Declaration Owner

Karndean Designflooring
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Product

Luxury Vinyl Flooring:

- Art Select
- Van Gogh*
- Opus**
- Knight Tile
- (North America only) K-Trade Gluedown 12mil
- (North America only) K-Trade Gluedown 20mil

*(In Australasia) For Capitol LVP please refer to Van Gogh.

**(In the UK) For Opus Enhance, Heritage/Solid Colours please refer to Opus.

EPD represents delivery of product to customers in North America, the United Kingdom and Australasia
(UNSPSC Class Code 30161700/CSI Code 09 65 00)

Functional Unit

The functional unit is one square meter of installed floor covering for use over a 1-year period.

EPD Number and Period of Validity

SCS-EPD-10607
EPD Valid February 23, 2026, through February 22, 2031

Product Category Rule

The International EPD System, 2025-06-05, PCR 2019:14 CONSTRUCTION PRODUCTS, PCR 2019:14, VERSION 2.0.1, VALID UNTIL: 2030-04-07.
The International EPD System, C-PCR-004 (TO PCR 2019:14), RESILIENT, TEXTILE AND LAMINATE FLOOR COVERINGS (EN 16810:2017), VERSION 1.0.0, DATE 2025-04-08, Valid until: 2030-04-08.

CEN standard EN 15804 serves as the core Product Category Rules (PCR)

Program Operator

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Declaration Owner:	Karndean Designflooring
Address:	Crab Apple Way, Vale Park, Evesham, Worcestershire, WR11 1GP, United Kingdom
Declaration Number:	SCS-EPD-10607
Declaration Validity Period:	February 23, 2026 through February 22, 2031
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Gerard Mansell, Ph.D., SCS Consulting Services
LCA Software and LCI database:	OpenLCA v2.4 software and the Ecoinvent v3.11 database
Product RSL:	1 year
Markets of Applicability:	North America, the United Kingdom and Australasia
EPD Type:	Product-Specific
EPD Scope:	Cradle-to-Grave and Module D
LCIA Method and Version:	EN15804 (EF3.1)
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☐ internal ☒ external
LCA Reviewer:	Lindita Bushi, PhD, Athena Sustainable Materials Institute
Part A Product Category Rule:	The International EPD System, 2025-06-05, PCR 2019:14 CONSTRUCTION PRODUCTS, PCR 2019:14, VERSION 2.0.1, VALID UNTIL: 2030-04-07
Part A PCR Review conducted by:	The Technical Committee of the International EPD® System. Review chair: Rob Rouwette (chair), Noa Meron (co-chair)
Part B Product Category Rule:	The International EPD System, C-PCR-004 (TO PCR 2019:14), RESILIENT, TEXTILE AND LAMINATE FLOOR COVERINGS (EN 16810:2017), VERSION 1.0.0, DATE 2025-04-08, Valid until: 2030-04-08.
Part B PCR Review conducted by:	The Technical Committee of the International EPD® System. Review chair: Rob Rouwette (chair), Noa Meron (co-chair)
Independent verification of the declaration and data, according to ISO 14025 and the PCR	☐ internal ☒ external
EPD Verifier:	Lindita Bushi, PhD, Athena Sustainable Materials Institute
Declaration Contents:	

Disclaimers: *This EPD conforms to ISO 14025, 14040, 14044, and EN 15804.*

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: *EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.*

The owner of the declaration shall be liable for the underlying information and evidence; SCS shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence supplied or made available to SCS.

1. Karndean Designflooring

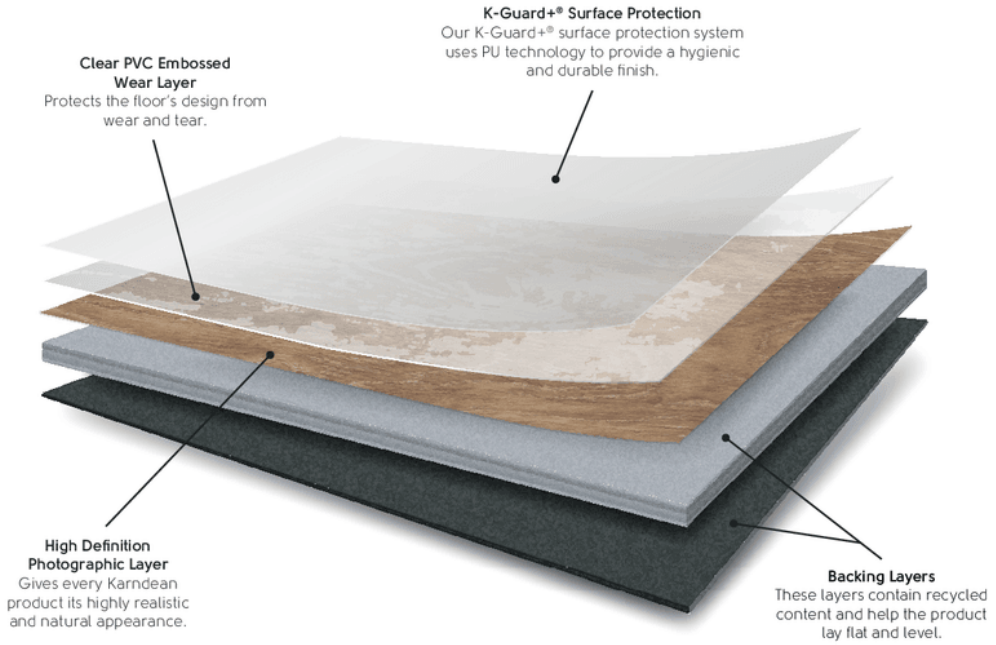
Karndean Designflooring is a global leader in flooring design with operations in the UK, North America and Australasia. By offering a wide range of colours, textures and finishes, our products allow you to create looks that are unique to your home or business and are guaranteed to last. With a passion for creating floors which are both stylish and practical, we're here to help customers find the right floor for their space, needs and unique style.

At Karndean, we see flooring differently. From the ancient forests of Europe, to the remote Australian outback and beyond, we seek out expressive and intriguing forms in the natural world to influence our unique floor designs. By combining these original features with cutting edge design, we create simply beautiful floors that you'll love for a lifetime.

2. Product

2.1 PRODUCT DESCRIPTION

Karndean Designflooring's Luxury Vinyl Tile (LVT) ranges are suitable for both commercial and residential interiors. The products covered in this environmental product declaration are available in a wide variety of designs, formats and sizes, including both tiles and planks. These products are structured into a number of layers, as shown in the diagram below. Post-industrial recycled material is included in the stability and backing layers of the product.



2.2 PRODUCT FLOW DIAGRAM

A flow diagram illustrating the production processes and life cycle phases included in the scope of the EPD is provided below.

2.3 APPLICATION

The LVT products provide the primary function of flooring for interior applications. The flooring products are used in various residential and commercial applications including retail, healthcare, education, and hospitality.

2.4 DECLARATION OF METHODOLOGICAL FRAMEWORK

The scope of the EPD is cradle-to-grave and Module D, including raw material extraction and processing, transportation, product manufacture, product delivery, installation and use, and product disposal. Cut-off and allocation procedures are described below and conform to the PCR and ISO standards.

The life cycle phases included in the product system boundary are shown below

Table 1. *Life cycle phases included in the product system boundary.*

	Product			Construction Process		Use							End-of-life				Benefits and loads beyond the system boundary
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
Modules Declared	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Geography	GLO	GLO	CN VN TW KR	GLO	NA GB AU	n/a	NA GB AU	n/a	n/a	n/a	n/a	n/a	NA GB AU	NA GB AU	NA GB AU	NA GB AU	NA GB AU
Share of specific data	>90%			>90%		-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-			-		-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	-			-		-	-	-	-	-	-	-	-	-	-	-	-

X = Included in system boundary; MND = Module not declared; n/a = Not applicable

GLO = Global; NA = North America; CN = China; VN = Vietnam; GB = Great Britian; AU = Australasia; TW = Taiwan; KR = South Korea

2.5 TECHNICAL DATA

Technical specifications for the LVT flooring product are summarized in Table 2 through Table 7.

Table 2. *Product specifications for the* **Art Select** *luxury vinyl flooring product.*

Product Characteristics			Nominal value	Unit	Minimum value	Maximum value
Product thickness			3.0 (0.118)	mm (inch)	2.90 (0.114)	3.13 (0.123)
Wear layer thickness			0.70 (0.028)	mm (inch)	0.63 (0.025)	0.79 (0.031)
Product weight			5,015 (16.43)	g/m^2 (oz/ft^2)	4,514 (14.79)	5,667 (18.57)
VOC emissions test method			FloorScore®; Indoor Air Comfort Gold			
Sustainable certifications			ISO 14001; CE			
Product form	Tiles	width	Various	mm (inch)	Various	Various
		length	Various	mm (inch)	Various	Various

Table 3. *Product specifications for the* **Van Gogh** *luxury vinyl flooring product.*

Product Characteristics			Nominal value	Unit	Minimum value	Maximum value
Product thickness			3.0 (0.118)	mm (inch)	2.90 (0.114)	3.13 (0.123)
Wear layer thickness			0.55 (0.022)	mm (inch)	0.50 (0.020)	0.62 (0.024)
Product weight			5,187 (17.00)	g/m^2 (oz/ft2)	4,668 (15.30)	5,862 (19.21
VOC emissions test method			FloorScore®; Indoor Air Comfort Gold			
Sustainable certifications			ISO 14001; CE			
Product form	Tiles	width	Various	mm (inch)	Various	Various
		length	Various	mm (inch)	Various	Various

Table 4. *Product specifications for the* **Opus** *luxury vinyl flooring product.*

Product Characteristics			Nominal value	Unit	Minimum value	Maximum value
Product thickness			2.50 (0.098)	mm (inch)	2.40 (0.094)	2.63 (0.104)
Wear layer thickness			0.55 (0.022)	mm (inch)	0.50 (0.020)	0.62 (0.024)
Product weight			4,398 (14.41)	g/m^2 (oz/ft^2)	3,958 (12.97)	4,970 (16.29)
VOC emissions test method			FloorScore®; Indoor Air Comfort Gold			
Sustainable certifications			ISO 14001; CE			
Product form	Tiles	width	Various	mm (inch)	Various	Various
		length	Various	mm (inch)	Various	Various

Table 5. *Product specifications for the* **Knight Tile** *luxury vinyl flooring product.*

Product Characteristics			Nominal value	Unit	Minimum value	Maximum value
Product thickness			2.0 (0.079)	mm (inch)	1.90 (0.075)	2.13 (0.084)
Wear layer thickness			0.30 (0.012)	mm (inch)	0.27 (0.011)	0.33 (0.013)
Product weight			3,605 (11.81)	g/m^2 (oz/ft^2)	3,245 (10.63)	4,074 (13.35)
VOC emissions test method			FloorScore®; Indoor Air Comfort Gold			
Sustainable certifications			ISO 14001; CE			
Product form	Tiles	width	Various	mm (inch)	Various	Various
		length	Various	mm (inch)	Various	Various

Table 6 *Product specifications for the* **K-Trade Gluedown 20mil** *luxury vinyl flooring product.*

Product Characteristics			Nominal value	Unit	Minimum value	Maximum value
Product thickness			2.50 (0.098)	mm (inch)	2.40 (0.094)	2.63 (0.104)
Wear layer thickness			0.55 (0.022)	mm (inch)	0.50 (0.020)	0.62 (0.024)
Product weight			4,398 (14.41)	g/m^2 (oz/ft2)	3,958 (12.97)	4,970 (16.29)
VOC emissions test method			FloorScore®; Indoor Air Comfort Gold			
Sustainable certifications			ISO 14001; CE			
Product form	Planks	width	177.8 (7.0)	mm (inch)	177.6 (6.99)	178.0 (7.01)
		length	1,219.2 (48.0)	mm (inch)	1,218.7 (47.98)	1,219.7 (48.02)

Table 7. *Product specifications for the* **K-Trade Gluedown 12mil** *luxury vinyl flooring product.*

Product Characteristics			Nominal value	Unit	Minimum value	Maximum value
Product thickness			2.0 (0.079)	mm (inch)	1.90 (0.075)	2.13 (0.084)
Wear layer thickness			0.30 (0.012)	mm (inch)	0.27 (0.011)	0.33 (0.013)
Product weight			3,605 (11.81)	g/m^2 (oz/ft^2)	3,245 (10.63)	4,074 (13.35)
VOC emissions test method			FloorScore®; Indoor Air Comfort Gold			
Sustainable certifications			ISO 14001; CE			
Product form	Planks	width	177.8 (7.0)	mm (inch)	177.6 (6.99)	178.0 (7.01)
		length	1,219.2 (48.0)	mm (inch)	1,218.7 (47.98)	1,219.7 (48.02)

2.6 MARKET PLACEMENT/APPLICATION RULES

Technical specifications of the flooring products are summarized below. Detailed product performance results can be found on the manufacturer's website www.karndean.com/technicaldatasheets.

- ASTM F1700 - 18a: Standard Specification for Solid Vinyl Floor Tile
- EN ISO 10582:2018 - Resilient floor coverings — Heterogeneous polyvinyl chloride floor covering — Specifications
- EN ISO 10874:2012 - Resilient, Laminate and Textile Floor coverings. Classification
- European standard EN 14041:2004 - Resilient, Textile and Laminate Floor coverings;
- Essential Characteristics EU Construction Products Regulation 305/2011
- EN 13501-1:2018 - Fire classification of construction products and building elements. Classification using test data from reaction to fire tests - Bfl-S1

2.7 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

The luxury vinyl flooring products are delivered for installation in the form of tiles and planks of various dimensions.

2.8 MATERIAL COMPOSITION

The primary materials include polyvinyl chloride (PVC), plasticizers, fillers and various stabilizers, pigments and coatings. While the products are available with various colors, the impact of different pigments on the estimated impact indicators is expected to be less than ±10%. Note that the *Art Select* and *Knight Tile* flooring products are produced at multiple manufacturing facilities with slightly different composition. Impact assessment results for these products are presented as a production-weighted average across the facilities.

Table 8. *Material component summary for the flooring products by mass in kg/m² and as a percentage of total mass. All values in the table have been rounded; masses to three significant figures, percentages to two significant figures.*

Component	Renewable	Recycled Content (%)	Art Select Taiwan (F2)	Art Select China (F16)	Art Select Vietnam (F19)	Opus Taiwan (F2)	Opus China (F16)
PVC	No	0%	1.671	1.671	2.03	1.41	1.41
			33%	33%	39%	32%	32%
Filler	No	0%	2.75	2.75	2.64	2.46	2.46
			55%	55%	50%	56%	56%
Plasticizer	No	0%	0.553	0.553	0.588	0.498	0.498
			11%	11%	11%	11%	11%
Stabilizer	No	0%	$3.00x10^{-2}$	$3.00x10^{-2}$	$1.74x10^{-2}$	$2.20x10^{-2}$	$2.20x10^{-2}$
			0.6%	0.6%	0.33%	0.5%	0.5%
Pigment/Coatings/Adhesives	No	0%	$1.10x10^{-2}$	$1.10x10^{-2}$	$2.45x10^{-3}$	$1.00x10^{-2}$	$1.00x10^{-2}$
			0.22%	0.22%	0.046%	0.23%	0.23%
Total Product			**5.02**	**5.02**	**5.27**	**4.40**	**4.40**
			100%	**100%**	**100%**	**100%**	**100%**

Table 9. *Material component summary for the Karndean products by mass in kg/m² and as a percentage of total mass. All values in the table have been rounded; masses to three significant figures, percentages to two significant figures.*

Component	Renewable	Recycled Content (%)	Van Gogh China (F16)	Van Gogh Vietnam (F19)	K-Trade Gluedown 20mil Korea (F4)	K-Trade Gluedown 12mil Korea (F4)
PVC	No	0%	1.60	1.63	1.53	1.09
			31%	30%	34%	29%
Filler	No	0%	3.02	3.24	2.50	2.31
			58%	60%	55%	61%
Plasticizer	No	0%	0.522	0.511	0.414	0.307
			10%	9.5%	9.2%	8.1%
Stabilizer	No	0%	$3.00x10^{-2}$	$1.74x10^{-2}$	$1.56x10^{-2}$	$1.76x10^{-2}$
			0.58%	0.32%	0.34%	0.47%
Pigment/Coatings/Adhesives	No	0%	$1.20x10^{-2}$	$2.98x10^{-3}$	$6.10x10^{-2}$	$5.16x10^{-2}$
			0.23%	0.055%	1.3%	1.4%
Total Product			**5.19**	**5.40**	**4.52**	**3.78**
			100%	**100%**	**100%**	**100%**

Table 10. *Material component summary for the Karndean products by mass in kg/m² and as a percentage of total mass. All values in the table have been rounded; masses to three significant figures, percentages to two significant figures.*

Component	Renewable	Recycled Content (%)	Knight Tile Taiwan (F2)	Knight Tile China (F16)	Knight Tile China (F17)	Knight Tile China (F18)	Knight Tile Vietnam (F19)
PVC	No	0%	1.11	1.11	0.855	1.14	1.14
			31%	31%	29%	32%	32%
Filler	No	0%	2.09	2.09	1.48	2.09	2.09
			58%	58%	49%	59%	59%
Plasticizer	No	0%	0.384	0.384	0.165	0.323	0.323
			11%	11%	5.5%	9%	9%
Stabilizer	No	0%	$1.60x10^{-2}$	$1.60x10^{-2}$	$5.70x10^{-2}$	$1.38x10^{-2}$	$1.38x10^{-2}$
			0.44%	0.44%	1.9%	0.39%	0.39%
Pigment/Coatings/Adhesives	No	0%	$8.00x10^{-3}$	$8.00x10^{-3}$	$4.10x10^{-2}$	$1.76x10^{-3}$	$1.76x10^{-3}$
			0.22%	0.22%	1.4%	0.049%	0.049%
Total Product			**3.61**	**3.61**	**3.00**	**3.57**	**3.57**
			100%	**100%**	**100%**	**100%**	**100%**

In conformance with the PCR, product materials were reviewed for the presence of any toxic or hazardous chemicals. Based on a review of the product components provided by the manufacturer, no regulated chemicals, i.e., substances of Very High Concern (SVHC) or substances on the REACH Candidate List, were identified in the product or product components.

2.9 MANUFACTURING

Karndean's luxury vinyl tile flooring is produced at their manufacturing facilities in Asia. The luxury vinyl flooring is made primarily from polyvinyl chloride (PVC), calcium carbonate (mineral reinforcement), plasticizers and additives (i.e., pigments and stabilizers). The products are structured with multiple layers including PVC backing layers, a high definition photographic layer, a PVC wear layer and a polyurethane (PU) protective layer.

The production of luxury vinyl tile flooring involves the following general manufacturing processes. The raw materials are first mixed and heated. The mixture is then calendared into a sheet to create the backing or the transparent wear layers. The sheets are cut and laminated with a print film. The semi-finished product is coated with lacquer and annealed. Finally, the product is cut into tiles or planks and packaged. Quality checks are made at each step of the production process.

The manufacturer provided primary data for their annual production, resource use and electricity consumption and waste generation at the facilities. Electricity consumption is modeled using Ecoinvent datasets for the regional electricity grid resource mix on the market. Additionally, no green power sources or CO_2 certificates are included in the study.

The manufacturer provided material-specific scrap rates which are accounted for within the raw material extraction and processing and upstream transport phases of the assessment. Manufacturing scrap is re-ground and used as material input to the product.

2.10 PACKAGING

The products are packaged for shipment using cardboard cartons, plastic wrap and wooden pallets.

Table 11. *Material content for the luxury vinyl flooring product packaging in kg per square meter. All values in the table have been rounded; masses to 3 significant figures, percentages to 2 significant figures.*

Component	Renewable	Recycled Content (%)	Art Select	Art Select	Art Select	Opus	Opus
			Taiwan (F2)	China (F16)	Vietnam (F19)	Taiwan (F2)	China (F16)
Corrugate/Paper	Yes	0%	0.114	0.105	8.00×10^{-2}	0.102	9.80×10^{-2}
			31%	30%	44%	38%	42%
Plastic	No	0%	7.00×10^{-3}	7.00×10^{-3}	1.80×10^{-3}	7.00×10^{-3}	7.00×10^{-3}
			1.9%	2%	0.99%	2.6%	3%
Wood	Yes	0%	0.250	0.240	0.100	0.160	0.128
			67%	68%	55%	59%	55%
Total Packaging			**0.371**	**0.352**	**0.182**	**0.269**	**0.233**
			100%	**100%**	**100%**	**100%**	**100%**

Table 12. *Material content for the luxury vinyl flooring product packaging in kg per square meter. All values in the table have been rounded; masses to 3 significant figures, percentages to 2 significant figures.*

Component	Renewable	Recycled Content (%)	Van Gogh	Van Gogh	K-Trade Gluedown 20mil	K-Trade Gluedown 12mil
			China (F16)	Vietnam (F19)	Korea (F4)	Korea (F4)
Corrugate/Paper	Yes	0%	0.105	8.00×10^{-2}	3.57×10^{-2}	2.01×10^{-2}
			23%	44%	63%	54%
Plastic	No	0%	7.00×10^{-3}	1.80×10^{-3}	2.14×10^{-3}	1.75×10^{-3}
			1.5%	0.99%	3.8%	4.7%
Wood	Yes	0%	0.350	0.100	1.89×10^{-2}	1.55×10^{-2}
			76%	55%	33%	41%
Total Packaging			**0.462**	**0.182**	**5.68×10^{-2}**	**3.74×10^{-2}**
			100%	**100%**	**100%**	**100%**

Table 13. *Material content for the luxury vinyl flooring product packaging in kg per square meter. All values in the table have been rounded; masses to 3 significant figures, percentages to 2 significant figures.*

Component	Renewable	Recycled Content (%)	Knight Tile Taiwan (F2)	Knight Tile China (F16)	Knight Tile China (F17)	Knight Tile China (F18)	Knight Tile Vietnam (F19)
Corrugate/Paper	Yes	0%	$8.60x10^{-2}$	$9.80x10^{-2}$	0.319	$8.00x10^{-2}$	$8.00x10^{-2}$
			37%	47%	87%	44%	44%
Plastic	No	0%	$7.00x10^{-3}$	$7.00x10^{-3}$	$8.00x10^{-3}$	$1.80x10^{-3}$	$1.80x10^{-3}$
			3%	3.4%	2.2%	0.99%	0.99%
Wood	Yes	0%	0.140	0.102	$3.80x10^{-2}$	0.100	0.100
			60%	49%	10%	55%	55%
Total Packaging			**0.233**	**0.207**	**0.365**	**0.182**	**0.182**
			100%	**100%**	**100%**	**100%**	**100%**

2.11 PRODUCT INSTALLATION

Installation of the product is accomplished using hand tools with negligible impacts. Approximately 4% installation waste is assumed. The impacts associated with packaging disposal, as well as the production, transport and disposal of installation waste are included with the installation phase as per PCR requirements.

2.12 USE CONDITIONS

No special conditions of use are noted.

2.13 REFERENCE SERVICE LIFE

The Reference Service Life (RSL) of the flooring product is one year based on PCR requirements.

2.14 RE-USE PHASE

The flooring products are not reused at end-of-life.

2.15 DISPOSAL

At end-of-life, the products may be disposed of in a landfill or via incineration. Although in some instances, flooring can be recycled into other products, the practice is not typical, nor widely available as a disposal route for the products in the consumer markets considered. It is assumed that products are 100% landfilled and no components of the product are recycled at end-of-life.

2.16 FURTHER INFORMATION

Further information on the product can be found on the manufacturer's website www.karndean.com.

3. LCA: Calculation Rules

3.1 FUNCTIONAL UNIT

The functional unit used in the study, as specified in the PCR, is 1 m^2 of installed floor covering for use over a 1-year period. The corresponding reference flow for the product system is defined as the mass, in kg, of 1 m^2 of flooring product, excluding packaging and is presented in Table 14. For the present assessment, a reference service lifetime (RSL) is 1-year in conformance with the PCR.

Table 14. *Reference flows for the luxury vinyl flooring products.*

Product - Manufacturing facility	Reference Flow (kg/m^2)	Reference Service Lifetime (yr)	Representative thickness (mm)
Art Select – Taiwan (F2)	5.02	1	3.0
Art Select – China F16)	5.02	1	3.0
Art Select – Vietnam (F19)	5.27	1	3.0
Opus – Taiwan (F2)	4.40	1	2.5
Opus – China F16)	4.40	1	2.5
Van Gogh – China F16)	5.19	1	3.0
Van Gogh – Vietnam (F19)	5.40	1	3.0
Knight Tile – Taiwan (F2)	3.61	1	2.0
Knight Tile – China F16)	3.61	1	2.0
Knight Tile – China (F17)	3.00	1	2.0
Knight Tile - China (F18)	3.57	1	2.0
Knight Tile – Vietnam (F19)	3.57	1	2.0
K-Trade Gluedown 20mil – Korea (F4)	4.52	1	2.5
K-Trade Gluedown 12mil – Korea (F4)	3.78	1	2.0

3.2 SYSTEM BOUNDARY

The scope of the EPD is cradle-to-grave and Module D, including raw material extraction and processing, transportation, product manufacture, product delivery, installation and use, and product disposal. The life cycle phases included in the EPD scope are described in Table 6 and illustrated in Figure 1.

Consistent with PCR requirements, processes excluded from the system boundary include the following:

- Construction activities, capital equipment, and infrastructure
- Maintenance and operation of capital equipment
- Personnel travel and resource use

The deletion of these processes is permitted since it is not expected to significantly change the overall conclusions of the study.

The life cycle phases included in the EPD scope are described in Table 15 and illustrated in Figure 1.

Table 15. *The modules and unit processes included in the scope for the flooring product system.*

Module	Module Description	Unit Processes Included in Scope
A1	Extraction and processing of raw materials; any reuse of products or materials from previous product systems; processing of secondary materials; generation of electricity from primary energy resources; energy, or other recovery processes from secondary fuels	Extraction and processing of raw materials for the product components.
A2	Transport (to the manufacturer)	Transport of component materials to the manufacturing facilities
A3	Manufacturing, including ancillary material production	Manufacturing of the flooring products and packaging (including upstream unit processes*)
A4	Transport (to the building site)	Transport of product (including packaging) to the building site
A5	Construction-installation process	Impacts from the installation of the product are assumed negligible. Impacts from the production, transport and disposal of waste material associated with installation are included in this phase in addition to impacts from packaging disposal
B1	Product use	Not applicable
B2	Product maintenance	Maintenance of products over the product the 1-year RSL, including periodic cleaning.
B3	Product repair	Not applicable
B4	Product replacement	Not applicable
B5	Product refurbishment	Not applicable
B6	Operational energy use by technical building systems	Not applicable
B7	Operational water uses by technical building systems	Not applicable
C1	Deconstruction, demolition	Demolition of the product is accomplished using hand tools with no associated emissions and negligible impacts
C2	Transport (to waste processing)	Transport of the product to waste treatment at end-of-life
C3	Waste processing for reuse, recovery and/or recycling	The products are disposed of by landfilling which requires no waste processing
C4	Disposal	Disposal of the product
D	Reuse-recovery-recycling potential	There are no significant impacts associated with Module D as no recycled materials are used in the products. In addition, no product components are recycled at end-of-life.

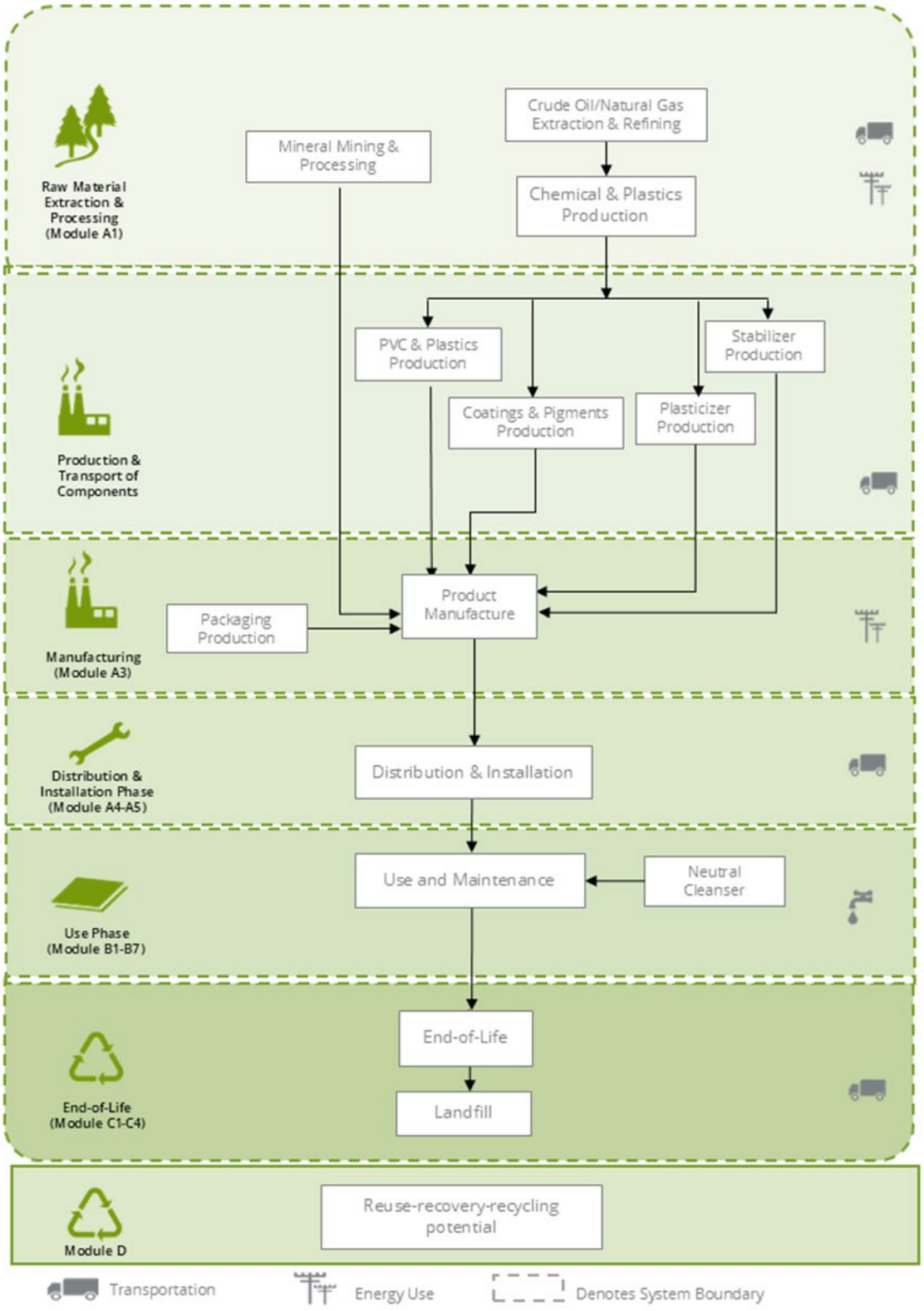


Figure 1. *Flow Diagram for the life cycle of the luxury vinyl flooring products.*

3.3 PRODUCT SPECIFIC CALCULATION FOR USE PHASE

The recommended cleaning regime is highly dependent on the use of the premises where the floor covering is installed. In high traffic areas more frequent cleaning will be needed compared to areas where there is low traffic. For the purposes of this EPD, average maintenance (moderate traffic levels) is presented based on typical installations.

3.4 UNITS

All data and results are presented using SI units.

3.5 ESTIMATES AND ASSUMPTIONS

The Karndean Designflooring manufacturing facilities are located in Asia. Regional Ecoinvent inventory datasets for the appropriate energy grid mix were used to model resource use and emissions from electricity use at the manufacturing facilities.

- Resource use at the manufacturing facilities was allocated to the products based on the product area as a fraction of the total production.
- The Reference Service Life (RSL) of the products was modeled based on PCR requirements.
- Downstream transport was modeled based on information provided by the manufacturer representing distribution to consumer markets in the United Kingdom, North America, Europe and Australasia.
- The maintenance phase of the product life cycle was modeled based on information provided by the manufacturer including recommended installation and cleaning methods, as well as cleaning frequency.
- For the product end-of-life, disposal of product and product packaging is modeled based on the PCR guidance regarding recycling rates of product and packaging materials.
- For final disposal of the packaging materials at end-of-life, all materials are assumed to be transported 80 km by diesel truck to either a landfill or material reclamation facility (for recycling). Datasets representing disposal in a landfill and waste incineration are from Ecoinvent.
- For final disposal of the flooring products at end-of-life, all materials are assumed to be transported 80 km by diesel truck to a landfill. Datasets representing disposal in a landfill are from Ecoinvent.

The PCR requires the results for several inventory flows related to construction products to be reported including energy and resource use and waste and outflows. These are aggregated inventory flows, and do not characterize any potential impact; results should be interpreted taking into account this limitation.

3.6 CUT-OFF RULES

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results. No known flows are deliberately excluded from this EPD.

3.7 DATA SOURCES

Primary data were provided by Karndean Designflooring for their manufacturing facilities. The sources of secondary LCI data are the Ecoinvent database.

Table 16. *Data sources for the luxury vinyl flooring products.*

Component	Dataset	Data Source	Publication Date
PRODUCT			
PVC			
Polyvinyl Chloride	market for polyvinyl chloride, unspecified polymerisation, weighted average | polyvinyl chloride, unspecified polymerisation, weighted average | EN15804GD, S/RoW	EI v3.11	2024
Filler			
Calcium Carbonate	limestone production, crushed, washed | limestone, crushed, washed | EN15804GD, S/RoW	EI v3.11	2024
Plasticizer			
PVC Plasticizer	dioctyl terephthalate production | dioctyl terephthalate | EN15804GD, S/GLO	EI v3.11	2024
Stabilizer			
Stabilizer	Ca-Zn stabilizer;	EI v3.11	2024
	chemical production, organic | chemical, organic | EN15804GD, S/GLO	EI v3.11	2024
	chemical production, inorganic | chemical, inorganic | EN15804GD, S/GLO	EI v3.11	2024
	limestone production, crushed, washed | limestone, crushed, washed | EN15804GD, S/RoW	EI v3.11	2024
	zinc oxide production | zinc oxide | EN15804GD, S/RoW	EI v3.11	2024
Pigment			
Titanium dioxide	market for titanium dioxide | titanium dioxide | EN15804GD, S/RoW	EI v3.11	2024
Carbon black	carbon black production | carbon black | EN15804GD, S/GLO	EI v3.11	2024
Other			
Organic chemica	chemical production, organic | chemical, organic | EN15804GD, S/GLO	EI v3.11	2024
Adhesive	polyurethane adhesive production | polyurethane adhesive | EN15804GD, S/GLO	EI v3.11	2024
Epoxy	epoxy resin production, liquid | epoxy resin, liquid | EN15804GD, S/RoW	EI v3.11	2024
Glass fiber	glass fibre production | glass fibre | EN15804GD, S/RoW	EI v3.11	2024
PE	polyethylene production, low density, granulate | polyethylene, low density, granulate | EN15804GD, S/RoW	EI v3.11	2024
PACKAGING			
Paper/Cardboard	containerboard production, linerboard, kraftliner | containerboard, linerboard | EN15804GD, S/RoW	EI v3.11	2024
	folding boxboard carton production | folding boxboard carton | EN15804GD, S/RoW	EI v3.11	2024
	kraft paper production | kraft paper | EN15804GD, S/RoW	EI v3.11	2024
Plastic	packaging film production, low density polyethylene | packaging film, low density polyethylene | EN15804GD, S/RoW polyethylene production, low density, granulate | polyethylene, low density, granulate | EN15804GD, S/RoW	EI v3.11	2024
	polyethylene terephthalate production, granulate, amorphous | polyethylene terephthalate, granulate, amorphous | EN15804GD, S/RoW	EI v3.11	2024
Wood	EUR-flat pallet production | EUR-flat pallet | EN15804GD, S/RoW	EI v3.11	2024
	plywood production | plywood | EN15804GD, S/RoW	EI v3.11	2024
	medium density fibreboard production, uncoated | medium density fibreboard | EN15804GD, S/RoW	EI v3.11	2024
TRANSPORT			
Road transport	transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 | transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 | EN15804GD, S/RoW	EI v3.11	2024
Rail transport	transport, freight, train, diesel | transport, freight, train, fleet average | EN15804GD, S/RoW	EI v3.11	2024
Ship transport	transport, freight, sea, container ship, heavy fuel oil | transport, freight, sea, container ship, heavy fuel oil | EN15804GD, S/GLO	EI v3.11	2024
MAINTENACE			

Component	Dataset	Data Source	Publication Date
Neutral cleaner	ethoxylated alcohol (AE7) production, petrochemical | ethoxylated alcohol (AE7) | EN15804GD, S/RoW	EI v3.11	2024
	fatty acid production, from palm oil | fatty acid | EN15804GD, S/RoW	EI v3.11	2024
	market group for tap water | tap water | EN15804GD, S/GLO	EI v3.11	2024
Electricity	market group for electricity, low voltage | electricity, low voltage | EN15804GD, S/RNA	EI v3.11	2024
	market for electricity, low voltage | electricity, low voltage | EN15804GD, S/GB	EI v3.11	2024
	market for electricity, low voltage | electricity, low voltage | EN15804GD, S/AU	EI v3.11	2024
Water	tap water production, conventional treatment | tap water | EN15804GD, S/RoW	EI v3.11	2024
WASTE DESPOSAL			
Landfill	treatment of municipal solid waste, sanitary landfill | municipal solid waste | EN15804GD, S/RoW	EI v3.11	2024
	treatment of waste polyethylene, sanitary landfill | waste polyethylene | EN15804GD, S/RoW	EI v3.11	2024
	treatment of waste polyvinylchloride, sanitary landfill | waste polyvinylchloride | EN15804GD, S/RoW	EI v3.11	2024
	treatment of waste paperboard, sanitary landfill | waste paperboard | EN15804GD, S/RoW	EI v3.11	2024
	treatment of inert waste, inert material landfill | inert waste, for final disposal | EN15804GD, S/RoW	EI v3.11	2024
	diesel, burned in building machine | diesel, burned in building machine | EN15804GD, S/GLO	EI v3.11	2024
Incineration	treatment of municipal solid waste, municipal incineration | municipal solid waste | EN15804GD, S/RoW	EI v3.11	2024
	treatment of waste polyethylene, municipal incineration | waste polyethylene | EN15804GD, S/GLO	EI v3.11	2024
	treatment of waste paperboard, municipal incineration | waste paperboard | EN15804GD, S/GLO	EI v3.11	2024
Wastewater	treatment of wastewater, average, wastewater treatment | wastewater, average | EN15804GD, S/RoW	EI v3.11	2024
RESOURCES			
Grid electricity	market for electricity, medium voltage | electricity, medium voltage | EN15804GD, S/VN[1]	EI v3.11	2024
	market for electricity, medium voltage | electricity, medium voltage | EN15804GD, S/TW[2]	EI v3.11	2024
	market for electricity, medium voltage | electricity, medium voltage | EN15804GD, S/KR[3]	EI v3.11	2024
	market group for electricity, medium voltage | electricity, medium voltage | EN15804GD, S/CN[4]	EI v3.11	2024
Heat – nat. gas	market group for heat, district or industrial, natural gas | heat, district or industrial, natural gas | EN15804GD, S/GLO	EI v3.11	2024
Heat – diesel	diesel, burned in building machine | diesel, burned in building machine | EN15804GD, S/GLO		
Heat – gasoline	petrol, unleaded, burned in machinery | petrol, unleaded, burned in machinery | EN15804GD, S/GLO	EI v3.11	2024
Heat - steam	market for heat, from steam, in chemical industry | heat, from steam, in chemical industry | EN15804GD, S/RoW		

[1] The Vietnamese electricity resource mix consists of approximately 49% coal, 38% hydropower, 12% natural gas and 2% wind as represented in the Ecoinvent v3.11 database. The GWP-GHG (AR6) impact of the Vietnamese grid electricity is ~0.6310 kg CO_2e/kWh.
[2] The Taiwanese electricity resource mix consists of approximately 44% coal, 11% nuclear, 37% natural gas, 2% oil and 6% renewable resources (wind, biomass, hydropower) as represented in the Ecoinvent v3.11 database. The GWP-GHG (AR6) impact of the Taiwanese grid electricity is ~0.7740 kg CO_2e/kWh.
[3] The South Korean electricity resource mix consists of approximately 34% coal, 28% nuclear, 34% natural gas and 4% renewable resources (wind, biomass, hydropower) as represented in the Ecoinvent v3.11 database. The GWP-GHG (AR6) impact of the South Korean grid electricity is ~0.6929 kg CO_2e/kWh.
[4] The Chinese electricity resource mix consists of approximately 61% coal, 11% nuclear, 10% natural gas, 10% imports and 8% renewable resources (wind, hydropower) as represented in the Ecoinvent v3.11 database. The GWP-GHG (AR6) impact of the Chinese grid electricity is ~0.8505 kg CO_2e/kWh.

3.8 DATA QUALITY

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 17. *Data quality assessment for the flooring product system.*

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 5 years old. All of the 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 annual production for 2024.
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 Asia. Surrogate data used in the assessment are representative of global or European operations. Data representative of European operations are considered sufficiently similar to actual processes. Data representing product disposal are based on regional 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 fabrication datasets, specific to the type of material, 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. Data collected for operations were 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 flooring 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 5% of the total environmental impact for each indicator are excluded.
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 v3.11 data where available. Different portions of the product life cycle are equally considered.
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 the manufacturing facility represents an annual average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. For secondary LCI data, Ecoinvent v3.11 LCI data are used.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the products and packaging is low. Actual supplier data for upstream operations were 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.

3.9 PERIOD UNDER REVIEW

The period of review is calendar year 2024.

3.10 ALLOCATION

Resource use at the manufacturing facilities (e.g., water and energy) was allocated to the products based on the product area as a fraction of the total facility production volume (i.e., area-based allocation). Area-based allocation was deemed most appropriate for the flooring products as total facility production was available as total square meters of product. Electricity use at the manufacturing facilities was modeled using Ecoinvent inventory datasets for the country-specific electrical grid.

Material-specific scrap rates associated with product manufacture were provided and accounted for within the raw material extraction and processing and upstream transport phases of the assessment.

Impacts from transportation, including product distribution to point of sale, were attributed to the products based on the mass of material and distance transported.

3.11 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.

4. LCA: Scenarios and Additional Technical Information

Delivery and Installation stage (A4 - A5)

Distribution of the flooring products to the point of sale is included, based on data from the manufacturer. Average transport distances for distribution of the products from the manufacturing facilities to distribution centers in North America, the United Kingdom and Australasia were estimated based on information provided by the manufacturer. Transport by diesel truck from the distribution centers to the point of installation is also included. Transportation parameters for modeling product distribution are summarized in Table 18.

Table 18. *Product distribution parameters by transport mode.*

Parameter	Unit	Value
Road transport		
Fuel type	-	Diesel
Liters of fuel	L/100km	18.7
Vehicle type	-	Diesel truck
Capacity utilization	%	76
Ocean transport		
Fuel type	-	Fuel oil
Liters of fuel	g/tkm	2.52
Vehicle type	-	Ocean freighter
Capacity utilization	%	70

Product Name/Consumer Market	Gross mass transported (kg)[1]	Transport Distance (km)	
		Road	Ship
Art Select - Distributed to Australasia	5.40	800.00	7,815
Art Select - Distributed to the United Kingdom	5.40	400.00	25,490
Art Select - Distributed to North America	5.40	800.00	12,068
Knight Tile - Distributed to Australasia	3.78	800.00	8,672
Knight Tile - Distributed to the United Kingdom	3.64	400.00	26,830
Knight Tile - Distributed to North America	3.79	800.00	12,637
K-Trade Gluedown 12mil - Distributed to North America	3.82	800.00	9,800
K-Trade Gluedown 20mil - Distributed to North America	4.58	800.00	9,800
Opus - Distributed to Australasia	4.65	800.00	8,870
Opus - Distributed to the United Kingdom	4.65	400.00	26,505
Opus - Distributed to North America	4.67	800.00	11,610
Van Gogh - Distributed to Australasia	5.65	800.00	8,672
Van Gogh - Distributed to North America	5.58	800.00	13,664
Van Gogh - Distributed to the United Kingdom	5.61	400.00	25,145

[1] Including packaging

Installation of the product and periodic cleaning are included in the life cycle Use phase. The manufacturer provided installation and maintenance guidelines detailing the recommended installation methods, as well as maintenance and cleaning guidance. For the current assessment, the impacts associated with the product installation are assumed negligible. Approximately 4% of the product mass is assumed lost as waste during product installation which is landfilled. The VOC emissions associated with the installation, use and maintenance of the products are negligible.

Impacts associated with the disposal of packaging materials are also included in the installation life cycle phase. Assumed recycling rates for packaging component materials are based on the PCR requirements and are summarized in Table 19.

Table 19. *Recycling rates for packaging materials at end-of-life.*

Material	North America	United Kingdom	Australasia
Packaging			
Paper & Pulp	68.0%	82.3%	60.0%
Plastics	9.0%	41.0%	12.0%
Wood	0%	31.1%	31.1%
Disposal of Non-recyclables			
Landfill	80.0%	55.0%	80.0%
Incineration	20.0%	45.0%	20.0%

Table 20 through Table 22 summarize the relevant parameters for the product installation phase including biogenic carbon emissions and removals, and wastes associated with product packaging.

Table 20. *Installation parameters for the flooring products, per 1 m^2.*

Parameter		Art Select	Art Select	Art Select	Opus	Opus
		Taiwan (F2)	China (F16)	Vietnam (F19)	Taiwan (F2)	China (F16)
Ancillary materials – adhesive (kg)		0.00	0.00	0.00	0.00	0.00
Net freshwater consumption (m^3)		0.00	0.00	0.00	0.00	0.00
Electricity consumption (kWh)		0.00	0.00	0.00	0.00	0.00
Product loss per functional unit (kg)		0.201	0.201	0.211	0.176	0.176
Waste materials generated by product installation (kg)		0.572	0.553	0.393	0.445	0.409
Output materials resulting from on-site waste processing (kg)		n/a	n/a	n/a	n/a	n/a
Mass of packaging waste (kg)	Plastic	$7.00x10^{-3}$	$7.00x10^{-3}$	$1.80x10^{-3}$	$7.00x10^{-3}$	$7.00x10^{-3}$
	Corrugate	0.114	0.105	$8.00x10^{-2}$	0.102	$9.80x10^{-2}$
	Wood	0.250	0.240	0.100	0.160	0.128
Biogenic carbon contained in packaging (kg CO_2)[1]		0.667	0.633	0.330	0.480	0.414
Direct emissions (kg)		0.00	0.00	0.00	0.00	0.00

[1] Biogenic carbon contained in packaging calculated assuming the carbon content of corrugate is 50% by weight

Table 21. *Installation parameters for the flooring products, per 1 m^2.*

Parameter		Van Gogh	Van Gogh	K-Trade Gluedown 20mil	K-Trade Gluedown 12mil
		China (F16)	Vietnam (F19)	Korea (F4)	Korea (F4)
Ancillary materials – adhesive (kg)		0.00	0.00	0.00	0.00
Net freshwater consumption (m^3)		0.00	0.00	0.00	0.00
Electricity consumption (kWh)		0.00	0.00	0.00	0.00
Product loss per functional unit (kg)		0.207	0.216	0.181	0.151
Waste materials generated by product installation (kg)		0.669	0.398	0.238	0.189
Output materials resulting from on-site waste processing (kg)		n/a	n/a	n/a	n/a
Mass of packaging waste (kg)	Plastic	$7.00x10^{-3}$	$1.80x10^{-3}$	$2.14x10^{-3}$	$1.75x10^{-3}$
	Corrugate	0.105	$8.00x10^{-2}$	$3.57x10^{-2}$	$2.01x10^{-2}$
	Wood	0.350	0.100	$1.89x10^{-2}$	$1.55x10^{-2}$
Biogenic carbon contained in packaging (kg CO_2)[1]		0.834	0.330	0.100	$6.53x10^{-2}$
Direct emissions (kg)		0.00	0.00	0.00	0.00

[1] Biogenic carbon contained in packaging calculated assuming the carbon content of corrugate is 50% by weight

Table 22. *Installation parameters for the flooring products, per 1 m^2.*

Parameter		Knight Tile Taiwan (F2)	Knight Tile China (F16)	Knight Tile China (F17)	Knight Tile China (F18)	Knight Tile Vietnam (F19)
Ancillary materials – adhesive (kg)		0.00	0.00	0.00	0.00	0.00
Net freshwater consumption (m^3)		0.00	0.00	0.00	0.00	0.00
Electricity consumption (kWh)		0.00	0.00	0.00	0.00	0.00
Product loss per functional unit (kg)		0.144	0.144	0.120	0.143	0.143
Waste materials generated by product installation (kg)		0.377	0.351	0.479	0.324	0.324
Output materials resulting from on-site waste processing (kg)		n/a	n/a	n/a	n/a	n/a
Mass of packaging waste (kg)	Plastic	$7.00x10^{-3}$	$7.00x10^{-3}$	$2.00x10^{-3}$	$1.80x10^{-3}$	$1.80x10^{-3}$
	Corrugate	$8.60x10^{-2}$	$9.80x10^{-2}$	0.319	$8.00x10^{-2}$	$8.00x10^{-2}$
	Wood	0.140	0.102	$3.80x10^{-2}$	0.100	0.100
Biogenic carbon contained in packaging (kg CO_2)[1]		0.414	0.367	0.655	0.330	0.330
Direct emissions (kg)		0.00	0.00	0.00	0.00	0.00

[1] Biogenic carbon contained in packaging calculated assuming the carbon content of corrugate is 50% by weight

Use stage (B1)

No impacts are associated with the use of the product over the Reference Service Lifetime.

Maintenance stage (B2)

According to the manufacturer, typical maintenance involves regular sweeping and damp mopping, as well as periodic machine cleaning of the vinyl flooring. The present assessment is based on a recommended weekly cleaning schedule including sweeping and mopping with a neutral cleaner and monthly machine cleaning. The parameters used to model the product maintenance are summarized in Table 23.

Table 23. *Maintenance parameters for the flooring products, per 1 m^2.*

Parameter	Unit	Value
Maintenance cycle	Cycles / ESL	52
Maintenance cycle	Cycles / RSL	52
Maintenance process	-	Damp mopping
Net freshwater consumption	$m^3/m^2/yr$	0.0058
Cleaning agent	$kg/m^2/yr$	0.119
Maintenance process	-	Vacuuming
Electricity	$kWh/m^2/yr$	0.022
Further assumptions	-	Moderate traffic; weekly maintenance

Disposal stage (C1 - C4)

The disposal stage includes removal of the products (C1); transport of the flooring products to waste treatment facilities (C2); waste processing (C3); and associated emissions as the product degrades in a landfill or is burned in an incinerator (C4). For the flooring products, no emissions are generated during demolition (C1) while no waste processing (C3) is required for incineration or landfill disposal. Stage C4 also includes the use of 1.6 kWh diesel/tonne of landfilled material to account for the burden of compacting of waste (including backfilling).

At end-of-life, the product is assumed to be disposed of in a landfill. Transportation for end-of-life scenarios was modeled assuming a distance of 80 km from the point of product use to a landfill, material recovery center, or waste incinerator. Ecoinvent datasets are used to model the impacts associated with incineration and landfilling, which does not include energy recovery from landfill gas. The end-of-life disposal parameters are summarized in Table 24.

Table 24. *End-of-life disposal scenario parameters for the flooring product, per 1 m^2.*

Product	Scenario assumptions	Collection process		Recovery	Disposal			Removals of biogenic carbon[1]
		Collected separately	Collected with mixed construction		Recycling	Landfill	Incineration	
Art Select - Taiwan (F2)	Landfill	-	5.02	n/a	0	5.02	0	n/a
Art Select - China (F16)	Landfill	-	5.02	n/a	0	5.02	0	n/a
Art Select - China (F19)	Landfill	-	5.27	n/a	0	5.27	0	n/a
Opus - Taiwan (F2)	Landfill	-	4.40	n/a	0	4.40	0	n/a
Opus - China (F16)	Landfill	-	4.40	n/a	0	4.40	0	n/a
Van Gogh - China (F16)	Landfill	-	5.19	n/a	0	5.19	0	n/a
Van Gogh - Vietnam (F19)	Landfill	-	5.40	n/a	0	5.40	0	n/a
Knight Tile - Taiwan (F2)	Landfill	-	3.61	n/a	0	3.61	0	n/a
Knight Tile - China (F16)	Landfill	-	3.61	n/a	0	3.61	0	n/a
Knight Tile - China (F17)	Landfill	-	3.00	n/a	0	3.00	0	n/a
Knight Tile - China (F18)	Landfill	-	3.57	n/a	0	3.57	0	n/a
Knight Tile - Vietnam (F19)	Landfill	-	3.57	n/a	0	3.57	0	n/a
K-Trade Gluedown 20mil - Korea (F4)	Landfill	-	4.52	n/a	0	4.52	0	n/a
K-Trade Gluedown 12mil - Korea (F4)	Landfill	-	3.78	n/a	0	3.78	0	n/a

5. LCA: Results

Results of the Life Cycle Assessment are presented below. It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. All LCA results are stated to three significant figures in agreement with the PCR for this flooring product and therefore the sum of the total values may not exactly equal 100%.

The impact indicators specified by the PCR include:

- Potential for Global Warming,
- Acidification Potential,
- Eutrophication Potential,
- Ozone Depletion Potential,
- Photochemical Ozone (smog) Creation Potential.
- Depletion of Abiotic Resources,
- Ecotoxicity,
- Human Toxicity, and
- Land Use/Land Occupation

Impact category indicators for acidification, eutrophication, ozone depletion potential and photochemical ozone creation are estimated using the characterization factors[1], as prescribed by the PCR, including from CML-IA and ReCiPe methodologies as well as those defined by EN 15804 reference package based on EF 3.1. Impact indicators for Ecotoxicity and Human Toxicity are estimated using the USEtox 2.02 characterization method, while Land Occupation impacts are estimated using the ReCiPe 2016 version 1.1 methodology. The impact category indicators included in the assessment are summarized below.

Note that the use of the results of modules A1-A3 without considering the results of module C is discouraged.

Modules B1, B3, B5, B6 and B7 are not associated with any impact and are therefore declared as zero. In addition, modules C1 and C3 are likewise not associated with any impact as the floor is manually deconstructed. Additionally, as luxury vinyl flooring products do not typically contain significant amounts of bio-based materials, biogenic carbon emissions and removals are not declared. Module D is not declared. In the interest of space and table readability, these modules are not included in the results presented below.

[1] https://www.environdec.com/resources/indicators

Table 25. *Key Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Art Select - Distributed to the United Kingdom)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	10.8	1.85	0.677	$4.65x10^{-2}$	$7.71x10^{-2}$	0.848
	%	76%	13%	4.7%	0.32%	0.54%	5.9%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	10.8	1.85	0.549	$5.47x10^{-2}$	$7.70x10^{-2}$	0.606
	%	77%	13%	3.9%	0.39%	0.55%	4.4%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	$1.52x10^{-2}$	$-7.26x10^{-5}$	0.128	$-3.28x10^{-2}$	$5.32x10^{-5}$	0.242
	%	4.3%	-0.021%	36%	-9.3%	0.015%	69%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$8.49x10^{-3}$	$9.56x10^{-4}$	$3.83x10^{-4}$	$2.46x10^{-2}$	$2.57x10^{-5}$	$6.11x10^{-5}$
	%	25%	2.8%	1.1%	71%	0.074%	0.18%
Global warming potential (GWP-GHG)	kg CO_2 eq.	11.1	1.85	0.579	$7.94x10^{-2}$	$7.70x10^{-2}$	0.607
	%	78%	13%	4%	0.56%	0.54%	4.2%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$6.67x10^{-6}$	$2.58x10^{-8}$	$2.69x10^{-7}$	$1.16x10^{-9}$	$1.69x10^{-9}$	$2.36x10^{-9}$
	%	96%	0.37%	3.9%	0.017%	0.024%	0.034%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$4.41x10^{-2}$	$4.34x10^{-2}$	$3.72x10^{-3}$	$3.30x10^{-4}$	$3.14x10^{-4}$	$4.93x10^{-4}$
	%	48%	47%	4%	0.36%	0.34%	0.53%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$3.72x10^{-4}$	$1.08x10^{-5}$	$1.54x10^{-5}$	$2.28x10^{-6}$	$5.68x10^{-7}$	$1.73x10^{-6}$
	%	92%	2.7%	3.8%	0.57%	0.14%	0.43%
Eutrophication potential - marine (EP-marine)	kg N eq.	$8.76x10^{-3}$	$1.10x10^{-2}$	$8.94x10^{-4}$	$2.05x10^{-4}$	$1.17x10^{-4}$	$1.66x10^{-4}$
	%	41%	52%	4.2%	0.97%	0.55%	0.79%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$9.43x10^{-2}$	0.122	$9.68x10^{-3}$	$9.23x10^{-4}$	$1.29x10^{-3}$	$1.69x10^{-3}$
	%	41%	53%	4.2%	0.4%	0.56%	0.74%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$4.35x10^{-2}$	$3.37x10^{-2}$	$3.49x10^{-3}$	$3.10x10^{-4}$	$4.66x10^{-4}$	$5.46x10^{-4}$
	%	53%	41%	4.3%	0.38%	0.57%	0.67%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	195	23.3	9.28	1.11	1.10	1.11
	%	84%	10%	4%	0.48%	0.47%	0.48%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$8.22x10^{-5}$	$2.90x10^{-6}$	$3.43x10^{-6}$	$5.33x10^{-7}$	$2.67x10^{-7}$	$4.85x10^{-7}$
	%	92%	3.2%	3.8%	0.59%	0.3%	0.54%
Water use (WDP)[1]	m^3 World eq.	3.51	$8.19x10^{-2}$	0.150	$4.22x10^{-2}$	$5.76x10^{-3}$	0.511
	%	82%	1.9%	3.5%	0.98%	0.13%	12%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 26. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits. (***Art Select - Distributed to the United Kingdom)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$4.49x10^{-7}$	$7.59x10^{-8}$	$2.61x10^{-8}$	$4.91x10^{-9}$	$6.31x10^{-9}$	$5.83x10^{-9}$
	%	79%	13%	4.6%	0.86%	1.1%	1%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.166	$4.83x10^{-3}$	$6.94x10^{-3}$	$3.18x10^{-3}$	$4.75x10^{-4}$	$1.09x10^{-3}$
	%	91%	2.6%	3.8%	1.7%	0.26%	0.6%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	65.6	2.32	2.80	0.674	0.146	24.9
	%	68%	2.4%	2.9%	0.7%	0.15%	26%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$9.25x10^{-9}$	$3.72x10^{-10}$	$3.90x10^{-10}$	$2.10x10^{-11}$	$1.32x10^{-11}$	$1.92x10^{-10}$
	%	90%	3.6%	3.8%	0.21%	0.13%	1.9%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$8.49x10^{-8}$	$7.93x10^{-9}$	$3.99x10^{-9}$	$5.80x10^{-10}$	$6.88x10^{-10}$	$3.86x10^{-9}$
	%	83%	7.8%	3.9%	0.57%	0.67%	3.8%
Potential Soil quality index (SQP)[1]	Dimensionless	74.2	4.80	3.33	1.26	0.650	1.16
	%	87%	5.6%	3.9%	1.5%	0.76%	1.4%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 27. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Art Select - Distributed to the United Kingdom)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	20.1	0.431	0.828	1.82	$3.58x10^{-2}$	0.130
	%	86%	1.8%	3.5%	7.8%	0.15%	0.56%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	10.9	0.00	0.438	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	31.0	0.431	1.27	1.82	$3.58x10^{-2}$	0.130
	%	89%	1.2%	3.6%	5.3%	0.1%	0.37%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	317	46.4	18.2	2.25	2.18	2.19
	%	82%	12%	4.7%	0.58%	0.56%	0.57%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	67.4	0.00	$1.33x10^{-2}$	0.00	0.00	0.00
	%	100%	0%	0.02%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	384	46.4	18.3	2.25	2.18	2.19
	%	84%	10%	4%	0.49%	0.48%	0.48%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$5.23x10^{-2}$	$1.48x10^{-3}$	$2.17x10^{-3}$	$2.12x10^{-3}$	$2.49x10^{-4}$	$4.34x10^{-4}$
	%	89%	2.5%	3.7%	3.6%	0.42%	0.74%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.228	$3.92x10^{-3}$	$8.65x10^{-3}$	$1.38x10^{-2}$	$2.66x10^{-4}$	$1.65x10^{-2}$
	%	84%	1.4%	3.2%	5.1%	0.098%	6.1%

Table 28. *Waste and outflows, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Art Select - Distributed to the United Kingdom)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.475	$2.87x10^{-2}$	$2.09x10^{-2}$	$5.62x10^{-3}$	$1.12x10^{-3}$	0.111
	%	74%	4.5%	3.3%	0.88%	0.17%	17%
Nonhazardous waste disposed (NHWD)	kg	10.6	0.190	0.998	0.115	$1.19x10^{-2}$	4.84
	%	63%	1.1%	6%	0.69%	0.071%	29%
Radioactive waste disposed (RWD)	kg	$1.06x10^{-4}$	$3.01x10^{-6}$	$4.41x10^{-6}$	$1.58x10^{-6}$	$3.23x10^{-7}$	$7.22x10^{-7}$
	%	91%	2.6%	3.8%	1.4%	0.28%	0.62%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	0.306	0.00	0.00	5.09
	%	0%	0%	5.7%	0%	0%	94%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$7.96x10^{-2}$	$2.57x10^{-3}$	$3.35x10^{-3}$	$4.63x10^{-3}$	$4.23x10^{-4}$	$7.86x10^{-4}$
	%	87%	2.8%	3.7%	5.1%	0.46%	0.86%
Exported thermal energy (EET)	MJ	$2.86x10^{-2}$	$1.38x10^{-3}$	$1.34x10^{-3}$	$5.81x10^{-4}$	$2.56x10^{-4}$	$1.32x10^{-3}$
	%	85%	4.1%	4%	1.7%	0.76%	3.9%

Table 29. *Key Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Knight Tile - Distributed to the United Kingdom)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	7.17	1.27	0.466	$4.65x10^{-2}$	$5.03x10^{-2}$	0.532
	%	75%	13%	4.9%	0.49%	0.53%	5.6%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	7.25	1.27	0.376	$5.47x10^{-2}$	$5.02x10^{-2}$	0.361
	%	77%	14%	4%	0.58%	0.54%	3.9%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	-0.132	$-5.51x10^{-5}$	$8.79x10^{-2}$	$-3.28x10^{-2}$	$3.47x10^{-5}$	0.172
	%	-140%	-0.058%	92%	-35%	0.036%	180%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$5.06x10^{-2}$	$6.60x10^{-4}$	$2.05x10^{-3}$	$2.46x10^{-2}$	$1.68x10^{-5}$	$3.55x10^{-5}$
	%	65%	0.85%	2.6%	32%	0.021%	0.046%
Global warming potential (GWP-GHG)	kg CO_2 eq.	7.48	1.27	0.411	$7.94x10^{-2}$	$5.03x10^{-2}$	0.361
	%	77%	13%	4.3%	0.82%	0.52%	3.7%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$3.47x10^{-6}$	$1.78x10^{-8}$	$1.40x10^{-7}$	$1.16x10^{-9}$	$1.10x10^{-9}$	$1.35x10^{-9}$
	%	96%	0.49%	3.9%	0.032%	0.03%	0.037%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$3.20x10^{-2}$	$3.02x10^{-2}$	$2.67x10^{-3}$	$3.30x10^{-4}$	$2.05x10^{-4}$	$2.96x10^{-4}$
	%	49%	46%	4.1%	0.5%	0.31%	0.45%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$2.51x10^{-4}$	$7.37x10^{-6}$	$1.04x10^{-5}$	$2.28x10^{-6}$	$3.71x10^{-7}$	$9.93x10^{-7}$
	%	92%	2.7%	3.8%	0.84%	0.14%	0.36%
Eutrophication potential - marine (EP-marine)	kg N eq.	$7.01x10^{-3}$	$7.63x10^{-3}$	$6.82x10^{-4}$	$2.05x10^{-4}$	$7.65x10^{-5}$	$1.02x10^{-4}$
	%	45%	49%	4.3%	1.3%	0.49%	0.65%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$7.27x10^{-2}$	$8.48x10^{-2}$	$7.15x10^{-3}$	$9.23x10^{-4}$	$8.40x10^{-4}$	$1.04x10^{-3}$
	%	43%	51%	4.3%	0.55%	0.5%	0.62%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$2.91x10^{-2}$	$2.34x10^{-2}$	$2.44x10^{-3}$	$3.10x10^{-4}$	$3.04x10^{-4}$	$3.33x10^{-4}$
	%	52%	42%	4.4%	0.56%	0.54%	0.6%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	121	16.1	5.94	1.11	0.717	0.657
	%	83%	11%	4.1%	0.76%	0.49%	0.45%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$4.52x10^{-5}$	$1.97x10^{-6}$	$1.91x10^{-6}$	$5.33x10^{-7}$	$1.75x10^{-7}$	$2.72x10^{-7}$
	%	90%	3.9%	3.8%	1.1%	0.35%	0.54%
Water use (WDP)[1]	m^3 World eq.	2.23	$5.60x10^{-2}$	$9.55x10^{-2}$	$4.22x10^{-2}$	$3.76x10^{-3}$	0.284
	%	82%	2.1%	3.5%	1.6%	0.14%	11%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 30. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Knight Tile - Distributed to the United Kingdom)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$4.11x10^{-7}$	$5.18x10^{-8}$	$2.28x10^{-8}$	$4.91x10^{-9}$	$4.12x10^{-9}$	$3.56x10^{-9}$
	%	82%	10%	4.6%	0.99%	0.83%	0.72%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.111	$3.31x10^{-3}$	$4.67x10^{-3}$	$3.18x10^{-3}$	$3.10x10^{-4}$	$6.13x10^{-4}$
	%	90%	2.7%	3.8%	2.6%	0.25%	0.5%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	46.7	1.58	2.05	0.674	$9.51x10^{-2}$	13.7
	%	72%	2.4%	3.2%	1%	0.15%	21%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$4.93x10^{-9}$	$2.57x10^{-10}$	$2.12x10^{-10}$	$2.10x10^{-11}$	$8.63x10^{-12}$	$1.18x10^{-10}$
	%	89%	4.6%	3.8%	0.38%	0.16%	2.1%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$5.64x10^{-8}$	$5.40x10^{-9}$	$2.71x10^{-9}$	$5.80x10^{-10}$	$4.49x10^{-10}$	$2.43x10^{-9}$
	%	83%	8%	4%	0.85%	0.66%	3.6%
Potential Soil quality index (SQP)[1]	Dimensionless	58.2	3.23	2.57	1.26	0.424	0.708
	%	88%	4.9%	3.9%	1.9%	0.64%	1.1%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 31. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*
(Knight Tile - Distributed to the United Kingdom)

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	16.9	0.295	0.695	1.82	$2.34x10^{-2}$	$7.28x10^{-2}$
	%	85%	1.5%	3.5%	9.2%	0.12%	0.37%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	9.08	0.00	0.363	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	26.0	0.295	1.06	1.82	$2.34x10^{-2}$	$7.28x10^{-2}$
	%	89%	1%	3.6%	6.2%	0.08%	0.25%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	208	31.9	11.7	2.25	1.42	1.30
	%	81%	12%	4.6%	0.88%	0.56%	0.51%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	31.9	0.00	$6.10x10^{-3}$	0.00	0.00	0.00
	%	100%	0%	0.019%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	240	31.9	11.7	2.25	1.42	1.30
	%	83%	11%	4.1%	0.78%	0.49%	0.45%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$3.01x10^{-2}$	$1.01x10^{-3}$	$1.26x10^{-3}$	$2.12x10^{-3}$	$1.63x10^{-4}$	$2.43x10^{-4}$
	%	86%	2.9%	3.6%	6.1%	0.47%	0.7%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.136	$2.68x10^{-3}$	$5.24x10^{-3}$	$1.38x10^{-2}$	$1.73x10^{-4}$	$9.22x10^{-3}$
	%	81%	1.6%	3.1%	8.2%	0.1%	5.5%

Table 32. *Waste and outflows, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Knight Tile - Distributed to the United Kingdom)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.378	$1.97x10^{-2}$	$1.65x10^{-2}$	$5.62x10^{-3}$	$7.30x10^{-4}$	$6.27x10^{-2}$
	%	78%	4.1%	3.4%	1.2%	0.15%	13%
Nonhazardous waste disposed (NHWD)	kg	6.78	0.130	0.587	0.115	$7.79x10^{-3}$	2.71
	%	66%	1.3%	5.7%	1.1%	0.075%	26%
Radioactive waste disposed (RWD)	kg	$7.67x10^{-5}$	$2.06x10^{-6}$	$3.20x10^{-6}$	$1.58x10^{-6}$	$2.11x10^{-7}$	$4.06x10^{-7}$
	%	91%	2.4%	3.8%	1.9%	0.25%	0.48%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	0.366	0.00	0.00	3.33
	%	0%	0%	9.9%	0%	0%	90%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$4.20x10^{-2}$	$1.76x10^{-3}$	$1.81x10^{-3}$	$4.63x10^{-3}$	$2.76x10^{-4}$	$4.39x10^{-4}$
	%	83%	3.4%	3.6%	9.1%	0.54%	0.86%
Exported thermal energy (EET)	MJ	$1.94x10^{-2}$	$9.32x10^{-4}$	$8.95x10^{-4}$	$5.81x10^{-4}$	$1.67x10^{-4}$	$7.25x10^{-4}$
	%	85%	4.1%	3.9%	2.6%	0.74%	3.2%

Table 33. *Key Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Opus - Distributed to the United Kingdom)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	9.46	1.17	0.692	$5.73x10^{-2}$	$6.65x10^{-2}$	0.113
	%	82%	10%	6%	0.5%	0.58%	0.98%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	9.31	1.17	0.456	$6.59x10^{-2}$	$6.65x10^{-2}$	0.113
	%	83%	10%	4.1%	0.59%	0.59%	1%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	0.143	$1.80x10^{-4}$	0.236	$-3.32x10^{-2}$	$4.59x10^{-5}$	$1.44x10^{-4}$
	%	41%	0.052%	68%	-9.6%	0.013%	0.042%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$7.30x10^{-3}$	$5.67x10^{-4}$	$3.19x10^{-4}$	$2.46x10^{-2}$	$2.22x10^{-5}$	$1.40x10^{-5}$
	%	22%	1.7%	0.97%	75%	0.067%	0.043%
Global warming potential (GWP-GHG)	kg CO_2 eq.	9.69	1.17	0.581	$9.07x10^{-2}$	$6.65x10^{-2}$	0.113
	%	83%	10%	5%	0.77%	0.57%	0.96%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$5.97x10^{-6}$	$1.61x10^{-8}$	$2.40x10^{-7}$	$1.01x10^{-9}$	$1.46x10^{-9}$	$9.51x10^{-10}$
	%	96%	0.26%	3.9%	0.016%	0.023%	0.015%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$3.55x10^{-2}$	$1.56x10^{-2}$	$2.24x10^{-3}$	$3.94x10^{-4}$	$2.71x10^{-4}$	$2.27x10^{-4}$
	%	65%	29%	4.1%	0.72%	0.5%	0.42%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$3.15x10^{-4}$	$1.09x10^{-5}$	$1.31x10^{-5}$	$5.30x10^{-6}$	$4.90x10^{-7}$	$3.02x10^{-7}$
	%	91%	3.1%	3.8%	1.5%	0.14%	0.088%
Eutrophication potential - marine (EP-marine)	kg N eq.	$7.35x10^{-3}$	$4.22x10^{-3}$	$6.30x10^{-4}$	$2.14x10^{-4}$	$1.01x10^{-4}$	$1.08x10^{-4}$
	%	58%	33%	5%	1.7%	0.8%	0.85%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$7.83x10^{-2}$	$4.68x10^{-2}$	$5.91x10^{-3}$	$1.02x10^{-3}$	$1.11x10^{-3}$	$9.78x10^{-4}$
	%	58%	35%	4.4%	0.76%	0.83%	0.73%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$3.71x10^{-2}$	$1.37x10^{-2}$	$2.42x10^{-3}$	$3.36x10^{-4}$	$4.02x10^{-4}$	$3.73x10^{-4}$
	%	68%	25%	4.5%	0.62%	0.74%	0.69%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	170	15.6	7.90	1.14	0.949	0.791
	%	87%	7.9%	4%	0.58%	0.48%	0.4%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$6.89x10^{-5}$	$2.96x10^{-6}$	$2.91x10^{-6}$	$5.38x10^{-7}$	$2.31x10^{-7}$	$5.90x10^{-8}$
	%	91%	3.9%	3.8%	0.71%	0.31%	0.078%
Water use (WDP)[1]	m^3 World eq.	2.93	$7.02x10^{-2}$	0.127	$4.24x10^{-2}$	$4.97x10^{-3}$	$3.58x10^{-2}$
	%	91%	2.2%	4%	1.3%	0.15%	1.1%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 34. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Opus - Distributed to the United Kingdom)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$3.83x10^{-7}$	$7.17x10^{-8}$	$2.27x10^{-8}$	$4.96x10^{-9}$	$5.45x10^{-9}$	$5.28x10^{-9}$
	%	78%	15%	4.6%	1%	1.1%	1.1%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.157	$4.14x10^{-3}$	$6.62x10^{-3}$	$7.53x10^{-4}$	$4.10x10^{-4}$	$3.20x10^{-4}$
	%	93%	2.4%	3.9%	0.44%	0.24%	0.19%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	57.5	2.26	2.70	0.710	0.126	8.83
	%	80%	3.1%	3.8%	0.99%	0.17%	12%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$7.44x10^{-9}$	$2.16x10^{-10}$	$3.12x10^{-10}$	$2.28x10^{-11}$	$1.14x10^{-11}$	$7.03x10^{-12}$
	%	93%	2.7%	3.9%	0.28%	0.14%	0.088%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$7.21x10^{-8}$	$7.71x10^{-9}$	$3.67x10^{-9}$	$6.99x10^{-10}$	$5.94x10^{-10}$	$3.60x10^{-10}$
	%	85%	9.1%	4.3%	0.82%	0.7%	0.42%
Potential Soil quality index (SQP)[1]	Dimensionless	66.2	6.48	3.12	1.22	0.561	1.70
	%	84%	8.2%	3.9%	1.5%	0.71%	2.1%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 35. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*
(Opus - Distributed to the United Kingdom)

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	16.6	0.368	0.690	1.81	$3.09x10^{-2}$	$2.57x10^{-2}$
	%	85%	1.9%	3.5%	9.3%	0.16%	0.13%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	8.88	0.00	0.355	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	25.5	0.368	1.05	1.81	$3.09x10^{-2}$	$2.57x10^{-2}$
	%	89%	1.3%	3.6%	6.3%	0.11%	0.089%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	280	31.0	15.5	2.29	1.88	1.57
	%	84%	9.3%	4.7%	0.69%	0.57%	0.47%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	53.3	0.00	$1.49x10^{-2}$	0.00	0.00	0.00
	%	100%	0%	0.028%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	334	31.0	15.5	2.29	1.88	1.57
	%	86%	8%	4%	0.59%	0.49%	0.41%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$5.68x10^{-2}$	$1.18x10^{-3}$	$2.35x10^{-3}$	$2.37x10^{-4}$	$2.15x10^{-4}$	$7.77x10^{-5}$
	%	93%	1.9%	3.9%	0.39%	0.35%	0.13%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.193	$3.52x10^{-3}$	$6.22x10^{-3}$	$1.38x10^{-2}$	$2.29x10^{-4}$	$-1.17x10^{-2}$
	%	94%	1.7%	3%	6.7%	0.11%	-5.7%

Table 36. *Waste and outflows, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* (**Opus - Distributed to the United Kingdom)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.391	$2.30x10^{-2}$	$1.73x10^{-2}$	$6.03x10^{-3}$	$9.65x10^{-4}$	$7.75x10^{-4}$
	%	89%	5.2%	3.9%	1.4%	0.22%	0.18%
Nonhazardous waste disposed (NHWD)	kg	9.62	0.140	1.59	0.115	$1.03x10^{-2}$	8.00
	%	49%	0.72%	8.2%	0.59%	0.053%	41%
Radioactive waste disposed (RWD)	kg	$9.72x10^{-5}$	$2.59x10^{-6}$	$4.08x10^{-6}$	$4.72x10^{-7}$	$2.79x10^{-7}$	$1.87x10^{-7}$
	%	93%	2.5%	3.9%	0.45%	0.27%	0.18%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	$8.74x10^{-3}$	0.00	0.00	0.00
	%	0%	0%	100%	0%	0%	0%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$7.28x10^{-2}$	$2.17x10^{-3}$	$3.18x10^{-3}$	$4.03x10^{-4}$	$3.65x10^{-4}$	$3.32x10^{-4}$
	%	92%	2.7%	4%	0.51%	0.46%	0.42%
Exported thermal energy (EET)	MJ	$2.30x10^{-2}$	$1.66x10^{-3}$	$1.29x10^{-3}$	$5.83x10^{-4}$	$2.21x10^{-4}$	$2.03x10^{-3}$
	%	80%	5.8%	4.5%	2%	0.77%	7.1%

Table 37. *Key Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Van Gogh - Distributed to the United Kingdom)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	10.0	1.88	0.644	$4.65x10^{-2}$	$8.03x10^{-2}$	0.858
	%	74%	14%	4.8%	0.34%	0.59%	6.3%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	10.1	1.88	0.521	$5.47x10^{-2}$	$8.02x10^{-2}$	0.588
	%	76%	14%	3.9%	0.41%	0.61%	4.5%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	$-9.92x10^{-2}$	$-6.93x10^{-5}$	0.123	$-3.28x10^{-2}$	$5.54x10^{-5}$	0.269
	%	-38%	-0.027%	47%	-13%	0.021%	100%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$7.68x10^{-3}$	$9.72x10^{-4}$	$3.51x10^{-4}$	$2.46x10^{-2}$	$2.68x10^{-5}$	$5.82x10^{-5}$
	%	23%	2.9%	1%	73%	0.079%	0.17%
Global warming potential (GWP-GHG)	kg CO_2 eq.	10.3	1.88	0.546	$7.94x10^{-2}$	$8.03x10^{-2}$	0.589
	%	76%	14%	4%	0.59%	0.59%	4.4%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$5.89x10^{-6}$	$2.63x10^{-8}$	$2.37x10^{-7}$	$1.16x10^{-9}$	$1.76x10^{-9}$	$2.22x10^{-9}$
	%	96%	0.43%	3.9%	0.019%	0.029%	0.036%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$4.40x10^{-2}$	$4.39x10^{-2}$	$3.73x10^{-3}$	$3.30x10^{-4}$	$3.27x10^{-4}$	$4.81x10^{-4}$
	%	47%	47%	4%	0.36%	0.35%	0.52%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$3.46x10^{-4}$	$1.11x10^{-5}$	$1.44x10^{-5}$	$2.28x10^{-6}$	$5.92x10^{-7}$	$1.63x10^{-6}$
	%	92%	2.9%	3.8%	0.61%	0.16%	0.43%
Eutrophication potential - marine (EP-marine)	kg N eq.	$8.43x10^{-3}$	$1.11x10^{-2}$	$8.84x10^{-4}$	$2.05x10^{-4}$	$1.22x10^{-4}$	$1.65x10^{-4}$
	%	40%	53%	4.2%	0.98%	0.58%	0.79%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$9.16x10^{-2}$	0.123	$9.61x10^{-3}$	$9.23x10^{-4}$	$1.34x10^{-3}$	$1.68x10^{-3}$
	%	40%	54%	4.2%	0.4%	0.59%	0.74%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$4.08x10^{-2}$	$3.41x10^{-2}$	$3.39x10^{-3}$	$3.10x10^{-4}$	$4.85x10^{-4}$	$5.40x10^{-4}$
	%	51%	43%	4.3%	0.39%	0.61%	0.68%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	178	23.8	8.59	1.11	1.15	1.07
	%	83%	11%	4%	0.52%	0.54%	0.5%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$7.33x10^{-5}$	$2.97x10^{-6}$	$3.08x10^{-6}$	$5.33x10^{-7}$	$2.79x10^{-7}$	$4.51x10^{-7}$
	%	91%	3.7%	3.8%	0.66%	0.35%	0.56%
Water use (WDP)[1]	m^3 World eq.	3.18	$8.37x10^{-2}$	0.136	$4.22x10^{-2}$	$6.00x10^{-3}$	0.471
	%	81%	2.1%	3.5%	1.1%	0.15%	12%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 38. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits*. **(Van Gogh - Distributed to the United Kingdom)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$4.30x10^{-7}$	$7.77x10^{-8}$	$2.53x10^{-8}$	$4.91x10^{-9}$	$6.58x10^{-9}$	$5.78x10^{-9}$
	%	78%	14%	4.6%	0.89%	1.2%	1%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.139	$4.94x10^{-3}$	$5.86x10^{-3}$	$3.18x10^{-3}$	$4.95x10^{-4}$	$1.01x10^{-3}$
	%	90%	3.2%	3.8%	2.1%	0.32%	0.65%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	58.1	2.38	2.50	0.674	0.152	22.7
	%	67%	2.7%	2.9%	0.78%	0.18%	26%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$8.50x10^{-9}$	$3.78x10^{-10}$	$3.60x10^{-10}$	$2.10x10^{-11}$	$1.38x10^{-11}$	$1.90x10^{-10}$
	%	90%	4%	3.8%	0.22%	0.15%	2%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$7.81x10^{-8}$	$8.12x10^{-9}$	$3.72x10^{-9}$	$5.80x10^{-10}$	$7.17x10^{-10}$	$3.91x10^{-9}$
	%	82%	8.5%	3.9%	0.61%	0.75%	4.1%
Potential Soil quality index (SQP)[1]	Dimensionless	67.3	4.95	3.06	1.26	0.677	1.15
	%	86%	6.3%	3.9%	1.6%	0.86%	1.5%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 39. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Van Gogh - Distributed to the United Kingdom)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	19.6	0.441	0.809	1.82	$3.73x10^{-2}$	0.120
	%	86%	1.9%	3.5%	8%	0.16%	0.53%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	10.9	0.00	0.436	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	30.5	0.441	1.24	1.82	$3.73x10^{-2}$	0.120
	%	89%	1.3%	3.6%	5.3%	0.11%	0.35%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	289	47.2	16.9	2.25	2.27	2.12
	%	80%	13%	4.7%	0.63%	0.63%	0.59%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	61.3	0.00	$1.18x10^{-2}$	0.00	0.00	0.00
	%	100%	0%	0.019%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	350	47.2	16.9	2.25	2.27	2.12
	%	83%	11%	4%	0.53%	0.54%	0.5%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$3.89x10^{-2}$	$1.51x10^{-3}$	$1.64x10^{-3}$	$2.12x10^{-3}$	$2.60x10^{-4}$	$4.02x10^{-4}$
	%	87%	3.4%	3.7%	4.7%	0.58%	0.9%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.204	$4.01x10^{-3}$	$7.67x10^{-3}$	$1.38x10^{-2}$	$2.77x10^{-4}$	$1.53x10^{-2}$
	%	83%	1.6%	3.1%	5.6%	0.11%	6.2%

Table 40. *Waste and outflows, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*
(Van Gogh - Distributed to the United Kingdom)

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.458	$2.93x10^{-2}$	$2.02x10^{-2}$	$5.62x10^{-3}$	$1.17x10^{-3}$	0.104
	%	74%	4.7%	3.3%	0.91%	0.19%	17%
Nonhazardous waste disposed (NHWD)	kg	9.06	0.193	0.943	0.115	$1.24x10^{-2}$	4.49
	%	61%	1.3%	6.4%	0.78%	0.084%	30%
Radioactive waste disposed (RWD)	kg	$9.11x10^{-5}$	$3.08x10^{-6}$	$3.82x10^{-6}$	$1.58x10^{-6}$	$3.37x10^{-7}$	$6.71x10^{-7}$
	%	91%	3.1%	3.8%	1.6%	0.34%	0.67%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	0.291	0.00	0.00	5.31
	%	0%	0%	5.2%	0%	0%	95%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$6.73x10^{-2}$	$2.62x10^{-3}$	$2.86x10^{-3}$	$4.63x10^{-3}$	$4.41x10^{-4}$	$7.27x10^{-4}$
	%	86%	3.3%	3.6%	5.9%	0.56%	0.93%
Exported thermal energy (EET)	MJ	$2.71x10^{-2}$	$1.42x10^{-3}$	$1.28x10^{-3}$	$5.81x10^{-4}$	$2.67x10^{-4}$	$1.21x10^{-3}$
	%	85%	4.4%	4%	1.8%	0.84%	3.8%

Table 41. *Key Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Art Select - Distributed to Australasia)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	10.8	1.30	0.775	$5.73x10^{-2}$	$7.71x10^{-2}$	0.140
	%	82%	9.9%	5.9%	0.44%	0.59%	1.1%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	10.8	1.30	0.526	$6.59x10^{-2}$	$7.70x10^{-2}$	0.140
	%	84%	10%	4.1%	0.51%	0.6%	1.1%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	$1.52x10^{-2}$	$2.18x10^{-4}$	0.248	$-3.32x10^{-2}$	$5.32x10^{-5}$	$1.81x10^{-4}$
	%	6.6%	0.094%	110%	-14%	0.023%	0.078%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$8.49x10^{-3}$	$6.27x10^{-4}$	$3.71x10^{-4}$	$2.46x10^{-2}$	$2.57x10^{-5}$	$1.60x10^{-5}$
	%	25%	1.8%	1.1%	72%	0.075%	0.047%
Global warming potential (GWP-GHG)	kg CO_2 eq.	11.1	1.30	0.652	$9.07x10^{-2}$	$7.70x10^{-2}$	0.140
	%	83%	9.7%	4.9%	0.68%	0.58%	1%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$6.67x10^{-6}$	$1.79x10^{-8}$	$2.68x10^{-7}$	$1.01x10^{-9}$	$1.69x10^{-9}$	$1.12x10^{-9}$
	%	96%	0.26%	3.9%	0.014%	0.024%	0.016%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$4.41x10^{-2}$	$1.65x10^{-2}$	$2.66x10^{-3}$	$3.94x10^{-4}$	$3.14x10^{-4}$	$2.67x10^{-4}$
	%	69%	26%	4.1%	0.61%	0.49%	0.42%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$3.72x10^{-4}$	$1.24x10^{-5}$	$1.55x10^{-5}$	$5.30x10^{-6}$	$5.68x10^{-7}$	$3.54x10^{-7}$
	%	92%	3%	3.8%	1.3%	0.14%	0.087%
Eutrophication potential - marine (EP-marine)	kg N eq.	$8.76x10^{-3}$	$4.48x10^{-3}$	$7.12x10^{-4}$	$2.14x10^{-4}$	$1.17x10^{-4}$	$1.28x10^{-4}$
	%	61%	31%	4.9%	1.5%	0.81%	0.89%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$9.43x10^{-2}$	$4.96x10^{-2}$	$6.83x10^{-3}$	$1.02x10^{-3}$	$1.29x10^{-3}$	$1.15x10^{-3}$
	%	61%	32%	4.4%	0.66%	0.83%	0.75%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$4.35x10^{-2}$	$1.46x10^{-2}$	$2.78x10^{-3}$	$3.36x10^{-4}$	$4.66x10^{-4}$	$4.41x10^{-4}$
	%	70%	23%	4.5%	0.54%	0.75%	0.71%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	195	17.4	9.08	1.14	1.10	0.928
	%	87%	7.7%	4%	0.51%	0.49%	0.41%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$8.22x10^{-5}$	$3.38x10^{-6}$	$3.46x10^{-6}$	$5.38x10^{-7}$	$2.67x10^{-7}$	$7.02x10^{-8}$
	%	91%	3.8%	3.8%	0.6%	0.3%	0.078%
Water use (WDP)[1]	m^3 World eq.	3.51	$7.94x10^{-2}$	0.152	$4.24x10^{-2}$	$5.76x10^{-3}$	$4.21x10^{-2}$
	%	92%	2.1%	4%	1.1%	0.15%	1.1%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 42. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Art Select - Distributed to Australasia)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$4.49x10^{-7}$	$8.15x10^{-8}$	$2.66x10^{-8}$	$4.96x10^{-9}$	$6.31x10^{-9}$	$6.21x10^{-9}$
	%	78%	14%	4.6%	0.86%	1.1%	1.1%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.166	$4.68x10^{-3}$	$7.01x10^{-3}$	$7.53x10^{-4}$	$4.75x10^{-4}$	$3.87x10^{-4}$
	%	93%	2.6%	3.9%	0.42%	0.26%	0.22%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	65.6	2.58	3.05	0.710	0.146	11.2
	%	79%	3.1%	3.7%	0.85%	0.18%	13%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$9.25x10^{-9}$	$2.39x10^{-10}$	$3.86x10^{-10}$	$2.28x10^{-11}$	$1.32x10^{-11}$	$8.35x10^{-12}$
	%	93%	2.4%	3.9%	0.23%	0.13%	0.084%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$8.49x10^{-8}$	$8.78x10^{-9}$	$4.26x10^{-9}$	$6.99x10^{-10}$	$6.88x10^{-10}$	$4.43x10^{-10}$
	%	85%	8.8%	4.3%	0.7%	0.69%	0.44%
Potential Soil quality index (SQP)[1]	Dimensionless	74.2	7.47	3.52	1.22	0.650	2.01
	%	83%	8.4%	4%	1.4%	0.73%	2.3%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 43. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Art Select - Distributed to Australasia)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	20.1	0.416	0.833	1.81	$3.58x10^{-2}$	$3.11x10^{-2}$
	%	87%	1.8%	3.6%	7.8%	0.15%	0.13%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	10.9	0.00	0.438	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	31.0	0.416	1.27	1.81	$3.58x10^{-2}$	$3.11x10^{-2}$
	%	90%	1.2%	3.7%	5.2%	0.1%	0.09%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	317	34.5	17.9	2.29	2.18	1.84
	%	84%	9.2%	4.8%	0.61%	0.58%	0.49%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	67.4	0.00	$1.33x10^{-2}$	0.00	0.00	0.00
	%	100%	0%	0.02%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	384	34.5	17.9	2.29	2.18	1.84
	%	87%	7.8%	4%	0.52%	0.49%	0.42%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$5.23x10^{-2}$	$1.33x10^{-3}$	$2.18x10^{-3}$	$2.37x10^{-4}$	$2.49x10^{-4}$	$9.23x10^{-5}$
	%	93%	2.4%	3.9%	0.42%	0.44%	0.16%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.228	$3.99x10^{-3}$	$7.29x10^{-3}$	$1.38x10^{-2}$	$2.66x10^{-4}$	$-1.49x10^{-2}$
	%	96%	1.7%	3.1%	5.8%	0.11%	-6.2%

Table 44. *Waste and outflows, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Art Select - Distributed to Australasia)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.475	$2.60x10^{-2}$	$2.09x10^{-2}$	$6.03x10^{-3}$	$1.12x10^{-3}$	$9.22x10^{-4}$
	%	90%	4.9%	3.9%	1.1%	0.21%	0.17%
Nonhazardous waste disposed (NHWD)	kg	10.6	0.157	1.87	0.115	$1.19x10^{-2}$	10.1
	%	46%	0.69%	8.2%	0.5%	0.052%	44%
Radioactive waste disposed (RWD)	kg	$1.06x10^{-4}$	$2.94x10^{-6}$	$4.45x10^{-6}$	$4.72x10^{-7}$	$3.23x10^{-7}$	$2.27x10^{-7}$
	%	93%	2.6%	3.9%	0.41%	0.28%	0.2%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	$6.77x10^{-3}$	0.00	0.00	0.00
	%	0%	0%	100%	0%	0%	0%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$7.96x10^{-2}$	$2.46x10^{-3}$	$3.48x10^{-3}$	$4.03x10^{-4}$	$4.23x10^{-4}$	$4.11x10^{-4}$
	%	92%	2.8%	4%	0.47%	0.49%	0.47%
Exported thermal energy (EET)	MJ	$2.86x10^{-2}$	$1.91x10^{-3}$	$1.59x10^{-3}$	$5.83x10^{-4}$	$2.56x10^{-4}$	$2.57x10^{-3}$
	%	81%	5.4%	4.5%	1.6%	0.72%	7.2%

Table 45. *Key Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Knight Tile (Rubens) - Distributed to Australasia)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	7.17	0.937	0.533	$5.73x10^{-2}$	$5.41x10^{-2}$	$9.06x10^{-2}$
	%	81%	11%	6%	0.65%	0.61%	1%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	7.32	0.936	0.356	$6.59x10^{-2}$	$5.40x10^{-2}$	$9.05x10^{-2}$
	%	83%	11%	4%	0.75%	0.61%	1%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	-0.153	$1.47x10^{-4}$	0.177	$-3.32x10^{-2}$	$3.73x10^{-5}$	$1.15x10^{-4}$
	%	1800%	-1.7%	-2100%	390%	-0.43%	-1.3%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$5.87x10^{-3}$	$4.53x10^{-4}$	$2.57x10^{-4}$	$2.46x10^{-2}$	$1.80x10^{-5}$	$1.14x10^{-5}$
	%	19%	1.4%	0.82%	79%	0.058%	0.036%
Global warming potential (GWP-GHG)	kg CO_2 eq.	7.41	0.937	0.451	$9.07x10^{-2}$	$5.40x10^{-2}$	$9.05x10^{-2}$
	%	82%	10%	5%	1%	0.6%	1%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$3.77x10^{-6}$	$1.29x10^{-8}$	$1.52x10^{-7}$	$1.01x10^{-9}$	$1.18x10^{-9}$	$7.71x10^{-10}$
	%	96%	0.33%	3.9%	0.026%	0.03%	0.02%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$3.10x10^{-2}$	$1.23x10^{-2}$	$1.88x10^{-3}$	$3.94x10^{-4}$	$2.20x10^{-4}$	$1.84x10^{-4}$
	%	67%	27%	4.1%	0.86%	0.48%	0.4%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$2.24x10^{-4}$	$8.73x10^{-6}$	$9.38x10^{-6}$	$5.30x10^{-6}$	$3.98x10^{-7}$	$2.45x10^{-7}$
	%	90%	3.5%	3.8%	2.1%	0.16%	0.099%
Eutrophication potential - marine (EP-marine)	kg N eq.	$6.47x10^{-3}$	$3.34x10^{-3}$	$5.23x10^{-4}$	$2.14x10^{-4}$	$8.22x10^{-5}$	$8.71x10^{-5}$
	%	60%	31%	4.9%	2%	0.77%	0.81%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$7.02x10^{-2}$	$3.70x10^{-2}$	$4.95x10^{-3}$	$1.02x10^{-3}$	$9.03x10^{-4}$	$7.93x10^{-4}$
	%	61%	32%	4.3%	0.89%	0.79%	0.69%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$2.93x10^{-2}$	$1.08x10^{-2}$	$1.89x10^{-3}$	$3.36x10^{-4}$	$3.27x10^{-4}$	$3.02x10^{-4}$
	%	68%	25%	4.4%	0.78%	0.76%	0.7%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	125	12.5	5.84	1.14	0.771	0.641
	%	86%	8.6%	4%	0.78%	0.53%	0.44%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$4.96x10^{-5}$	$2.38x10^{-6}$	$2.10x10^{-6}$	$5.38x10^{-7}$	$1.88x10^{-7}$	$4.77x10^{-8}$
	%	90%	4.3%	3.8%	0.98%	0.34%	0.087%
Water use (WDP)[1]	m^3 World eq.	2.23	$5.64x10^{-2}$	$9.67x10^{-2}$	$4.24x10^{-2}$	$4.04x10^{-3}$	$2.90x10^{-2}$
	%	91%	2.3%	3.9%	1.7%	0.16%	1.2%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 46. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Knight Tile (Rubens) - Distributed to Australasia)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$3.85x10^{-7}$	$5.76x10^{-8}$	$2.10x10^{-8}$	$4.96x10^{-9}$	$4.43x10^{-9}$	$4.28x10^{-9}$
	%	81%	12%	4.4%	1%	0.93%	0.9%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.111	$3.32x10^{-3}$	$4.68x10^{-3}$	$7.53x10^{-4}$	$3.33x10^{-4}$	$2.58x10^{-4}$
	%	92%	2.8%	3.9%	0.63%	0.28%	0.21%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	40.2	1.82	1.94	0.710	0.102	7.06
	%	78%	3.5%	3.7%	1.4%	0.2%	14%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$5.37x10^{-9}$	$1.73x10^{-10}$	$2.26x10^{-10}$	$2.28x10^{-11}$	$9.28x10^{-12}$	$5.68x10^{-12}$
	%	92%	3%	3.9%	0.39%	0.16%	0.098%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$5.69x10^{-8}$	$6.20x10^{-9}$	$2.90x10^{-9}$	$6.99x10^{-10}$	$4.83x10^{-10}$	$2.89x10^{-10}$
	%	84%	9.2%	4.3%	1%	0.72%	0.43%
Potential Soil quality index (SQP)[1]	Dimensionless	48.5	5.23	2.31	1.22	0.456	1.38
	%	82%	8.9%	3.9%	2.1%	0.77%	2.3%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 47. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*
(Knight Tile (Rubens) - Distributed to Australasia)

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	14.3	0.295	0.594	1.81	$2.51x10^{-2}$	$2.07x10^{-2}$
	%	84%	1.7%	3.5%	11%	0.15%	0.12%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	6.66	0.00	0.266	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	21.0	0.295	0.860	1.81	$2.51x10^{-2}$	$2.07x10^{-2}$
	%	87%	1.2%	3.6%	7.5%	0.1%	0.086%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	203	24.8	11.5	2.29	1.53	1.27
	%	83%	10%	4.7%	0.94%	0.63%	0.52%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	42.6	0.00	$8.46x10^{-3}$	0.00	0.00	0.00
	%	100%	0%	0.02%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	246	24.8	11.5	2.29	1.53	1.27
	%	86%	8.6%	4%	0.8%	0.53%	0.44%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$2.92x10^{-2}$	$9.44x10^{-4}$	$1.23x10^{-3}$	$2.37x10^{-4}$	$1.75x10^{-4}$	$6.29x10^{-5}$
	%	92%	3%	3.9%	0.74%	0.55%	0.2%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.140	$2.83x10^{-3}$	$4.53x10^{-3}$	$1.38x10^{-2}$	$1.86x10^{-4}$	$-9.32x10^{-3}$
	%	92%	1.9%	3%	9%	0.12%	-6.1%

Table 48. *Waste and outflows, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Knight Tile (Rubens) - Distributed to Australasia)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.364	$1.85x10^{-2}$	$1.59x10^{-2}$	$6.03x10^{-3}$	$7.84x10^{-4}$	$6.27x10^{-4}$
	%	90%	4.5%	3.9%	1.5%	0.19%	0.15%
Nonhazardous waste disposed (NHWD)	kg	7.85	0.112	1.20	0.115	$8.38x10^{-3}$	6.40
	%	50%	0.71%	7.7%	0.73%	0.053%	41%
Radioactive waste disposed (RWD)	kg	$7.44x10^{-5}$	$2.08x10^{-6}$	$3.13x10^{-6}$	$4.72x10^{-7}$	$2.27x10^{-7}$	$1.51x10^{-7}$
	%	92%	2.6%	3.9%	0.59%	0.28%	0.19%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	$3.57x10^{-3}$	0.00	0.00	0.00
	%	0%	0%	100%	0%	0%	0%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$4.55x10^{-2}$	$1.75x10^{-3}$	$2.03x10^{-3}$	$4.03x10^{-4}$	$2.97x10^{-4}$	$2.67x10^{-4}$
	%	91%	3.5%	4%	0.8%	0.59%	0.53%
Exported thermal energy (EET)	MJ	$2.02x10^{-2}$	$1.34x10^{-3}$	$1.09x10^{-3}$	$5.83x10^{-4}$	$1.80x10^{-4}$	$1.62x10^{-3}$
	%	81%	5.3%	4.3%	2.3%	0.72%	6.5%

Table 49. *Key Life Cycle Impact Assessment results, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Opus - Distributed to Australasia)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	9.46	1.17	0.692	$5.73x10^{-2}$	$6.65x10^{-2}$	0.113
	%	82%	10%	6%	0.5%	0.58%	0.98%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	9.31	1.17	0.456	$6.59x10^{-2}$	$6.65x10^{-2}$	0.113
	%	83%	10%	4.1%	0.59%	0.59%	1%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	0.143	$1.80x10^{-4}$	0.236	$-3.32x10^{-2}$	$4.59x10^{-5}$	$1.44x10^{-4}$
	%	41%	0.052%	68%	-9.6%	0.013%	0.042%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$7.30x10^{-3}$	$5.67x10^{-4}$	$3.19x10^{-4}$	$2.46x10^{-2}$	$2.22x10^{-5}$	$1.40x10^{-5}$
	%	22%	1.7%	0.97%	75%	0.067%	0.043%
Global warming potential (GWP-GHG)	kg CO_2 eq.	9.69	1.17	0.581	$9.07x10^{-2}$	$6.65x10^{-2}$	0.113
	%	83%	10%	5%	0.77%	0.57%	0.96%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$5.97x10^{-6}$	$1.61x10^{-8}$	$2.40x10^{-7}$	$1.01x10^{-9}$	$1.46x10^{-9}$	$9.51x10^{-10}$
	%	96%	0.26%	3.9%	0.016%	0.023%	0.015%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$3.55x10^{-2}$	$1.56x10^{-2}$	$2.24x10^{-3}$	$3.94x10^{-4}$	$2.71x10^{-4}$	$2.27x10^{-4}$
	%	65%	29%	4.1%	0.72%	0.5%	0.42%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$3.15x10^{-4}$	$1.09x10^{-5}$	$1.31x10^{-5}$	$5.30x10^{-6}$	$4.90x10^{-7}$	$3.02x10^{-7}$
	%	91%	3.1%	3.8%	1.5%	0.14%	0.088%
Eutrophication potential - marine (EP-marine)	kg N eq.	$7.35x10^{-3}$	$4.22x10^{-3}$	$6.30x10^{-4}$	$2.14x10^{-4}$	$1.01x10^{-4}$	$1.08x10^{-4}$
	%	58%	33%	5%	1.7%	0.8%	0.85%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$7.83x10^{-2}$	$4.68x10^{-2}$	$5.91x10^{-3}$	$1.02x10^{-3}$	$1.11x10^{-3}$	$9.78x10^{-4}$
	%	58%	35%	4.4%	0.76%	0.83%	0.73%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$3.71x10^{-2}$	$1.37x10^{-2}$	$2.42x10^{-3}$	$3.36x10^{-4}$	$4.02x10^{-4}$	$3.73x10^{-4}$
	%	68%	25%	4.5%	0.62%	0.74%	0.69%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	170	15.6	7.90	1.14	0.949	0.791
	%	87%	7.9%	4%	0.58%	0.48%	0.4%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$6.89x10^{-5}$	$2.96x10^{-6}$	$2.91x10^{-6}$	$5.38x10^{-7}$	$2.31x10^{-7}$	$5.90x10^{-8}$
	%	91%	3.9%	3.8%	0.71%	0.31%	0.078%
Water use (WDP)[1]	m^3 World eq.	2.93	$7.02x10^{-2}$	0.127	$4.24x10^{-2}$	$4.97x10^{-3}$	$3.58x10^{-2}$
	%	91%	2.2%	4%	1.3%	0.15%	1.1%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 50. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits*. **(Opus - Distributed to Australasia)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$3.83x10^{-7}$	$7.17x10^{-8}$	$2.27x10^{-8}$	$4.96x10^{-9}$	$5.45x10^{-9}$	$5.28x10^{-9}$
	%	78%	15%	4.6%	1%	1.1%	1.1%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.157	$4.14x10^{-3}$	$6.62x10^{-3}$	$7.53x10^{-4}$	$4.10x10^{-4}$	$3.20x10^{-4}$
	%	93%	2.4%	3.9%	0.44%	0.24%	0.19%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	57.5	2.26	2.70	0.710	0.126	8.83
	%	80%	3.1%	3.8%	0.99%	0.17%	12%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$7.44x10^{-9}$	$2.16x10^{-10}$	$3.12x10^{-10}$	$2.28x10^{-11}$	$1.14x10^{-11}$	$7.03x10^{-12}$
	%	93%	2.7%	3.9%	0.28%	0.14%	0.088%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$7.21x10^{-8}$	$7.71x10^{-9}$	$3.67x10^{-9}$	$6.99x10^{-10}$	$5.94x10^{-10}$	$3.60x10^{-10}$
	%	85%	9.1%	4.3%	0.82%	0.7%	0.42%
Potential Soil quality index (SQP)[1]	Dimensionless	66.2	6.48	3.12	1.22	0.561	1.70
	%	84%	8.2%	3.9%	1.5%	0.71%	2.1%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 51. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*
(Opus - Distributed to Australasia)

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	16.6	0.368	0.690	1.81	$3.09x10^{-2}$	$2.57x10^{-2}$
	%	85%	1.9%	3.5%	9.3%	0.16%	0.13%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	8.88	0.00	0.355	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	25.5	0.368	1.05	1.81	$3.09x10^{-2}$	$2.57x10^{-2}$
	%	89%	1.3%	3.6%	6.3%	0.11%	0.089%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	280	31.0	15.5	2.29	1.88	1.57
	%	84%	9.3%	4.7%	0.69%	0.57%	0.47%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	53.3	0.00	$1.49x10^{-2}$	0.00	0.00	0.00
	%	100%	0%	0.028%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	334	31.0	15.5	2.29	1.88	1.57
	%	86%	8%	4%	0.59%	0.49%	0.41%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$5.68x10^{-2}$	$1.18x10^{-3}$	$2.35x10^{-3}$	$2.37x10^{-4}$	$2.15x10^{-4}$	$7.77x10^{-5}$
	%	93%	1.9%	3.9%	0.39%	0.35%	0.13%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.193	$3.52x10^{-3}$	$6.22x10^{-3}$	$1.38x10^{-2}$	$2.29x10^{-4}$	$-1.17x10^{-2}$
	%	94%	1.7%	3%	6.7%	0.11%	-5.7%

Table 52. *Waste and outflows, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Opus - Distributed to Australasia)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.391	$2.30x10^{-2}$	$1.73x10^{-2}$	$6.03x10^{-3}$	$9.65x10^{-4}$	$7.75x10^{-4}$
	%	89%	5.2%	3.9%	1.4%	0.22%	0.18%
Nonhazardous waste disposed (NHWD)	kg	9.62	0.140	1.59	0.115	$1.03x10^{-2}$	8.00
	%	49%	0.72%	8.2%	0.59%	0.053%	41%
Radioactive waste disposed (RWD)	kg	$9.72x10^{-5}$	$2.59x10^{-6}$	$4.08x10^{-6}$	$4.72x10^{-7}$	$2.79x10^{-7}$	$1.87x10^{-7}$
	%	93%	2.5%	3.9%	0.45%	0.27%	0.18%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	$8.74x10^{-3}$	0.00	0.00	0.00
	%	0%	0%	100%	0%	0%	0%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$7.28x10^{-2}$	$2.17x10^{-3}$	$3.18x10^{-3}$	$4.03x10^{-4}$	$3.65x10^{-4}$	$3.32x10^{-4}$
	%	92%	2.7%	4%	0.51%	0.46%	0.42%
Exported thermal energy (EET)	MJ	$2.30x10^{-2}$	$1.66x10^{-3}$	$1.29x10^{-3}$	$5.83x10^{-4}$	$2.21x10^{-4}$	$2.03x10^{-3}$
	%	80%	5.8%	4.5%	2%	0.77%	7.1%

Table 53. *Key Life Cycle Impact Assessment results, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits*. **(Van Gogh - Distributed to Australasia)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	12.7	1.41	0.936	$5.73x10^{-2}$	$7.85x10^{-2}$	0.130
	%	83%	9.2%	6.1%	0.37%	0.51%	0.85%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	12.6	1.41	0.624	$6.59x10^{-2}$	$7.84x10^{-2}$	0.130
	%	85%	9.4%	4.2%	0.44%	0.53%	0.87%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	$6.80x10^{-2}$	$2.21x10^{-4}$	0.312	$-3.32x10^{-2}$	$5.41x10^{-5}$	$1.65x10^{-4}$
	%	20%	0.064%	90%	-9.6%	0.016%	0.048%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$8.88x10^{-3}$	$6.80x10^{-4}$	$3.91x10^{-4}$	$2.46x10^{-2}$	$2.61x10^{-5}$	$1.65x10^{-5}$
	%	26%	2%	1.1%	71%	0.075%	0.048%
Global warming potential (GWP-GHG)	kg CO_2 eq.	13.1	1.41	0.768	$9.07x10^{-2}$	$7.84x10^{-2}$	0.130
	%	84%	9%	4.9%	0.58%	0.5%	0.83%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$6.52x10^{-6}$	$1.94x10^{-8}$	$2.63x10^{-7}$	$1.01x10^{-9}$	$1.72x10^{-9}$	$1.12x10^{-9}$
	%	96%	0.28%	3.9%	0.015%	0.025%	0.016%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$5.02x10^{-2}$	$1.86x10^{-2}$	$3.09x10^{-3}$	$3.94x10^{-4}$	$3.20x10^{-4}$	$2.67x10^{-4}$
	%	69%	25%	4.2%	0.54%	0.44%	0.37%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$3.71x10^{-4}$	$1.31x10^{-5}$	$1.56x10^{-5}$	$5.30x10^{-6}$	$5.78x10^{-7}$	$3.55x10^{-7}$
	%	91%	3.2%	3.8%	1.3%	0.14%	0.087%
Eutrophication potential - marine (EP-marine)	kg N eq.	$1.04x10^{-2}$	$5.01x10^{-3}$	$8.52x10^{-4}$	$2.14x10^{-4}$	$1.19x10^{-4}$	$1.26x10^{-4}$
	%	62%	30%	5.1%	1.3%	0.71%	0.75%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	0.111	$5.56x10^{-2}$	$8.27x10^{-3}$	$1.02x10^{-3}$	$1.31x10^{-3}$	$1.15x10^{-3}$
	%	62%	31%	4.6%	0.57%	0.73%	0.64%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$4.93x10^{-2}$	$1.62x10^{-2}$	$3.28x10^{-3}$	$3.36x10^{-4}$	$4.74x10^{-4}$	$4.37x10^{-4}$
	%	70%	23%	4.7%	0.48%	0.68%	0.62%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	216	18.7	10.2	1.14	1.12	0.929
	%	87%	7.6%	4.1%	0.46%	0.45%	0.37%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$8.16x10^{-5}$	$3.58x10^{-6}$	$3.46x10^{-6}$	$5.38x10^{-7}$	$2.72x10^{-7}$	$6.89x10^{-8}$
	%	91%	4%	3.9%	0.6%	0.3%	0.077%
Water use (WDP)[1]	m^3 World eq.	3.63	$8.47x10^{-2}$	0.160	$4.24x10^{-2}$	$5.86x10^{-3}$	$4.20x10^{-2}$
	%	92%	2.1%	4%	1.1%	0.15%	1.1%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 54. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits*. **(Van Gogh - Distributed to Australasia)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$6.10x10^{-7}$	$8.66x10^{-8}$	$3.58x10^{-8}$	$4.96x10^{-9}$	$6.42x10^{-9}$	$6.20x10^{-9}$
	%	81%	12%	4.8%	0.66%	0.86%	0.83%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.169	$4.99x10^{-3}$	$7.21x10^{-3}$	$7.53x10^{-4}$	$4.83x10^{-4}$	$3.71x10^{-4}$
	%	92%	2.7%	3.9%	0.41%	0.26%	0.2%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	71.6	2.73	3.33	0.710	0.148	10.1
	%	81%	3.1%	3.8%	0.8%	0.17%	11%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$1.04x10^{-8}$	$2.59x10^{-10}$	$4.34x10^{-10}$	$2.28x10^{-11}$	$1.35x10^{-11}$	$8.21x10^{-12}$
	%	93%	2.3%	3.9%	0.21%	0.12%	0.074%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$9.36x10^{-8}$	$9.32x10^{-9}$	$4.77x10^{-9}$	$6.99x10^{-10}$	$7.01x10^{-10}$	$4.15x10^{-10}$
	%	85%	8.5%	4.4%	0.64%	0.64%	0.38%
Potential Soil quality index (SQP)[1]	Dimensionless	93.6	7.86	4.41	1.22	0.662	1.99
	%	85%	7.2%	4%	1.1%	0.6%	1.8%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 55. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Van Gogh - Distributed to Australasia)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	9.51	0.222	0.398	0.905	$1.82x10^{-2}$	$1.49x10^{-2}$
	%	86%	2%	3.6%	8.2%	0.16%	0.13%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	8.44	0.00	0.337	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	17.9	0.222	0.735	0.905	$1.82x10^{-2}$	$1.49x10^{-2}$
	%	90%	1.1%	3.7%	4.6%	0.092%	0.075%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	182	18.6	10.1	1.15	1.11	0.921
	%	85%	8.7%	4.7%	0.54%	0.52%	0.43%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	30.5	0.00	$1.04x10^{-2}$	0.00	0.00	0.00
	%	100%	0%	0.034%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	212	18.6	10.1	1.15	1.11	0.921
	%	87%	7.6%	4.1%	0.47%	0.45%	0.38%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$3.93x10^{-2}$	$1.42x10^{-3}$	$1.67x10^{-3}$	$2.37x10^{-4}$	$2.54x10^{-4}$	$9.08x10^{-5}$
	%	91%	3.3%	3.9%	0.55%	0.59%	0.21%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.116	$2.13x10^{-3}$	$3.21x10^{-3}$	$6.88x10^{-3}$	$1.35x10^{-4}$	$-6.65x10^{-3}$
	%	95%	1.7%	2.6%	5.6%	0.11%	-5.4%

Table 56. *Waste and outflows, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* (**Van Gogh - Distributed to Australasia)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.545	$2.77x10^{-2}$	$2.41x10^{-2}$	$6.03x10^{-3}$	$1.14x10^{-3}$	$9.06x10^{-4}$
	%	90%	4.6%	4%	1%	0.19%	0.15%
Nonhazardous waste disposed (NHWD)	kg	11.0	0.168	2.63	0.115	$1.22x10^{-2}$	9.14
	%	48%	0.73%	11%	0.5%	0.053%	40%
Radioactive waste disposed (RWD)	kg	$1.12x10^{-4}$	$3.13x10^{-6}$	$4.74x10^{-6}$	$4.72x10^{-7}$	$3.29x10^{-7}$	$2.18x10^{-7}$
	%	93%	2.6%	3.9%	0.39%	0.27%	0.18%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	$4.37x10^{-3}$	0.00	0.00	0.00
	%	0%	0%	100%	0%	0%	0%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$3.78x10^{-2}$	$1.31x10^{-3}$	$1.68x10^{-3}$	$2.02x10^{-4}$	$2.15x10^{-4}$	$1.91x10^{-4}$
	%	91%	3.2%	4.1%	0.49%	0.52%	0.46%
Exported thermal energy (EET)	MJ	$2.83x10^{-2}$	$2.01x10^{-3}$	$1.76x10^{-3}$	$5.83x10^{-4}$	$2.61x10^{-4}$	$2.32x10^{-3}$
	%	80%	5.7%	5%	1.7%	0.74%	6.6%

Table 57. *Key Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Art Select - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	10.8	1.53	0.665	$4.98x10^{-2}$	$7.71x10^{-2}$	0.140
	%	81%	12%	5%	0.37%	0.58%	1.1%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	10.8	1.53	0.536	$5.83x10^{-2}$	$7.70x10^{-2}$	0.140
	%	82%	12%	4.1%	0.44%	0.59%	1.1%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	$1.52x10^{-2}$	$1.83x10^{-4}$	0.128	$-3.31x10^{-2}$	$5.32x10^{-5}$	$1.81x10^{-4}$
	%	14%	0.17%	120%	-30%	0.048%	0.16%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$8.49x10^{-3}$	$7.48x10^{-4}$	$3.75x10^{-4}$	$2.47x10^{-2}$	$2.57x10^{-5}$	$1.60x10^{-5}$
	%	25%	2.2%	1.1%	72%	0.075%	0.047%
Global warming potential (GWP-GHG)	kg CO_2 eq.	11.1	1.53	0.591	$8.30x10^{-2}$	$7.70x10^{-2}$	0.140
	%	82%	11%	4.4%	0.61%	0.57%	1%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$6.67x10^{-6}$	$2.11x10^{-8}$	$2.68x10^{-7}$	$9.19x10^{-10}$	$1.69x10^{-9}$	$1.12x10^{-9}$
	%	96%	0.3%	3.9%	0.013%	0.024%	0.016%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$4.41x10^{-2}$	$2.31x10^{-2}$	$2.91x10^{-3}$	$3.40x10^{-4}$	$3.14x10^{-4}$	$2.67x10^{-4}$
	%	62%	33%	4.1%	0.48%	0.44%	0.38%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$3.72x10^{-4}$	$1.32x10^{-5}$	$1.55x10^{-5}$	$3.04x10^{-6}$	$5.68x10^{-7}$	$3.54x10^{-7}$
	%	92%	3.3%	3.8%	0.75%	0.14%	0.087%
Eutrophication potential - marine (EP-marine)	kg N eq.	$8.76x10^{-3}$	$6.13x10^{-3}$	$7.19x10^{-4}$	$2.05x10^{-4}$	$1.17x10^{-4}$	$1.28x10^{-4}$
	%	55%	38%	4.5%	1.3%	0.73%	0.8%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$9.43x10^{-2}$	$6.80x10^{-2}$	$7.53x10^{-3}$	$9.20x10^{-4}$	$1.29x10^{-3}$	$1.15x10^{-3}$
	%	54%	39%	4.3%	0.53%	0.74%	0.66%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$4.35x10^{-2}$	$1.96x10^{-2}$	$2.94x10^{-3}$	$3.15x10^{-4}$	$4.66x10^{-4}$	$4.41x10^{-4}$
	%	65%	29%	4.4%	0.47%	0.69%	0.66%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	195	20.2	9.17	1.13	1.10	0.928
	%	86%	8.8%	4%	0.5%	0.48%	0.41%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$8.22x10^{-5}$	$3.61x10^{-6}$	$3.46x10^{-6}$	$5.24x10^{-7}$	$2.67x10^{-7}$	$7.02x10^{-8}$
	%	91%	4%	3.8%	0.58%	0.3%	0.078%
Water use (WDP)[1]	m^3 World eq.	3.51	$8.74x10^{-2}$	0.150	$4.49x10^{-2}$	$5.76x10^{-3}$	$4.21x10^{-2}$
	%	91%	2.3%	3.9%	1.2%	0.15%	1.1%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 58. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits. (***Art Select - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$4.49x10^{-7}$	$8.81x10^{-8}$	$2.67x10^{-8}$	$4.97x10^{-9}$	$6.31x10^{-9}$	$6.21x10^{-9}$
	%	77%	15%	4.6%	0.85%	1.1%	1.1%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.166	$5.15x10^{-3}$	$6.98x10^{-3}$	$2.37x10^{-3}$	$4.75x10^{-4}$	$3.87x10^{-4}$
	%	92%	2.8%	3.8%	1.3%	0.26%	0.21%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	65.6	2.77	2.86	0.686	0.146	11.2
	%	79%	3.3%	3.4%	0.82%	0.18%	13%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$9.25x10^{-9}$	$2.86x10^{-10}$	$3.86x10^{-10}$	$2.13x10^{-11}$	$1.32x10^{-11}$	$8.35x10^{-12}$
	%	93%	2.9%	3.9%	0.21%	0.13%	0.084%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$8.49x10^{-8}$	$9.45x10^{-9}$	$4.07x10^{-9}$	$6.07x10^{-10}$	$6.88x10^{-10}$	$4.43x10^{-10}$
	%	85%	9.4%	4.1%	0.61%	0.69%	0.44%
Potential Soil quality index (SQP)[1]	Dimensionless	74.2	7.67	3.50	1.22	0.650	2.01
	%	83%	8.6%	3.9%	1.4%	0.73%	2.2%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 59. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Art Select - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	20.1	0.458	0.831	1.80	$3.58x10^{-2}$	$3.11x10^{-2}$
	%	86%	2%	3.6%	7.8%	0.15%	0.13%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	10.9	0.00	0.438	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	31.0	0.458	1.27	1.80	$3.58x10^{-2}$	$3.11x10^{-2}$
	%	90%	1.3%	3.7%	5.2%	0.1%	0.09%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	317	40.0	18.0	2.28	2.18	1.84
	%	83%	11%	4.7%	0.6%	0.57%	0.48%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	67.4	0.00	$1.33x10^{-2}$	0.00	0.00	0.00
	%	100%	0%	0.02%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	384	40.0	18.1	2.28	2.18	1.84
	%	86%	8.9%	4%	0.51%	0.49%	0.41%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$5.23x10^{-2}$	$1.48x10^{-3}$	$2.18x10^{-3}$	$3.78x10^{-4}$	$2.49x10^{-4}$	$9.23x10^{-5}$
	%	92%	2.6%	3.8%	0.67%	0.44%	0.16%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.228	$4.36x10^{-3}$	$7.74x10^{-3}$	$1.39x10^{-2}$	$2.66x10^{-4}$	$-1.49x10^{-2}$
	%	95%	1.8%	3.2%	5.8%	0.11%	-6.2%

Table 60. *Waste and outflows, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Art Select - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.475	$2.89x10^{-2}$	$2.08x10^{-2}$	$5.65x10^{-3}$	$1.12x10^{-3}$	$9.22x10^{-4}$
	%	89%	5.4%	3.9%	1.1%	0.21%	0.17%
Nonhazardous waste disposed (NHWD)	kg	10.6	0.178	1.55	0.115	$1.19x10^{-2}$	10.1
	%	47%	0.79%	6.9%	0.51%	0.053%	45%
Radioactive waste disposed (RWD)	kg	$1.06x10^{-4}$	$3.23x10^{-6}$	$4.43x10^{-6}$	$1.38x10^{-6}$	$3.23x10^{-7}$	$2.27x10^{-7}$
	%	92%	2.8%	3.8%	1.2%	0.28%	0.2%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	0.143	0.00	0.00	0.00
	%	0%	0%	100%	0%	0%	0%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$7.96x10^{-2}$	$2.71x10^{-3}$	$3.40x10^{-3}$	$8.49x10^{-4}$	$4.23x10^{-4}$	$4.11x10^{-4}$
	%	91%	3.1%	3.9%	0.97%	0.48%	0.47%
Exported thermal energy (EET)	MJ	$2.86x10^{-2}$	$1.99x10^{-3}$	$1.51x10^{-3}$	$5.81x10^{-4}$	$2.56x10^{-4}$	$2.57x10^{-3}$
	%	81%	5.6%	4.2%	1.6%	0.72%	7.2%

Table 61. *TRACI Life Cycle Impact Assessment results for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Art Select - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
TRACI							
Global warming	kg CO_2 eq	10.9	1.51	0.578	$8.23x10^{-2}$	$7.58x10^{-2}$	0.126
	%	82%	11%	4.4%	0.62%	0.57%	0.95%
Ozone depletion	kg CFC-11 eq	$7.17x10^{-6}$	$2.23x10^{-8}$	$2.89x10^{-7}$	$9.84x10^{-10}$	$1.78x10^{-9}$	$1.18x10^{-9}$
	%	96%	0.3%	3.9%	0.013%	0.024%	0.016%
Acidification	kg SO_2 eq	$3.98x10^{-2}$	$1.98x10^{-2}$	$2.59x10^{-3}$	$2.79x10^{-4}$	$2.82x10^{-4}$	$5.11x10^{-4}$
	%	63%	31%	4.1%	0.44%	0.45%	0.81%
Eutrophication	kg N eq	$3.57x10^{-2}$	$9.59x10^{-4}$	$1.52x10^{-3}$	$3.36x10^{-4}$	$2.85x10^{-5}$	$6.43x10^{-5}$
	%	92%	2.5%	3.9%	0.87%	0.074%	0.17%
Smog	kg O_3 eq	0.608	0.400	$4.69x10^{-2}$	$3.61x10^{-3}$	$7.96x10^{-3}$	$7.14x10^{-3}$
	%	57%	37%	4.4%	0.34%	0.74%	0.66%
Fossil fuel depletion	MJ surplus	23.4	2.81	1.13	0.131	0.155	0.133
	%	84%	10%	4.1%	0.47%	0.56%	0.48%

Table 62. *Key Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* (**Knight Tile - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	6.47	1.08	0.428	$4.98x10^{-2}$	$5.44x10^{-2}$	$8.95x10^{-2}$
	%	79%	13%	5.2%	0.61%	0.67%	1.1%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	6.48	1.08	0.334	$5.83x10^{-2}$	$5.43x10^{-2}$	$8.94x10^{-2}$
	%	80%	13%	4.1%	0.72%	0.67%	1.1%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	$-1.50x10^{-2}$	$1.29x10^{-4}$	$9.37x10^{-2}$	$-3.31x10^{-2}$	$3.75x10^{-5}$	$1.14x10^{-4}$
	%	-33%	0.28%	200%	-72%	0.082%	0.25%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$5.51x10^{-3}$	$5.31x10^{-4}$	$2.46x10^{-4}$	$2.47x10^{-2}$	$1.81x10^{-5}$	$1.15x10^{-5}$
	%	18%	1.7%	0.79%	80%	0.059%	0.037%
Global warming potential (GWP-GHG)	kg CO_2 eq.	6.70	1.08	0.377	$8.30x10^{-2}$	$5.44x10^{-2}$	$8.94x10^{-2}$
	%	80%	13%	4.5%	0.99%	0.65%	1.1%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$4.34x10^{-6}$	$1.49x10^{-8}$	$1.75x10^{-7}$	$9.19x10^{-10}$	$1.19x10^{-9}$	$7.72x10^{-10}$
	%	96%	0.33%	3.9%	0.02%	0.026%	0.017%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$2.58x10^{-2}$	$1.64x10^{-2}$	$1.85x10^{-3}$	$3.40x10^{-4}$	$2.22x10^{-4}$	$1.85x10^{-4}$
	%	58%	37%	4.1%	0.76%	0.5%	0.41%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$2.53x10^{-4}$	$9.38x10^{-6}$	$1.06x10^{-5}$	$3.04x10^{-6}$	$4.01x10^{-7}$	$2.46x10^{-7}$
	%	91%	3.4%	3.8%	1.1%	0.14%	0.089%
Eutrophication potential - marine (EP-marine)	kg N eq.	$5.14x10^{-3}$	$4.35x10^{-3}$	$4.72x10^{-4}$	$2.05x10^{-4}$	$8.27x10^{-5}$	$8.70x10^{-5}$
	%	50%	42%	4.6%	2%	0.8%	0.84%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$5.49x10^{-2}$	$4.83x10^{-2}$	$4.87x10^{-3}$	$9.20x10^{-4}$	$9.09x10^{-4}$	$7.94x10^{-4}$
	%	50%	44%	4.4%	0.83%	0.82%	0.72%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$2.62x10^{-2}$	$1.39x10^{-2}$	$1.91x10^{-3}$	$3.15x10^{-4}$	$3.29x10^{-4}$	$3.03x10^{-4}$
	%	61%	32%	4.4%	0.73%	0.77%	0.71%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	121	14.3	5.81	1.13	0.776	0.643
	%	84%	9.9%	4%	0.79%	0.54%	0.45%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$5.13x10^{-5}$	$2.55x10^{-6}$	$2.18x10^{-6}$	$5.24x10^{-7}$	$1.89x10^{-7}$	$4.77x10^{-8}$
	%	90%	4.5%	3.8%	0.92%	0.33%	0.084%
Water use (WDP)[1]	m^3 World eq.	2.19	$6.19x10^{-2}$	$9.45x10^{-2}$	$4.49x10^{-2}$	$4.07x10^{-3}$	$2.91x10^{-2}$
	%	90%	2.6%	3.9%	1.9%	0.17%	1.2%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 63. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits*. **(Knight Tile - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$2.28x10^{-7}$	$6.24x10^{-8}$	$1.54x10^{-8}$	$4.97x10^{-9}$	$4.45x10^{-9}$	$4.29x10^{-9}$
	%	71%	20%	4.8%	1.6%	1.4%	1.3%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.124	$3.65x10^{-3}$	$5.18x10^{-3}$	$2.37x10^{-3}$	$3.35x10^{-4}$	$2.56x10^{-4}$
	%	91%	2.7%	3.8%	1.8%	0.25%	0.19%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	41.2	1.96	1.83	0.686	0.103	6.93
	%	78%	3.7%	3.5%	1.3%	0.2%	13%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$5.58x10^{-9}$	$2.03x10^{-10}$	$2.35x10^{-10}$	$2.13x10^{-11}$	$9.34x10^{-12}$	$5.68x10^{-12}$
	%	92%	3.4%	3.9%	0.35%	0.15%	0.094%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$5.16x10^{-8}$	$6.69x10^{-9}$	$2.55x10^{-9}$	$6.07x10^{-10}$	$4.86x10^{-10}$	$2.86x10^{-10}$
	%	83%	11%	4.1%	0.98%	0.78%	0.46%
Potential Soil quality index (SQP)[1]	Dimensionless	53.2	5.43	2.50	1.22	0.459	1.38
	%	83%	8.5%	3.9%	1.9%	0.71%	2.1%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 64. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*
(Knight Tile - Distributed to North America)

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	13.6	0.325	0.564	1.80	$2.53x10^{-2}$	$2.06x10^{-2}$
	%	83%	2%	3.4%	11%	0.15%	0.13%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	7.63	0.00	0.305	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	21.2	0.325	0.869	1.80	$2.53x10^{-2}$	$2.06x10^{-2}$
	%	87%	1.3%	3.6%	7.4%	0.1%	0.085%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	196	28.4	11.4	2.28	1.54	1.28
	%	81%	12%	4.7%	0.95%	0.64%	0.53%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	41.9	0.00	$1.04x10^{-2}$	0.00	0.00	0.00
	%	100%	0%	0.025%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	238	28.4	11.4	2.28	1.54	1.28
	%	84%	10%	4%	0.81%	0.54%	0.45%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$5.46x10^{-2}$	$1.05x10^{-3}$	$2.24x10^{-3}$	$3.78x10^{-4}$	$1.76x10^{-4}$	$6.28x10^{-5}$
	%	93%	1.8%	3.8%	0.65%	0.3%	0.11%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.146	$3.09x10^{-3}$	$4.90x10^{-3}$	$1.39x10^{-2}$	$1.88x10^{-4}$	$-9.12x10^{-3}$
	%	92%	1.9%	3.1%	8.7%	0.12%	-5.7%

Table 65. *Waste and outflows, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Knight Tile - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.274	$2.05x10^{-2}$	$1.23x10^{-2}$	$5.65x10^{-3}$	$7.89x10^{-4}$	$6.26x10^{-4}$
	%	87%	6.5%	3.9%	1.8%	0.25%	0.2%
Nonhazardous waste disposed (NHWD)	kg	7.32	0.126	1.07	0.115	$8.43x10^{-3}$	6.28
	%	49%	0.85%	7.1%	0.77%	0.057%	42%
Radioactive waste disposed (RWD)	kg	$7.33x10^{-5}$	$2.29x10^{-6}$	$3.07x10^{-6}$	$1.38x10^{-6}$	$2.28x10^{-7}$	$1.50x10^{-7}$
	%	91%	2.8%	3.8%	1.7%	0.28%	0.19%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	0.121	0.00	0.00	0.00
	%	0%	0%	100%	0%	0%	0%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$5.85x10^{-2}$	$1.92x10^{-3}$	$2.50x10^{-3}$	$8.49x10^{-4}$	$2.99x10^{-4}$	$2.64x10^{-4}$
	%	91%	3%	3.9%	1.3%	0.46%	0.41%
Exported thermal energy (EET)	MJ	$1.79x10^{-2}$	$1.41x10^{-3}$	$9.67x10^{-4}$	$5.81x10^{-4}$	$1.81x10^{-4}$	$1.60x10^{-3}$
	%	79%	6.2%	4.3%	2.6%	0.8%	7.1%

Table 66. *TRACI Life Cycle Impact Assessment results for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Knight Tile - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
TRACI							
Global warming	kg CO_2 eq	6.56	1.07	0.368	$8.23x10^{-2}$	$5.35x10^{-2}$	$8.08x10^{-2}$
	%	80%	13%	4.5%	1%	0.65%	0.98%
Ozone depletion	kg CFC-11 eq	$4.63x10^{-6}$	$1.58x10^{-8}$	$1.86x10^{-7}$	$9.84x10^{-10}$	$1.26x10^{-9}$	$8.15x10^{-10}$
	%	96%	0.33%	3.9%	0.02%	0.026%	0.017%
Acidification	kg SO_2 eq	$2.33x10^{-2}$	$1.41x10^{-2}$	$1.64x10^{-3}$	$2.79x10^{-4}$	$1.99x10^{-4}$	$3.35x10^{-4}$
	%	58%	35%	4.1%	0.7%	0.5%	0.84%
Eutrophication	kg N eq	$2.26x10^{-2}$	$6.80x10^{-4}$	$9.74x10^{-4}$	$3.36x10^{-4}$	$2.01x10^{-5}$	$4.19x10^{-5}$
	%	92%	2.8%	3.9%	1.4%	0.082%	0.17%
Smog	kg O_3 eq	0.357	0.284	$3.04x10^{-2}$	$3.61x10^{-3}$	$5.62x10^{-3}$	$4.93x10^{-3}$
	%	52%	41%	4.4%	0.53%	0.82%	0.72%
Fossil fuel depletion	MJ surplus	14.7	1.99	0.726	0.131	0.110	$9.24x10^{-2}$
	%	83%	11%	4.1%	0.74%	0.62%	0.52%

Table 67. *Key Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Opus - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	6.47	1.08	0.428	$4.98x10^{-2}$	$5.44x10^{-2}$	$8.95x10^{-2}$
	%	79%	13%	5.2%	0.61%	0.67%	1.1%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	6.48	1.08	0.334	$5.83x10^{-2}$	$5.43x10^{-2}$	$8.94x10^{-2}$
	%	80%	13%	4.1%	0.72%	0.67%	1.1%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	$-1.50x10^{-2}$	$1.29x10^{-4}$	$9.37x10^{-2}$	$-3.31x10^{-2}$	$3.75x10^{-5}$	$1.14x10^{-4}$
	%	-33%	0.28%	200%	-72%	0.082%	0.25%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$5.51x10^{-3}$	$5.31x10^{-4}$	$2.46x10^{-4}$	$2.47x10^{-2}$	$1.81x10^{-5}$	$1.15x10^{-5}$
	%	18%	1.7%	0.79%	80%	0.059%	0.037%
Global warming potential (GWP-GHG)	kg CO_2 eq.	6.70	1.08	0.377	$8.30x10^{-2}$	$5.44x10^{-2}$	$8.94x10^{-2}$
	%	80%	13%	4.5%	0.99%	0.65%	1.1%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$4.34x10^{-6}$	$1.49x10^{-8}$	$1.75x10^{-7}$	$9.19x10^{-10}$	$1.19x10^{-9}$	$7.72x10^{-10}$
	%	96%	0.33%	3.9%	0.02%	0.026%	0.017%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$2.58x10^{-2}$	$1.64x10^{-2}$	$1.85x10^{-3}$	$3.40x10^{-4}$	$2.22x10^{-4}$	$1.85x10^{-4}$
	%	58%	37%	4.1%	0.76%	0.5%	0.41%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$2.53x10^{-4}$	$9.38x10^{-6}$	$1.06x10^{-5}$	$3.04x10^{-6}$	$4.01x10^{-7}$	$2.46x10^{-7}$
	%	91%	3.4%	3.8%	1.1%	0.14%	0.089%
Eutrophication potential - marine (EP-marine)	kg N eq.	$5.14x10^{-3}$	$4.35x10^{-3}$	$4.72x10^{-4}$	$2.05x10^{-4}$	$8.27x10^{-5}$	$8.70x10^{-5}$
	%	50%	42%	4.6%	2%	0.8%	0.84%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$5.49x10^{-2}$	$4.83x10^{-2}$	$4.87x10^{-3}$	$9.20x10^{-4}$	$9.09x10^{-4}$	$7.94x10^{-4}$
	%	50%	44%	4.4%	0.83%	0.82%	0.72%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$2.62x10^{-2}$	$1.39x10^{-2}$	$1.91x10^{-3}$	$3.15x10^{-4}$	$3.29x10^{-4}$	$3.03x10^{-4}$
	%	61%	32%	4.4%	0.73%	0.77%	0.71%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	121	14.3	5.81	1.13	0.776	0.643
	%	84%	9.9%	4%	0.79%	0.54%	0.45%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$5.13x10^{-5}$	$2.55x10^{-6}$	$2.18x10^{-6}$	$5.24x10^{-7}$	$1.89x10^{-7}$	$4.77x10^{-8}$
	%	90%	4.5%	3.8%	0.92%	0.33%	0.084%
Water use (WDP)[1]	m^3 World eq.	2.19	$6.19x10^{-2}$	$9.45x10^{-2}$	$4.49x10^{-2}$	$4.07x10^{-3}$	$2.91x10^{-2}$
	%	90%	2.6%	3.9%	1.9%	0.17%	1.2%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 68. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Opus - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$2.28x10^{-7}$	$6.24x10^{-8}$	$1.54x10^{-8}$	$4.97x10^{-9}$	$4.45x10^{-9}$	$4.29x10^{-9}$
	%	71%	20%	4.8%	1.6%	1.4%	1.3%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.124	$3.65x10^{-3}$	$5.18x10^{-3}$	$2.37x10^{-3}$	$3.35x10^{-4}$	$2.56x10^{-4}$
	%	91%	2.7%	3.8%	1.8%	0.25%	0.19%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	41.2	1.96	1.83	0.686	0.103	6.93
	%	78%	3.7%	3.5%	1.3%	0.2%	13%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$5.58x10^{-9}$	$2.03x10^{-10}$	$2.35x10^{-10}$	$2.13x10^{-11}$	$9.34x10^{-12}$	$5.68x10^{-12}$
	%	92%	3.4%	3.9%	0.35%	0.15%	0.094%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$5.16x10^{-8}$	$6.69x10^{-9}$	$2.55x10^{-9}$	$6.07x10^{-10}$	$4.86x10^{-10}$	$2.86x10^{-10}$
	%	83%	11%	4.1%	0.98%	0.78%	0.46%
Potential Soil quality index (SQP)[1]	Dimensionless	53.2	5.43	2.50	1.22	0.459	1.38
	%	83%	8.5%	3.9%	1.9%	0.71%	2.1%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 69. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.*
(Opus - Distributed to North America)

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	13.6	0.325	0.564	1.80	$2.53x10^{-2}$	$2.06x10^{-2}$
	%	83%	2%	3.4%	11%	0.15%	0.13%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	7.63	0.00	0.305	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	21.2	0.325	0.869	1.80	$2.53x10^{-2}$	$2.06x10^{-2}$
	%	87%	1.3%	3.6%	7.4%	0.1%	0.085%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	196	28.4	11.4	2.28	1.54	1.28
	%	81%	12%	4.7%	0.95%	0.64%	0.53%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	41.9	0.00	$1.04x10^{-2}$	0.00	0.00	0.00
	%	100%	0%	0.025%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	238	28.4	11.4	2.28	1.54	1.28
	%	84%	10%	4%	0.81%	0.54%	0.45%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$5.46x10^{-2}$	$1.05x10^{-3}$	$2.24x10^{-3}$	$3.78x10^{-4}$	$1.76x10^{-4}$	$6.28x10^{-5}$
	%	93%	1.8%	3.8%	0.65%	0.3%	0.11%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.146	$3.09x10^{-3}$	$4.90x10^{-3}$	$1.39x10^{-2}$	$1.88x10^{-4}$	$-9.12x10^{-3}$
	%	92%	1.9%	3.1%	8.7%	0.12%	-5.7%

Table 70. *Waste and outflows, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits*. **(Opus - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.274	$2.05x10^{-2}$	$1.23x10^{-2}$	$5.65x10^{-3}$	$7.89x10^{-4}$	$6.26x10^{-4}$
	%	87%	6.5%	3.9%	1.8%	0.25%	0.2%
Nonhazardous waste disposed (NHWD)	kg	7.32	0.126	1.07	0.115	$8.43x10^{-3}$	6.28
	%	49%	0.85%	7.1%	0.77%	0.057%	42%
Radioactive waste disposed (RWD)	kg	$7.33x10^{-5}$	$2.29x10^{-6}$	$3.07x10^{-6}$	$1.38x10^{-6}$	$2.28x10^{-7}$	$1.50x10^{-7}$
	%	91%	2.8%	3.8%	1.7%	0.28%	0.19%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	0.121	0.00	0.00	0.00
	%	0%	0%	100%	0%	0%	0%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$5.85x10^{-2}$	$1.92x10^{-3}$	$2.50x10^{-3}$	$8.49x10^{-4}$	$2.99x10^{-4}$	$2.64x10^{-4}$
	%	91%	3%	3.9%	1.3%	0.46%	0.41%
Exported thermal energy (EET)	MJ	$1.79x10^{-2}$	$1.41x10^{-3}$	$9.67x10^{-4}$	$5.81x10^{-4}$	$1.81x10^{-4}$	$1.60x10^{-3}$
	%	79%	6.2%	4.3%	2.6%	0.8%	7.1%

Table 71. *TRACI Life Cycle Impact Assessment results for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Opus - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
TRACI							
Global warming	kg CO_2 eq	6.56	1.07	0.368	$8.23x10^{-2}$	$5.35x10^{-2}$	$8.08x10^{-2}$
	%	80%	13%	4.5%	1%	0.65%	0.98%
Ozone depletion	kg CFC-11 eq	$4.63x10^{-6}$	$1.58x10^{-8}$	$1.86x10^{-7}$	$9.84x10^{-10}$	$1.26x10^{-9}$	$8.15x10^{-10}$
	%	96%	0.33%	3.9%	0.02%	0.026%	0.017%
Acidification	kg SO_2 eq	$2.33x10^{-2}$	$1.41x10^{-2}$	$1.64x10^{-3}$	$2.79x10^{-4}$	$1.99x10^{-4}$	$3.35x10^{-4}$
	%	58%	35%	4.1%	0.7%	0.5%	0.84%
Eutrophication	kg N eq	$2.26x10^{-2}$	$6.80x10^{-4}$	$9.74x10^{-4}$	$3.36x10^{-4}$	$2.01x10^{-5}$	$4.19x10^{-5}$
	%	92%	2.8%	3.9%	1.4%	0.082%	0.17%
Smog	kg O_3 eq	0.357	0.284	$3.04x10^{-2}$	$3.61x10^{-3}$	$5.62x10^{-3}$	$4.93x10^{-3}$
	%	52%	41%	4.4%	0.53%	0.82%	0.72%
Fossil fuel depletion	MJ surplus	14.7	1.99	0.726	0.131	0.110	$9.24x10^{-2}$
	%	83%	11%	4.1%	0.74%	0.62%	0.52%

Table 72. *Key Life Cycle Impact Assessment results, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* (**K-Trade Gluedown 20mil - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	8.88	1.19	0.439	$4.98x10^{-2}$	$6.84x10^{-2}$	0.121
	%	83%	11%	4.1%	0.46%	0.64%	1.1%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	8.78	1.19	0.409	$5.83x10^{-2}$	$6.83x10^{-2}$	0.120
	%	83%	11%	3.8%	0.55%	0.64%	1.1%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	$8.70x10^{-2}$	$1.71x10^{-4}$	$3.03x10^{-2}$	$-3.31x10^{-2}$	$4.72x10^{-5}$	$1.55x10^{-4}$
	%	100%	0.2%	36%	-39%	0.056%	0.18%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$7.34x10^{-3}$	$5.79x10^{-4}$	$3.18x10^{-4}$	$2.47x10^{-2}$	$2.28x10^{-5}$	$1.43x10^{-5}$
	%	22%	1.8%	0.97%	75%	0.069%	0.043%
Global warming potential (GWP-GHG)	kg CO_2 eq.	8.91	1.19	0.426	$8.30x10^{-2}$	$6.84x10^{-2}$	0.121
	%	82%	11%	3.9%	0.77%	0.63%	1.1%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$4.76x10^{-6}$	$1.64x10^{-8}$	$1.91x10^{-7}$	$9.19x10^{-10}$	$1.50x10^{-9}$	$9.88x10^{-10}$
	%	96%	0.33%	3.8%	0.018%	0.03%	0.02%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$3.27x10^{-2}$	$1.66x10^{-2}$	$2.02x10^{-3}$	$3.40x10^{-4}$	$2.79x10^{-4}$	$2.36x10^{-4}$
	%	63%	32%	3.9%	0.65%	0.53%	0.45%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$3.82x10^{-4}$	$1.08x10^{-5}$	$1.57x10^{-5}$	$3.04x10^{-6}$	$5.04x10^{-7}$	$3.13x10^{-7}$
	%	93%	2.6%	3.8%	0.74%	0.12%	0.076%
Eutrophication potential - marine (EP-marine)	kg N eq.	$7.30x10^{-3}$	$4.45x10^{-3}$	$4.99x10^{-4}$	$2.05x10^{-4}$	$1.04x10^{-4}$	$1.13x10^{-4}$
	%	58%	35%	3.9%	1.6%	0.82%	0.89%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$7.88x10^{-2}$	$4.94x10^{-2}$	$5.34x10^{-3}$	$9.20x10^{-4}$	$1.14x10^{-3}$	$1.01x10^{-3}$
	%	58%	36%	3.9%	0.67%	0.84%	0.74%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$3.46x10^{-2}$	$1.43x10^{-2}$	$2.04x10^{-3}$	$3.15x10^{-4}$	$4.13x10^{-4}$	$3.88x10^{-4}$
	%	66%	28%	3.9%	0.6%	0.79%	0.75%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	168	15.8	7.47	1.13	0.975	0.819
	%	86%	8.2%	3.8%	0.58%	0.5%	0.42%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$6.76x10^{-5}$	$2.95x10^{-6}$	$2.83x10^{-6}$	$5.24x10^{-7}$	$2.37x10^{-7}$	$6.16x10^{-8}$
	%	91%	4%	3.8%	0.71%	0.32%	0.083%
Water use (WDP)[1]	m^3 World eq.	3.12	$7.05x10^{-2}$	0.130	$4.49x10^{-2}$	$5.11x10^{-3}$	$3.71x10^{-2}$
	%	92%	2.1%	3.8%	1.3%	0.15%	1.1%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 73. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* (**K-Trade Gluedown 20mil - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$3.07x10^{-7}$	$7.17x10^{-8}$	$1.62x10^{-8}$	$4.97x10^{-9}$	$5.60x10^{-9}$	$5.48x10^{-9}$
	%	75%	17%	4%	1.2%	1.4%	1.3%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.339	$4.16x10^{-3}$	$1.38x10^{-2}$	$2.37x10^{-3}$	$4.21x10^{-4}$	$3.37x10^{-4}$
	%	94%	1.2%	3.8%	0.66%	0.12%	0.094%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	52.0	2.26	2.21	0.686	0.129	9.55
	%	78%	3.4%	3.3%	1%	0.19%	14%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$7.14x10^{-9}$	$2.21x10^{-10}$	$2.96x10^{-10}$	$2.13x10^{-11}$	$1.17x10^{-11}$	$7.33x10^{-12}$
	%	93%	2.9%	3.8%	0.28%	0.15%	0.095%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$6.97x10^{-8}$	$7.71x10^{-9}$	$3.16x10^{-9}$	$6.07x10^{-10}$	$6.11x10^{-10}$	$3.83x10^{-10}$
	%	85%	9.4%	3.9%	0.74%	0.74%	0.47%
Potential Soil quality index (SQP)[1]	Dimensionless	29.4	6.41	1.51	1.22	0.577	1.77
	%	72%	16%	3.7%	3%	1.4%	4.3%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 74. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(K-Trade Gluedown 20mil - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	5.95	0.185	0.247	0.902	$1.59x10^{-2}$	$1.36x10^{-2}$
	%	81%	2.5%	3.4%	12%	0.22%	0.19%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	0.967	0.00	$3.87x10^{-2}$	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	6.92	0.185	0.285	0.902	$1.59x10^{-2}$	$1.36x10^{-2}$
	%	83%	2.2%	3.4%	11%	0.19%	0.16%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	136	15.7	7.34	1.14	0.968	0.813
	%	84%	9.7%	4.5%	0.7%	0.6%	0.5%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	28.9	0.00	$3.17x10^{-3}$	0.00	0.00	0.00
	%	100%	0%	0.011%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	165	15.7	7.35	1.14	0.968	0.813
	%	86%	8.2%	3.8%	0.6%	0.51%	0.43%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$5.41x10^{-2}$	$1.19x10^{-3}$	$2.22x10^{-3}$	$3.78x10^{-4}$	$2.21x10^{-4}$	$8.10x10^{-5}$
	%	93%	2%	3.8%	0.65%	0.38%	0.14%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	0.115	$1.76x10^{-3}$	$4.58x10^{-3}$	$6.94x10^{-3}$	$1.18x10^{-4}$	$-6.35x10^{-3}$
	%	94%	1.5%	3.8%	5.7%	0.097%	-5.2%

Table 75. *Waste and outflows, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits*. **(K-Trade Gluedown 20mil - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.402	$2.32x10^{-2}$	$1.71x10^{-2}$	$5.65x10^{-3}$	$9.92x10^{-4}$	$8.09x10^{-4}$
	%	89%	5.2%	3.8%	1.3%	0.22%	0.18%
Nonhazardous waste disposed (NHWD)	kg	15.5	0.141	0.778	0.115	$1.06x10^{-2}$	8.66
	%	62%	0.56%	3.1%	0.46%	0.042%	34%
Radioactive waste disposed (RWD)	kg	$2.36x10^{-4}$	$2.60x10^{-6}$	$9.54x10^{-6}$	$1.38x10^{-6}$	$2.87x10^{-7}$	$1.98x10^{-7}$
	%	94%	1%	3.8%	0.55%	0.11%	0.079%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	$2.55x10^{-2}$	0.00	0.00	0.00
	%	0%	0%	100%	0%	0%	0%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$6.14x10^{-2}$	$1.09x10^{-3}$	$2.51x10^{-3}$	$4.25x10^{-4}$	$1.88x10^{-4}$	$1.77x10^{-4}$
	%	93%	1.7%	3.8%	0.65%	0.29%	0.27%
Exported thermal energy (EET)	MJ	$2.50x10^{-2}$	$1.65x10^{-3}$	$1.10x10^{-3}$	$5.81x10^{-4}$	$2.27x10^{-4}$	$2.20x10^{-3}$
	%	81%	5.4%	3.6%	1.9%	0.74%	7.1%

Table 76. *TRACI Life Cycle Impact Assessment results for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(K-Trade Gluedown 20mil - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
TRACI							
Global warming	kg CO_2 eq	8.74	1.18	0.418	$8.23x10^{-2}$	$6.73x10^{-2}$	0.109
	%	83%	11%	3.9%	0.78%	0.64%	1%
Ozone depletion	kg CFC-11 eq	$5.22x10^{-6}$	$1.74x10^{-8}$	$2.10x10^{-7}$	$9.84x10^{-10}$	$1.58x10^{-9}$	$1.04x10^{-9}$
	%	96%	0.32%	3.8%	0.018%	0.029%	0.019%
Acidification	kg SO_2 eq	$2.98x10^{-2}$	$1.43x10^{-2}$	$1.81x10^{-3}$	$2.79x10^{-4}$	$2.50x10^{-4}$	$4.44x10^{-4}$
	%	64%	30%	3.9%	0.6%	0.53%	0.95%
Eutrophication	kg N eq	$2.77x10^{-2}$	$7.17x10^{-4}$	$1.15x10^{-3}$	$3.36x10^{-4}$	$2.53x10^{-5}$	$5.58x10^{-5}$
	%	92%	2.4%	3.8%	1.1%	0.085%	0.19%
Smog	kg O_3 eq	0.499	0.291	$3.30x10^{-2}$	$3.61x10^{-3}$	$7.07x10^{-3}$	$6.29x10^{-3}$
	%	59%	35%	3.9%	0.43%	0.84%	0.75%
Fossil fuel depletion	MJ surplus	18.8	2.20	0.859	0.131	0.138	0.118
	%	85%	9.9%	3.9%	0.59%	0.62%	0.53%

Table 77. *Key Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(K-Trade Gluedown 12mil - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	7.09	0.995	0.347	$4.98x10^{-2}$	$5.72x10^{-2}$	$8.93x10^{-2}$
	%	82%	12%	4%	0.58%	0.66%	1%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	6.99	0.994	0.326	$5.83x10^{-2}$	$5.71x10^{-2}$	$8.91x10^{-2}$
	%	82%	12%	3.8%	0.68%	0.67%	1%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	$8.83x10^{-2}$	$1.43x10^{-4}$	$2.04x10^{-2}$	$-3.31x10^{-2}$	$3.94x10^{-5}$	$1.12x10^{-4}$
	%	120%	0.19%	27%	-44%	0.052%	0.15%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$5.63x10^{-3}$	$4.83x10^{-4}$	$2.46x10^{-4}$	$2.47x10^{-2}$	$1.90x10^{-5}$	$1.22x10^{-5}$
	%	18%	1.6%	0.79%	79%	0.061%	0.039%
Global warming potential (GWP-GHG)	kg CO_2 eq.	7.09	0.995	0.338	$8.30x10^{-2}$	$5.71x10^{-2}$	$8.92x10^{-2}$
	%	82%	11%	3.9%	0.96%	0.66%	1%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$3.50x10^{-6}$	$1.37x10^{-8}$	$1.41x10^{-7}$	$9.19x10^{-10}$	$1.25x10^{-9}$	$8.01x10^{-10}$
	%	96%	0.37%	3.8%	0.025%	0.034%	0.022%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$2.59x10^{-2}$	$1.38x10^{-2}$	$1.62x10^{-3}$	$3.40x10^{-4}$	$2.33x10^{-4}$	$1.92x10^{-4}$
	%	62%	33%	3.8%	0.81%	0.55%	0.46%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$3.24x10^{-4}$	$9.04x10^{-6}$	$1.33x10^{-5}$	$3.04x10^{-6}$	$4.21x10^{-7}$	$2.57x10^{-7}$
	%	93%	2.6%	3.8%	0.87%	0.12%	0.073%
Eutrophication potential - marine (EP-marine)	kg N eq.	$5.96x10^{-3}$	$3.71x10^{-3}$	$4.06x10^{-4}$	$2.05x10^{-4}$	$8.69x10^{-5}$	$8.95x10^{-5}$
	%	57%	35%	3.9%	2%	0.83%	0.86%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$6.41x10^{-2}$	$4.12x10^{-2}$	$4.36x10^{-3}$	$9.20x10^{-4}$	$9.55x10^{-4}$	$8.25x10^{-4}$
	%	57%	37%	3.9%	0.82%	0.85%	0.73%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$2.72x10^{-2}$	$1.19x10^{-2}$	$1.63x10^{-3}$	$3.15x10^{-4}$	$3.45x10^{-4}$	$3.13x10^{-4}$
	%	65%	29%	3.9%	0.75%	0.83%	0.75%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	132	13.2	5.91	1.13	0.815	0.669
	%	86%	8.6%	3.8%	0.74%	0.53%	0.43%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$4.97x10^{-5}$	$2.46x10^{-6}$	$2.09x10^{-6}$	$5.24x10^{-7}$	$1.98x10^{-7}$	$4.91x10^{-8}$
	%	90%	4.5%	3.8%	0.95%	0.36%	0.089%
Water use (WDP)[1]	m^3 World eq.	2.39	$5.88x10^{-2}$	$9.94x10^{-2}$	$4.49x10^{-2}$	$4.27x10^{-3}$	$3.02x10^{-2}$
	%	91%	2.2%	3.8%	1.7%	0.16%	1.2%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 78. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded o three significant digits*. **(K-Trade Gluedown 12mil - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$2.34x10^{-7}$	$5.98x10^{-8}$	$1.25x10^{-8}$	$4.97x10^{-9}$	$4.68x10^{-9}$	$4.46x10^{-9}$
	%	73%	19%	3.9%	1.5%	1.5%	1.4%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.309	$3.46x10^{-3}$	$1.25x10^{-2}$	$2.37x10^{-3}$	$3.52x10^{-4}$	$2.60x10^{-4}$
	%	94%	1.1%	3.8%	0.72%	0.11%	0.079%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	40.0	1.89	1.70	0.686	0.108	6.79
	%	78%	3.7%	3.3%	1.3%	0.21%	13%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$5.22x10^{-9}$	$1.84x10^{-10}$	$2.17x10^{-10}$	$2.13x10^{-11}$	$9.81x10^{-12}$	$5.85x10^{-12}$
	%	92%	3.3%	3.8%	0.38%	0.17%	0.1%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$5.37x10^{-8}$	$6.43x10^{-9}$	$2.45x10^{-9}$	$6.07x10^{-10}$	$5.11x10^{-10}$	$2.87x10^{-10}$
	%	84%	10%	3.8%	0.95%	0.8%	0.45%
Potential Soil quality index (SQP)[1]	Dimensionless	22.4	5.35	1.17	1.22	0.482	1.43
	%	70%	17%	3.7%	3.8%	1.5%	4.5%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 79. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(K-Trade Gluedown 12mil - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	4.47	0.154	0.186	0.902	$1.33x10^{-2}$	$1.04x10^{-2}$
	%	78%	2.7%	3.2%	16%	0.23%	0.18%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	0.636	0.00	$2.55x10^{-2}$	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	5.11	0.154	0.211	0.902	$1.33x10^{-2}$	$1.04x10^{-2}$
	%	80%	2.4%	3.3%	14%	0.21%	0.16%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	110	13.1	5.81	1.14	0.809	0.664
	%	84%	10%	4.4%	0.87%	0.62%	0.51%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	20.5	0.00	$2.60x10^{-3}$	0.00	0.00	0.00
	%	100%	0%	0.013%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	130	13.1	5.81	1.14	0.809	0.664
	%	86%	8.6%	3.8%	0.75%	0.53%	0.44%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$4.47x10^{-2}$	$9.89x10^{-4}$	$1.83x10^{-3}$	$3.78x10^{-4}$	$1.85x10^{-4}$	$6.48x10^{-5}$
	%	93%	2.1%	3.8%	0.79%	0.38%	0.13%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	$9.06x10^{-2}$	$1.47x10^{-3}$	$3.63x10^{-3}$	$6.94x10^{-3}$	$9.85x10^{-5}$	$-4.42x10^{-3}$
	%	92%	1.5%	3.7%	7.1%	0.1%	-4.5%

Table 80. *Waste and outflows, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits*. **(K-Trade Gluedown 12mil - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.320	$1.93x10^{-2}$	$1.37x10^{-2}$	$5.65x10^{-3}$	$8.29x10^{-4}$	$6.45x10^{-4}$
	%	89%	5.4%	3.8%	1.6%	0.23%	0.18%
Nonhazardous waste disposed (NHWD)	kg	13.7	0.118	0.661	0.115	$8.86x10^{-3}$	6.15
	%	66%	0.57%	3.2%	0.55%	0.043%	30%
Radioactive waste disposed (RWD)	kg	$2.16x10^{-4}$	$2.17x10^{-6}$	$8.73x10^{-6}$	$1.38x10^{-6}$	$2.40x10^{-7}$	$1.53x10^{-7}$
	%	94%	0.95%	3.8%	0.61%	0.11%	0.067%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	$1.44x10^{-2}$	0.00	0.00	0.00
	%	0%	0%	100%	0%	0%	0%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$5.33x10^{-2}$	$9.11x10^{-4}$	$2.18x10^{-3}$	$4.25x10^{-4}$	$1.57x10^{-4}$	$1.32x10^{-4}$
	%	93%	1.6%	3.8%	0.74%	0.27%	0.23%
Exported thermal energy (EET)	MJ	$1.84x10^{-2}$	$1.37x10^{-3}$	$8.20x10^{-4}$	$5.81x10^{-4}$	$1.90x10^{-4}$	$1.56x10^{-3}$
	%	80%	6%	3.6%	2.5%	0.83%	6.8%

Table 81. *TRACI Life Cycle Impact Assessment results for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(K-Trade Gluedown 12mil - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
TRACI							
Global warming	kg CO_2 eq	6.97	0.982	0.331	$8.23x10^{-2}$	$5.63x10^{-2}$	$8.07x10^{-2}$
	%	82%	12%	3.9%	0.97%	0.66%	0.95%
Ozone depletion	kg CFC-11 eq	$3.83x10^{-6}$	$1.45x10^{-8}$	$1.54x10^{-7}$	$9.84x10^{-10}$	$1.32x10^{-9}$	$8.46x10^{-10}$
	%	96%	0.36%	3.8%	0.025%	0.033%	0.021%
Acidification	kg SO_2 eq	$2.36x10^{-2}$	$1.19x10^{-2}$	$1.45x10^{-3}$	$2.79x10^{-4}$	$2.09x10^{-4}$	$3.38x10^{-4}$
	%	62%	32%	3.8%	0.74%	0.55%	0.9%
Eutrophication	kg N eq	$2.08x10^{-2}$	$5.98x10^{-4}$	$8.64x10^{-4}$	$3.36x10^{-4}$	$2.12x10^{-5}$	$4.22x10^{-5}$
	%	92%	2.6%	3.8%	1.5%	0.094%	0.19%
Smog	kg O_3 eq	0.402	0.243	$2.67x10^{-2}$	$3.61x10^{-3}$	$5.91x10^{-3}$	$5.12x10^{-3}$
	%	59%	35%	3.9%	0.53%	0.86%	0.75%
Fossil fuel depletion	MJ surplus	14.4	1.83	0.663	0.131	0.115	$9.62x10^{-2}$
	%	84%	11%	3.8%	0.76%	0.67%	0.56%

Table 82. *Key Life Cycle Impact Assessment results, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits*. **(Van Gogh - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Core Indicators							
Global Warming Potential - total (GWP-total)	kg CO_2 eq.	8.03	1.68	0.494	$4.98x10^{-2}$	$8.17x10^{-2}$	0.132
	%	77%	16%	4.7%	0.48%	0.78%	1.3%
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO_2 eq.	8.25	1.67	0.422	$5.83x10^{-2}$	$8.16x10^{-2}$	0.132
	%	78%	16%	4%	0.55%	0.77%	1.2%
Global Warming Potential - biogenic (GWP-biogenic)	kg CO_2 eq.	-0.221	$1.75x10^{-4}$	$7.17x10^{-2}$	$-3.31x10^{-2}$	$5.63x10^{-5}$	$1.67x10^{-4}$
	%	120%	-0.096%	-39%	18%	-0.031%	-0.092%
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO_2 eq.	$6.81x10^{-3}$	$8.25x10^{-4}$	$3.09x10^{-4}$	$2.47x10^{-2}$	$2.72x10^{-5}$	$1.73x10^{-5}$
	%	21%	2.5%	0.95%	76%	0.083%	0.053%
Global warming potential (GWP-GHG)	kg CO_2 eq.	8.29	1.68	0.455	$8.30x10^{-2}$	$8.16x10^{-2}$	0.132
	%	77%	16%	4.2%	0.77%	0.76%	1.2%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.	$5.42x10^{-6}$	$2.31x10^{-8}$	$2.18x10^{-7}$	$9.19x10^{-10}$	$1.79x10^{-9}$	$1.15x10^{-9}$
	%	96%	0.41%	3.9%	0.016%	0.032%	0.02%
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq.	$3.96x10^{-2}$	$2.67x10^{-2}$	$2.78x10^{-3}$	$3.40x10^{-4}$	$3.33x10^{-4}$	$2.77x10^{-4}$
	%	57%	38%	4%	0.49%	0.48%	0.4%
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.	$3.28x10^{-4}$	$1.41x10^{-5}$	$1.37x10^{-5}$	$3.04x10^{-6}$	$6.02x10^{-7}$	$3.69x10^{-7}$
	%	91%	3.9%	3.8%	0.85%	0.17%	0.1%
Eutrophication potential - marine (EP-marine)	kg N eq.	$6.99x10^{-3}$	$7.04x10^{-3}$	$6.40x10^{-4}$	$2.05x10^{-4}$	$1.24x10^{-4}$	$1.30x10^{-4}$
	%	46%	47%	4.2%	1.4%	0.82%	0.86%
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.	$7.72x10^{-2}$	$7.81x10^{-2}$	$6.84x10^{-3}$	$9.20x10^{-4}$	$1.36x10^{-3}$	$1.19x10^{-3}$
	%	47%	47%	4.1%	0.56%	0.82%	0.72%
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq.	$3.46x10^{-2}$	$2.23x10^{-2}$	$2.53x10^{-3}$	$3.15x10^{-4}$	$4.93x10^{-4}$	$4.52x10^{-4}$
	%	57%	37%	4.2%	0.52%	0.81%	0.74%
Depletion of abiotic resources - fossil fuels (ADPF)[1]	MJ	150	22.0	7.23	1.13	1.16	0.962
	%	82%	12%	4%	0.62%	0.64%	0.53%
Depletion of abiotic resources - minerals and metals (ADPE)[1]	kg Sb eq.	$6.72x10^{-5}$	$3.82x10^{-6}$	$2.86x10^{-6}$	$5.24x10^{-7}$	$2.84x10^{-7}$	$7.11x10^{-8}$
	%	90%	5.1%	3.8%	0.7%	0.38%	0.095%
Water use (WDP)[1]	m^3 World eq.	2.85	$9.37x10^{-2}$	0.122	$4.49x10^{-2}$	$6.10x10^{-3}$	$4.35x10^{-2}$
	%	90%	3%	3.9%	1.4%	0.19%	1.4%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

Table 83. *Other Life Cycle Impact Assessment results, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits*. **(Van Gogh - Distributed to North America)**

Impact Category	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Additional Indicators							
Potential incidence of disease due to PM emissions (PM)	Disease Incidence	$2.99x10^{-7}$	$9.39x10^{-8}$	$1.89x10^{-8}$	$4.97x10^{-9}$	$6.69x10^{-9}$	$6.42x10^{-9}$
	%	70%	22%	4.4%	1.2%	1.6%	1.5%
Potential Human exposure efficiency relative to U235 (IRP)2	kBq U235 eq.	0.117	$5.53x10^{-3}$	$4.98x10^{-3}$	$2.37x10^{-3}$	$5.03x10^{-4}$	$3.81x10^{-4}$
	%	89%	4.2%	3.8%	1.8%	0.38%	0.29%
Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	48.3	2.95	2.14	0.686	0.154	10.2
	%	75%	4.6%	3.3%	1.1%	0.24%	16%
Potential Comparative Toxic Unit for humans - cancer effects (HTP-c)[1]	CTUh	$7.14x10^{-9}$	$3.16x10^{-10}$	$3.01x10^{-10}$	$2.13x10^{-11}$	$1.40x10^{-11}$	$8.48x10^{-12}$
	%	92%	4.1%	3.9%	0.27%	0.18%	0.11%
Potential Comparative Toxic Unit for humans - non-cancer effects (HTP-nc)[1]	CTUh	$6.67x10^{-8}$	$1.00x10^{-8}$	$3.26x10^{-9}$	$6.07x10^{-10}$	$7.29x10^{-10}$	$4.24x10^{-10}$
	%	82%	12%	4%	0.74%	0.89%	0.52%
Potential Soil quality index (SQP)[1]	Dimensionless	48.0	8.01	2.40	1.22	0.689	2.06
	%	77%	13%	3.8%	2%	1.1%	3.3%

1) The results of this environmental impact indicator shall be used with care as uncertainties on these results are high or as there is limited experience with the indicator.

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

Table 84. *Resource use, per 1 m^2, for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Van Gogh - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Resources							
Use of renewable primary energy resources used as energy carrier (PERE)	MJ	10.0	0.246	0.413	0.902	$1.90x10^{-2}$	$1.53x10^{-2}$
	%	86%	2.1%	3.6%	7.8%	0.16%	0.13%
Use of renewable primary energy resources used as raw materials (PERM)	MJ	3.26	0.00	0.130	0.00	0.00	0.00
	%	96%	0%	3.8%	0%	0%	0%
Total use of renewable primary energy resources (PERT)	MJ	13.3	0.246	0.544	0.902	$1.90x10^{-2}$	$1.53x10^{-2}$
	%	88%	1.6%	3.6%	6%	0.13%	0.1%
Use of nonrenewable primary energy resources used as energy carrier (PENRE)	MJ	117	21.9	7.12	1.14	1.16	0.955
	%	78%	15%	4.8%	0.77%	0.77%	0.64%
Use of nonrenewable primary energy resources used as raw materials (PENRM)	MJ	30.8	0.00	$2.66x10^{-3}$	0.00	0.00	0.00
	%	100%	0%	0.0086%	0%	0%	0%
Total use of nonrenewable primary energy resources (PENRT)	MJ	148	21.9	7.12	1.14	1.16	0.955
	%	82%	12%	4%	0.63%	0.64%	0.53%
Use of secondary materials (SM)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of renewable secondary fuels (RSF)	MJ	$3.86x10^{-2}$	$1.60x10^{-3}$	$1.62x10^{-3}$	$3.78x10^{-4}$	$2.64x10^{-4}$	$9.38x10^{-5}$
	%	91%	3.7%	3.8%	0.89%	0.62%	0.22%
Use of nonrenewable secondary fuels (NRSF)	MJ	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Use of net fresh water (FW)	m^3	$9.11x10^{-2}$	$2.33x10^{-3}$	$3.34x10^{-3}$	$6.94x10^{-3}$	$1.41x10^{-4}$	$-6.69x10^{-3}$
	%	94%	2.4%	3.4%	7.1%	0.14%	-6.9%

Table 85. *Waste and outflows, per 1 m², for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Van Gogh - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
Wastes							
Hazardous waste disposed (HWD)	kg	0.395	$3.12x10^{-2}$	$1.74x10^{-2}$	$5.65x10^{-3}$	$1.18x10^{-3}$	$9.35x10^{-4}$
	%	88%	6.9%	3.9%	1.3%	0.26%	0.21%
Nonhazardous waste disposed (NHWD)	kg	7.63	0.193	0.916	0.115	$1.27x10^{-2}$	9.24
	%	42%	1.1%	5.1%	0.63%	0.07%	51%
Radioactive waste disposed (RWD)	kg	$7.56x10^{-5}$	$3.46x10^{-6}$	$3.21x10^{-6}$	$1.38x10^{-6}$	$3.43x10^{-7}$	$2.24x10^{-7}$
	%	90%	4.1%	3.8%	1.6%	0.41%	0.27%
Components for re-use (CRU)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Materials for recycling (MFR)	kg	0.00	0.00	$5.67x10^{-2}$	0.00	0.00	0.00
	%	0%	0%	100%	0%	0%	0%
Materials for energy recovery (MER)	kg	0.00	0.00	0.00	0.00	0.00	0.00
	%	0%	0%	0%	0%	0%	0%
Exported electrical energy (EEE)	MJ	$3.06x10^{-2}$	$1.45x10^{-3}$	$1.32x10^{-3}$	$4.25x10^{-4}$	$2.24x10^{-4}$	$1.95x10^{-4}$
	%	89%	4.3%	3.8%	1.2%	0.66%	0.57%
Exported thermal energy (EET)	MJ	$2.63x10^{-2}$	$2.09x10^{-3}$	$1.29x10^{-3}$	$5.81x10^{-4}$	$2.71x10^{-4}$	$2.35x10^{-3}$
	%	80%	6.4%	3.9%	1.8%	0.83%	7.1%

Table 86. *TRACI Life Cycle Impact Assessment results for the product over a 1-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.* **(Van Gogh - Distributed to North America)**

Parameter	Unit	Production (A1-A3)	Downstream Transport	Installation	Maintenance	Transport to Disposal	Disposal
TRACI							
Global warming	kg CO_2 eq	8.14	1.65	0.445	$8.23x10^{-2}$	$8.04x10^{-2}$	0.120
	%	77%	16%	4.2%	0.78%	0.76%	1.1%
Ozone depletion	kg CFC-11 eq	$5.84x10^{-6}$	$2.44x10^{-8}$	$2.35x10^{-7}$	$9.84x10^{-10}$	$1.89x10^{-9}$	$1.22x10^{-9}$
	%	96%	0.4%	3.9%	0.016%	0.031%	0.02%
Acidification	kg SO_2 eq	$3.51x10^{-2}$	$2.29x10^{-2}$	$2.45x10^{-3}$	$2.79x10^{-4}$	$2.99x10^{-4}$	$4.97x10^{-4}$
	%	57%	37%	4%	0.45%	0.49%	0.81%
Eutrophication	kg N eq	$2.80x10^{-2}$	$1.08x10^{-3}$	$1.20x10^{-3}$	$3.36x10^{-4}$	$3.02x10^{-5}$	$6.21x10^{-5}$
	%	91%	3.5%	3.9%	1.1%	0.098%	0.2%
Smog	kg O_3 eq	0.492	0.459	$4.20x10^{-2}$	$3.61x10^{-3}$	$8.44x10^{-3}$	$7.37x10^{-3}$
	%	49%	45%	4.1%	0.36%	0.83%	0.73%
Fossil fuel depletion	MJ surplus	17.5	3.07	0.874	0.131	0.165	0.138
	%	80%	14%	4%	0.6%	0.75%	0.63%

6. LCA: Interpretation

With the exception of Eutrophication, Acidification and Smog Formation Potential indicators, impacts over a single product life cycle are dominated by the production stages (A1-A3) followed by product distribution (A4) and product disposal (C4). Impacts related to phase A1 are associated primarily with the extraction and processing of plastics and plasticizers, while manufacturing impacts (A3) are dominated by electricity consumption at the production facility.

Contributions to the Eutrophication, Acidification and Ozone Depletion Potential indicators are dominated by impacts associated with extraction and processing of plastic component materials and the product distribution and disposal stages.

7. Additional Environmental Information

7.1 ENVIRONMENT AND HEALTH DURING MANUFACTURING

The Karndean manufacturing facilities are certified to ISO 14001 – Environmental management systems and ISO 9001 - Quality management systems.

7.2 ENVIRONMENT AND HEALTH DURING INSTALLATION

The Karndean luxury vinyl flooring products meet the requirements of the following:

- Indoor Air Comfort Gold (VOC certification)
- FloorScore®
- CDPH/EHLB Standard Method v1.2-2017 (California Section 01350)

7.3 EXTRAORDINARY EFFECTS

Fire

The Karndean flooring products meet the following fire classification and performance standards:

- EN 13501-1:2018: Fire classification of construction products and building elements. Classification using test data from reaction to fire tests. All Karndean Designflooring's LVT ranges achieve a reaction to fire classification of B_{fl}-s1.
- ASTM E648: Standard Test Method for Critical Radiant Flux of Floor-Covering Systems using a Radiant Heat Energy Source (also referenced as NFPA 253 and FTM Standard 372). All Karndean Designflooring's LVT ranges achieve Class 1.
- AS ISO 9239.1:2003: Reaction to fire tests for floor-coverings. Determination of the burning behavior using a radiant heat source.
- ASTM E662: Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials, also referenced as NFPA 258. All Karndean Designflooring's LVT ranges meet <450 requirement for smoke density.

7.4 ENVIRONMENTAL ACTIVITIES AND CERTIFICATIONS

The Karndean Designflooring products are REACH compliant. Our accreditations and certifications include; FloorScore, Indoor Air Comfort Gold, NSF 332. CE and UKCA accredited.

For more information on Karndean Designflooring's certifications and environmental initiatives please view our Global Environmental Statement www.karndean.com/eco

8. References

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