSUMPTION	Non applicable
TYPE OF ENERGY CARRIER (E.G. ELECTRICITY, NATURAL GAS, DISTRICT HEATING)	156 MJ of electricity / FU/ RSL European grid mix considered
POWER OUTPUT OF EQUIPMENT (IDLE MODE)	0,0567 kW
CHARACTERISTIC PERFORMANCE, E.G. ENERGY EFFICIENCY, EMISSIONS, VARIATION OF PERFORMANCE WITH CAPACITY UTILISATION ETC	Assumptions according to ISO 25745
FURTHER ASSUMPTIONS FOR SCENARIO DEVELOPMENT, E.G. FREQUENCY AND PERIOD OF USE, NUMBER OF OCCUPANTS	Assumptions according to ISO 25745

After running throughout many years and being maintained over decades the elevator might be dismantled and substituted with a new elevator or modernization product. Below's table showcases the consequences.


END-OF-LIFE

SCENARIO INFORMATION	UNIT (PER FU)
COLLECTION PROCESS SPECIFIED BY TYPE	9 kg collected separately/ FU
RECOVERY SYSTEM SPECIFIED BY TYPE	5,87kg for recycling (metals) / FU 0,36 kg for energy recovery (plastics) / FU
DISPOSAL SPECIFIED BY TYPE	2,78 kg material for final deposition / FU
ASSUMPTIONS FOR SCENARIO DEVELOPMENT (E.G. TRANSPORTATION)	500 km assumed for transportation to end of life



PROGRAMME-RELATED INFORMATION AND VERIFICATION

See PCR for detailed requirements.

Programme	The International EPD® System EPD International AB Box 210 60, SE-100 31 Stockholm, Sweden www.environdec.com
EPD registration number	S-P-01061
Published	2018-04-05
Valid until	2028-06-23
Revision number	3.0
Product Category Rules	EN15804 :2012 + A2:2019 as Core PCR; PCR 2019 :14 Construction Products, version 1.1; C-PCR-008 Lifts (to PCR 2019:14), version 2020-10-30
Product group classification	Lifts
Reference year for data	2022
Geographical scope	Europe
Product category rules (PCR)	PCR 2019:14 Construction Products, version 1.1; C-PCR-008 Lifts (to PCR 2019:14), version 2020-10-30
Product Classification	UN CPC 4354. 2015:05. Version 1.0
PCR review was conducted by	The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members.
Review chair	Claudia A. Peña, University of Concepción, Chile. <i>The review panel may be contacted via the Secretariat www.environdec.com/contact.</i>
Independent verification of the declaration and data, according to ISO 14025:2006	<input type="checkbox"/> EPD Process Certification (internal) <input checked="" type="checkbox"/> EPD Verification (external)
Third party verifier	Yannick Le Guern - ELYS Conseil S.A.S.U
Accredited by	The International EPD® System Technical Committee, supported by the Secretariat
CONTACT INFORMATION:	
EPD owner	OTIS Elevator Company New Equipment Center Avenue des Montoires / 45504, Cedex, Gien, France www.otis.com
LCA author	sphera Hauptstraße 111-113, 70771 Leinfelden-Echterdingen, Germany www.sphera.com
Programme operator	EPD International AB info@environdec.com 

EPDs of construction products may not be comparable if they do not comply with EN 15804+A2:2019.

Comparability between EPDs based on this c-PCR-008 (to PCR 2019:14) and EPDs based on PCR 2015:05 is not conceivable and shall be avoided. Any comparability of this kind shall be considered as false and misleading the EPD user.



RECYCLING AND WASTE TREATMENT DECLARATION

The modules considered for the end-of-life scenario includes waste processing (C3) and disposal (C4).

The main materials used in the Gen2 Life are metals (mainly steel) and inert materials (mainly concrete).

Due to this composition, there is a high potential of recyclability at the lift's end-of life for approximately **70%** of the components. Steel and non-ferrous metals as well as the electronic equipment - contributing approximately to **70%** of the lift's composition - can all be recycled.

For the inert materials fraction (approx. **30%**) landfilling is assumed in this EPD as a realistic and conservative approach.

Incineration is considered for the minor proportion (2%) of combustible materials (e.g., plastic parts).

For any of these waste treatment plants European average technologies are considered.

The Gen2 Life is made possible as halogen free thanks to the use of specific cables and wiring.

Hazardous substances are avoided during the design stage, to be in accordance with EU REACH (candidate list) and ROHS requirements. Upon request Otis can provide the information about substances identified by the European Chemical Agency as candidates for Annex XIV of REACH, in a concentration above 0.1% weight by weight in articles



Renovate Europe

OTIS Elevator supports the European Union program Renovate Europe as part of the European effort to renovate buildings which represents the biggest potential of energy savings.



GLOSSARY

ENVIRONMENTAL PRODUCT DECLARATION (EPD)

An EPD is a type III declaration, complying with ISO14025, which provides results about a product's environmental performance and facilitates comparison between different products with the same function (Functional Unit and Lift's characteristics). The results are based on the Life Cycle Analysis done in accordance with ISO 14040.

FUNCTIONAL UNIT (FU)

The quantified performance of a product system for use, as a reference unit. For Lifts the FU corresponds to the transportation of 1 tonne of load over a distance of 1 kilometer, expressed in [tkm]

ISO 25745

ISO 25745-2:2015 specifies a method of estimating energy consumption based on measured values, calculation, or simulation on an annual basis for traction, hydraulic and positive drive lifts on a single-unit basis, and an energy classification system for new, existing, and modernized traction,

hydraulic, and positive drive lifts on a single-unit basis.

LIFE CYCLE ASSESSMENT (LCA)

LCA is a method that quantifies the total environment impact of products or activities over their entire life cycle and life cycle thinking. Life cycle assessment is based on ISO 14040 and ISO 14044 standards and comprises four phases: goal and scope definition, inventory data collection and analysis, environmental impact assessment, and interpretation of results. The results of LCA are used in communication and product development purposes, for example.

LIFE CYCLE INVENTORY (LCI)

The phase of life cycle assessment involving the compilation and quantification of inputs and outputs for a product system throughout its life cycle.

LIFE CYCLE IMPACT ASSESSMENT (LCIA)

The phase of life cycle assessment aimed at understanding and evaluating the

magnitude and significance of the potential environmental impacts of a product system throughout the life cycle of the product.

PRODUCT CATEGORY RULES (PCR)

Product Category Rules (PCR) defines the rules and requirements for EPDs of a certain product category. They are a key part of ISO 14025 as they enable transparency and comparability between EPDs.

FOREST STEWARDSHIP COUNCIL (FSC)

International not-for-profit, multi-stakeholder organization established in 1993 to promote responsible management of the world's forests

PROGRAM FOR THE ENDORSEMENT OF FOREST CERTIFICATION (PEFC)

International, non-profit, non-governmental organization which promotes sustainable forest management through independent third-party certification

REACH

Registration, Evaluation, Authorisation and

restriction of Chemicals – European Union Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 that addresses the production and use of chemical substances, and their potential impacts on both human health and the environment.

ROHS

Restriction of Hazardous Substances Directive - RoHS 1 Directive 2002/95/EC and RoHS 2 Directive 2011/65/EU.

WEEE

Waste Electrical and Electronic Equipment Directive - European Community Directive 2012/19/EU

UC

Usage Category: Defines the intensity of the lift usage by categories, based on average number of trips per day according to ISO 25745-2.

ISO Certified

OTIS sustainable development and environment strategy, leading to more and more energy efficient lifts, incorporates also the production. All our manufacturing plants and facilities in Europe have taken their commitment to continuously improve their environmental performance. They are all certified **ISO14001** Environmental Management, in its latest version considering the Life Cycle approach; the design for sustainability is now part of our **ISO 140001** certificate. The **ISO 9001** Quality Management and more importantly the **ISO 50001** Energy management Systems certifications are also part of these greatest achievements contributing to our continuous improvement strategy.

The standard specifies the requirements for establishing, implementing, maintaining and improving an energy management system, whose purpose is to enable an organization to follow a systematic approach in achieving continual improvement of energy performance, including energy efficiency, energy security, energy use and consumption. It establishes for OTIS a more systematic and sustainable approach to continually reduce energy within the facilities, and therefore the costs and the Greenhouse gases (GHG) emissions into the atmosphere.

In the case of Madrid factory the entire manufacturing roof area, some **12,500 square metres is covered in solar panels** which contributes more than 50% towards the energy consumed in the factory every day.

Picture 2. Madrid Factory, Spain Solar panels



REFERENCES

General Programme Instructions of the International EPD® System. Version 2.5.

EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

PCR 2019:14
Construction Products

C-PCR-008 (TO PCR 2019:14)
Lifts (Elevators)

ISO 14025:2006: Sustainability of construction works – Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

ISO (2006) ISO 14040:
Environmental management – Life cycle assessment – Principles and framework.

ISO (2006) ISO 14044:
Environmental management – Life cycle assessment – Requirements and guidelines.

ISO (2012) ISO 25745-1:
Energy performance of lifts, escalators, and moving walks – Part 1: Energy measurement and verification.

ISO 25745-2:2015:
Energy performance of lifts, escalators, and moving walks – Part 2: Energy calculation and classification for lifts (lifts).

ISO 16000-9:2006:
Indoor air quality and VOC emission testing - Determination of the emission of volatile organic compounds from building products and furnishing – Emission test chamber method.

ISO 16000-3:2011:
Indoor air quality and VOC emission testing - Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air - Active sampling method.

ISO 16000-11:2006: Indoor air quality and VOC emission testing - Determination of the emission of volatile organic compounds from building products and furnishing - Sampling, storage of samples and preparation of test specimens.

ISO 14001:2015:
Environmental management systems - Requirements with guidance for use.

ISO 9001:2015: Quality management systems – Requirements.

OHSAS 18001:2007:
Occupational Health and Safety management systems - Requirements.

ISO 50001:2018:
Energy management systems - Requirements with guidance for use.

Otis gives people freedom to connect and thrive in a taller, faster, smarter world. The global leader in the manufacture, installation and servicing of elevators and escalators, we move 2 billion people a day and maintain approximately 2.2 million customer units worldwide – the industry's largest Service portfolio. You'll find us in the world's most iconic structures, as well as residential and commercial buildings, transportation hubs and everywhere people are on the move. Headquartered in Connecticut, USA, Otis is 69,000 people strong, including 41,000 field professionals, all committed to meeting the diverse needs of our customers and passengers in more than 200 countries and territories.

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