

ASPHALT ENVIRONMENTAL PRODUCT DECLARATION

JULY 2023

In accordance with ISO
14025 and EN15804+A2:2019

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AUSTRALASIA



HIGGINS

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This Environmental Product Declaration (EPD) has been produced in accordance with a consistent set of rules known as product category rules (PCR). EPDs within the same product category from different programmes may not be comparable.

EPDs of construction products may not be comparable if they do not comply with EN15801+A2 or if they are produced using different product category rules.





WHAT IS AN ENVIRONMENTAL PRODUCT DECLARATION?

Higgins recognises the importance of providing transparent and independently verified environmental impact information about our products. An Environmental Product Declaration (EPD) is a robust, science-based, independently verified and standardised method for communicating the environmental impacts of products.

This EPD covers the environmental impacts of Higgins asphalt products, covering the complete spectrum of asphalt mixes, from hard-wearing rut-resistant mixes like SMA (stone mastic asphalt) to open-graded mixes designed for lower noise and better water dispersion. The products included in this assessment are manufactured at Higgins' 10 asphalt plants in New Zealand (Auckland - Silverdale, Auckland - East Tāmaki, Hamilton, Tauranga, Taupō, Napier, Palmerston North, Masterton, Wellington, Christchurch). This EPD does not cover Higgins operations in Fiji.

This EPD is based on a cradle-to-gate Life Cycle Assessment (LCA), with end-of-life modules C1-C4 and module D. 'Cradle' refers to the raw material extraction and 'the gate' is the gate of the asphalt manufacturing facility as the product is ready to go out to customers.

Higgins, as the EPD owner has the sole ownership, liability, and responsibility for the EPD.

ABOUT HIGGINS

Higgins is a dynamic and trusted New Zealand civil construction business with a 'customer leading' focus and a team of over 1600 staff. We have a breadth of capabilities and resources to deliver a fully integrated complement of civil construction services across New Zealand. This EPD assesses products produced in Higgins permanent New Zealand plants. Higgins is proud to be a part of Fletcher Construction, an iconic New Zealand company. Our purpose is to make places better for generations to come.

Dan Higgins founded the company in 1958. He was a man full of innovative ideas - always developing new and ingenious ways of doing things. We'd like to think there is a little of Dan in everyone at Higgins and the opportunity to be innovative is as alive today as it was all those years ago.

Over the years Higgins has invested in the development of efficient processes and productive practices so that we are able to maximise operational efficiency and deliver better results. Our ISO9001, ISO14001 and ISO45001, quality, environmental and safety management systems form an integral part of the way we manage our business. We focus on compliance with all relevant legislation, industry standards, and best practices. We strive for the highest standards and carry out regular reviews and analysis in order to implement methods of improvement.



WHAT WE DO



MAJOR INFRASTRUCTURE

Higgins design and build major infrastructure projects including roads, wind farms, airport runways and port hardstand container infrastructure.



REGIONAL INFRASTRUCTURE

We build a diverse range of community infrastructure including infrastructure for central and local government, commercial and residential developments, car parks and sports infrastructure.



ROAD MAINTENANCE

Working in collaboration with clients, Higgins provides road urban and rural maintenance services within New Zealand and in Fiji.

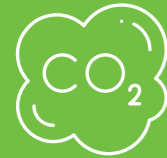


CONSTRUCTION PRODUCT MANUFACTURE

Higgins manufacture bitumen based products, road signage and bitumen equipment.

OUR SUSTAINABILITY JOURNEY SO FAR

Within Higgins and across the Fletcher Construction Company, our sustainability goal is to build innovation and sustainable practices to help shape the future. To lead the industry into a sustainable future, we are working across five key areas: Carbon, Waste, Water, Shifting Mindsets and Social Outcomes.



Carbon

To develop decarbonisation initiatives that lead the way for smarter and cleaner operations.



Shifting mindsets

By providing visible, transparent, flexible strategies to support and promote a cultural shift within the organisation.



Waste

To understand the waste we create and develop innovative ways to aim for zero waste project sites.



Social outcomes

To create enduring benefits within the construction industry which help local and diverse people, communities and businesses for generations to come.



Water

To recognise the value of water and provide the knowledge, strategies and tools to manage this resource sustainably.



HOW THIS EPD SUPPORTS OUR SUSTAINABILITY COMMITMENTS

At Higgins, we believe this EPD is important to promote transparency around the products we produce. It gives us a baseline against which we can continuously improve.

Alongside internal targets across each of the sustainability focus areas, we are aligned to Fletcher Building's Science-Based Target (SBT) to reduce our scope 1 and 2 carbon emissions by 30% by 2030, in line with Paris Agreement goals.

A large portion of our scope 1 and 2 carbon emissions come from our asphalt manufacturing operations. Achieving an EPD for our products is a key tool for us to better understand the impact of our products and a baseline from which to improve and reduce our carbon emissions in a credible and transparent way. This will contribute towards achieving our SBT, as well as improvements across our other sustainability focus areas.



COVERED IN THIS EPD

Asphalt concrete, commonly known as hot mix asphalt, or more simply as asphalt, is a mixture of bitumen, crushed rock, and manufactured sand. The asphalt is produced by heating and mixing the components together in an asphalt plant. Additives are sometimes used to enhance its properties. It is used as an all-weather pavement surfacing, or as a structural component of a pavement system.

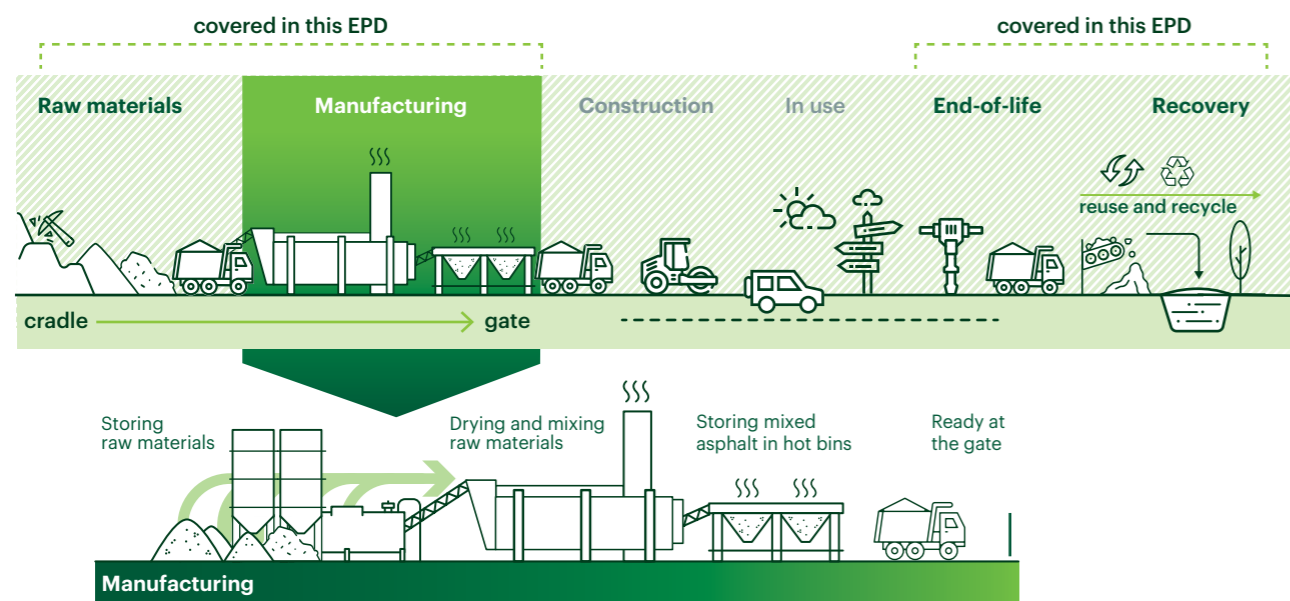
PRODUCT APPLICATION

Asphalt is an engineered product that is designed to meet various performance, safety and environmental standards for durability, strength, skid resistance and noise reduction. It has numerous applications from construction of pedestrian walkways and streetscapes,

to high speed motorways, to industrial applications such as loading zones at ports, airport runways, and everything in-between.

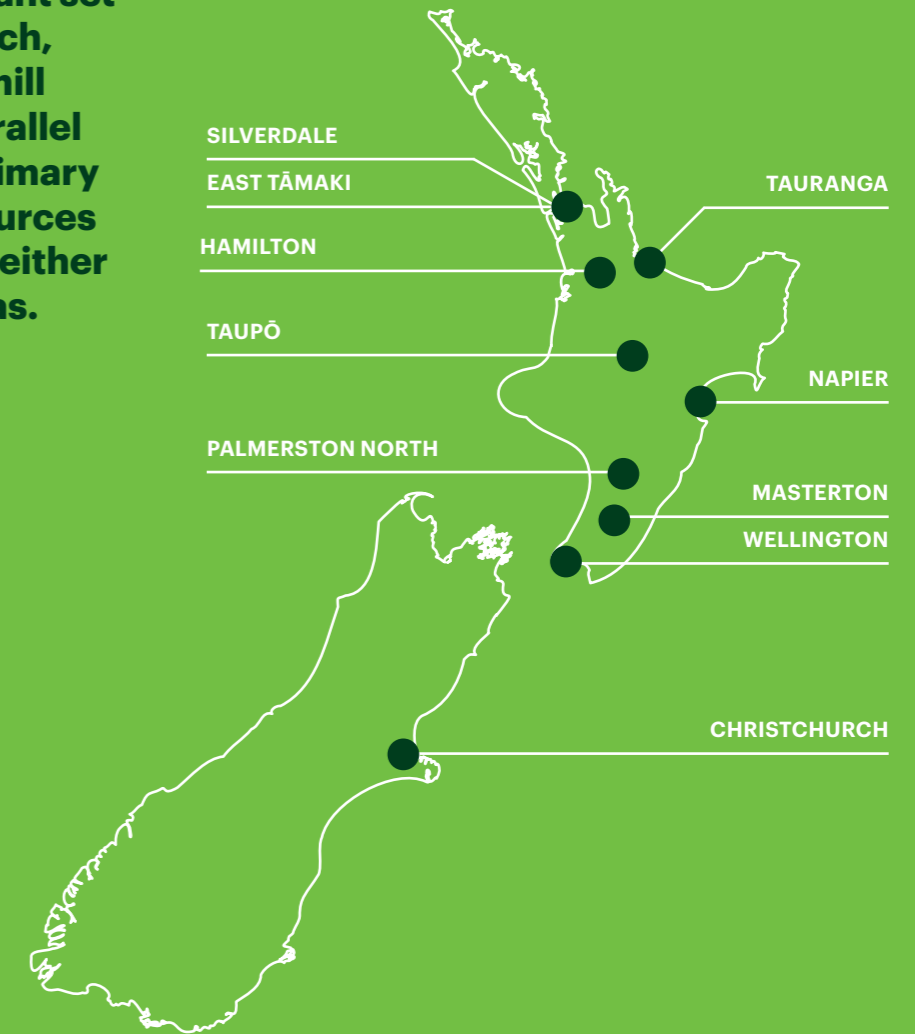
Asphalt is an ideal contributor to the circular economy; it is 100% recyclable and often incorporates recycled materials.

Figure 1. Lifecycle and manufacturing



OUR ASPHALT PLANTS

This EPD covers asphalt produced at Higgin's 10 permanent asphalt plants located across the North and South Islands. These cover three different types of asphalt plant set ups, including: batch, double drum/pugmill counter flow or parallel flow plants. The primary process energy sources are electricity and either diesel or natural gas.





HOW TO USE THIS EPD

Higgins has developed this EPD to showcase the environmental credentials of their asphalt products. The EPD also provides life cycle data for calculating the impacts of these products at a building level. This data may be used by specifiers and developers to calculate and present the environmental impacts of particular construction projects.

The data in our EPD feeds into the Infrastructure Sustainability Council (ISC) IS Rating tool.

This EPD allows the represented products to contribute points to green building rating tools, such as New Zealand Green Building Council's Green Star.

New Zealand Green Building Council states:

“An EPD is a transparent declaration of the life-cycle environmental impact. The detailed, transparent environmental data that EPDs provide is an important step towards enabling whole-of-building life cycle assessment”

The remainder of this EPD is made up of two parts. Part one is the Technical Information for the method, assumptions, description of environmental indicators. Part two contains the results from modelling the life cycle assessment of the different products.



TECHNICAL INFORMATION

DECLARED UNIT AND REFERENCE SERVICE LIFE

The declared unit for the EPD is

ONE TONNE OF ASPHALT MIXTURE.

This EPD has been produced according to EN 15804+A2:2019 for construction products. In addition, it also aligns with the methodology provided by the Australian Technical Guidance Note (TGN) for developing EPDs according to EN 15804+A2:2019 for asphalt mixtures. (EPD Australasia, 2022).

CLASSIFICATION

Table 1 shows the classification codes and class descriptions of the products included within this EPD according to the UN CPC (Version 2.1) and ANZSIC 2006 classification systems.

Product type	Classification	Code	Category
Asphalt mixes (All declared products)	UN CPC Ver.2	3794	Bituminous mixtures based on natural and artificial stone materials and bitumen, natural asphalt or related substances as a binder
	ANZSIC 2006	3101	Hot-mix bituminous paving manufacturing and/or laying



PRODUCT COMPOSITION

The EPD covers over 90 asphalt products from the 10 Higgins asphalt plants. These products have varying inputs and input quantities based on the type of asphalt mix. The products are not grouped. The product composition shows a range of inputs for the different mixes.

Table 2. Content declaration

Product components	Min and Max composition, weight %	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/kg
Aggregates	<80%	0%	0
Bitumen / Polymer Modified Bitumen (PMB)	4-8%	0%	0
Baghouse filler	<2%	0%	0
Crusher dust	12-87%	0%	0
Evotherm	<1%	0%	0
Fibre	<2%	0%	75%, -0.5
Kerosene	<3%	0%	0
Limestone filler	<11%	0%	0
Melter slag	<70%	0%	0
Reclaimed Asphalt Pavement (RAP)	<15%	100%	0
Washed sand	<19%	0%	0

PACKAGING

Asphalt products are transported in trucks and have no packaging associated with the product.

DANGEROUS SUBSTANCES FROM THE CANDIDATE LIST OF SVHC FOR AUTHORISATION

Asphalt is not classified as hazardous as per Hazardous Substances and New Organisms (HSNO classifications) and Globally Harmonized System (GHS) classifications and does not include hazardous substances requiring labelling. No substances in these asphalt mixes are listed as a Substance of Very High Concern (SVHA) by ECHA.

SYSTEM BOUNDARIES

In Life Cycle Assessments (LCA), the system boundary is a line that divides the processes which are included from those which are excluded.

As shown in the table below, this EPD is of the 'cradle-to-gate with modules C1-C4 and module D' as shown in Table 3. The other life cycle stages, transport to customer (A4), construction (A5), and the use stage (B1-B7) are not included as they are either not relevant or dependent on particular scenarios and best modelled at the building level.



Table 3. Modules included in the scope of the EPD
X = included in the EPD; ND = Module not declared (such a declaration shall not be regarded as an indicator result of zero)

	Product stage			Construction process stage				Use stage					End-of-life			Recovery	
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport	Waste processing		Disposal
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	NZ	NZ	-	-	-	-	-	-	-	-	-	NZ	NZ	NZ	NZ	NZ
Specific data	>90%																
Variation - products	N/A																
Variation - sites	N/A																

PRODUCTION (MODULES A1-A3)

The production stage includes the environmental impacts associated with raw materials extraction and processing of inputs, transport to, between and within the manufacturing site, and manufacturing of average product at the exit gate of the manufacturing site.

Module A1 (raw material supply) includes the mining and processing of inputs, such as extraction of bitumen and additives from international suppliers, production of fillers and aggregates from New Zealand, and generation and transmission of electricity in New Zealand. It also includes processing of RAP input from the end-of-waste state.

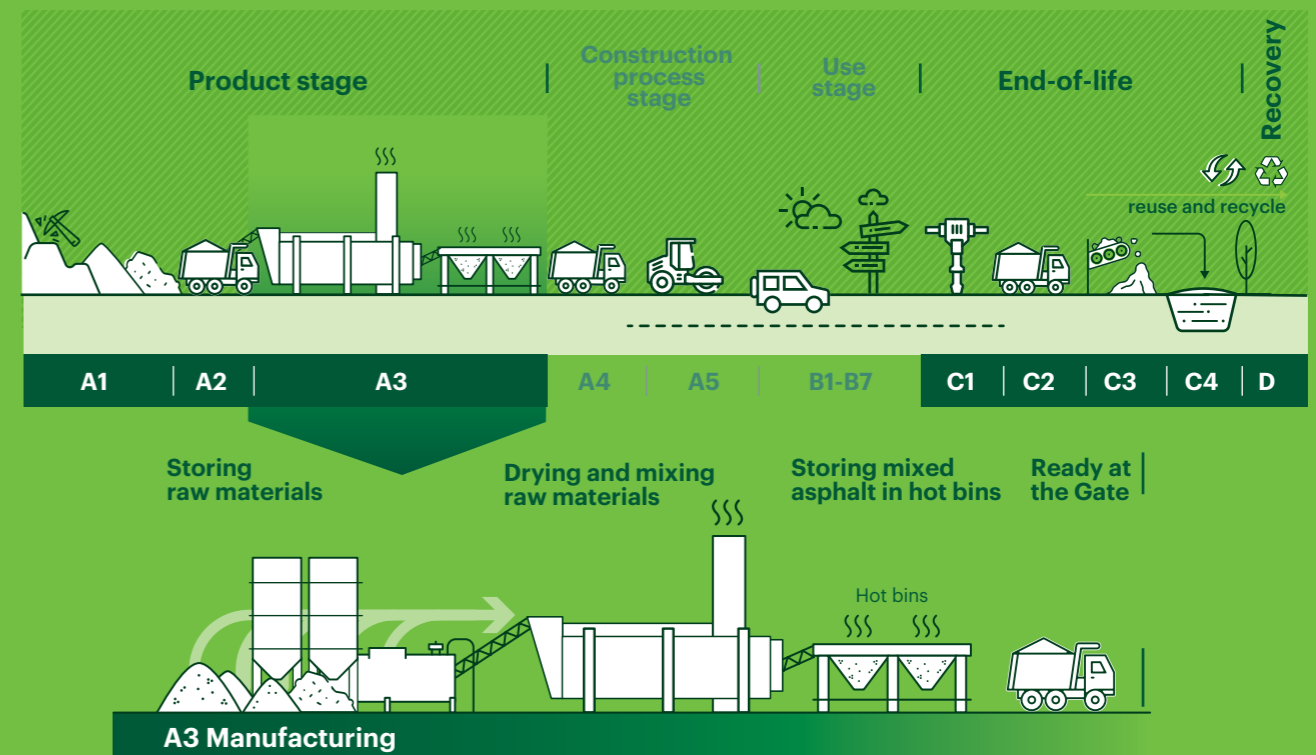
Module A2 (raw material transport) includes road transport via truck of materials such as aggregates and Recycled Asphalt Pavement (RAP), and materials which are sourced from overseas, such as bitumen, Evotherm, and cellulose fibre, that are transported via a combination of truck and sea freight. All other input materials are sourced locally in New Zealand via truck.

Module A3 (manufacturing) is the production of Higgins' asphalt products in their plants across New Zealand. In this process, all inputs are added in specific quantities and blended using different parameters to achieve the 'grading' of the desired mix.

Polymer Modified Bitumen (PMB) is transported via Higgins' PMB plant in Napier where the raw bitumen is modified as per the desired mix requirements.

Figure 2 shows the value chain and basic manufacturing processes for the products included within this EPD.

Figure 2. Life cycle and manufacturing (A3) process flowchart



XX modules included in this EPD
XX modules excluded in this EPD

END-OF-LIFE (MODULE C)

Module C1 (deconstruction/demolition). When asphalt reaches the end of its functional life, it is typically demolished by milling or excavation.

Module C2 (transport to end-of-life) includes transport of waste asphalt to a processing facility after demolition of the pavement as asphalt is a valuable material at the end of life.

Module C3 (waste processing), includes the processing of asphalt waste for reuse or recycling to produce RAP and to downcycling, as granular subbase or back fill.

This EPD aligns with the generic scenarios provided in the Australian TGN, presented in Table 4. Auckland and Silverdale plants were assumed to be in a 'metropolitan' area and that all other plants were in 'regional' areas.

Module C4 (disposal) would include landfill of waste asphalt at end-of life.. Asphalt is 100% recyclable. So, landfilling or incineration of asphalt are not assessed as per the TGN.

Table 4. End-of-life scenarios for products. Source: Australian TGN

End-of-life disposal option	Pavement in metro areas	Pavement in regional areas
Recycling into asphalt	90%	75%
Downcycling as granular subbase or backfill	10%	25%
Landfill or Incineration	0%	0%

RECOVERY AND RECYCLING POTENTIAL (MODULE D)

Module D declares a potential credit or burden for the net RAP associated with the asphalt products. Module D gives a credit for the net RAP, as prescribed in EN 15804. Of the 90% or 75% of output RAP available for recycling following module C3, the input RAP for Higgin's asphalt production is satisfied first, with the remainder (net) available for recycling through Module D.

The processes used to calculate the benefits in module D are based on the specific mix composition for the proportion recycled into asphalt, and fixed proportions of 99% of gravel and 1% of bitumen for the proportion downcycled into granular subbase.



LIFE CYCLE INVENTORY (LCI) AND ASSUMPTIONS

Primary data was used for all manufacturing operations up to the factory gate, including the asphalt plant. Primary data for asphalt plant operations was sourced from the period 01 July 2021 to 30 June 2022 . Background data was used for input materials sourced from other suppliers.

All data in the background system were from the GaBi Life Cycle Inventory Database 2022 (Sphera, 2022). Most datasets have a reference year between 2018 and 2021 and all fall within the 10-year limit allowable for generic data under EN 15804.

UPSTREAM DATA

With the exception of electricity and water use (which correctly reflect New Zealand conditions), a number of geological and technological proxies for upstream (supply

chain) data were used due to a lack of consistent LCI data for New Zealand. For example, German granulated blast furnace slag was used to model Melter slag.

ELECTRICITY

Electricity consumption was modelled using the specific country electricity consumption mix for New Zealand, which is made up of hydro (57.8%), geothermal (17.8%), natural gas (12.4%), wind (5.1%), hard coal (4.8%), biomass

(1.1%), biogas (0.6%), photovoltaics (0.3%), and waste heat (0.1%) (Sphera, 2022). The emission factor for the New Zealand national grid mix (1–60 kV) for the GWP-GHG indicator is 0.151 kg CO₂-eq/kWh.

CUT OFF CRITERIA

Cut-off criteria are applied for packaging materials for minor inputs such as additives, lubricants, greases, etc., which are used in very small quantities. These exclusions are not expected to have a significant impact.

Personnel is excluded as per section 4.3.1 in the PCR (EPD International, 2021). thinkstep-anz consistently excludes environmental impacts from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process, ('capital goods') regardless of potential significance.

Capital goods data can be applied to LCA studies inconsistently. This is because high-quality infrastructure-related data isn't always available and there is no clear cut-off for what to include. This is expected to lead to reduced consistency and comparability of EPDs. Because capital goods were previously excluded from EPDs, including capital goods in current EPDs would further reduce their comparability.

All other reported data were incorporated and modelled using the best available life cycle inventory data.

ALLOCATION

Where subdivision of processes was not possible, allocation rules listed in PCR chapter 4.5

Thermal Energy: To allocate the on-site thermal energy use for each mix design the composition, specific heat capacity of components, moisture content of raw materials and the plant's overall efficiency were considered as per Australian TGN's Method A.

End-of-life allocation follows the requirements of EN15804:2012+A2:2019 § 6.4.3.3 and generally follows the polluter pays principle. End-of-Life Allocation for RAP recycling (avoided burden approach): RAP output from the disposed product is first used to satisfy open RAP inputs from the production stage. The difference between scrap input and output is called the 'net scrap output from the product life cycle'. A credit for this net scrap is given in Module D, based on the specific end of life scenarios (that is share of recycling and downcycling material) and mix composition.



ENVIRONMENTAL IMPACT INDICATORS

An introduction to the core environmental impact indicators is provided below. The best-known effect of each indicator is listed in the descriptions and the abbreviations, in brackets, correspond to the labels in the following results tables.



CLIMATE CHANGE (GLOBAL WARMING POTENTIAL)

(GWPt, GWPf, GWPb, GWPluluc)

A measure of greenhouse gas emissions, such as CO₂ and methane. These emissions are causing an increase in the absorption of radiation emitted by the earth, increasing the natural greenhouse effect. This may in turn have adverse impacts on ecosystem health, human health and material welfare. The Global Warming Potential (GWP) is split into three sub indicators: total (GWPt), fossil (GWPf), biogenic (GWPb), and land-use and land-use change (GWPluluc).



OZONE DEPLETION POTENTIAL (ODP)

Depletion of the ozone leads to higher levels of UVB ultraviolet rays reaching the earth's surface with detrimental effects on humans and plants. The Ozone Depletion Potential is a measure of air emissions that contribute to the depletion of the stratospheric ozone layer.



ACIDIFICATION POTENTIAL (AP)

Acidification Potential is a measure of emissions that cause acidifying effects to the environment. A molecule's acidification potential indicates its capacity to increase the hydrogen ion (H⁺) concentration in the presence of water, thus decreasing the pH value. Potential effects include fish mortality, forest decline, and the deterioration of building materials.



EUTROPHICATION POTENTIAL (EPfw, EPm, EPt)

Eutrophication covers all potential impacts of excessively high levels of macronutrients, the most important of which are nitrogen (N) and phosphorus (P). In aquatic ecosystems where this term is mostly applied, this typically describes a degradation in water quality. Eutrophication can result in an undesirable change in the type of species that flourish and an increase the production of biomass. As the decomposition of biomass consumes oxygen, eutrophication may decrease the available oxygen level in the water column and threaten fish in their ability to respire.



PHOTOCHEMICAL OZONE CREATION POTENTIAL (POCP)

Photochemical Ozone Creation Potential gives an indication of the emissions from precursors that contribute to ground level smog formation, mainly ozone (O₃). Ground level ozone may be harmful to human health and ecosystems and may also damage crops. These emissions are produced by the reaction of volatile organic compounds (VOCs) and carbon monoxide in the presence of nitrogen oxides and UV light.



ABIOTIC RESOURCE DEPLETION (ADPmm, ADPf)

The consumption of non-renewable resources decreases the availability of these resources and their associated functions in the future. Depletion of mineral resources and non-renewable energy resources are reported separately. Depletion of mineral resources is assessed based on total reserves.



WATER USE (WDP)

Water scarcity is a measure of the stress on a region due to water consumption.

RESULTS

The following tables show the results grouped in seven categories, each looking at different types of indicators. The headings below provide descriptions for each of these categories. Each column of numbers represents one declared unit: one tonne of asphalt mixture.

The results are presented on a location basis. Each column of A1-A3 and module D results represents the named product in each plant. Modules C1-C4 results are the same for all products and are presented in a single table for each plant.

The first row of the Environmental impact indicators, the Global Warming Potential (total) (GWPt) represents the total carbon footprint of the product. This is the sum of the biogenic carbon footprint (GWPb), mostly from the sequestration of carbon in wood, and the fossil

carbon footprint (GWPf), which is mostly from the fossil fuels combusted during the production of the product. It should be noted that the GWPb is largely dependent on the density of the wood, which can vary by a large degree due to a range of factors.

CORE ENVIRONMENTAL IMPACT EN15804+A2

The reported impact categories represent impact potentials, i.e., they are approximations of environmental impacts that could occur if the emissions would (a) follow the underlying impact pathway and (b) meet certain conditions in the receiving environment while doing so. The environmental impact results are therefore relative expressions only and do not predict actual impacts, the exceeding of thresholds, safety margins, or risks. Long-term emissions (>100 years) are not taken into consideration in the impact estimate.

RESOURCE USE

The resource use indicators describe the use of renewable and non-renewable material resources, renewable and non-renewable primary energy and water.

Note: Water consumption: The FW indicator in the EPD results tables reports consumption (i.e. net use) of 'blue water' (which includes river water, lake water and ground water). This indicator deliberately excludes consumption of 'green water' (rain water), as net loss should be interpreted as any additional water loss beyond what would occur in the original, natural system. For plantation softwood forestry, the natural system might be a native forest or a grassland (Quinteiro et al. 2015).

Table 5. Core environmental impact indicators EN15804+A2

Indicator	abbr.
Climate change (total)	GWPt
Climate change (fossil)	GWPf
Climate change (biogenic)	GWPb
Climate change (land use and land use change)	GWPluluc
Ozone depletion	ODP
Acidification potential	AP
Eutrophication potential - freshwater	EPfw
Eutrophication potential - marine	EPm
Eutrophication potential - terrestrial	EPt
Photochemical ozone formation potential	POCP
Abiotic depletion potential - minerals & metals	ADPmm
Abiotic depletion potential - fossil fuels	ADPF
Water Depletion Potential	WDP

Table 6. Life cycle inventory indicators on use of resources

Indicator	abbr.
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	PERE
Use of renewable primary energy resources used as raw materials	PERM
Total use of renewable primary energy resources	PERT
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	PENRE
Use of non-renewable primary energy resources used as raw materials	PENRM
Total use of non-renewable primary energy resources	PENRT
Use of secondary material;	SM
Use of renewable secondary fuels	RSF
Use of non-renewable secondary fuels	NRSF
Total use of net fresh water	FW

WASTE AND OUTPUT FLOW

Waste indicators describe waste generated within the life cycle of the product. Waste is categorised by hazard venergy content.

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

These indicators are voluntarily included to facilitate modularity where an EPD is used as input data for creating another EPD downstream in the value chain (EPD International, 2021).

ENVIRONMENTAL IMPACT EN15804+A1

EN 15804+A1 core environmental impact categories aid with historical comparison and are used within various rating tools.

BIOGENIC CARBON INDICATORS

Biogenic carbon refers to the carbon stored in organic materials. This is sequestered during growth and released at end-of-life. EN15804+A2 requires the declaration of biogenic carbon content of the product.

Table 7. Life cycle inventory indicators on waste categories and output flows

Indicator	abbr.
Hazardous waste disposed	HWD
Non-hazardous waste disposed	NHWD
Radioactive waste disposed	RWD
Components for reuse	CRU
Materials for energy recovery	MER
Materials for recycling	MFR
Exported electrical energy	EEE
Exported thermal energy	EET

Table 8. Additional environmental impact indicators

Indicator	abbr.
IPCC AR5 GWP-GHG	GWP-GHG
Particulate matter emissions	PM
Ionising radiation - human health	IRP
Eco-toxicity (freshwater)	ETPfw
Human toxicity, cancer	HTPc
Human toxicity, non-cancer	HTPnc
Soil quality	SQP

Table 9. Environmental impact indicators EN15804+A1

Indicator	abbr.
Global warming potential (total)	GWP
Ozone depletion potential	ODP
Acidification potential of land and water	AP
Eutrophication potential	EP
Photochemical ozone creation potential	POCP
Depletion abiotic resources - minerals & metals	ADPE
Depletion abiotic resources - fossil fuels	ADPF

Table 10. Biogenic Carbon Indicators

Indicator	abbr.
Biogenic carbon content in product	BCC-prod

SILVERDALE RESULTS FOR ONE TONNE OF ASPHALT

MODULES A1-A3

Table 11. EN 15804+A2 Core environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC20_SLV001	AC14_SLV002	AC14-PMB_O	PA10_SLV005
GWpt	kg CO ₂ -eq	77.4	56.7	84.4	55.0
GWpf	kg CO ₂ -eq	75.5	56.3	82.3	58.3
GWpb	kg CO ₂ -eq	1.80	0.291	2.07	-3.31
GWPluluc	kg CO ₂ -eq	0.0865	0.0813	0.0888	0.0842
ODP	kg CFC-11 eq	1.48E-10	5.78E-11	1.65E-10	9.01E-11
AP	Mole of H+eq	0.327	0.317	0.365	0.353
EPfw	kg P eq	2.86E-04	1.96E-04	3.03E-04	2.69E-04
EPm	kg N eq	0.110	0.104	0.121	0.114
EPt	Mole of N eq	1.21	1.15	1.32	1.25
POCP	kg NMVOC eq	0.320	0.285	0.355	0.313
ADPmm*	kg Sb-eq	2.62E-05	2.57E-05	3.03E-05	2.70E-05
ADPF*	MJ	2,900	2,670	3,330	2,750
WDP	m ³ world equiv	5.26	4.93	5.35	9.15

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

Table 12. Resource use indicators results covering modules A1-A3

PARAMETER	UNIT	AC20_SLV001	AC14_SLV002	AC14-PMB_O	PA10_SLV005
PERE	MJ	128	85.4	137	167
PERM	MJ	0	0	0	37.1
PERT	MJ	128	85.4	137	204
PENRE	MJ	-551	-1,060	-730	-1,080
PENRM	MJ	3,510	3,800	4,130	3,900
PENRT	MJ	2,960	2,740	3,400	2,820
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	0.305	0.254	0.316	0.281

Table 13. Biogenic Carbon

PARAMETER	UNIT	QUANTITY
Biogenic carbon content in product	kg C	0

Table 14. Waste categories and output flow indicators covering modules A1-A3

PARAMETER	UNIT	AC20_SLV001	AC14_SLV002	AC14-PMB_O	PA10_SLV005
HWD	kg	8.96E-08	2.60E-08	1.01E-07	2.91E-08
NHWD	kg	1.84	0.469	2.09	0.608
RWD	kg	0.0165	0.0119	0.0176	0.0136
CRU	kg	0	0	0	0
MFR	kg	3.33	3.33	3.33	3.33
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 15. Additional environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC20_SLV001	AC14_SLV002	AC14-PMB_O	PA10_SLV005
GWP-GHG**	kg CO ₂ -eq	76.6	56.2	83.6	58.2
PM	Disease incidences	4.14E-06	4.00E-06	4.68E-06	5.71E-06
IRP***	kBq U235 eq.	2.31	1.84	2.41	2.00
ETP-fw*	CTUe	1,210	1,150	1,390	1,200
HTPc*	CTUh	2.70E-08	2.11E-08	3.07E-08	2.28E-08
HTPnc*	CTUh	1.16E-06	6.82E-07	1.33E-06	7.89E-07
SQP*	Pt	173	141	180	1,560

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 16. EN 15804+A1 Environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC20_SLV001	AC14_SLV002	AC14-PMB_O	PA10_SLV005
GWP	kg CO ₂ -eq	73.2	53.1	79.7	51.4
ODP	kg CFC ₁₁ -eq.	1.75E-10	6.80E-11	1.94E-10	1.06E-10
AP	kg SO ₂ -eq	0.248	0.241	0.278	0.270
EP	kg PO ₃ ⁴⁻ -eq.	0.0413	0.0372	0.0452	0.0410
POCP	kg C ₂ H ₄ -eq.	0.0157	0.0129	0.0197	0.0154
ADPE	kg Sb eq.	2.63E-05	2.58E-05	3.04E-05	2.71E-05
ADPF	MJ	2,790	2,560	3,190	2,630

MODULES C1-C4

Modules C1-C4 results are the same for all products and results for each EOL module are presented together per one tonne of product.

Table 18. EN 15804+A2 Core environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWpt	kg CO ₂ -eq	0.625	2.57	0	0
GWPf	kg CO ₂ -eq	0.625	2.58	0	0
GWPb	kg CO ₂ -eq	6.18E-05	-0.0255	0	0
GWPluluc	kg CO ₂ -eq	4.53E-06	0.0176	0	0
ODP	kg CFC-11 eq	4.96E-14	2.56E-13	0	0
AP	Mole of H+eq	0.00297	0.0157	0	0
EPfw	kg P eq	1.10E-07	9.32E-06	0	0
EPm	kg N eq	0.00143	0.00764	0	0
EPt	Mole of N eq	0.0157	0.0846	0	0
POCP	kg NMVOC eq	0.00402	0.0147	0	0
ADPmm*	kg Sb-eq	7.62E-09	2.63E-07	0	0
ADPf*	MJ	8.29	34.3	0	0
WDP	m ³ world equiv	0.00464	0.0292	0	0

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

Table 19. Resource use indicators results covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
PERE	MJ	0.0271	2.37	0	0
PERM	MJ	0	0	0	0
PERT	MJ	0.0271	2.37	0	0
PENRE	MJ	8.29	34.4	0	0
PENRM	MJ	0	0	0	0
PENRT	MJ	8.29	34.4	0	0
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	6.98E-05	0.00274	0	0

Table 20. Waste categories and output flow indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
HWD	kg	8.99E-12	1.82E-10	0	0
NHWD	kg	1.18E-04	0.00560	0	0
RWD	kg	1.21E-07	6.39E-05	0	0
CRU	kg	0	0	0	0
MFR	kg	0	0	1,000	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 21. Additional environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP-GHG**	kg CO ₂ -eq	0.622	2.58	0	0
PM	Disease incidences	3.36E-08	5.88E-08	0	0
IRP***	kBq U235 eq.	1.57E-05	0.00964	0	0
ETP-fw*	CTUe	2.08	24.3	0	0
HTPc*	CTUh	3.49E-11	5.01E-10	0	0
HTPnc*	CTUh	2.18E-09	2.90E-08	0	0
SQP*	Pt	0.0190	14.5	0	0

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 22. EN 15804+A1 Environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP	kg CO ₂ -eq	0.615	2.51	0	0
ODP	kg CFC ₁₁ -eq.	5.84E-14	3.02E-13	0	0
AP	kg SO ₂ -eq	0.00206	0.0107	0	0
EP	kg PO ₃ ⁴⁻⁻ -eq.	4.80E-04	0.00268	0	0
POCP	kg C ₂ H ₄ -eq.	2.03E-04	-0.00402	0	0
ADPE	kg Sb eq.	7.63E-09	2.63E-07	0	0
ADPF	MJ	8.29	33.9	0	0

MODULES D

Table 23. EN 15804+A2 Core environmental impact indicators covering modules D

PARAMETER	UNIT	AC20_ SLV001	AC14_ SLV002	AC14- PMB_0	PA10_ SLV005
GWpt	kg CO ₂ -eq	-14.7	-15.6	-17.0	-16.8
GWpf	kg CO ₂ -eq	-14.7	-15.6	-17.0	-16.8
GWpb	kg CO ₂ -eq	0.00292	0.00161	-1.04E-04	-0.00487
GWpluluc	kg CO ₂ -eq	-0.00333	-0.00351	-0.00361	-0.00596
ODP	kg CFC-11 eq	-2.77E-11	-2.81E-11	-2.80E-11	-3.58E-11
AP	Mole of H+eq	-0.0351	-0.0380	-0.0426	-0.0412
EPfw	kg P eq	-1.31E-05	-1.37E-05	-1.44E-05	-1.66E-05
EPm	kg N eq	-0.00316	-0.00374	-0.00466	-0.00459
EPt	Mole of N eq	-0.0362	-0.0426	-0.0528	-0.0527
POCP	kg NMVOC eq	-0.0269	-0.0298	-0.0346	-0.0326
ADPmm*	kg Sb-eq	7.33E-07	6.31E-07	4.73E-07	4.38E-07
ADPF*	MJ	-1,870	-1,990	-2,190	-2,050
WDP	m ³ world equiv	-1.15	-1.18	-1.19	-1.89

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

Table 24. Resource use indicators results covering modules D

PARAMETER	UNIT	AC20_ SLV001	AC14_ SLV002	AC14- PMB_0	PA10_ SLV005
PERE	MJ	-20.5	-20.9	-21.1	-27.4
PERM	MJ	0	0	0	0
PERT	MJ	-20.5	-20.9	-21.1	-27.4
PENRE	MJ	-1,870	-1,990	-2,190	-2,050
PENRM	MJ	0	0	0	0
PENRT	MJ	-1,870	-1,990	-2,190	-2,050
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	-0.0391	-0.0403	-0.0408	-0.0599

Table 25. Waste categories and output flow indicators covering modules D

PARAMETER	UNIT	AC20_ SLV001	AC14_ SLV002	AC14- PMB_0	PA10_ SLV005
HWD	kg	-4.54E-09	-4.69E-09	-4.85E-09	-5.82E-09
NHWD	kg	-9.31	-9.04	-8.98	-4.03
RWD	kg	-0.00523	-0.00532	-0.00531	-0.00750
CRU	kg	0	0	0	0
MFR	kg	0	0	0	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 26. Additional environmental impact indicators covering modules D

PARAMETER	UNIT	AC20_ SLV001	AC14_ SLV002	AC14- PMB_0	PA10_ SLV005
GWP-GHG**	kg CO ₂ -eq	-14.5	-15.4	-16.9	-16.7
PM	Disease incidences	-2.26E-07	-2.44E-07	-2.72E-07	-2.78E-07
IRP***	kBq U235 eq.	-0.880	-0.896	-0.893	-1.28
ETP-fw*	CTUe	-272	-290	-320	-304
HTPc*	CTUh	-5.88E-09	-6.23E-09	-6.81E-09	-6.48E-09
HTPnc*	CTUh	-2.21E-07	-2.33E-07	-2.52E-07	-2.38E-07
SQP*	Pt	-13.8	-14.2	-14.3	-19.7

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 27. EN 15804+A1 Environmental impact indicators covering modules D

PARAMETER	UNIT	AC20_ SLV001	AC14_ SLV002	AC14- PMB_0	PA10_ SLV005
GWP	kg CO ₂ -eq	-12.3	-13.0	-14.2	-14.2
ODP	kg CFC ₁₁ -eq.	-3.27E-11	-3.31E-11	-3.30E-11	-4.22E-11
AP	kg SO ₂ -eq	-0.0304	-0.0328	-0.0366	-0.0353
EP	kg PO ₃ ⁴⁻ -eq.	-0.00154	-0.00176	-0.00210	-0.00213
POCP	kg C ₂ H ₄ -eq.	-0.00967	-0.0104	-0.0117	-0.0109
ADPE	kg Sb eq.	6.97E-07	5.94E-07	4.37E-07	3.89E-07
ADPF	MJ	-1,850	-1,970	-2,170	-2,020

EAST TĀMAKI RESULTS FOR ONE TONNE OF ASPHALT

MODULES A1-A3

Table 28. EN 15804+A2 Core environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC14_AKL102	AC14_AKL103	AC14_AKL104	AC20_AKL105	DG7_AKL107	DG10_AKL108	AC20_AKL115	AC20_AKL120	AC10_AKL125	AC14_HFB_AKL101	AC20_AKL113
GWpt	kg CO ₂ -eq	55.6	70.2	53.6	55.1	64.7	62.4	72.3	69.7	58.7	58.0	71.9
GWpf	kg CO ₂ -eq	55.3	69.0	53.3	54.7	64.4	62.1	70.9	68.3	58.4	57.6	70.5
GWpb	kg CO ₂ -eq	0.261	1.18	0.258	0.261	0.268	0.269	1.39	1.29	0.265	0.265	1.39
GWPluluc	kg CO ₂ -eq	0.0420	0.0478	0.0413	0.0420	0.0442	0.0441	0.0484	0.0471	0.0431	0.0429	0.0478
ODP	kg CFC-11 eq	5.75E-11	1.13E-10	5.72E-11	5.75E-11	5.90E-11	6.14E-11	1.32E-10	1.26E-10	6.00E-11	5.79E-11	1.25E-10
AP	Mole of H+eq	0.309	0.329	0.291	0.308	0.373	0.357	0.324	0.306	0.333	0.332	0.326
EPfw	kg P eq	1.79E-04	2.41E-04	1.78E-04	1.79E-04	1.83E-04	1.83E-04	2.52E-04	2.47E-04	1.81E-04	1.81E-04	2.52E-04
EPm	kg N eq	0.0962	0.104	0.0913	0.0956	0.114	0.109	0.102	0.0971	0.102	0.102	0.103
Ept	Mole of N eq	1.06	1.14	1.01	1.05	1.25	1.20	1.12	1.07	1.13	1.12	1.13
POCP	kg NMVOC eq	0.278	0.309	0.263	0.276	0.332	0.318	0.306	0.290	0.297	0.296	0.309
ADPmm*	kg Sb-eq	2.73E-05	2.78E-05	2.53E-05	2.73E-05	3.36E-05	3.22E-05	2.75E-05	2.53E-05	2.97E-05	2.98E-05	2.76E-05
ADPf*	MJ	2,790	3,020	2,600	2,780	3,440	3,290	3,020	2,810	3,030	3,020	3,010
WDP	m ³ world equiv	6.39	6.66	6.38	6.39	6.44	6.62	7.06	7.04	6.54	6.41	6.70

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

Table 29. Resource use indicators results covering modules A1-A3

PARAMETER	UNIT	AC14_AKL102	AC14_AKL103	AC14_AKL104	AC20_AKL105	DG7_AKL107	DG10_AKL108	AC20_AKL115	AC20_AKL120	AC10_AKL125	AC14_HFB_AKL101	AC20_AKL113
PERE	MJ	132	159	132	132	135	136	169	166	135	133	165
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	132	159	132	132	135	136	169	166	135	133	165
PENRE	MJ	-1,110	-853	-990	-1,120	-1,470	-1,390	-766	-667	-1,250	-1,260	-777
PENRM	MJ	3,970	3,940	3,650	3,970	5,000	4,760	3,850	3,540	4,370	4,370	3,850
PENRT	MJ	2,860	3,090	2,660	2,850	3,530	3,380	3,080	2,870	3,110	3,100	3,080
SM	kg	150	150	150	150	73.6	74.6	0	0	99.8	149	151
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	0.391	0.423	0.390	0.391	0.395	0.399	0.440	0.436	0.396	0.392	0.429

Table 30. Biogenic Carbon

PARAMETER	UNIT	QUANTITY
Biogenic carbon content in product	kg C	0

Table 31. Waste categories and output flow indicators covering modules A1-A3

PARAMETER	UNIT	AC14_AKL102	AC14_AKL103	AC14_AKL104	AC20_AKL105	DG7_AKL107	DG10_AKL108	AC20_AKL115	AC20_AKL120	AC10_AKL125	AC14_HFB_AKL101	AC20_AKL113
HWD	kg	2.80E-08	6.68E-08	2.77E-08	2.75E-08	3.14E-08	3.05E-08	7.59E-08	7.21E-08	2.90E-08	2.82E-08	7.48E-08
NHWD	kg	0.474	1.31	0.469	0.472	3.56	0.493	1.50	1.41	0.483	0.480	1.49
RWD	kg	0.0109	0.0137	0.0108	0.0109	0.0115	0.0120	0.0158	0.0154	0.0116	0.0111	0.0143
CRU	kg	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0
MER	kg	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0

Table 32. Additional environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC14_AKL102	AC14_AKL103	AC14_AKL104	AC20_AKL105	DG7_AKL107	DG10_AKL108	AC20_AKL115	AC20_AKL120	AC10_AKL125	AC14_HFB_AKL101	AC20_AKL113
GWP-GHG**	kg CO ₂ -eq	55.2	69.7	53.2	54.7	64.3	62.0	71.7	69.1	58.3	57.6	71.3
PM	Disease incidences	4.17E-06	4.39E-06	3.91E-06	4.16E-06	5.02E-06	4.83E-06	4.36E-06	4.09E-06	4.49E-06	4.49E-06	4.36E-06
IRP***	kBq U235 eq.	1.65	1.94	1.65	1.65	1.71	1.80	2.25	2.22	1.75	1.66	2.00
ETP-fw*	CTUe	1,240	1,300	1,150	1,240	1,500	1,440	1,300	1,210	1,340	1,340	1,300
HTPc*	CTUh	2.19E-08	2.60E-08	2.06E-08	2.19E-08	2.65E-08	2.54E-08	2.67E-08	2.49E-08	2.37E-08	2.36E-08	2.65E-08
HTPnc*	CTUh	6.53E-07	9.62E-07	6.12E-07	6.52E-07	7.91E-07	7.57E-07	1.03E-06	9.54E-07	7.05E-07	7.03E-07	1.02E-06
SQP*	Pt	129	150	128	129	131	132	157	154	131	130	154

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 33. EN 15804+A1 Environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC14_AKL102	AC14_AKL103	AC14_AKL104	AC20_AKL105	DG7_AKL107	DG10_AKL108	AC20_AKL115	AC20_AKL120	AC10_AKL125	AC14_HFB_AKL101	AC20_AKL113
GWP	kg CO ₂ -eq	52.0	66.1	50.2	51.4	60.3	58.2	68.2	65.8	54.8	54.0	67.8
ODP	kg CFC ₁₁ -eq.	6.77E-11	1.33E-10	6.74E-11	6.77E-11	6.94E-11	7.23E-11	1.55E-10	1.49E-10	7.06E-11	6.81E-11	1.48E-10
AP	kg SO ₂ -eq	0.238	0.253	0.224	0.237	0.288	0.276	0.249	0.235	0.257	0.256	0.250
EP	kg PO ₃ ⁴⁻ -eq.	0.0344	0.0382	0.0327	0.0342	0.0405	0.0389	0.0380	0.0362	0.0365	0.0364	0.0382
POCP	kg C ₂ H ₄ -eq.	0.0236	0.0255	0.0218	0.0235	0.0294	0.0280	0.0256	0.0237	0.0258	0.0257	0.0257
ADPE	kg Sb eq.	2.74E-05	2.79E-05	2.54E-05	2.74E-05	3.37E-05	3.22E-05	2.76E-05	2.54E-05	2.98E-05	2.99E-05	2.77E-05
ADPF	MJ	2,670	2,900	2,480	2,660	3,300	3,150	2,890	2,690	2,910	2,900	2,890

MODULES C1-C4

Modules C1-C4 results are the same for all products and results for each EOL module are presented together per one tonne of product.

Table 34. EN 15804+A2 Core environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWpt	kg CO ₂ -eq	0.625	2.57	0	0
GWpf	kg CO ₂ -eq	0.625	2.58	0	0
GWpb	kg CO ₂ -eq	6.18E-05	-0.0255	0	0
GWpluluc	kg CO ₂ -eq	4.53E-06	0.0176	0	0
ODP	kg CFC-11 eq	4.96E-14	2.56E-13	0	0
AP	Mole of H+eq	0.00297	0.0157	0	0
EPfw	kg P eq	1.10E-07	9.32E-06	0	0
EPm	kg N eq	0.00143	0.00764	0	0
EPt	Mole of N eq	0.0157	0.0846	0	0
POCP	kg NMVOC eq	0.00402	0.0147	0	0
ADPmm*	kg Sb-eq	7.62E-09	2.63E-07	0	0
ADPf*	MJ	8.29	34.3	0	0
WDP	m ³ world equiv	0.00464	0.0292	0	0

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

Table 35. Resource use indicators results covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
PERE	MJ	0.0271	2.37	0	0
PERM	MJ	0	0	0	0
PERT	MJ	0.0271	2.37	0	0
PENRE	MJ	8.29	34.4	0	0
PENRM	MJ	0	0	0	0
PENRT	MJ	8.29	34.4	0	0
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	6.98E-05	0.00274	0	0

Table 36. Waste categories and output flow indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
HWD	kg	8.99E-12	1.82E-10	0	0
NHWD	kg	1.18E-04	0.00560	0	0
RWD	kg	1.21E-07	6.39E-05	0	0
CRU	kg	0	0	0	0
MFR	kg	0	0	1,000	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 37. Additional environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP-GHG**	kg CO ₂ -eq	0.622	2.58	0	0
PM	Disease incidences	3.36E-08	5.88E-08	0	0
IRP***	kBq U235 eq.	1.57E-05	0.00964	0	0
ETP-fw*	CTUe	2.08	24.3	0	0
HTPc*	CTUh	3.49E-11	5.01E-10	0	0
HTPnc*	CTUh	2.18E-09	2.90E-08	0	0
SQP*	Pt	0.0190	14.5	0	0

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 38. EN 15804+A1 Environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP	kg CO ₂ -eq	0.615	2.51	0	0
ODP	kg CFC ₁₁ -eq.	5.84E-14	3.02E-13	0	0
AP	kg SO ₂ -eq	0.00206	0.0107	0	0
EP	kg PO ₃ ⁴⁻ -eq.	4.80E-04	0.00268	0	0
POCP	kg C ₂ H ₄ -eq.	2.03E-04	-0.00402	0	0
ADPE	kg Sb eq.	7.63E-09	2.63E-07	0	0
ADPF	MJ	8.29	33.9	0	0

MODULES D

Table 39. EN 15804+A2 Core environmental impact indicators covering modules D

PARAMETER	UNIT	AC14_AKL102	AC14_AKL103	AC14_AKL104	AC20_AKL105	DG7_AKL107	DG10_AKL108	AC20_AKL115	AC20_AKL120	AC10_AKL125	AC14_HFB_AKL101	AC20_AKL113
GWpt	kg CO ₂ -eq	-13.5	-13.5	-12.5	-13.7	-17.1	-16.7	-16.1	-14.9	-15.4	-14.7	-13.5
GWPf	kg CO ₂ -eq	-13.4	-13.5	-12.5	-13.7	-17.1	-16.7	-16.1	-14.9	-15.4	-14.7	-13.5
GWPb	kg CO ₂ -eq	2.85E-04	-2.59E-04	0.00109	-0.00102	0.00356	0.00160	-0.00188	1.55E-04	3.98E-05	-0.00114	-0.00125
GWPluluc	kg CO ₂ -eq	-0.00339	-0.00360	-0.00345	-0.00391	-9.83E-04	-0.00208	-0.00489	-0.00455	-0.00315	-0.00348	-0.00409
ODP	kg CFC-11 eq	-2.51E-11	-2.58E-11	-2.56E-11	-2.68E-11	-1.79E-11	-2.16E-11	-3.25E-11	-3.17E-11	-2.49E-11	-2.51E-11	-2.74E-11
AP	Mole of H+eq	-0.0328	-0.0330	-0.0298	-0.0333	-0.0445	-0.0429	-0.0393	-0.0353	-0.0386	-0.0367	-0.0327
EPfw	kg P eq	-1.21E-05	-1.24E-05	-1.18E-05	-1.27E-05	-1.16E-05	-1.25E-05	-1.53E-05	-1.44E-05	-1.29E-05	-1.27E-05	-1.28E-05
EPm	kg N eq	-0.00332	-0.00338	-0.00274	-0.00346	-0.00509	-0.00489	-0.00412	-0.00331	-0.00424	-0.00410	-0.00336
EPt	Mole of N eq	-0.0379	-0.0387	-0.0316	-0.0397	-0.0565	-0.0547	-0.0472	-0.0383	-0.0480	-0.0465	-0.0386
POCP	kg NMVOC eq	-0.0258	-0.0260	-0.0227	-0.0262	-0.0376	-0.0358	-0.0309	-0.0268	-0.0314	-0.0298	-0.0255
ADPmm*	kg Sb-eq	5.03E-07	4.89E-07	6.00E-07	4.69E-07	3.55E-07	3.65E-07	5.39E-07	6.83E-07	4.20E-07	3.72E-07	4.81E-07
ADPF*	MJ	-1,700	-1,700	-1,570	-1,700	-2,320	-2,220	-2,000	-1,840	-1,980	-1,870	-1,670
WDP	m ³ world equiv	-1.12	-1.19	-1.16	-1.27	-0.372	-0.703	-1.58	-1.51	-1.04	-1.13	-1.33

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

Table 40. Resource use indicators results covering modules D

PARAMETER	UNIT	AC14_AKL102	AC14_AKL103	AC14_AKL104	AC20_AKL105	DG7_AKL107	DG10_AKL108	AC20_AKL115	AC20_AKL120	AC10_AKL125	AC14_HFB_AKL101	AC20_AKL113
PERE	MJ	-18.8	-19.4	-19.1	-20.2	-13.0	-16.0	-24.6	-23.8	-18.7	-19.0	-20.7
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	-18.8	-19.4	-19.1	-20.2	-13.0	-16.0	-24.6	-23.8	-18.7	-19.0	-20.7
PENRE	MJ	-1,700	-1,700	-1,570	-1,700	-2,320	-2,220	-2,000	-1,840	-1,980	-1,870	-1,670
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	-1,700	-1,700	-1,570	-1,700	-2,320	-2,220	-2,000	-1,840	-1,980	-1,870	-1,670
SM	kg	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	-0.0375	-0.0393	-0.0383	-0.0417	-0.0185	-0.0274	-0.0514	-0.0489	-0.0359	-0.0380	-0.0432



Table 41. Waste categories and output flow indicators covering modules D

PARAMETER	UNIT	AC14_AKL102	AC14_AKL103	AC14_AKL104	AC20_AKL105	DG7_AKL107	DG10_AKL108	AC20_AKL115	AC20_AKL120	AC10_AKL125	AC14_HFB_AKL101	AC20_AKL113
HWD	kg	-4.17E-09	-4.27E-09	-4.13E-09	-4.41E-09	-3.59E-09	-4.02E-09	-5.32E-09	-5.07E-09	-4.33E-09	-4.31E-09	-4.47E-09
NHWD	kg	-6.85	-6.40	-6.61	-5.78	-13.4	-11.1	-6.19	-6.78	-8.30	-6.81	-5.36
RWD	kg	-0.00488	-0.00508	-0.00501	-0.00535	-0.00263	-0.00367	-0.00656	-0.00634	-0.00468	-0.00488	-0.00553
CRU	kg	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0

Table 42. Additional environmental impact indicators covering modules D

PARAMETER	UNIT	AC14_AKL102	AC14_AKL103	AC14_AKL104	AC20_AKL105	DG7_AKL107	DG10_AKL108	AC20_AKL115	AC20_AKL120	AC10_AKL125	AC14_HFB_AKL101	AC20_AKL113
GWP-GHG**	kg CO ₂ -eq	-13.3	-13.4	-12.4	-13.5	-16.9	-16.5	-16.0	-14.7	-15.3	-14.5	-13.4
PM	Disease incidences	-2.13E-07	-2.16E-07	-1.96E-07	-2.19E-07	-2.66E-07	-2.64E-07	-2.60E-07	-2.35E-07	-2.46E-07	-2.37E-07	-2.17E-07
IRP***	kBq U235 eq.	-0.825	-0.860	-0.848	-0.908	-0.423	-0.607	-1.12	-1.08	-0.787	-0.824	-0.940
ETP-fw*	CTUe	-249	-250	-230	-251	-334	-321	-295	-270	-290	-274	-246
HTPc*	CTUh	-5.34E-09	-5.35E-09	-4.96E-09	-5.37E-09	-7.10E-09	-6.83E-09	-6.31E-09	-5.83E-09	-6.17E-09	-5.83E-09	-5.27E-09
HTPnc*	CTUh	-1.99E-07	-1.99E-07	-1.86E-07	-1.99E-07	-2.62E-07	-2.52E-07	-2.33E-07	-2.18E-07	-2.28E-07	-2.15E-07	-1.96E-07
SQP*	Pt	-13.0	-13.4	-13.2	-14.1	-7.80	-10.3	-17.3	-16.6	-12.7	-13.1	-14.6

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 43. EN 15804+A1 Environmental impact indicators covering modules D

PARAMETER	UNIT	AC14_AKL102	AC14_AKL103	AC14_AKL104	AC20_AKL105	DG7_AKL107	DG10_AKL108	AC20_AKL115	AC20_AKL120	AC10_AKL125	AC14_HFB_AKL101	AC20_AKL113
GWP	kg CO ₂ -eq	-11.3	-11.4	-10.5	-11.5	-14.1	-13.9	-13.6	-12.5	-12.9	-12.3	-11.3
ODP	kg CFC ₁₁ -eq.	-2.96E-11	-3.04E-11	-3.01E-11	-3.16E-11	-2.11E-11	-2.54E-11	-3.83E-11	-3.73E-11	-2.93E-11	-2.96E-11	-3.23E-11
AP	kg SO ₂ -eq	-0.0283	-0.0284	-0.0258	-0.0287	-0.0382	-0.0369	-0.0338	-0.0305	-0.0332	-0.0315	-0.0281
EP	kg PO ₃ ⁴⁻⁻ -eq.	-0.00156	-0.00158	-0.00135	-0.00162	-0.00217	-0.00212	-0.00193	-0.00163	-0.00190	-0.00184	-0.00159
POCP	kg C ₂ H ₄ -eq.	-0.00893	-0.00895	-0.00811	-0.00897	-0.0126	-0.0120	-0.0105	-0.00951	-0.0106	-0.00998	-0.00877
ADPE	kg Sb eq.	4.70E-07	4.55E-07	5.66E-07	4.33E-07	3.35E-07	3.40E-07	4.95E-07	6.41E-07	3.88E-07	3.39E-07	4.44E-07
ADPF	MJ	-1,690	-1,690	-1,560	-1,690	-2,310	-2,210	-1,980	-1,820	-1,970	-1,850	-1,650

HAMILTON RESULTS FOR ONE TONNE OF ASPHALT

MODULES A1-A3

Table 44. EN 15804+A2 Core environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC10_WAK005	AC14_WAK007	DG7_WAK107	SMA11_WAK112	WSMA11_WAK101	SMA14_WAK001	SMA14_WAK012	SMA10_WAK002	AC20_WAK114	AC10_WAK013	DG10_WAK022	AC20_WAK115	DG7_WAK109	EPA7_WAK016	PA10_WAK108	AC14_WAK026	AC14-HFB_WAK004	DG7_WAK006	AC20_WAK113
GWpt	kg CO ₂ -eq	60.6	57.7	64.8	133	79.9	78.0	78.0	78.4	53.3	77.9	60.4	66.2	77.8	53.1	61.9	73.0	59.5	62.1	76.2
GWpf	kg CO ₂ -eq	60.4	57.5	64.6	138	84.9	83.0	83.0	83.3	53.2	76.6	60.2	65.2	76.5	65.7	61.7	71.9	59.3	61.9	74.8
GWpb	kg CO ₂ -eq	0.126	0.121	0.131	-4.93	-5.00	-5.06	-5.06	-5.06	0.115	1.20	0.124	0.913	1.18	-12.7	0.132	1.09	0.124	0.127	1.35
GWpluluc	kg CO ₂ -eq	0.0605	0.0597	0.0614	0.0983	0.0740	0.0733	0.0733	0.0733	0.0586	0.0668	0.0602	0.0633	0.0665	0.139	0.0615	0.0654	0.0602	0.0607	0.0659
ODP	kg CFC-11 eq	6.32E-11	6.28E-11	6.37E-11	1.88E-10	1.93E-10	1.90E-10	1.90E-10	1.90E-10	6.22E-11	1.28E-10	6.31E-11	1.11E-10	1.27E-10	1.00E-10	6.37E-11	1.21E-10	6.31E-11	6.34E-11	1.37E-10
AP	Mole of H+eq	0.356	0.328	0.389	0.654	0.470	0.456	0.456	0.457	0.288	0.379	0.348	0.305	0.375	0.475	0.387	0.349	0.346	0.366	0.354
EPfw	kg P eq	7.40E-05	7.25E-05	7.57E-05	3.36E-04	2.85E-04	2.81E-04	2.81E-04	2.81E-04	7.02E-05	1.46E-04	7.35E-05	1.23E-04	1.44E-04	0.00200	7.59E-05	1.37E-04	7.35E-05	7.45E-05	1.51E-04
EPm	kg N eq	0.110	0.103	0.119	0.186	0.143	0.140	0.140	0.140	0.0922	0.119	0.108	0.0987	0.118	0.149	0.117	0.111	0.108	0.113	0.112
EPt	Mole of N eq	1.21	1.14	1.31	2.05	1.57	1.53	1.53	1.53	1.02	1.31	1.20	1.09	1.30	1.76	1.29	1.22	1.19	1.25	1.23
POCP	kg NMVOC eq	0.315	0.293	0.343	0.562	0.425	0.413	0.413	0.414	0.259	0.352	0.310	0.286	0.349	0.314	0.338	0.325	0.307	0.324	0.334
ADPmm*	kg Sb-eq	3.14E-05	2.84E-05	3.49E-05	3.99E-05	3.70E-05	3.55E-05	3.55E-05	3.55E-05	2.39E-05	3.20E-05	3.04E-05	2.43E-05	3.15E-05	1.87E-04	3.53E-05	2.89E-05	3.04E-05	3.24E-05	3.00E-05
ADPf*	MJ	3,210	2,920	3,550	4,550	3,910	3,760	3,760	3,760	2,490	3,480	3,120	2,690	3,440	2,970	3,560	3,160	3,110	3,310	3,260
WDP	m ³ world equiv	5.68	5.66	5.71	16.0	13.5	13.5	13.5	13.5	5.63	6.00	5.68	5.86	5.99	6.75	5.71	5.95	5.68	5.69	5.99

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

Table 45. Resource use indicators results covering modules A1-A3

PARAMETER	UNIT	AC10_WAK005	AC14_WAK007	DG7_WAK107	SMA11_WAK112	WSMA11_WAK101	SMA14_WAK001	SMA14_WAK012	SMA10_WAK002	AC20_WAK114	AC10_WAK013	DG10_WAK022	AC20_WAK115	DG7_WAK109	EPA7_WAK016	PA10_WAK108	AC14_WAK026	AC14-HFB_WAK004	DG7_WAK006	AC20_WAK113
PERE	MJ	119	118	120	426	301	299	299	299	117	150	118	140	149	308	120	146	118	119	153
PERM	MJ	0	0	0	61.9	61.9	61.9	61.9	61.9	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	119	118	120	488	363	361	361	361	117	150	118	140	149	308	120	146	118	119	153
PENRE	MJ	-1,330	-1,150	-1,530	-534	-1,180	-1,100	-1,100	-1,100	-877	-1,030	-1,260	-652	-995	-1,300	-1,600	-881	-1,270	-1,390	-847
PENRM	MJ	4,620	4,150	5,180	5,180	5,180	4,940	4,940	4,940	3,430	4,590	4,460	3,400	4,510	4,340	5,260	4,110	4,460	4,780	4,180
PENRT	MJ	3,290	3,000	3,650	4,650	4,000	3,840	3,840	3,850	2,550	3,560	3,200	2,750	3,510	3,040	3,660	3,230	3,190	3,400	3,330
SM	kg	0	0	0	738	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	0.302	0.300	0.304	0.743	0.393	0.390	0.390	0.390	0.298	0.339	0.302	0.325	0.338	0.427	0.304	0.334	0.302	0.303	0.343

Table 46. Biogenic Carbon

PARAMETER	UNIT	QUANTITY
Biogenic carbon content in product	kg C	0



Table 47. Waste categories and output flow indicators covering modules A1-A3

PARAMETER	UNIT	AC10_WAK005	AC14_WAK007	DG7_WAK107	SMA11_WAK112	WSMA11_WAK101	SMA14_WAK001	SMA14_WAK012	SMA10_WAK002	AC20_WAK114	AC10_WAK013	DG10_WAK022	AC20_WAK115	DG7_WAK109	EPA7_WAK016	PA10_WAK108	AC14_WAK026	AC14-HFB_WAK004	DG7_WAK006	AC20_WAK113
HWD	kg	2.80E-08	2.76E-08	2.92E-08	1.04E-07	8.51E-08	8.29E-08	8.29E-08	8.32E-08	2.70E-08	7.37E-08	2.86E-08	6.09E-08	7.34E-08	4.90E-08	2.63E-08	6.84E-08	2.78E-08	2.86E-08	7.89E-08
NHWD	kg	0.236	0.228	0.246	1.74	1.58	1.53	1.53	1.53	0.217	1.21	0.235	0.942	1.20	0.893	0.239	1.10	0.233	0.239	1.34
RWD	kg	0.0128	0.0126	0.0130	0.0143	0.0196	0.0193	0.0193	0.0193	0.0123	0.0160	0.0127	0.0147	0.0160	0.0153	0.0130	0.0155	0.0127	0.0128	0.0164
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5	59.5
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 48. Additional environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC10_WAK005	AC14_WAK007	DG7_WAK107	SMA11_WAK112	WSMA11_WAK101	SMA14_WAK001	SMA14_WAK012	SMA10_WAK002	AC20_WAK114	AC10_WAK013	DG10_WAK022	AC20_WAK115	DG7_WAK109	EPA7_WAK016	PA10_WAK108	AC14_WAK026	AC14-HFB_WAK004	DG7_WAK006	AC20_WAK113
GWP-GHG**	kg CO ₂ -eq	60.2	57.3	64.4	138	85.6	83.7	83.7	84.1	53.0	77.3	60.0	65.7	77.2	65.6	61.5	72.4	59.1	61.7	75.6
PM	Disease incidences	4.74E-06	4.35E-06	5.20E-06	1.02E-05	8.39E-06	8.19E-06	8.19E-06	8.19E-06	3.77E-06	5.00E-06	4.62E-06	3.96E-06	4.94E-06	5.58E-06	5.24E-06	4.58E-06	4.61E-06	4.87E-06	4.69E-06
IRP***	kBq U235 eq.	1.94	1.93	1.95	1.55	2.61	2.59	2.59	2.59	1.91	2.27	1.93	2.16	2.27	2.28	1.95	2.23	1.93	1.94	2.31
ETP-fw*	CTUe	1,400	1,280	1,540	1,960	1,690	1,620	1,620	1,620	1,090	1,480	1,360	1,150	1,450	1,390	1,560	1,340	1,360	1,440	1,390
HTPc*	CTUh	2.48E-08	2.27E-08	2.72E-08	5.19E-08	3.48E-08	3.36E-08	3.36E-08	3.36E-08	1.97E-08	2.95E-08	2.41E-08	2.33E-08	2.92E-08	5.27E-08	2.73E-08	2.70E-08	2.41E-08	2.55E-08	2.85E-08
HTPnc*	CTUh	7.63E-07	7.03E-07	8.34E-07	2.10E-06	1.41E-06	1.36E-06	1.36E-06	1.36E-06	6.12E-07	1.12E-06	7.44E-07	8.80E-07	1.11E-06	5.84E-06	8.42E-07	1.03E-06	7.43E-07	7.84E-07	1.12E-06
SQP*	Pt	298	297	299	2,860	2,830	2,830	2,830	2,830	295	322	297	314	322	1,820	299	319	297	298	324

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 49. EN 15804+A1 Environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC10_WAK005	AC14_WAK007	DG7_WAK107	SMA11_WAK112	WSMA11_WAK101	SMA14_WAK001	SMA14_WAK012	SMA10_WAK002	AC20_WAK114	AC10_WAK013	DG10_WAK022	AC20_WAK115	DG7_WAK109	EPA7_WAK016	PA10_WAK108	AC14_WAK026	AC14-HFB_WAK004	DG7_WAK006	AC20_WAK113
GWP	kg CO ₂ -eq	56.5	53.9	60.3	127	74.7	73.0	73.0	73.3	50.1	73.2	56.4	62.5	73.2	49.2	57.4	68.7	55.5	57.8	71.8
ODP	kg CFC ₁₁ -eq.	7.44E-11	7.40E-11	7.50E-11	2.21E-10	2.28E-10	2.24E-10	2.24E-10	2.24E-10	7.33E-11	1.51E-10	7.43E-11	1.30E-10	1.50E-10	1.18E-10	7.51E-11	1.43E-10	7.43E-11	7.46E-11	1.61E-10
AP	kg SO ₂ -eq	0.274	0.252	0.300	0.512	0.364	0.353	0.353	0.353	0.220	0.291	0.268	0.233	0.288	0.336	0.299	0.268	0.267	0.282	0.272
EP	kg PO ₃ ⁴⁻⁻ -eq.	0.0384	0.0360	0.0415	0.0675	0.0524	0.0511	0.0511	0.0512	0.0323	0.0429	0.0378	0.0356	0.0426	0.0829	0.0408	0.0399	0.0376	0.0394	0.0408
POCP	kg C ₂ H ₄ -eq.	0.0233	0.0206	0.0266	0.0498	0.0327	0.0313	0.0313	0.0313	0.0166	0.0257	0.0225	0.0184	0.0253	0.0204	0.0266	0.0228	0.0224	0.0243	0.0240
ADPE	kg Sb eq.	3.14E-05	2.84E-05	3.50E-05	4.00E-05	3.71E-05	3.56E-05	3.56E-05	3.56E-05	2.39E-05	3.21E-05	3.05E-05	2.44E-05	3.16E-05	1.87E-04	3.54E-05	2.90E-05	3.04E-05	3.25E-05	3.01E-05
ADPF	MJ	3,070	2,790	3,400	4,400	3,750	3,600	3,600	3,610	2,380	3,340	2,990	2,580	3,300	2,840	3,410	3,030	2,980	3,170	3,130



MODULES C1-C4

Modules C1-C4 results are the same for all products and results for each EOL module are presented together per one tonne of product.

Table 50. EN 15804+A2 Core environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWPt	kg CO ₂ -eq	0.625	2.57	0	0
GWPf	kg CO ₂ -eq	0.625	2.58	0	0
GWPb	kg CO ₂ -eq	6.18E-05	-0.0255	0	0
GWPluluc	kg CO ₂ -eq	4.53E-06	0.0176	0	0
ODP	kg CFC-11 eq	4.96E-14	2.56E-13	0	0
AP	Mole of H+eq	0.00297	0.0157	0	0
EPfw	kg P eq	1.10E-07	9.32E-06	0	0
EPm	kg N eq	0.00143	0.00764	0	0
EPt	Mole of N eq	0.0157	0.0846	0	0
POCP	kg NMVOC eq	0.00402	0.0147	0	0
ADPmm*	kg Sb-eq	7.62E-09	2.63E-07	0	0
ADPf*	MJ	8.29	34.3	0	0
WDP	m ³ world equiv	0.00464	0.0292	0	0

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

Table 51. Resource use indicators results covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
PERE	MJ	0.0271	2.37	0	0
PERM	MJ	0	0	0	0
PERT	MJ	0.0271	2.37	0	0
PENRE	MJ	8.29	34.4	0	0
PENRM	MJ	0	0	0	0
PENRT	MJ	8.29	34.4	0	0
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	6.98E-05	0.00274	0	0

Table 52. Waste categories and output flow indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
HWD	kg	8.99E-12	1.82E-10	0	0
NHWD	kg	1.18E-04	0.00560	0	0
RWD	kg	1.21E-07	6.39E-05	0	0
CRU	kg	0	0	0	0
MFR	kg	0	0	1,000	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 53. Additional environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP-GHG**	kg CO ₂ -eq	0.622	2.58	0	0
PM	Disease incidences	3.36E-08	5.88E-08	0	0
IRP***	kBq U235 eq.	1.57E-05	0.00964	0	0
ETP-fw*	CTUe	2.08	24.3	0	0
HTPc*	CTUh	3.49E-11	5.01E-10	0	0
HTPnc*	CTUh	2.18E-09	2.90E-08	0	0
SQP*	Pt	0.0190	14.5	0	0

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 54. EN 15804+A1 Environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP	kg CO ₂ -eq	0.615	2.51	0	0
ODP	kg CFC ₁₁ -eq.	5.84E-14	3.02E-13	0	0
AP	kg SO ₂ -eq	0.00206	0.0107	0	0
EP	kg PO ₃ ⁴⁻ -eq.	4.80E-04	0.00268	0	0
POCP	kg C ₂ H ₄ -eq.	2.03E-04	-0.00402	0	0
ADPE	kg Sb eq.	7.63E-09	2.63E-07	0	0
ADPF	MJ	8.29	33.9	0	0

MODULES D

Table 55. EN 15804+A2 Core environmental impact indicators covering modules D

PARAMETER	UNIT	AC10_WAK005	AC14_WAK007	DG7_WAK107	SMA11_WAK112	WSMA11_WAK101	SMA14_WAK001	SMA14_WAK012	SMA10_WAK002	AC20_WAK114	AC10_WAK013	DG10_WAK022	AC20_WAK115	DG7_WAK109	EPA7_WAK016	PA10_WAK108	AC14_WAK026	AC14-HFB_WAK004	DG7_WAK006	AC20_WAK113
GWpt	kg CO ₂ -eq	-16.0	-14.7	-17.3	-16.5	-18.5	-17.7	-17.7	-17.5	-12.6	-15.9	-15.3	-12.6	-15.4	-16.2	-19.0	-14.7	-15.6	-16.3	-15.1
GWPf	kg CO ₂ -eq	-16.0	-14.7	-17.3	-16.5	-18.5	-17.7	-17.6	-17.5	-12.6	-15.9	-15.3	-12.6	-15.4	-16.2	-19.0	-14.7	-15.6	-16.3	-15.1
GWPb	kg CO ₂ -eq	1.62E-04	0.00141	6.21E-04	0.00623	-0.00668	-0.00526	-0.00511	-0.00440	0.00364	8.52E-04	0.00258	0.00364	0.00280	-0.00457	-0.00848	0.00143	2.92E-04	9.03E-04	2.53E-05
GWPluluc	kg CO ₂ -eq	-0.00397	-0.00405	-0.00311	-8.83E-04	-0.00601	-0.00573	-0.00568	-0.00539	-0.00403	-0.00369	-0.00320	-0.00403	-0.00302	-0.00613	-0.00663	-0.00404	-0.00411	-0.00348	-0.00450
ODP	kg CFC-11 eq	-2.95E-11	-3.01E-11	-2.63E-11	-1.92E-11	-3.56E-11	-3.49E-11	-3.47E-11	-3.38E-11	-3.06E-11	-2.86E-11	-2.71E-11	-3.06E-11	-2.65E-11	-3.66E-11	-3.75E-11	-3.01E-11	-3.00E-11	-2.78E-11	-3.15E-11
AP	Mole of H+eq	-0.0393	-0.0348	-0.0438	-0.0417	-0.0466	-0.0440	-0.0440	-0.0437	-0.0280	-0.0390	-0.0371	-0.0280	-0.0376	-0.0391	-0.0479	-0.0348	-0.0379	-0.0404	-0.0360
EPfw	kg P eq	-1.43E-05	-1.38E-05	-1.41E-05	-1.15E-05	-1.74E-05	-1.68E-05	-1.67E-05	-1.64E-05	-1.29E-05	-1.40E-05	-1.33E-05	-1.29E-05	-1.32E-05	-1.65E-05	-1.82E-05	-1.38E-05	-1.43E-05	-1.40E-05	-1.44E-05
EPm	kg N eq	-0.00404	-0.00317	-0.00486	-0.00425	-0.00565	-0.00512	-0.00511	-0.00503	-0.00182	-0.00397	-0.00354	-0.00182	-0.00364	-0.00419	-0.00596	-0.00317	-0.00378	-0.00421	-0.00344
EPT	Mole of N eq	-0.0461	-0.0366	-0.0547	-0.0473	-0.0643	-0.0585	-0.0583	-0.0574	-0.0218	-0.0452	-0.0403	-0.0218	-0.0413	-0.0484	-0.0680	-0.0366	-0.0433	-0.0478	-0.0397
POCP	kg NMVOC eq	-0.0311	-0.0265	-0.0359	-0.0342	-0.0381	-0.0355	-0.0355	-0.0353	-0.0194	-0.0309	-0.0290	-0.0194	-0.0296	-0.0304	-0.0393	-0.0265	-0.0296	-0.0323	-0.0276
ADPmm*	kg Sb-eq	5.70E-07	7.16E-07	4.50E-07	5.97E-07	2.59E-07	3.53E-07	3.57E-07	3.75E-07	9.44E-07	5.88E-07	6.71E-07	9.44E-07	6.58E-07	5.03E-07	1.93E-07	7.16E-07	6.11E-07	5.52E-07	6.61E-07
ADPf*	MJ	-2,030	-1,840	-2,260	-2,240	-2,280	-2,180	-2,180	-2,170	-1,540	-2,030	-1,960	-1,540	-1,990	-1,950	-2,310	-1,840	-1,970	-2,090	-1,870
WDP	m ³ world equiv	-1.31	-1.36	-1.03	-0.388	-1.87	-1.80	-1.79	-1.71	-1.40	-1.23	-1.10	-1.40	-1.04	-1.95	-2.04	-1.36	-1.36	-1.16	-1.49

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

Table 56. Resource use indicators results covering modules D

PARAMETER	UNIT	AC10_WAK005	AC14_WAK007	DG7_WAK107	SMA11_WAK112	WSMA11_WAK101	SMA14_WAK001	SMA14_WAK012	SMA10_WAK002	AC20_WAK114	AC10_WAK013	DG10_WAK022	AC20_WAK115	DG7_WAK109	EPA7_WAK016	PA10_WAK108	AC14_WAK026	AC14-HFB_WAK004	DG7_WAK006	AC20_WAK113
PERE	MJ	-22.1	-22.4	-19.7	-13.7	-27.4	-26.7	-26.6	-25.8	-22.5	-21.4	-20.1	-22.5	-19.6	-27.9	-29.1	-22.4	-22.5	-20.8	-23.6
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	-22.1	-22.4	-19.7	-13.7	-27.4	-26.7	-26.6	-25.8	-22.5	-21.4	-20.1	-22.5	-19.6	-27.9	-29.1	-22.4	-22.5	-20.8	-23.6
PENRE	MJ	-2,030	-1,840	-2,260	-2,240	-2,280	-2,180	-2,180	-2,170	-1,540	-2,030	-1,960	-1,540	-1,990	-1,950	-2,310	-1,840	-1,970	-2,090	-1,870
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	-2,030	-1,840	-2,260	-2,240	-2,280	-2,180	-2,180	-2,170	-1,540	-2,030	-1,960	-1,540	-1,990	-1,950	-2,310	-1,840	-1,970	-2,090	-1,870
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	-0.0439	-0.0449	-0.0367	-0.0189	-0.0599	-0.0578	-0.0574	-0.0551	-0.0452	-0.0418	-0.0379	-0.0452	-0.0364	-0.0614	-0.0648	-0.0449	-0.0452	-0.0400	-0.0485



Table 57. Waste categories and output flow indicators covering modules D

PARAMETER	UNIT	AC10_WAK005	AC14_WAK007	DG7_WAK107	SMA11_WAK112	WSMA11_WAK101	SMA14_WAK001	SMA14_WAK012	SMA10_WAK002	AC20_WAK114	AC10_WAK013	DG10_WAK022	AC20_WAK115	DG7_WAK109	EPA7_WAK016	PA10_WAK108	AC14_WAK026	AC14-HFB_WAK004	DG7_WAK006	AC20_WAK113
HWD	kg	-4.92E-09	-4.85E-09	-4.66E-09	-3.65E-09	-5.97E-09	-5.79E-09	-5.77E-09	-5.64E-09	-4.67E-09	-4.80E-09	-4.53E-09	-4.67E-09	-4.47E-09	-5.85E-09	-6.27E-09	-4.84E-09	-4.95E-09	-4.74E-09	-5.07E-09
NHWD	kg	-8.13	-7.80	-10.1	-14.6	-4.11	-4.60	-4.72	-5.30	-7.61	-8.69	-9.65	-7.61	-10.1	-3.60	-2.87	-7.82	-7.79	-9.18	-6.90
RWD	kg	-0.00571	-0.00589	-0.00482	-0.00282	-0.00742	-0.00723	-0.00717	-0.00692	-0.00603	-0.00547	-0.00506	-0.00603	-0.00488	-0.00771	-0.00796	-0.00589	-0.00587	-0.00524	-0.00628
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 58. Additional environmental impact indicators covering modules D

PARAMETER	UNIT	AC10_WAK005	AC14_WAK007	DG7_WAK107	SMA11_WAK112	WSMA11_WAK101	SMA14_WAK001	SMA14_WAK012	SMA10_WAK002	AC20_WAK114	AC10_WAK013	DG10_WAK022	AC20_WAK115	DG7_WAK109	EPA7_WAK016	PA10_WAK108	AC14_WAK026	AC14-HFB_WAK004	DG7_WAK006	AC20_WAK113
GWP-GHG**	kg CO ₂ -eq	-15.9	-14.5	-17.2	-16.3	-18.3	-17.5	-17.5	-17.4	-12.5	-15.8	-15.1	-12.5	-15.3	-16.1	-18.8	-14.5	-15.5	-16.2	-15.0
PM	Disease incidences	-2.55E-07	-2.29E-07	-2.76E-07	-2.50E-07	-3.10E-07	-2.93E-07	-2.93E-07	-2.89E-07	-1.88E-07	-2.51E-07	-2.37E-07	-1.88E-07	-2.39E-07	-2.67E-07	-3.22E-07	-2.29E-07	-2.47E-07	-2.58E-07	-2.39E-07
IRP***	kBq U235 eq.	-0.965	-0.997	-0.807	-0.454	-1.27	-1.23	-1.22	-1.18	-1.02	-0.922	-0.849	-1.02	-0.818	-1.32	-1.36	-0.996	-0.994	-0.882	-1.07
ETP-fw*	CTUe	-298	-269	-329	-321	-338	-323	-323	-322	-225	-297	-285	-225	-290	-290	-345	-269	-288	-306	-275
HTPc*	CTUh	-6.37E-09	-5.80E-09	-7.00E-09	-6.88E-09	-7.16E-09	-6.85E-09	-6.85E-09	-6.83E-09	-4.93E-09	-6.36E-09	-6.14E-09	-4.93E-09	-6.22E-09	-6.20E-09	-7.29E-09	-5.80E-09	-6.19E-09	-6.54E-09	-5.92E-09
HTPnc*	CTUh	-2.37E-07	-2.17E-07	-2.59E-07	-2.57E-07	-2.60E-07	-2.51E-07	-2.51E-07	-2.50E-07	-1.89E-07	-2.37E-07	-2.30E-07	-1.89E-07	-2.33E-07	-2.28E-07	-2.64E-07	-2.17E-07	-2.30E-07	-2.43E-07	-2.21E-07
SQP*	Pt	-15.2	-15.5	-13.2	-8.13	-19.7	-19.1	-19.0	-18.4	-15.6	-14.6	-13.5	-15.6	-13.1	-20.1	-21.1	-15.4	-15.5	-14.1	-16.5

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 59. EN 15804+A1 Environmental impact indicators covering modules D

PARAMETER	UNIT	AC10_WAK005	AC14_WAK007	DG7_WAK107	SMA11_WAK112	WSMA11_WAK101	SMA14_WAK001	SMA14_WAK012	SMA10_WAK002	AC20_WAK114	AC10_WAK013	DG10_WAK022	AC20_WAK115	DG7_WAK109	EPA7_WAK016	PA10_WAK108	AC14_WAK026	AC14-HFB_WAK004	DG7_WAK006	AC20_WAK113
GWP	kg CO ₂ -eq	-13.4	-12.3	-14.4	-13.6	-15.6	-14.9	-14.9	-14.7	-10.6	-13.3	-12.8	-10.6	-12.9	-13.7	-16.0	-12.3	-13.1	-13.6	-12.7
ODP	kg CFC ₁₁ -eq.	-3.47E-11	-3.54E-11	-3.10E-11	-2.26E-11	-4.19E-11	-4.10E-11	-4.08E-11	-3.98E-11	-3.60E-11	-3.37E-11	-3.20E-11	-3.60E-11	-3.12E-11	-4.30E-11	-4.41E-11	-3.54E-11	-3.54E-11	-3.27E-11	-3.71E-11
AP	kg SO ₂ -eq	-0.0339	-0.0302	-0.0377	-0.0361	-0.0397	-0.0376	-0.0376	-0.0374	-0.0245	-0.0337	-0.0321	-0.0245	-0.0326	-0.0335	-0.0408	-0.0301	-0.0327	-0.0348	-0.0311
EP	kg PO ₃ ⁴⁻ -eq.	-0.00188	-0.00156	-0.00216	-0.00188	-0.00252	-0.00232	-0.00231	-0.00228	-0.00107	-0.00185	-0.00168	-0.00107	-0.00171	-0.00199	-0.00265	-0.00156	-0.00179	-0.00193	-0.00167
POCP	kg C ₂ H ₄ -eq.	-0.0107	-0.00948	-0.0121	-0.0119	-0.0123	-0.0117	-0.0117	-0.0116	-0.00762	-0.0107	-0.0102	-0.00762	-0.0104	-0.0103	-0.0126	-0.00947	-0.0103	-0.0111	-0.00972
ADPE	kg Sb eq.	5.32E-07	6.76E-07	4.17E-07	5.77E-07	2.10E-07	3.05E-07	3.09E-07	3.29E-07	9.04E-07	5.51E-07	6.37E-07	9.04E-07	6.25E-07	4.52E-07	1.40E-07	6.77E-07	5.72E-07	5.16E-07	6.19E-07
ADPF	MJ	-2,020	-1,820	-2,240	-2,230	-2,250	-2,150	-2,150	-2,150	-1,520	-2,010	-1,950	-1,520	-1,980	-1,930	-2,290	-1,820	-1,950	-2,080	-1,850



TAURANGA RESULTS FOR ONE TONNE OF ASPHALT

MODULES A1-A3

Table 60. EN 15804+A2 Core environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC10_ BOP001	AC20_ BOP003	DG7_ BOP004	DG10_ BOP005	AC14_ BOP007	AC28_ BOP104	AC20_ BOP106	AC28_0	AC14_0
GWpt	kg CO ₂ -eq	63.5	60.7	68.6	66.6	79.6	74.7	82.6	63.6	60.4
GWpf	kg CO ₂ -eq	63.1	60.4	68.3	66.3	78.3	73.5	81.1	63.3	60.1
GWpb	kg CO ₂ -eq	0.283	0.280	0.288	0.286	1.24	1.13	1.50	0.283	0.279
GWPluluc	kg CO ₂ -eq	0.0561	0.0557	0.0566	0.0563	0.0645	0.0632	0.0651	0.0561	0.0557
ODP	kg CFC-11 eq	6.59E-11	6.55E-11	6.65E-11	6.62E-11	1.24E-10	1.17E-10	1.39E-10	6.59E-11	6.55E-11
AP	Mole of H+eq	0.327	0.304	0.365	0.347	0.350	0.321	0.356	0.327	0.300
EPfw	kg P eq	1.90E-04	1.89E-04	1.92E-04	1.91E-04	2.55E-04	2.47E-04	2.69E-04	1.90E-04	1.89E-04
EPm	kg N eq	0.0973	0.0914	0.107	0.103	0.106	0.0980	0.108	0.0974	0.0903
EPt	Mole of N eq	1.07	1.01	1.18	1.13	1.17	1.08	1.18	1.07	0.996
POCP	kg NMVOC eq	0.280	0.261	0.312	0.297	0.314	0.288	0.323	0.281	0.258
ADPmm*	kg Sb-eq	2.82E-05	2.57E-05	3.21E-05	3.02E-05	2.88E-05	2.57E-05	2.98E-05	2.82E-05	2.52E-05
ADPF*	MJ	2,990	2,750	3,390	3,200	3,250	2,930	3,340	3,000	2,710
WDP	m ³ world equiv	4.98	4.96	5.02	5.01	5.28	5.22	5.32	4.98	4.96

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

Table 61. Resource use indicators results covering modules A1-A3

PARAMETER	UNIT	AC10_ BOP001	AC20_ BOP003	DG7_ BOP004	DG10_ BOP005	AC14_ BOP007	AC28_ BOP104	AC20_ BOP106	AC28_0	AC14_0
PERE	MJ	139	138	140	140	167	163	174	139	138
PERM	MJ	0	0	0	0	0	0	0	0	0
PERT	MJ	139	138	140	140	167	163	174	139	138
PENRE	MJ	-1,050	-907	-1,280	-1,160	-774	-626	-743	-1,050	-874
PENRM	MJ	4,120	3,730	4,760	4,440	4,090	3,620	4,160	4,120	3,650
PENRT	MJ	3,070	2,820	3,480	3,280	3,320	2,990	3,420	3,070	2,770
SM	kg	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0
FW	m ³	0.204	0.202	0.206	0.205	0.237	0.232	0.246	0.204	0.202

Table 62. Biogenic Carbon

PARAMETER	UNIT	QUANTITY
Biogenic carbon content in product	kg C	0

Table 63. Waste categories and output flow indicators covering modules A1-A3

PARAMETER	UNIT	AC10_ BOP001	AC20_ BOP003	DG7_ BOP004	DG10_ BOP005	AC14_ BOP007	AC28_ BOP104	AC20_ BOP106	AC28_0	AC14_0
HWD	kg	1.22E-08	1.19E-08	1.28E-08	1.25E-08	5.18E-08	4.69E-08	6.26E-08	1.22E-08	1.18E-08
NHWD	kg	0.422	0.415	0.434	0.429	1.29	1.18	1.53	0.423	0.415
RWD	kg	0.0124	0.0123	0.0127	0.0126	0.0154	0.0148	0.0162	0.0124	0.0122
CRU	kg	0	0	0	0	0	0	0	0	0
MFR	kg	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5
MER	kg	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0

Table 64. Additional environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC10_ BOP001	AC20_ BOP003	DG7_ BOP004	DG10_ BOP005	AC14_ BOP007	AC28_ BOP104	AC20_ BOP106	AC28_0	AC14_0
GWP-GHG**	kg CO ₂ -eq	63.1	60.3	68.2	66.2	79.0	74.1	82.0	63.2	60.1
PM	Disease incidences	4.34E-06	4.02E-06	4.86E-06	4.61E-06	4.58E-06	4.17E-06	4.69E-06	4.34E-06	3.96E-06
IRP***	kBq U235 eq.	1.91	1.90	1.92	1.91	2.21	2.16	2.29	1.91	1.90
ETP-fw*	CTUe	1,370	1,270	1,540	1,460	1,450	1,320	1,490	1,380	1,250
HTPc*	CTUh	2.43E-08	2.26E-08	2.71E-08	2.58E-08	2.87E-08	2.62E-08	3.02E-08	2.43E-08	2.23E-08
HTPnc*	CTUh	7.33E-07	6.83E-07	8.15E-07	7.75E-07	1.06E-06	9.63E-07	1.16E-06	7.34E-07	6.74E-07
SQP*	Pt	228	227	229	228	252	249	258	228	227

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 65. EN 15804+A1 Environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC10_ BOP001	AC20_ BOP003	DG7_ BOP004	DG10_ BOP005	AC14_ BOP007	AC28_ BOP104	AC20_ BOP106	AC28_0	AC14_0
GWP	kg CO ₂ -eq	59.8	57.3	64.5	62.7	75.4	70.9	78.3	60.0	57.1
ODP	kg CFC ₁₁ -eq.	7.76E-11	7.72E-11	7.83E-11	7.80E-11	1.46E-10	1.37E-10	1.64E-10	7.76E-11	7.71E-11
AP	kg SO ₂ -eq	0.254	0.236	0.284	0.269	0.271	0.248	0.275	0.254	0.232
EP	kg PO ₃ ⁴⁻ -eq.	0.0350	0.0329	0.0384	0.0368	0.0393	0.0364	0.0402	0.0350	0.0326
POCP	kg C ₂ H ₄ -eq.	0.0220	0.0197	0.0259	0.0240	0.0236	0.0207	0.0248	0.0221	0.0193
ADPE	kg Sb eq.	2.83E-05	2.58E-05	3.22E-05	3.03E-05	2.89E-05	2.58E-05	2.99E-05	2.83E-05	2.53E-05
ADPF	MJ	2,870	2,640	3,250	3,070	3,120	2,810	3,210	2,870	2,590

MODULES C1-C4

Modules C1-C4 results are the same for all products and results for each EOL module are presented together per one tonne of product.

Table 66. EN 15804+A2 Core environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWpt	kg CO ₂ -eq	0.625	2.57	0	0
GWPf	kg CO ₂ -eq	0.625	2.58	0	0
GWPb	kg CO ₂ -eq	6.18E-05	-0.0255	0	0
GWPluluc	kg CO ₂ -eq	4.53E-06	0.0176	0	0
ODP	kg CFC-11 eq	4.96E-14	2.56E-13	0	0
AP	Mole of H+eq	0.00297	0.0157	0	0
EPfw	kg P eq	1.10E-07	9.32E-06	0	0
EPm	kg N eq	0.00143	0.00764	0	0
EPT	Mole of N eq	0.0157	0.0846	0	0
POCP	kg NMVOC eq	0.00402	0.0147	0	0
ADPmm*	kg Sb-eq	7.62E-09	2.63E-07	0	0
ADPF*	MJ	8.29	34.3	0	0
WDP	m ³ world equiv	0.00464	0.0292	0	0

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

Table 67. Resource use indicators results covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
PERE	MJ	0.0271	2.37	0	0
PERM	MJ	0	0	0	0
PERT	MJ	0.0271	2.37	0	0
PENRE	MJ	8.29	34.4	0	0
PENRM	MJ	0	0	0	0
PENRT	MJ	8.29	34.4	0	0
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	6.98E-05	0.00274	0	0

Table 68. Waste categories and output flow indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
HWD	kg	8.99E-12	1.82E-10	0	0
NHWD	kg	1.18E-04	0.00560	0	0
RWD	kg	1.21E-07	6.39E-05	0	0
CRU	kg	0	0	0	0
MFR	kg	0	0	1,000	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 69. Additional environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP-GHG**	kg CO ₂ -eq	0.622	2.58	0	0
PM	Disease incidences	3.36E-08	5.88E-08	0	0
IRP***	kBq U235 eq.	1.57E-05	0.00964	0	0
ETP-fw*	CTUe	2.08	24.3	0	0
HTPc*	CTUh	3.49E-11	5.01E-10	0	0
HTPnc*	CTUh	2.18E-09	2.90E-08	0	0
SQP*	Pt	0.0190	14.5	0	0

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 70. EN 15804+A1 Environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP	kg CO ₂ -eq	0.615	2.51	0	0
ODP	kg CFC ₁₁ -eq.	5.84E-14	3.02E-13	0	0
AP	kg SO ₂ -eq	0.00206	0.0107	0	0
EP	kg PO ₃ ⁴⁻ -eq.	4.80E-04	0.00268	0	0
POCP	kg C ₂ H ₄ -eq.	2.03E-04	-0.00402	0	0
ADPE	kg Sb eq.	7.63E-09	2.63E-07	0	0
ADPF	MJ	8.29	33.9	0	0

MODULES D

Table 71. EN 15804+A2 Core environmental impact indicators covering modules D

PARAMETER	UNIT	AC10_ BOP001	AC20_ BOP003	DG7_ BOP004	DG10_ BOP005	AC14_ BOP007	AC28_ BOP104	AC20_ BOP106	AC28_0	AC14_0
GWpt	kg CO ₂ -eq	-14.7	-13.7	-16.2	-15.3	-14.7	-13.4	-15.1	-14.7	-13.4
GWPf	kg CO ₂ -eq	-14.7	-13.7	-16.2	-15.3	-14.7	-13.4	-15.1	-14.7	-13.4
GWPb	kg CO ₂ -eq	0.00110	0.00143	0.00190	0.00258	0.00141	0.00207	2.53E-05	0.00141	0.00207
GWPluluc	kg CO ₂ -eq	-0.00417	-0.00452	-0.00308	-0.00320	-0.00405	-0.00436	-0.00450	-0.00405	-0.00436
ODP	kg CFC-11 eq	-3.05E-11	-3.19E-11	-2.65E-11	-2.71E-11	-3.01E-11	-3.15E-11	-3.15E-11	-3.01E-11	-3.15E-11
AP	Mole of H+eq	-0.0349	-0.0315	-0.0400	-0.0371	-0.0348	-0.0306	-0.0360	-0.0348	-0.0306
EPfw	kg P eq	-1.40E-05	-1.39E-05	-1.35E-05	-1.33E-05	-1.38E-05	-1.36E-05	-1.44E-05	-1.38E-05	-1.36E-05
EPm	kg N eq	-0.00320	-0.00255	-0.00410	-0.00354	-0.00317	-0.00236	-0.00344	-0.00317	-0.00236
EPt	Mole of N eq	-0.0370	-0.0300	-0.0465	-0.0403	-0.0366	-0.0278	-0.0397	-0.0366	-0.0278
POCP	kg NMVOC eq	-0.0266	-0.0229	-0.0320	-0.0290	-0.0265	-0.0220	-0.0276	-0.0265	-0.0220
ADPmm*	kg Sb-eq	7.08E-07	8.11E-07	5.78E-07	6.71E-07	7.16E-07	8.46E-07	6.61E-07	7.16E-07	8.46E-07
ADPf*	MJ	-1,840	-1,680	-2,090	-1,960	-1,840	-1,640	-1,870	-1,840	-1,640
WDP	m ³ world equiv	-1.40	-1.52	-1.05	-1.10	-1.36	-1.48	-1.49	-1.36	-1.48

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

Table 72. Resource use indicators results covering modules D

PARAMETER	UNIT	AC10_ BOP001	AC20_ BOP003	DG7_ BOP004	DG10_ BOP005	AC14_ BOP007	AC28_ BOP104	AC20_ BOP106	AC28_0	AC14_0
PERE	MJ	-14.6	-13.6	-16.0	-15.1	-14.5	-13.3	-15.0	-14.5	-13.3
PERM	MJ	-2.30E-07	-2.12E-07	-2.53E-07	-2.37E-07	-2.29E-07	-2.06E-07	-2.39E-07	-2.29E-07	-2.06E-07
PERT	MJ	-1.02	-1.09	-0.819	-0.849	-0.997	-1.07	-1.07	-0.997	-1.07
PENRE	MJ	-269	-246	-304	-285	-269	-241	-275	-269	-241
PENRM	MJ	-5.81E-09	-5.34E-09	-6.52E-09	-6.14E-09	-5.80E-09	-5.24E-09	-5.92E-09	-5.80E-09	-5.24E-09
PENRT	MJ	-2.18E-07	-2.02E-07	-2.43E-07	-2.30E-07	-2.17E-07	-1.98E-07	-2.21E-07	-2.17E-07	-1.98E-07
SM	kg	-15.7	-16.6	-13.2	-13.5	-15.5	-16.3	-16.5	-15.5	-16.3
RSF	MJ	0	0	0	0					
NRSF	MJ	0	0	0	0					
FW	m ³	-0.0391	-0.0403	-0.0408	-0.0599					

Table 73. Waste categories and output flow indicators covering modules D

PARAMETER	UNIT	AC10_ BOP001	AC20_ BOP003	DG7_ BOP004	DG10_ BOP005	AC14_ BOP007	AC28_ BOP104	AC20_ BOP106	AC28_0	AC14_0
HWD	kg	-4.90E-09	-4.97E-09	-4.56E-09	-4.53E-09	-4.85E-09	-4.88E-09	-5.07E-09	-4.85E-09	-4.88E-09
NHWD	kg	-7.55	-6.71	-9.99	-9.65	-7.80	-7.01	-6.90	-7.80	-7.01
RWD	kg	-0.00600	-0.00640	-0.00488	-0.00506	-0.00589	-0.00628	-0.00628	-0.00589	-0.00628
CRU	kg	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0

Table 74. Additional environmental impact indicators covering modules D

PARAMETER	UNIT	AC10_ BOP001	AC20_ BOP003	DG7_ BOP004	DG10_ BOP005	AC14_ BOP007	AC28_ BOP104	AC20_ BOP106	AC28_0	AC14_0
GWP-GHG**	kg CO ₂ -eq	-14.6	-13.6	-16.0	-15.1	-14.5	-13.3	-15.0	-14.5	-13.3
PM	Disease incidences	-2.30E-07	-2.12E-07	-2.53E-07	-2.37E-07	-2.29E-07	-2.06E-07	-2.39E-07	-2.29E-07	-2.06E-07
IRP***	kBq U235 eq.	-1.02	-1.09	-0.819	-0.849	-0.997	-1.07	-1.07	-0.997	-1.07
ETP-fw*	CTUe	-269	-246	-304	-285	-269	-241	-275	-269	-241
HTPc*	CTUh	-5.81E-09	-5.34E-09	-6.52E-09	-6.14E-09	-5.80E-09	-5.24E-09	-5.92E-09	-5.80E-09	-5.24E-09
HTPnc*	CTUh	-2.18E-07	-2.02E-07	-2.43E-07	-2.30E-07	-2.17E-07	-1.98E-07	-2.21E-07	-2.17E-07	-1.98E-07
SQP*	Pt	-15.7	-16.6	-13.2	-13.5	-15.5	-16.3	-16.5	-15.5	-16.3

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**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 75. EN 15804+A1 Environmental impact indicators covering modules D

PARAMETER	UNIT	AC10_ BOP001	AC20_ BOP003	DG7_ BOP004	DG10_ BOP005	AC14_ BOP007	AC28_ BOP104	AC20_ BOP106	AC28_0	AC14_0
GWP	kg CO ₂ -eq	-12.4	-11.5	-13.5	-12.8	-12.3	-11.3	-12.7	-12.3	-11.3
ODP	kg CFC ₁₁ -eq.	-3.59E-11	-3.75E-11	-3.12E-11	-3.20E-11	-3.54E-11	-3.70E-11	-3.71E-11	-3.54E-11	-3.70E-11
AP	kg SO ₂ -eq	-0.0302	-0.0273	-0.0345	-0.0321	-0.0302	-0.0266	-0.0311	-0.0302	-0.0266
EP	kg PO ₃ ⁴⁻ -eq.	-0.00158	-0.00135	-0.00188	-0.00168	-0.00156	-0.00128	-0.00167	-0.00156	-0.00128
POCP	kg C ₂ H ₄ -eq.	-0.00948	-0.00848	-0.0111	-0.0102	-0.00948	-0.00826	-0.00972	-0.00948	-0.00826
ADPE	kg Sb eq.	6.67E-07	7.68E-07	5.45E-07	6.37E-07	6.76E-07	8.04E-07	6.19E-07	6.76E-07	8.04E-07
ADPF	MJ	-1,820	-1,660	-2,080	-1,950	-1,820	-1,620	-1,850	-1,820	-1,620

TAUPŌ RESULTS FOR ONE TONNE OF ASPHALT

MODULES A1-A3

Table 76. EN 15804+A2 Core environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	DG7_ TAU002	AC10_ TAU003	AC14_ TAU001	AC20_ TAU101
GWpt	kg CO ₂ -eq	74.7	71.4	70.2	66.0
GWPf	kg CO ₂ -eq	74.2	70.9	69.8	65.5
GWPb	kg CO ₂ -eq	0.372	0.368	0.366	0.360
GWPluluc	kg CO ₂ -eq	0.0893	0.0887	0.0884	0.0874
ODP	kg CFC-11 eq	8.39E-11	8.35E-11	8.34E-11	8.28E-11
AP	Mole of H+eq	0.410	0.383	0.373	0.333
EPfw	kg P eq	2.43E-04	2.41E-04	2.41E-04	2.39E-04
EPm	kg N eq	0.124	0.117	0.114	0.104
EPt	Mole of N eq	1.38	1.30	1.28	1.16
POCP	kg NMVOC eq	0.346	0.323	0.316	0.283
ADPmm*	kg Sb-eq	3.36E-05	3.06E-05	2.96E-05	2.52E-05
ADPF*	MJ	3,460	3,160	3,070	2,640
WDP	m ³ world equiv	14.1	14.1	14.1	14.1

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

Table 77. Resource use indicators results covering modules A1-A3

PARAMETER	UNIT	DG7_ TAU002	AC10_ TAU003	AC14_ TAU001	AC20_ TAU101
PERE	MJ	367	366	366	365
PERM	MJ	0	0	0	0
PERT	MJ	367	366	366	365
PENRE	MJ	-1,220	-1,040	-984	-710
PENRM	MJ	4,760	4,290	4,130	3,410
PENRT	MJ	3,540	3,240	3,140	2,700
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	1.02	1.02	1.02	1.01

Table 78. Biogenic Carbon

PARAMETER	UNIT	QUANTITY
Biogenic carbon content in product	kg C	0

Table 79. Waste categories and output flow indicators covering modules A1-A3

PARAMETER	UNIT	DG7_ TAU002	AC10_ TAU003	AC14_ TAU001	AC20_ TAU101
HWD	kg	1.70E-08	1.66E-08	1.65E-08	1.59E-08
NHWD	kg	0.578	0.570	0.567	0.556
RWD	kg	0.0129	0.0127	0.0126	0.0123
CRU	kg	0	0	0	0
MFR	kg	50.0	50.0	50.0	50.0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 80. Additional environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	DG7_ TAU002	AC10_ TAU003	AC14_ TAU001	AC20_ TAU101
GWP-GHG**	kg CO ₂ -eq	74.2	70.9	69.8	65.6
PM	Disease incidences	5.13E-06	4.74E-06	4.61E-06	4.03E-06
IRP***	kBq U235 eq.	1.95	1.94	1.93	1.91
ETP-fw*	CTUe	1,870	1,750	1,710	1,520
HTPc*	CTUh	3.05E-08	2.85E-08	2.78E-08	2.48E-08
HTPnc*	CTUh	8.77E-07	8.16E-07	7.96E-07	7.06E-07
SQP*	Pt	1,470	1,470	1,470	1,470

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 81. EN 15804+A1 Environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	DG7_ TAU002	AC10_ TAU003	AC14_ TAU001	AC20_ TAU101
GWP	kg CO ₂ -eq	70.3	67.4	66.4	62.6
ODP	kg CFC ₁₁ -eq.	9.88E-11	9.83E-11	9.82E-11	9.75E-11
AP	kg SO ₂ -eq	0.316	0.294	0.287	0.255
EP	kg PO ₃ ⁴⁻ -eq.	0.0451	0.0426	0.0418	0.0382
POCP	kg C ₂ H ₄ -eq.	0.0197	0.0170	0.0161	0.0121
ADPE	kg Sb eq.	3.37E-05	3.07E-05	2.97E-05	2.53E-05
ADPF	MJ	3,310	3,030	2,940	2,530

MODULES C1-C4

Modules C1-C4 results are the same for all products and results for each EOL module are presented together per one tonne of product.

Table 82. EN 15804+A2 Core environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWpt	kg CO ₂ -eq	0.625	2.57	0	0
GWpf	kg CO ₂ -eq	0.625	2.58	0	0
GWpb	kg CO ₂ -eq	6.18E-05	-0.0255	0	0
GWpluluc	kg CO ₂ -eq	4.53E-06	0.0176	0	0
ODP	kg CFC-11 eq	4.96E-14	2.56E-13	0	0
AP	Mole of H+eq	0.00297	0.0157	0	0
EPfw	kg P eq	1.10E-07	9.32E-06	0	0
EPm	kg N eq	0.00143	0.00764	0	0
EPt	Mole of N eq	0.0157	0.0846	0	0
POCP	kg NMVOC eq	0.00402	0.0147	0	0
ADPmm*	kg Sb-eq	7.62E-09	2.63E-07	0	0
ADPf*	MJ	8.29	34.3	0	0
WDP	m ³ world equiv	0.00464	0.0292	0	0

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

Table 83. Resource use indicators results covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
PERE	MJ	0.0271	2.37	0	0
PERM	MJ	0	0	0	0
PERT	MJ	0.0271	2.37	0	0
PENRE	MJ	8.29	34.4	0	0
PENRM	MJ	0	0	0	0
PENRT	MJ	8.29	34.4	0	0
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	6.98E-05	0.00274	0	0

Table 84. Waste categories and output flow indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
HWD	kg	8.99E-12	1.82E-10	0	0
NHWD	kg	1.18E-04	0.00560	0	0
RWD	kg	1.21E-07	6.39E-05	0	0
CRU	kg	0	0	0	0
MFR	kg	0	0	1,000	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 85. Additional environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP-GHG**	kg CO ₂ -eq	0.622	2.58	0	0
PM	Disease incidences	3.36E-08	5.88E-08	0	0
IRP***	kBq U235 eq.	1.57E-05	0.00964	0	0
ETP-fw*	CTUe	2.08	24.3	0	0
HTPc*	CTUh	3.49E-11	5.01E-10	0	0
HTPnc*	CTUh	2.18E-09	2.90E-08	0	0
SQP*	Pt	0.0190	14.5	0	0

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 86. EN 15804+A1 Environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP	kg CO ₂ -eq	0.615	2.51	0	0
ODP	kg CFC ₁₁ -eq.	5.84E-14	3.02E-13	0	0
AP	kg SO ₂ -eq	0.00206	0.0107	0	0
EP	kg PO ₃ ⁴⁻⁻ -eq.	4.80E-04	0.00268	0	0
POCP	kg C ₂ H ₄ -eq.	2.03E-04	-0.00402	0	0
ADPE	kg Sb eq.	7.63E-09	2.63E-07	0	0
ADPF	MJ	8.29	33.9	0	0

MODULES D

Table 87. EN 15804+A2 Core environmental impact indicators covering modules D

PARAMETER	UNIT	DG7_TAU002	AC10_TAU003	AC14_TAU001	AC20_TAU101
GWPt	kg CO ₂ -eq	-16.3	-15.1	-14.7	-12.6
GWPf	kg CO ₂ -eq	-16.3	-15.1	-14.7	-12.6
GWPb	kg CO ₂ -eq	9.03E-04	0.00133	0.00141	0.00364
GWPluluc	kg CO ₂ -eq	-0.00348	-0.00389	-0.00405	-0.00403
ODP	kg CFC-11 eq	-2.78E-11	-2.95E-11	-3.01E-11	-3.06E-11
AP	Mole of H+eq	-0.0404	-0.0362	-0.0348	-0.0280
EPfw	kg P eq	-1.40E-05	-1.38E-05	-1.38E-05	-1.29E-05
EPm	kg N eq	-0.00421	-0.00343	-0.00317	-0.00182
EPT	Mole of N eq	-0.0478	-0.0393	-0.0366	-0.0218
POCP	kg NMVOC eq	-0.0323	-0.0279	-0.0265	-0.0194
ADPmm*	kg Sb-eq	5.52E-07	6.76E-07	7.16E-07	9.44E-07
ADPf*	MJ	-2,090	-1,900	-1,840	-1,540
WDP	m ³ world equiv	-1.16	-1.31	-1.36	-1.40

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

Table 88. Resource use indicators results covering modules D

PARAMETER	UNIT	DG7_TAU002	AC10_TAU003	AC14_TAU001	AC20_TAU101
PERE	MJ	-20.8	-22.0	-22.4	-22.5
PERM	MJ	0	0	0	0
PERT	MJ	-20.8	-22.0	-22.4	-22.5
PENRE	MJ	-2,090	-1,900	-1,840	-1,540
PENRM	MJ	0	0	0	0
PENRT	MJ	-2,090	-1,900	-1,840	-1,540
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	-0.0400	-0.0435	-0.0449	-0.0452

Table 89. Waste categories and output flow indicators covering modules D

PARAMETER	UNIT	DG7_TAU002	AC10_TAU003	AC14_TAU001	AC20_TAU101
HWD	kg	-4.74E-09	-4.81E-09	-4.85E-09	-4.67E-09
NHWD	kg	-9.18	-8.19	-7.80	-7.61
RWD	kg	-0.00524	-0.00571	-0.00589	-0.00603
CRU	kg	0	0	0	0
MFR	kg	0	0	0	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 90. Additional environmental impact indicators covering modules D

PARAMETER	UNIT	DG7_TAU002	AC10_TAU003	AC14_TAU001	AC20_TAU101
GWP-GHG**	kg CO ₂ -eq	-16.2	-14.9	-14.5	-12.5
PM	Disease incidences	-2.58E-07	-2.36E-07	-2.29E-07	-1.88E-07
IRP***	kBq U235 eq.	-0.882	-0.965	-0.997	-1.02
ETP-fw*	CTUe	-306	-278	-269	-225
HTPc*	CTUh	-6.54E-09	-5.98E-09	-5.80E-09	-4.93E-09
HTPnc*	CTUh	-2.43E-07	-2.24E-07	-2.17E-07	-1.89E-07
SQP*	Pt	-14.1	-15.1	-15.5	-15.6

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 91. EN 15804+A1 Environmental impact indicators covering modules D

PARAMETER	UNIT	DG7_TAU002	AC10_TAU003	AC14_TAU001	AC20_TAU101
GWP	kg CO ₂ -eq	-13.6	-12.6	-12.3	-10.6
ODP	kg CFC ₁₁ -eq.	-3.27E-11	-3.47E-11	-3.54E-11	-3.60E-11
AP	kg SO ₂ -eq	-0.0348	-0.0313	-0.0302	-0.0245
EP	kg PO ₃ ⁴⁻ -eq.	-0.00193	-0.00165	-0.00156	-0.00107
POCP	kg C ₂ H ₄ -eq.	-0.0111	-0.00988	-0.00948	-0.00762
ADPE	kg Sb eq.	5.16E-07	6.38E-07	6.76E-07	9.04E-07
ADPF	MJ	-2,080	-1,880	-1,820	-1,520

NAPIER RESULTS FOR ONE TONNE OF ASPHALT

MODULES A1-A3

Table 92. EN 15804+A2 Core environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	SP14_HBY101	SP14_HBY102	AC14_HBY103	DG7_HBY106	AC14_HBY108	AC20_O	AC20-PMB_HBY109	AC10_HBY112	HPA16_HBY107
GWPt	kg CO ₂ -eq	62.3	80.3	59.4	69.9	73.9	56.8	71.6	79.5	73.5
GWPf	kg CO ₂ -eq	62.0	78.7	59.1	69.6	72.7	56.5	70.2	77.9	75.7
GWPb	kg CO ₂ -eq	0.270	1.54	0.266	0.279	1.20	0.262	1.29	1.57	-2.30
GWP _{luc}	kg CO ₂ -eq	0.0411	0.0427	0.0407	0.0423	0.0417	0.0401	0.0414	0.0428	0.0454
ODP	kg CFC-11 eq	7.10E-11	1.48E-10	7.06E-11	7.19E-11	1.27E-10	7.03E-11	1.32E-10	1.49E-10	1.71E-10
AP	Mole of H+eq	0.337	0.354	0.314	0.396	0.331	0.288	0.302	0.356	0.356
EP _{fw}	kg P eq	1.91E-04	2.66E-04	1.90E-04	1.94E-04	2.50E-04	1.89E-04	2.49E-04	2.68E-04	3.31E-04
EP _m	kg N eq	0.0965	0.103	0.0905	0.112	0.0959	0.0837	0.0888	0.103	0.104
EP _t	Mole of N eq	1.07	1.13	1.000	1.24	1.06	0.928	0.980	1.13	1.14
POCP	kg NMVOC eq	0.284	0.318	0.265	0.333	0.293	0.244	0.272	0.320	0.317
ADP _{mm} *	kg Sb-eq	3.01E-05	3.17E-05	2.77E-05	3.64E-05	2.82E-05	2.48E-05	2.60E-05	3.22E-05	2.89E-05
ADP _f *	MJ	3,120	3,430	2,890	3,750	3,120	2,610	2,860	3,460	3,110
WDP	m ³ world equiv	9.44	9.74	9.42	9.50	9.70	9.40	9.64	9.73	14.0

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

Table 93. Resource use indicators results covering modules A1-A3

PARAMETER	UNIT	SP14_HBY101	SP14_HBY102	AC14_HBY103	DG7_HBY106	AC14_HBY108	AC20_O	AC20-PMB_HBY109	AC10_HBY112	HPA16_HBY107
PERE	MJ	219	255	218	220	245	217	247	256	333
PERM	MJ	0	0	0	0	0	0	0	0	37.1
PERT	MJ	219	255	218	220	245	217	247	256	370
PENRE	MJ	-1,260	-922	-1,120	-1,640	-861	-932	-653	-968	-730
PENRM	MJ	4,470	4,420	4,080	5,490	4,050	3,610	3,570	4,500	3,900
PENRT	MJ	3,210	3,500	2,960	3,850	3,180	2,670	2,920	3,530	3,170
SM	kg	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0
FW	m ³	0.623	0.666	0.621	0.627	0.653	0.620	0.654	0.666	0.686

Table 94. Biogenic Carbon

PARAMETER	UNIT	QUANTITY
Biogenic carbon content in product	kg C	0

Table 95. Waste categories and output flow indicators covering modules A1-A3

PARAMETER	UNIT	SP14_HBY101	SP14_HBY102	AC14_HBY103	DG7_HBY106	AC14_HBY108	AC20_O	AC20-PMB_HBY109	AC10_HBY112	HPA16_HBY107
HWD	kg	1.36E-08	6.63E-08	1.33E-08	1.45E-08	5.20E-08	1.29E-08	5.55E-08	6.73E-08	6.42E-08
NHWD	kg	0.495	1.66	0.488	0.514	1.34	0.481	1.42	1.67	1.65
RWD	kg	0.0123	0.0163	0.0121	0.0127	0.0150	0.0119	0.0151	0.0164	0.0172
CRU	kg	0	0	0	0	0	0	0	0	0
MFR	kg	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6	25.6
MER	kg	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0

Table 96. Additional environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	SP14_HBY101	SP14_HBY102	AC14_HBY103	DG7_HBY106	AC14_HBY108	AC20_O	AC20-PMB_HBY109	AC10_HBY112	HPA16_HBY107
GWP-GHG**	kg CO ₂ -eq	61.9	79.6	59.1	69.5	73.4	56.5	71.0	78.9	76.6
PM	Disease incidences	4.60E-06	4.86E-06	4.28E-06	5.43E-06	4.49E-06	3.90E-06	4.11E-06	4.91E-06	6.08E-06
IRP***	kBq U235 eq.	1.87	2.27	1.86	1.89	2.15	1.85	2.17	2.28	2.37
ETP-fw*	CTUe	1,530	1,630	1,430	1,800	1,490	1,310	1,390	1,650	1,510
HTPc*	CTUh	2.59E-08	3.16E-08	2.42E-08	3.03E-08	2.83E-08	2.23E-08	2.69E-08	3.19E-08	3.00E-08
HTPnc*	CTUh	7.45E-07	1.17E-06	6.96E-07	8.75E-07	1.00E-06	6.38E-07	9.81E-07	1.18E-06	1.15E-06
SQP*	Pt	715	740	714	717	732	714	734	740	2,190

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 97. EN 15804+A1 Environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	SP14_HBY101	SP14_HBY102	AC14_HBY103	DG7_HBY106	AC14_HBY108	AC20_O	AC20-PMB_HBY109	AC10_HBY112	HPA16_HBY107
GWP	kg CO ₂ -eq	58.4	75.8	55.9	65.3	69.9	53.6	67.8	75.0	69.4
ODP	kg CFC _n -eq.	8.36E-11	1.74E-10	8.32E-11	8.47E-11	1.50E-10	8.27E-11	1.56E-10	1.76E-10	2.01E-10
AP	kg SO ₂ -eq	0.263	0.275	0.245	0.310	0.257	0.224	0.234	0.277	0.277
EP	kg PO ₃ ⁴⁻ -eq.	0.0349	0.0387	0.0328	0.0403	0.0360	0.0305	0.0337	0.0389	0.0395
POCP	kg C ₂ H ₄ -eq.	0.0271	0.0312	0.0248	0.0331	0.0279	0.0222	0.0256	0.0316	0.0297
ADPE	kg Sb eq.	3.02E-05	3.18E-05	2.78E-05	3.65E-05	2.83E-05	2.49E-05	2.61E-05	3.23E-05	2.91E-05
ADPF	MJ	2,990	3,290	2,760	3,590	2,990	2,500	2,740	3,320	2,980

MODULES C1-C4

Modules C1-C4 results are the same for all products and results for each EOL module are presented together per one tonne of product.

Table 98. EN 15804+A2 Core environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWPt	kg CO ₂ -eq	0.625	2.57	0	0
GWPf	kg CO ₂ -eq	0.625	2.58	0	0
GWPb	kg CO ₂ -eq	6.18E-05	-0.0255	0	0
GWPluluc	kg CO ₂ -eq	4.53E-06	0.0176	0	0
ODP	kg CFC-11 eq	4.96E-14	2.56E-13	0	0
AP	Mole of H+eq	0.00297	0.0157	0	0
EPfw	kg P eq	1.10E-07	9.32E-06	0	0
EPm	kg N eq	0.00143	0.00764	0	0
EPt	Mole of N eq	0.0157	0.0846	0	0
POCP	kg NMVOC eq	0.00402	0.0147	0	0
ADPmm*	kg Sb-eq	7.62E-09	2.63E-07	0	0
ADPF*	MJ	8.29	34.3	0	0
WDP	m ³ world equiv	0.00464	0.0292	0	0

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

Table 99. Resource use indicators results covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
PERE	MJ	0.0271	2.37	0	0
PERM	MJ	0	0	0	0
PERT	MJ	0.0271	2.37	0	0
PENRE	MJ	8.29	34.4	0	0
PENRM	MJ	0	0	0	0
PENRT	MJ	8.29	34.4	0	0
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	6.98E-05	0.00274	0	0

Table 100. Waste categories and output flow indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
HWD	kg	8.99E-12	1.82E-10	0	0
NHWD	kg	1.18E-04	0.00560	0	0
RWD	kg	1.21E-07	6.39E-05	0	0
CRU	kg	0	0	0	0
MFR	kg	0	0	1,000	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 101. Additional environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP-GHG**	kg CO ₂ -eq	0.622	2.58	0	0
PM	Disease incidences	3.36E-08	5.88E-08	0	0
IRP***	kBq U235 eq.	1.57E-05	0.00964	0	0
ETP-fw*	CTUe	2.08	24.3	0	0
HTPc*	CTUh	3.49E-11	5.01E-10	0	0
HTPnc*	CTUh	2.18E-09	2.90E-08	0	0
SQP*	Pt	0.0190	14.5	0	0

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 102. EN 15804+A1 Environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP	kg CO ₂ -eq	0.615	2.51	0	0
ODP	kg CFC ₁₁ -eq.	5.84E-14	3.02E-13	0	0
AP	kg SO ₂ -eq	0.00206	0.0107	0	0
EP	kg PO ₃ ⁴⁻ -eq.	4.80E-04	0.00268	0	0
POCP	kg C ₂ H ₄ -eq.	2.03E-04	-0.00402	0	0
ADPE	kg Sb eq.	7.63E-09	2.63E-07	0	0
ADPF	MJ	8.29	33.9	0	0

MODULES D

Table 103. EN 15804+A2 Core environmental impact indicators covering modules D

PARAMETER	UNIT	SP14_HBY101	SP14_HBY102	AC14_HBY103	DG7_HBY106	AC14_HBY108	AC20_O	AC20-PMB_HBY109	AC10_HBY112	HPA16_HBY107
GWpt	kg CO ₂ -eq	-15.7	-15.7	-14.7	-18.2	-14.7	-13.3	-13.3	-16.5	-14.6
GWpf	kg CO ₂ -eq	-15.7	-15.7	-14.7	-18.2	-14.7	-13.3	-13.3	-16.5	-14.6
GWpb	kg CO ₂ -eq	8.90E-04	8.90E-04	0.00123	0.00139	0.00108	0.00276	0.00276	-0.00285	-5.51E-04
GWpluluc	kg CO ₂ -eq	-0.00377	-0.00377	-0.00412	-0.00232	-0.00418	-0.00409	-0.00409	-0.00516	-0.00502
ODP	kg CFC-11 eq	-2.89E-11	-2.89E-11	-3.03E-11	-2.35E-11	-3.05E-11	-3.06E-11	-3.06E-11	-3.33E-11	-3.33E-11
AP	Mole of H+eq	-0.0384	-0.0384	-0.0349	-0.0469	-0.0349	-0.0303	-0.0303	-0.0404	-0.0342
EPfw	kg P eq	-1.40E-05	-1.40E-05	-1.39E-05	-1.37E-05	-1.40E-05	-1.33E-05	-1.33E-05	-1.57E-05	-1.47E-05
EPm	kg N eq	-0.00384	-0.00384	-0.00319	-0.00539	-0.00321	-0.00229	-0.00229	-0.00437	-0.00314
EPt	Mole of N eq	-0.0439	-0.0439	-0.0368	-0.0603	-0.0370	-0.0269	-0.0269	-0.0501	-0.0366
POCP	kg NMVOC eq	-0.0302	-0.0302	-0.0265	-0.0392	-0.0266	-0.0218	-0.0218	-0.0320	-0.0256
ADPmm*	kg Sb-eq	6.08E-07	6.08E-07	7.11E-07	3.76E-07	7.07E-07	8.64E-07	8.64E-07	4.91E-07	7.02E-07
ADPf*	MJ	-2,000	-2,000	-1,840	-2,410	-1,840	-1,640	-1,640	-2,040	-1,780
WDP	m ³ world equiv	-1.26	-1.26	-1.38	-0.781	-1.40	-1.40	-1.40	-1.66	-1.65

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

Table 104. Resource use indicators results covering modules D

PARAMETER	UNIT	SP14_HBY101	SP14_HBY102	AC14_HBY103	DG7_HBY106	AC14_HBY108	AC20_O	AC20-PMB_HBY109	AC10_HBY112	HPA16_HBY107
PERE	MJ	-21.6	-21.6	-22.6	-17.5	-22.8	-22.6	-22.6	-25.3	-25.1
PERM	MJ	0	0	0	0	0	0	0	0	0
PERT	MJ	-21.6	-21.6	-22.6	-17.5	-22.8	-22.6	-22.6	-25.3	-25.1
PENRE	MJ	-2,000	-2,000	-1,840	-2,410	-1,840	-1,640	-1,640	-2,040	-1,780
PENRM	MJ	0	0	0	0	0	0	0	0	0
PENRT	MJ	-2,000	-2,000	-1,840	-2,410	-1,840	-1,640	-1,640	-2,040	-1,780
SM	kg	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0
FW	m ³	-0.0425	-0.0425	-0.0455	-0.0302	-0.0460	-0.0456	-0.0456	-0.0535	-0.0528

Table 105. Waste categories and output flow indicators covering modules D

PARAMETER	UNIT	SP14_HBY101	SP14_HBY102	AC14_HBY103	DG7_HBY106	AC14_HBY108	AC20_O	AC20-PMB_HBY109	AC10_HBY112	HPA16_HBY107
HWD	kg	-4.81E-09	-4.81E-09	-4.88E-09	-4.40E-09	-4.90E-09	-4.75E-09	-4.75E-09	-5.46E-09	-5.25E-09
NHWD	kg	-8.50	-8.50	-7.66	-11.8	-7.54	-7.57	-7.57	-5.67	-5.76
RWD	kg	-0.00556	-0.00556	-0.00596	-0.00403	-0.00601	-0.00603	-0.00603	-0.00679	-0.00680
CRU	kg	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0

Table 106. Additional environmental impact indicators covering modules D

PARAMETER	UNIT	SP14_HBY101	SP14_HBY102	AC14_HBY103	DG7_HBY106	AC14_HBY108	AC20_O	AC20-PMB_HBY109	AC10_HBY112	HPA16_HBY107
GWP-GHG**	kg CO ₂ -eq	-15.6	-15.6	-14.6	-18.0	-14.6	-13.2	-13.2	-16.4	-14.5
PM	Disease incidences	-2.48E-07	-2.48E-07	-2.30E-07	-2.89E-07	-2.30E-07	-2.03E-07	-2.03E-07	-2.69E-07	-2.31E-07
IRP***	kBq U235 eq.	-0.938	-0.938	-1.01	-0.667	-1.02	-1.02	-1.02	-1.15	-1.16
ETP-fw*	CTUe	-292	-292	-269	-350	-269	-240	-240	-302	-262
HTPc*	CTUh	-6.26E-09	-6.26E-09	-5.80E-09	-7.44E-09	-5.81E-09	-5.22E-09	-5.22E-09	-6.44E-09	-5.66E-09
HTPnc*	CTUh	-2.33E-07	-2.33E-07	-2.18E-07	-2.74E-07	-2.18E-07	-1.98E-07	-1.98E-07	-2.37E-07	-2.12E-07
SQP*	Pt	-14.8	-14.8	-15.6	-11.3	-15.8	-15.6	-15.6	-17.9	-17.7

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 107. EN 15804+A1 Environmental impact indicators covering modules D

PARAMETER	UNIT	SP14_HBY101	SP14_HBY102	AC14_HBY103	DG7_HBY106	AC14_HBY108	AC20_O	AC20-PMB_HBY109	AC10_HBY112	HPA16_HBY107
GWP	kg CO ₂ -eq	-13.2	-13.2	-12.3	-15.1	-12.4	-11.2	-11.2	-13.9	-12.3
ODP	kg CFC ₁₁ -eq.	-3.40E-11	-3.40E-11	-3.57E-11	-2.77E-11	-3.59E-11	-3.60E-11	-3.60E-11	-3.92E-11	-3.92E-11
AP	kg SO ₂ -eq	-0.0331	-0.0331	-0.0302	-0.0403	-0.0302	-0.0264	-0.0264	-0.0347	-0.0296
EP	kg PO ₃ ⁴⁻ -eq.	-0.00180	-0.00180	-0.00157	-0.00233	-0.00158	-0.00124	-0.00124	-0.00203	-0.00158
POCP	kg C ₂ H ₄ -eq.	-0.0105	-0.0105	-0.00948	-0.0131	-0.00949	-0.00824	-0.00824	-0.0108	-0.00914
ADPE	kg Sb eq.	5.70E-07	5.70E-07	6.71E-07	3.48E-07	6.67E-07	8.24E-07	8.24E-07	4.46E-07	6.57E-07
ADPF	MJ	-1,980	-1,980	-1,820	-2,400	-1,820	-1,620	-1,620	-2,020	-1,760

PALMERSTON NORTH RESULTS FOR ONE TONNE OF ASPHALT

MODULES A1-A3

Table 108. EN 15804+A2 Core environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	PA10_ PMN105	DG7_ PMN109	DG10_ PMN113	DG5_ PMN116	AC20_ PMN118	AC14_ PMN119	AC14_ PMN120	DG7 Grader lay_0	SP10_ PMN102	SMA11_ PMN101	AC10_ PMN005	Plant Mix_0	DG7_ PMN006	AC14 HFB_ PMN117	SP10_0
GWpt	kg CO ₂ -eq	82.7	80.6	74.6	84.0	65.8	69.3	84.1	80.2	91.5	92.0	74.4	77.3	76.8	69.9	72.6
GWpf	kg CO ₂ -eq	87.6	80.3	74.3	83.7	65.6	69.0	82.8	79.9	89.8	95.5	74.1	77.0	76.5	69.6	72.2
GWpb	kg CO ₂ -eq	-5.00	0.268	0.258	0.274	0.248	0.254	1.20	0.264	1.58	-3.54	0.261	0.264	0.260	0.252	0.257
GWpluluc	kg CO ₂ -eq	0.0537	0.0530	0.0498	0.0556	0.0485	0.0506	0.0514	0.0512	0.0511	0.0702	0.0517	0.0512	0.0498	0.0469	0.0496
ODP	kg CFC-11 eq	1.83E-10	6.73E-11	6.65E-11	6.77E-11	6.55E-11	6.59E-11	1.24E-10	7.24E-11	1.46E-10	1.84E-10	6.66E-11	7.22E-11	6.68E-11	6.60E-11	6.63E-11
AP	Mole of H+eq	0.421	0.421	0.373	0.446	0.303	0.336	0.352	0.384	0.380	0.469	0.381	0.379	0.387	0.346	0.362
EPfw	kg P eq	3.80E-04	1.94E-04	1.91E-04	1.97E-04	1.87E-04	1.89E-04	2.50E-04	2.02E-04	2.68E-04	3.77E-04	1.92E-04	2.01E-04	1.91E-04	1.88E-04	1.90E-04
EPm	kg N eq	0.125	0.124	0.111	0.131	0.0922	0.101	0.106	0.112	0.114	0.141	0.113	0.110	0.114	0.103	0.108
EPt	Mole of N eq	1.37	1.36	1.22	1.44	1.02	1.11	1.17	1.23	1.25	1.54	1.24	1.21	1.26	1.13	1.19
POCP	kg NMVOC eq	0.375	0.363	0.323	0.384	0.265	0.292	0.320	0.331	0.349	0.419	0.329	0.326	0.335	0.300	0.314
ADPmm*	kg Sb-eq	3.14E-05	3.70E-05	3.20E-05	3.95E-05	2.46E-05	2.81E-05	2.86E-05	2.82E-05	3.26E-05	3.64E-05	3.30E-05	2.82E-05	3.35E-05	2.95E-05	3.10E-05
ADPF*	MJ	3,510	3,950	3,460	4,200	2,730	3,060	3,300	4,050	3,670	4,030	3,540	4,010	3,610	3,190	3,350
WDP	m ³ world equiv	14.3	6.77	6.72	6.80	6.66	6.68	6.97	6.76	7.01	12.9	6.72	6.73	6.74	6.69	6.71

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

Table 109. Resource use indicators results covering modules A1-A3

PARAMETER	UNIT	PA10_ PMN105	DG7_ PMN109	DG10_ PMN113	DG5_ PMN116	AC20_ PMN118	AC14_ PMN119	AC14_ PMN120	DG7 Grader lay_0	SP10_ PMN102	SMA11_ PMN101	AC10_ PMN005	Plant Mix_0	DG7_ PMN006	AC14 HFB_ PMN117	SP10_0
PERE	MJ	302	133	131	134	129	130	157	133	168	282	132	133	132	130	131
PERM	MJ	61.9	0	0	0	0	0	0	0	0	49.5	0	0	0	0	0
PERT	MJ	364	133	131	134	129	130	157	133	168	331	132	133	132	130	131
PENRE	MJ	-780	-1,490	-1,200	-1,630	-768	-980	-718	-687	-799	-1,020	-1,280	-725	-1,280	-1,080	-1,160
PENRM	MJ	4,360	5,540	4,750	5,940	3,560	4,120	4,090	4,810	4,550	5,140	4,910	4,810	4,990	4,350	4,590
PENRT	MJ	3,580	4,050	3,550	4,310	2,790	3,140	3,370	4,120	3,750	4,110	3,630	4,080	3,700	3,270	3,440
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	0.461	0.386	0.383	0.388	0.379	0.381	0.413	0.384	0.427	0.464	0.384	0.384	0.384	0.381	0.382

Table 110. Biogenic Carbon

PARAMETER	UNIT	QUANTITY
Biogenic carbon content in product	kg C	0



Table 111. Waste categories and output flow indicators covering modules A1-A3

PARAMETER	UNIT	PA10_ PMN105	DG7_ PMN109	DG10_ PMN113	DG5_ PMN116	AC20_ PMN118	AC14_ PMN119	AC14_ PMN120	DG7 Grader lay_0	SP10_ PMN102	SMA11_ PMN101	AC10_ PMN005	Plant Mix_0	DG7_ PMN006	AC14 HFB_ PMN117	SP10_0
HWD	kg	6.59E-08	1.72E-08	1.65E-08	1.76E-08	1.55E-08	1.60E-08	5.54E-08	1.77E-08	7.11E-08	7.27E-08	1.66E-08	1.77E-08	1.67E-08	1.61E-08	1.64E-08
NHWD	kg	17.1	15.9	15.9	15.9	15.9	15.9	16.8	15.9	17.1	17.2	15.9	15.9	15.9	15.9	15.9
RWD	kg	0.0184	0.0130	0.0127	0.0132	0.0122	0.0124	0.0153	0.0125	0.0167	0.0188	0.0128	0.0125	0.0128	0.0125	0.0126
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 112. Additional environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	PA10_ PMN105	DG7_ PMN109	DG10_ PMN113	DG5_ PMN116	AC20_ PMN118	AC14_ PMN119	AC14_ PMN120	DG7 Grader lay_0	SP10_ PMN102	SMA11_ PMN101	AC10_ PMN005	Plant Mix_0	DG7_ PMN006	AC14 HFB_ PMN117	SP10_0
GWP-GHG**	kg CO ₂ -eq	88.3	80.1	74.2	83.5	65.5	68.9	83.5	79.7	90.8	96.3	73.9	76.9	76.3	69.6	72.2
PM	Disease incidences	7.69E-06	5.59E-06	4.93E-06	5.92E-06	3.95E-06	4.40E-06	4.62E-06	4.60E-06	5.06E-06	7.84E-06	5.05E-06	4.58E-06	5.13E-06	4.58E-06	4.79E-06
IRP***	kBq U235 eq.	2.50	1.94	1.92	1.95	1.89	1.90	2.20	1.91	2.33	2.53	1.92	1.91	1.92	1.91	1.91
ETP-fw*	CTUe	1,540	1,740	1,530	1,850	1,220	1,360	1,430	1,800	1,590	1,760	1,570	1,790	1,590	1,420	1,490
HTPc*	CTUh	3.23E-08	3.11E-08	2.76E-08	3.29E-08	2.25E-08	2.49E-08	2.90E-08	3.21E-08	3.28E-08	3.63E-08	2.82E-08	3.18E-08	2.87E-08	2.57E-08	2.69E-08
HTPnc*	CTUh	1.28E-06	9.45E-07	8.40E-07	9.99E-07	6.89E-07	7.60E-07	1.07E-06	9.76E-07	1.26E-06	1.43E-06	8.60E-07	9.70E-07	8.71E-07	7.83E-07	8.18E-07
SQP*	Pt	2,680	193	190	195	188	190	208	192	215	2,200	191	192	190	187	189

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 113. EN 15804+A1 Environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	PA10_ PMN105	DG7_ PMN109	DG10_ PMN113	DG5_ PMN116	AC20_ PMN118	AC14_ PMN119	AC14_ PMN120	DG7 Grader lay_0	SP10_ PMN102	SMA11_ PMN101	AC10_ PMN005	Plant Mix_0	DG7_ PMN006	AC14 HFB_ PMN117	SP10_0
GWP	kg CO ₂ -eq	78.1	75.7	70.4	78.9	62.5	65.5	79.9	75.7	86.7	86.8	70.0	72.9	72.3	66.0	68.4
ODP	kg CFC ₁₁ -eq.	2.15E-10	7.92E-11	7.84E-11	7.97E-11	7.71E-11	7.76E-11	1.45E-10	8.53E-11	1.72E-10	2.16E-10	7.84E-11	8.50E-11	7.86E-11	7.77E-11	7.81E-11
AP	kg SO ₂ -eq	0.327	0.328	0.290	0.348	0.235	0.260	0.273	0.299	0.294	0.364	0.296	0.296	0.301	0.268	0.281
EP	kg PO ₃ ⁴⁻ -eq.	0.0467	0.0439	0.0394	0.0464	0.0331	0.0361	0.0393	0.0399	0.0424	0.0521	0.0402	0.0394	0.0407	0.0367	0.0384
POCP	kg C ₂ H ₄ -eq.	0.0332	0.0325	0.0283	0.0344	0.0213	0.0242	0.0274	0.0291	0.0316	0.0339	0.0287	0.0288	0.0298	0.0263	0.0273
ADPE	kg Sb eq.	3.16E-05	3.71E-05	3.21E-05	3.96E-05	2.47E-05	2.82E-05	2.87E-05	2.83E-05	3.28E-05	3.65E-05	3.31E-05	2.83E-05	3.36E-05	2.96E-05	3.11E-05
ADPF	MJ	3,370	3,790	3,320	4,030	2,620	2,940	3,170	3,920	3,520	3,870	3,400	3,890	3,470	3,060	3,210



MODULES C1-C4

Modules C1-C4 results are the same for all products and results for each EOL module are presented together per one tonne of product.

Table 114. EN 15804+A2 Core environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWpt	kg CO ₂ -eq	0.625	2.57	0	0
GWpf	kg CO ₂ -eq	0.625	2.58	0	0
GWpb	kg CO ₂ -eq	6.18E-05	-0.0255	0	0
GWpluluc	kg CO ₂ -eq	4.53E-06	0.0176	0	0
ODP	kg CFC-11 eq	4.96E-14	2.56E-13	0	0
AP	Mole of H+eq	0.00297	0.0157	0	0
EPfw	kg P eq	1.10E-07	9.32E-06	0	0
EPm	kg N eq	0.00143	0.00764	0	0
EPt	Mole of N eq	0.0157	0.0846	0	0
POCP	kg NMVOC eq	0.00402	0.0147	0	0
ADPmm*	kg Sb-eq	7.62E-09	2.63E-07	0	0
ADPf*	MJ	8.29	34.3	0	0
WDP	m ³ world equiv	0.00464	0.0292	0	0

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

Table 115. Resource use indicators results covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
PERE	MJ	0.0271	2.37	0	0
PERM	MJ	0	0	0	0
PERT	MJ	0.0271	2.37	0	0
PENRE	MJ	8.29	34.4	0	0
PENRM	MJ	0	0	0	0
PENRT	MJ	8.29	34.4	0	0
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	6.98E-05	0.00274	0	0

Table 116. Waste categories and output flow indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
HWD	kg	8.99E-12	1.82E-10	0	0
NHWD	kg	1.18E-04	0.00560	0	0
RWD	kg	1.21E-07	6.39E-05	0	0
CRU	kg	0	0	0	0
MFR	kg	0	0	1,000	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 117. Additional environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP-GHG**	kg CO ₂ -eq	0.622	2.58	0	0
PM	Disease incidences	3.36E-08	5.88E-08	0	0
IRP***	kBq U235 eq.	1.57E-05	0.00964	0	0
ETP-fw*	CTUe	2.08	24.3	0	0
HTPc*	CTUh	3.49E-11	5.01E-10	0	0
HTPnc*	CTUh	2.18E-09	2.90E-08	0	0
SQP*	Pt	0.0190	14.5	0	0

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 118. EN 15804+A1 Environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP	kg CO ₂ -eq	0.615	2.51	0	0
ODP	kg CFC ₁₁ -eq.	5.84E-14	3.02E-13	0	0
AP	kg SO ₂ -eq	0.00206	0.0107	0	0
EP	kg PO ₃ ⁴⁻ -eq.	4.80E-04	0.00268	0	0
POCP	kg C ₂ H ₄ -eq.	2.03E-04	-0.00402	0	0
ADPE	kg Sb eq.	7.63E-09	2.63E-07	0	0
ADPF	MJ	8.29	33.9	0	0

MODULES D

Table 119. EN 15804+A2 Core environmental impact indicators covering modules D

PARAMETER	UNIT	PA10_ PMN105	DG7_ PMN109	DG10_ PMN113	DG5_ PMN116	AC20_ PMN118	AC14_ PMN119	AC14_ PMN120	DG7 Grader lay_0	SP10_ PMN102	SMA11_ PMN101	AC10_ PMN005	Plant Mix_0	DG7_ PMN006	AC14 HFB_ PMN117	SP10_0
GWpt	kg CO ₂ -eq	-16.2	-18.1	-16.1	-19.1	-13.0	-14.7	-14.7	-13.1	-15.9	-18.4	-16.9	-13.1	-16.5	-15.4	-15.9
GWPf	kg CO ₂ -eq	-16.2	-18.1	-16.1	-19.1	-13.0	-14.7	-14.7	-13.1	-15.9	-18.3	-16.9	-13.1	-16.5	-15.4	-15.9
GWPb	kg CO ₂ -eq	-0.00483	0.00181	0.00257	0.00197	0.00305	0.00128	0.00110	0.00795	0.00102	-0.00581	-5.17E-04	0.00795	0.00324	2.03E-04	0.00102
GWPluluc	kg CO ₂ -eq	-0.00623	-0.00216	-0.00282	-0.00162	-0.00407	-0.00410	-0.00417	-0.00174	-0.00363	-0.00566	-0.00385	-0.00174	-0.00226	-0.00424	-0.00363
ODP	kg CFC-11 eq	-3.69E-11	-2.30E-11	-2.57E-11	-2.10E-11	-3.06E-11	-3.03E-11	-3.05E-11	-2.29E-11	-2.84E-11	-3.45E-11	-2.89E-11	-2.29E-11	-2.37E-11	-3.05E-11	-2.84E-11
AP	Mole of H+eq	-0.0392	-0.0467	-0.0397	-0.0500	-0.0295	-0.0349	-0.0349	-0.0303	-0.0390	-0.0463	-0.0422	-0.0303	-0.0415	-0.0373	-0.0390
EPfw	kg P eq	-1.66E-05	-1.35E-05	-1.32E-05	-1.34E-05	-1.31E-05	-1.39E-05	-1.40E-05	-1.09E-05	-1.39E-05	-1.70E-05	-1.46E-05	-1.09E-05	-1.29E-05	-1.43E-05	-1.39E-05
EPm	kg N eq	-0.00422	-0.00534	-0.00403	-0.00594	-0.00213	-0.00319	-0.00320	-0.00209	-0.00395	-0.00555	-0.00461	-0.00209	-0.00433	-0.00367	-0.00395
EPt	Mole of N eq	-0.0487	-0.0597	-0.0456	-0.0661	-0.0252	-0.0368	-0.0370	-0.0241	-0.0450	-0.0632	-0.0523	-0.0241	-0.0486	-0.0421	-0.0450
POCP	kg NMVOC eq	-0.0305	-0.0391	-0.0318	-0.0426	-0.0210	-0.0265	-0.0266	-0.0224	-0.0308	-0.0378	-0.0341	-0.0224	-0.0337	-0.0290	-0.0308
ADPmm*	kg Sb-eq	4.96E-07	3.87E-07	5.96E-07	2.97E-07	8.91E-07	7.13E-07	7.08E-07	9.44E-07	5.92E-07	2.82E-07	4.77E-07	9.44E-07	5.56E-07	6.28E-07	5.92E-07
ADPf*	MJ	-1,950	-2,410	-2,090	-2,570	-1,610	-1,840	-1,840	-1,720	-2,030	-2,270	-2,160	-1,720	-2,180	-1,940	-2,030
WDP	m ³ world equiv	-1.98	-0.733	-0.970	-0.553	-1.40	-1.38	-1.40	-0.711	-1.21	-1.77	-1.26	-0.711	-0.796	-1.40	-1.21

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

Table 120. Resource use indicators results covering modules D

PARAMETER	UNIT	PA10_ PMN105	DG7_ PMN109	DG10_ PMN113	DG5_ PMN116	AC20_ PMN118	AC14_ PMN119	AC14_ PMN120	DG7 Grader lay_0	SP10_ PMN102	SMA11_ PMN101	AC10_ PMN005	Plant Mix_0	DG7_ PMN006	AC14 HFB_ PMN117	SP10_0
PERE	MJ	-28.2	-17.0	-19.0	-15.5	-22.6	-22.6	-22.8	-16.3	-21.2	-26.5	-21.7	-16.3	-17.4	-22.9	-21.2
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	-28.2	-17.0	-19.0	-15.5	-22.6	-22.6	-22.8	-16.3	-21.2	-26.5	-21.7	-16.3	-17.4	-22.9	-21.2
PENRE	MJ	-1,950	-2,410	-2,090	-2,570	-1,610	-1,840	-1,840	-1,720	-2,030	-2,270	-2,160	-1,720	-2,180	-1,940	-2,030
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	-1,950	-2,410	-2,090	-2,570	-1,610	-1,840	-1,840	-1,720	-2,030	-2,270	-2,160	-1,720	-2,180	-1,940	-2,030
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	-0.0622	-0.0289	-0.0347	-0.0243	-0.0454	-0.0453	-0.0459	-0.0266	-0.0412	-0.0571	-0.0428	-0.0266	-0.0301	-0.0463	-0.0412



Table 121. Waste categories and output flow indicators covering modules D

PARAMETER	UNIT	PA10_PMN105	DG7_PMN109	DG10_PMN113	DG5_PMN116	AC20_PMN118	AC14_PMN119	AC14_PMN120	DG7 Grader lay_0	SP10_PMN102	SMA11_PMN101	AC10_PMN005	Plant Mix_0	DG7_PMN006	AC14 HFB_PMN117	SP10_0
HWD	kg	-5.89E-09	-4.32E-09	-4.44E-09	-4.17E-09	-4.73E-09	-4.87E-09	-4.90E-09	-3.75E-09	-4.77E-09	-5.82E-09	-4.94E-09	-3.75E-09	-4.24E-09	-4.99E-09	-4.77E-09
NHWD	kg	-3.39	-12.2	-10.5	-13.4	-7.58	-7.70	-7.55	-12.5	-8.82	-4.82	-8.47	-12.5	-11.8	-7.49	-8.82
RWD	kg	-0.00780	-0.00388	-0.00464	-0.00330	-0.00603	-0.00594	-0.00600	-0.00387	-0.00541	-0.00711	-0.00554	-0.00387	-0.00410	-0.00601	-0.00541
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 122. Additional environmental impact indicators covering modules D

PARAMETER	UNIT	PA10_PMN105	DG7_PMN109	DG10_PMN113	DG5_PMN116	AC20_PMN118	AC14_PMN119	AC14_PMN120	DG7 Grader lay_0	SP10_PMN102	SMA11_PMN101	AC10_PMN005	Plant Mix_0	DG7_PMN006	AC14 HFB_PMN117	SP10_0
GWP-GHG**	kg CO ₂ -eq	-16.1	-18.0	-15.9	-18.9	-12.9	-14.6	-14.6	-13.0	-15.8	-18.2	-16.8	-13.0	-16.4	-15.3	-15.8
PM	Disease incidences	-2.68E-07	-2.87E-07	-2.50E-07	-3.03E-07	-1.98E-07	-2.29E-07	-2.30E-07	-1.88E-07	-2.51E-07	-3.06E-07	-2.71E-07	-1.88E-07	-2.57E-07	-2.44E-07	-2.51E-07
IRP***	kBq U235 eq.	-1.33	-0.640	-0.776	-0.539	-1.02	-1.000	-1.02	-0.640	-0.911	-1.21	-0.934	-0.640	-0.679	-1.02	-0.911
ETP-fw'	CTUe	-291	-350	-303	-372	-235	-269	-269	-246	-296	-337	-317	-246	-316	-284	-296
HTPc'	CTUh	-6.21E-09	-7.43E-09	-6.50E-09	-7.88E-09	-5.13E-09	-5.80E-09	-5.81E-09	-5.38E-09	-6.35E-09	-7.14E-09	-6.75E-09	-5.38E-09	-6.76E-09	-6.10E-09	-6.35E-09
HTPnc'	CTUh	-2.28E-07	-2.74E-07	-2.42E-07	-2.90E-07	-1.95E-07	-2.18E-07	-2.18E-07	-2.06E-07	-2.37E-07	-2.60E-07	-2.50E-07	-2.06E-07	-2.52E-07	-2.27E-07	-2.37E-07
SQP*	Pt	-20.4	-10.9	-12.6	-9.64	-15.6	-15.6	-15.7	-10.3	-14.4	-18.9	-14.9	-10.3	-11.3	-15.8	-14.4

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 123. EN 15804+A1 Environmental impact indicators covering modules D

PARAMETER	UNIT	PA10_PMN105	DG7_PMN109	DG10_PMN113	DG5_PMN116	AC20_PMN118	AC14_PMN119	AC14_PMN120	DG7 Grader lay_0	SP10_PMN102	SMA11_PMN101	AC10_PMN005	Plant Mix_0	DG7_PMN006	AC14 HFB_PMN117	SP10_0
GWP	kg CO ₂ -eq	-13.7	-15.0	-13.4	-15.8	-11.0	-12.3	-12.4	-10.9	-13.3	-15.4	-14.2	-10.9	-13.7	-13.0	-13.3
ODP	kg CFC ₁₁ -eq.	-4.34E-11	-2.71E-11	-3.02E-11	-2.47E-11	-3.60E-11	-3.56E-11	-3.59E-11	-2.70E-11	-3.34E-11	-4.06E-11	-3.40E-11	-2.70E-11	-2.80E-11	-3.59E-11	-3.34E-11
AP	kg SO ₂ -eq.	-0.0336	-0.0401	-0.0343	-0.0429	-0.0258	-0.0302	-0.0302	-0.0266	-0.0336	-0.0395	-0.0363	-0.0266	-0.0358	-0.0322	-0.0336
EP	kg PO ₃ ⁴⁻ -eq.	-0.00200	-0.00231	-0.00185	-0.00252	-0.00118	-0.00157	-0.00158	-0.00111	-0.00184	-0.00247	-0.00209	-0.00111	-0.00194	-0.00175	-0.00184
POCP	kg C ₂ H ₄ -eq.	-0.0103	-0.0130	-0.0110	-0.0140	-0.00803	-0.00948	-0.00948	-0.00868	-0.0107	-0.0123	-0.0115	-0.00868	-0.0116	-0.0101	-0.0107
ADPE	kg Sb eq.	4.44E-07	3.60E-07	5.64E-07	2.73E-07	8.50E-07	6.73E-07	6.67E-07	9.17E-07	5.56E-07	2.34E-07	4.39E-07	9.17E-07	5.28E-07	5.87E-07	5.56E-07
ADPF	MJ	-1,930	-2,400	-2,080	-2,560	-1,590	-1,820	-1,820	-1,710	-2,010	-2,250	-2,150	-1,710	-2,170	-1,920	-2,010



MASTERTON RESULTS FOR ONE TONNE OF ASPHALT

MODULES A1-A3

Table 124. EN 15804+A2 Core environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC14_MAS002	DG7 Mix10_MAS101	DG10 Mix15_O	DG14 Mix20_MAS103	Mix 6_O
GWPt	kg CO ₂ -eq	76.0	70.6	68.9	66.4	74.6
GWPf	kg CO ₂ -eq	74.8	70.3	68.6	66.1	74.3
GWPb	kg CO ₂ -eq	1.22	0.279	0.277	0.273	0.284
GWP _{luluc}	kg CO ₂ -eq	0.0400	0.0418	0.0414	0.0403	0.0431
ODP	kg CFC-11 eq	1.24E-10	6.74E-11	6.72E-11	6.68E-11	6.78E-11
AP	Mole of H+eq	0.330	0.379	0.368	0.345	0.408
EP _{fw}	kg P eq	2.59E-04	2.02E-04	2.01E-04	1.99E-04	2.04E-04
EP _m	kg N eq	0.0962	0.108	0.106	0.0993	0.116
EP _t	Mole of N eq	1.06	1.19	1.16	1.09	1.28
POCP	kg NMVOC eq	0.295	0.322	0.313	0.294	0.347
ADP _{mm} *	kg Sb-eq	2.83E-05	3.45E-05	3.34E-05	3.09E-05	3.75E-05
ADP _f *	MJ	3,200	3,630	3,520	3,280	3,930
WDP	m ³ world equiv	7.06	6.85	6.84	6.82	6.88

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

Table 125. Resource use indicators results covering modules A1-A3

PARAMETER	UNIT	AC14_MAS002	DG7 Mix10_MAS101	DG10 Mix15_O	DG14 Mix20_MAS103	Mix 6_O
PERE	MJ	157	132	132	131	133
PERM	MJ	0	0	0	0	0
PERT	MJ	157	132	132	131	133
PENRE	MJ	-783	-1,400	-1,350	-1,200	-1,560
PENRM	MJ	4,050	5,120	4,960	4,560	5,600
PENRT	MJ	3,270	3,720	3,610	3,360	4,040
SM	kg	0	0	0	0	0
RSF	MJ	0	0	0	0	0
NRSF	MJ	0	0	0	0	0
FW	m ³	0.422	0.393	0.393	0.391	0.395

Table 126. Biogenic Carbon

PARAMETER	UNIT	QUANTITY
Biogenic carbon content in product	kg C	0

Table 127. Waste categories and output flow indicators covering modules A1-A3

PARAMETER	UNIT	AC14_MAS002	DG7 Mix10_MAS101	DG10 Mix15_O	DG14 Mix20_MAS103	Mix 6_O	AC14_HBY108
HWD	kg		5.15E-08	1.30E-08	1.29E-08	1.25E-08	1.35E-08
NHWD	kg		1.37	0.531	0.527	0.520	0.540
RWD	kg		0.0155	0.0130	0.0129	0.0128	0.0132
CRU	kg		0	0	0	0	0
MFR	kg		66.5	66.5	66.5	66.5	66.5
MER	kg		0	0	0	0	0
EEE	MJ		0	0	0	0	0
EET	MJ		0	0	0	0	0

Table 128. Additional environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC14_MAS002	DG7 Mix10_MAS101	DG10 Mix15_O	DG14 Mix20_MAS103	Mix 6_O
GWP-GHG**	kg CO ₂ -eq	75.5	70.2	68.5	66.0	74.2
PM	Disease incidences	4.53E-06	5.19E-06	5.05E-06	4.72E-06	5.59E-06
IRP***	kBq U235 eq.	2.22	1.96	1.95	1.94	1.97
ETP-fw*	CTUe	1,410	1,620	1,580	1,480	1,750
HTPc*	CTUh	2.80E-08	2.86E-08	2.78E-08	2.61E-08	3.07E-08
HTPnc*	CTUh	1.02E-06	8.48E-07	8.26E-07	7.75E-07	9.12E-07
SQP*	Pt	3,990	3,980	3,980	3,980	3,980

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 129. EN 15804+A1 Environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC14_MAS002	DG7 Mix10_MAS101	DG10 Mix15_O	DG14 Mix20_MAS103	Mix 6_O
GWP	kg CO ₂ -eq	72.0	66.2	64.7	62.4	69.8
ODP	kg CFC ₁₁ -eq.	1.46E-10	7.93E-11	7.91E-11	7.87E-11	7.99E-11
AP	kg SO ₂ -eq	0.257	0.296	0.288	0.269	0.319
EP	kg PO ₃ ⁴⁻⁻ -eq.	0.0359	0.0388	0.0378	0.0357	0.0415
POCP	kg C ₂ H ₄ -eq.	0.0289	0.0318	0.0308	0.0286	0.0345
ADPE	kg Sb eq.	2.84E-05	3.45E-05	3.35E-05	3.10E-05	3.76E-05
ADPF	MJ	3,070	3,480	3,380	3,140	3,770

MODULES C1-C4

Modules C1-C4 results are the same for all products and results for each EOL module are presented together per one tonne of product.

Table 130. EN 15804+A2 Core environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWpt	kg CO ₂ -eq	0.625	2.57	0	0
GWpf	kg CO ₂ -eq	0.625	2.58	0	0
GWpb	kg CO ₂ -eq	6.18E-05	-0.0255	0	0
GWpluluc	kg CO ₂ -eq	4.53E-06	0.0176	0	0
ODP	kg CFC-11 eq	4.96E-14	2.56E-13	0	0
AP	Mole of H+eq	0.00297	0.0157	0	0
EPfw	kg P eq	1.10E-07	9.32E-06	0	0
EPm	kg N eq	0.00143	0.00764	0	0
EPt	Mole of N eq	0.0157	0.0846	0	0
POCP	kg NMVOC eq	0.00402	0.0147	0	0
ADPmm*	kg Sb-eq	7.62E-09	2.63E-07	0	0
ADPf*	MJ	8.29	34.3	0	0
WDP	m ³ world equiv	0.00464	0.0292	0	0

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

Table 131. Resource use indicators results covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
PERE	MJ	0.0271	2.37	0	0
PERM	MJ	0	0	0	0
PERT	MJ	0.0271	2.37	0	0
PENRE	MJ	8.29	34.4	0	0
PENRM	MJ	0	0	0	0
PENRT	MJ	8.29	34.4	0	0
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	6.98E-05	0.00274	0	0

Table 132. Waste categories and output flow indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
HWD	kg	8.99E-12	1.82E-10	0	0
NHWD	kg	1.18E-04	0.00560	0	0
RWD	kg	1.21E-07	6.39E-05	0	0
CRU	kg	0	0	0	0
MFR	kg	0	0	1,000	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 133. Additional environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP-GHG**	kg CO ₂ -eq	0.622	2.58	0	0
PM	Disease incidences	3.36E-08	5.88E-08	0	0
IRP***	kBq U235 eq.	1.57E-05	0.00964	0	0
ETP-fw*	CTUe	2.08	24.3	0	0
HTPc*	CTUh	3.49E-11	5.01E-10	0	0
HTPnc*	CTUh	2.18E-09	2.90E-08	0	0
SQP*	Pt	0.0190	14.5	0	0

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 134. EN 15804+A1 Environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP	kg CO ₂ -eq	0.615	2.51	0	0
ODP	kg CFC ₁₁ -eq.	5.84E-14	3.02E-13	0	0
AP	kg SO ₂ -eq	0.00206	0.0107	0	0
EP	kg PO ₃ ⁴⁻ -eq.	4.80E-04	0.00268	0	0
POCP	kg C ₂ H ₄ -eq.	2.03E-04	-0.00402	0	0
ADPE	kg Sb eq.	7.63E-09	2.63E-07	0	0
ADPF	MJ	8.29	33.9	0	0

MODULES D

Table 135. EN 15804+A2 Core environmental impact indicators covering modules D

PARAMETER	UNIT	AC14_MAS002	DG7 Mix10_MAS101	DG10 Mix15_0	DG14 Mix20_MAS103	Mix 6_0
GWpt	kg CO ₂ -eq	-14.7	-16.9	-16.6	-15.5	-18.0
GWpf	kg CO ₂ -eq	-14.7	-16.9	-16.6	-15.5	-18.0
GWpb	kg CO ₂ -eq	-2.07E-04	0.00228	0.00148	0.00256	0.00274
GWpluluc	kg CO ₂ -eq	-0.00478	-0.00255	-0.00306	-0.00311	-0.00179
ODP	kg CFC-11 eq	-3.25E-11	-2.46E-11	-2.63E-11	-2.68E-11	-2.18E-11
AP	Mole of H+eq	-0.0348	-0.0425	-0.0415	-0.0377	-0.0464
EPfw	kg P eq	-1.46E-05	-1.33E-05	-1.37E-05	-1.33E-05	-1.31E-05
EPm	kg N eq	-0.00322	-0.00455	-0.00439	-0.00366	-0.00524
EPt	Mole of N eq	-0.0374	-0.0512	-0.0496	-0.0417	-0.0585
POCP	kg NMVOC eq	-0.0262	-0.0347	-0.0335	-0.0297	-0.0388
ADPmm*	kg Sb-eq	6.92E-07	5.12E-07	5.29E-07	6.52E-07	4.11E-07
ADPf*	MJ	-1,810	-2,220	-2,160	-1,990	-2,410
WDP	m ³ world equiv	-1.58	-0.874	-1.03	-1.07	-0.627

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

Table 136. Resource use indicators results covering modules D

PARAMETER	UNIT	AC14_MAS002	DG7 Mix10_MAS101	DG10 Mix15_0	DG14 Mix20_MAS103	Mix 6_0
PERE	MJ	-24.4	-18.2	-19.6	-19.8	-16.1
PERM	MJ	0	0	0	0	0
PERT	MJ	-24.4	-18.2	-19.6	-19.8	-16.1
PENRE	MJ	-1,810	-2,220	-2,160	-1,990	-2,410
PENRM	MJ	0	0	0	0	0
PENRT	MJ	-1,810	-2,220	-2,160	-1,990	-2,410
SM	kg	0	0	0	0	0
RSF	MJ	0	0	0	0	0
NRSF	MJ	0	0	0	0	0
FW	m ³	-0.0509	-0.0323	-0.0365	-0.0372	-0.0259

Table 137. Waste categories and output flow indicators covering modules D

PARAMETER	UNIT	AC14_MAS002	DG7 Mix10_MAS101	DG10 Mix15_0	DG14 Mix20_MAS103	Mix 6_0
HWD	kg	-5.16E-09	-4.39E-09	-4.58E-09	-4.51E-09	-4.15E-09
NHWD	kg	-6.26	-11.2	-10.1	-9.86	-12.9
RWD	kg	-0.00657	-0.00434	-0.00483	-0.00496	-0.00355
CRU	kg	0	0	0	0	0
MFR	kg	0	0	0	0	0
MER	kg	0	0	0	0	0
EEE	MJ	0	0	0	0	0
EET	MJ	0	0	0	0	0

Table 138. Additional environmental impact indicators covering modules D

PARAMETER	UNIT	AC14_MAS002	DG7 Mix10_MAS101	DG10 Mix15_0	DG14 Mix20_MAS103	Mix 6_0
GWP-GHG**	kg CO ₂ -eq	-14.6	-16.7	-16.5	-15.3	-17.8
PM	Disease incidences	-2.33E-07	-2.65E-07	-2.62E-07	-2.40E-07	-2.83E-07
IRP***	kBq U235 eq.	-1.12	-0.722	-0.808	-0.832	-0.582
ETP-fw*	CTUe	-266	-322	-314	-290	-348
HTPc*	CTUh	-5.74E-09	-6.87E-09	-6.71E-09	-6.23E-09	-7.41E-09
HTPnc*	CTUh	-2.15E-07	-2.55E-07	-2.49E-07	-2.33E-07	-2.74E-07
SQP*	Pt	-17.1	-11.9	-13.1	-13.3	-10.1

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 139. EN 15804+A1 Environmental impact indicators covering modules D

PARAMETER	UNIT	AC14_MAS002	DG7 Mix10_MAS101	DG10 Mix15_0	DG14 Mix20_MAS103	Mix 6_0
GWP	kg CO ₂ -eq	-12.4	-14.0	-13.9	-12.9	-14.9
ODP	kg CFC ₁₁ -eq.	-3.83E-11	-2.90E-11	-3.10E-11	-3.16E-11	-2.57E-11
AP	kg SO ₂ -eq	-0.0300	-0.0366	-0.0357	-0.0326	-0.0399
EP	kg PO ₃ ⁴⁻ -eq.	-0.00160	-0.00203	-0.00199	-0.00172	-0.00227
POCP	kg C ₂ H ₄ -eq.	-0.00932	-0.0118	-0.0115	-0.0104	-0.0130
ADPE	kg Sb eq.	6.49E-07	4.82E-07	4.96E-07	6.18E-07	3.86E-07
ADPF	MJ	-1,790	-2,210	-2,140	-1,980	-2,400

WELLINGTON RESULTS FOR ONE TONNE OF ASPHALT

MODULES A1-A3

Table 140. EN 15804+A2 Core environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	DG7_WEL104	DG7_WEL105	AC14_WEL002	AC20_WEL001	SMA11_WEL110	DG10_WEL106	AC14_WEL004	DG5_WEL103	DG14_WEL024	DG14_WEL025	DG10-PMB_0
GWpt	kg CO ₂ -eq	79.3	88.0	84.1	72.3	102	69.8	99.5	87.5	70.7	84.3	96.6
GWpf	kg CO ₂ -eq	79.2	87.8	84.0	72.2	101	69.7	104	86.4	70.6	83.3	95.4
GWpb	kg CO ₂ -eq	0.0695	0.0852	0.0790	0.0668	1.26	0.0622	-5.04	1.02	0.0622	0.899	1.17
GWpluluc	kg CO ₂ -eq	0.0562	0.0612	0.0595	0.0558	0.0587	0.0546	0.0814	0.0568	0.0546	0.0555	0.0573
ODP	kg CFC-11 eq	7.07E-11	7.80E-11	7.75E-11	7.54E-11	1.43E-10	7.62E-11	2.11E-10	1.33E-10	7.62E-11	1.27E-10	1.37E-10
AP	Mole of H+eq	0.410	0.472	0.438	0.367	0.458	0.340	0.535	0.385	0.342	0.358	0.430
EPfw	kg P eq	7.73E-05	8.34E-05	8.12E-05	7.66E-05	1.56E-04	7.52E-05	3.00E-04	1.38E-04	7.52E-05	1.29E-04	1.48E-04
EPm	kg N eq	0.130	0.147	0.138	0.117	0.145	0.110	0.167	0.123	0.111	0.116	0.137
EPt	Mole of N eq	1.44	1.63	1.53	1.30	1.60	1.22	1.84	1.36	1.23	1.29	1.51
POCP	kg NMVOC eq	0.371	0.423	0.395	0.332	0.431	0.310	0.489	0.362	0.312	0.339	0.405
ADPmm*	kg Sb-eq	3.28E-05	3.90E-05	3.55E-05	2.88E-05	3.60E-05	2.58E-05	3.92E-05	2.93E-05	2.59E-05	2.63E-05	3.34E-05
ADPf*	MJ	3,480	4,100	3,760	3,060	4,040	2,780	4,250	3,300	2,790	3,000	3,760
WDP	m ³ world equiv	9.82	10.5	10.4	10.3	10.2	10.3	18.3	10.6	10.3	10.6	10.1

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

Table 141. Resource use indicators results covering modules A1-A3

PARAMETER	UNIT	DG7_WEL104	DG7_WEL105	AC14_WEL002	AC20_WEL001	SMA11_WEL110	DG10_WEL106	AC14_WEL004	DG5_WEL103	DG14_WEL024	DG14_WEL025	DG10-PMB_0
PERE	MJ	263	270	269	266	298	266	454	293	266	290	294
PERM	MJ	0	0	0	0	0	0	61.9	0	0	0	0
PERT	MJ	263	270	269	266	298	266	516	293	266	290	294
PENRE	MJ	-1,150	-1,470	-1,270	-942	-953	-754	-1,020	-677	-744	-508	-846
PENRM	MJ	4,720	5,680	5,120	4,080	5,080	3,600	5,360	4,050	3,600	3,570	4,680
PENRT	MJ	3,570	4,210	3,850	3,140	4,130	2,850	4,340	3,370	2,860	3,060	3,840
SM	kg	0	0	0	24.5	0	0	0	24.5	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	0.674	0.694	0.692	0.686	0.717	0.686	0.785	0.718	0.686	0.715	0.712

Table 142. Biogenic Carbon

PARAMETER	UNIT	QUANTITY
Biogenic carbon content in product	kg C	0

Table 143. Waste categories and output flow indicators covering modules A1-A3

PARAMETER	UNIT	DG7_WEL104	DG7_WEL105	AC14_WEL002	AC20_WEL001	SMA11_WEL110	DG10_WEL106	AC14_WEL004	DG5_WEL103	DG14_WEL024	DG14_WEL025	DG10-PMB_0
HWD	kg	4.34E-08	4.67E-08	4.59E-08	4.05E-08	9.59E-08	4.06E-08	1.01E-07	8.13E-08	4.13E-08	7.75E-08	9.04E-08
NHWD	kg	71.0	66.9	66.9	66.8	72.1	66.8	68.2	67.7	66.8	67.6	72.0
RWD	kg	0.0112	0.0134	0.0132	0.0125	0.0150	0.0125	0.0201	0.0154	0.0125	0.0151	0.0146
CRU	kg	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0

Table 144. Additional environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	DG7_WEL104	DG7_WEL105	AC14_WEL002	AC20_WEL001	SMA11_WEL110	DG10_WEL106	AC14_WEL004	DG5_WEL103	DG14_WEL024	DG14_WEL025	DG10-PMB_0
GWP-GHG**	kg CO ₂ -eq	78.9	87.6	83.7	72.0	101	69.6	105	87.0	70.4	83.8	96.0
PM	Disease incidences	5.16E-06	6.00E-06	5.53E-06	4.61E-06	5.78E-06	4.23E-06	8.95E-06	4.84E-06	4.24E-06	4.44E-06	5.42E-06
IRP***	kBq U235 eq.	1.65	1.99	1.98	1.91	2.03	1.94	2.67	2.21	1.94	2.20	1.99
ETP-fw*	CTUe	1,620	1,880	1,730	1,460	1,810	1,340	1,960	1,520	1,340	1,390	1,690
HTPc*	CTUh	2.91E-08	3.34E-08	3.10E-08	2.62E-08	3.60E-08	2.42E-08	3.99E-08	3.03E-08	2.42E-08	2.79E-08	3.38E-08
HTPnc*	CTUh	9.12E-07	1.04E-06	9.66E-07	8.25E-07	1.36E-06	7.66E-07	1.60E-06	1.14E-06	7.67E-07	1.04E-06	1.27E-06
SQP*	Pt	183	191	189	185	207	184	2,750	203	184	200	204

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 145. EN 15804+A1 Environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	DG7_WEL104	DG7_WEL105	AC14_WEL002	AC20_WEL001	SMA11_WEL110	DG10_WEL106	AC14_WEL004	DG5_WEL103	DG14_WEL024	DG14_WEL025	DG10-PMB_0
GWP	kg CO ₂ -eq	74.7	82.6	79.2	68.2	96.4	66.1	93.7	82.9	66.9	80.1	91.4
ODP	kg CFC ₁₁ -eq.	8.33E-11	9.19E-11	9.13E-11	8.88E-11	1.69E-10	8.98E-11	2.48E-10	1.57E-10	8.98E-11	1.50E-10	1.62E-10
AP	kg SO ₂ -eq	0.314	0.362	0.336	0.280	0.351	0.259	0.412	0.294	0.260	0.272	0.329
EP	kg PO ₃ ⁴⁻⁻ -eq.	0.0454	0.0514	0.0483	0.0410	0.0523	0.0386	0.0608	0.0445	0.0389	0.0420	0.0494
POCP	kg C ₂ H ₄ -eq.	0.0280	0.0334	0.0304	0.0243	0.0342	0.0218	0.0358	0.0275	0.0219	0.0247	0.0316
ADPE	kg Sb eq.	3.29E-05	3.91E-05	3.56E-05	2.89E-05	3.61E-05	2.59E-05	3.94E-05	2.94E-05	2.59E-05	2.64E-05	3.35E-05
ADPF	MJ	3,350	3,940	3,610	2,940	3,890	2,660	4,080	3,170	2,670	2,880	3,620



MODULES C1-C4

Modules C1-C4 results are the same for all products and results for each EOL module are presented together per one tonne of product.

Table 146. EN 15804+A2 Core environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWpt	kg CO ₂ -eq	0.625	2.57	0	0
GWpf	kg CO ₂ -eq	0.625	2.58	0	0
GWpb	kg CO ₂ -eq	6.18E-05	-0.0255	0	0
GWpluluc	kg CO ₂ -eq	4.53E-06	0.0176	0	0
ODP	kg CFC-11 eq	4.96E-14	2.56E-13	0	0
AP	Mole of H+eq	0.00297	0.0157	0	0
EPfw	kg P eq	1.10E-07	9.32E-06	0	0
EPm	kg N eq	0.00143	0.00764	0	0
EPt	Mole of N eq	0.0157	0.0846	0	0
POCP	kg NMVOC eq	0.00402	0.0147	0	0
ADPmm*	kg Sb-eq	7.62E-09	2.63E-07	0	0
ADPf*	MJ	8.29	34.3	0	0
WDP	m ³ world equiv	0.00464	0.0292	0	0

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

Table 147. Resource use indicators results covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
PERE	MJ	0.0271	2.37	0	0
PERM	MJ	0	0	0	0
PERT	MJ	0.0271	2.37	0	0
PENRE	MJ	8.29	34.4	0	0
PENRM	MJ	0	0	0	0
PENRT	MJ	8.29	34.4	0	0
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	6.98E-05	0.00274	0	0

Table 148. Waste categories and output flow indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
HWD	kg	8.99E-12	1.82E-10	0	0
NHWD	kg	1.18E-04	0.00560	0	0
RWD	kg	1.21E-07	6.39E-05	0	0
CRU	kg	0	0	0	0
MFR	kg	0	0	1,000	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 149. Additional environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP-GHG**	kg CO ₂ -eq	0.622	2.58	0	0
PM	Disease incidences	3.36E-08	5.88E-08	0	0
IRP***	kBq U235 eq.	1.57E-05	0.00964	0	0
ETP-fw*	CTUe	2.08	24.3	0	0
HTPc*	CTUh	3.49E-11	5.01E-10	0	0
HTPnc*	CTUh	2.18E-09	2.90E-08	0	0
SQP*	Pt	0.0190	14.5	0	0

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 150. EN 15804+A1 Environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP	kg CO ₂ -eq	0.615	2.51	0	0
ODP	kg CFC ₁₁ -eq.	5.84E-14	3.02E-13	0	0
AP	kg SO ₂ -eq	0.00206	0.0107	0	0
EP	kg PO ₃ ⁴⁻ -eq.	4.80E-04	0.00268	0	0
POCP	kg C ₂ H ₄ -eq.	2.03E-04	-0.00402	0	0
ADPE	kg Sb eq.	7.63E-09	2.63E-07	0	0
ADPF	MJ	8.29	33.9	0	0

MODULES D

Table 151. EN 15804+A2 Core environmental impact indicators covering modules D

PARAMETER	UNIT	DG7_WEL104	DG7_WEL105	AC14_WEL002	AC20_WEL001	SMA11_WEL110	DG10_WEL106	AC14_WEL004	DG5_WEL103	DG14_WEL024	DG14_WEL025	DG10-PMB_0
GWpt	kg CO ₂ -eq	-16.0	-18.3	-16.8	-14.8	-16.8	-13.4	-18.9	-14.8	-13.2	-13.2	-16.0
GWPf	kg CO ₂ -eq	-16.0	-18.3	-16.8	-14.8	-16.8	-13.4	-18.9	-14.8	-13.2	-13.2	-16.0
GWPb	kg CO ₂ -eq	0.00201	0.00195	0.00311	-9.52E-04	0.00311	4.94E-04	-0.00686	-9.52E-04	0.00176	0.00176	0.00201
GWPluluc	kg CO ₂ -eq	-0.00314	-0.00201	-0.00222	-0.00508	-0.00222	-0.00508	-0.00589	-0.00508	-0.00458	-0.00458	-0.00314
ODP	kg CFC-11 eq	-2.68E-11	-2.24E-11	-2.35E-11	-3.34E-11	-2.35E-11	-3.38E-11	-3.51E-11	-3.34E-11	-3.22E-11	-3.22E-11	-2.68E-11
AP	Mole of H+eq	-0.0393	-0.0473	-0.0422	-0.0350	-0.0422	-0.0305	-0.0480	-0.0350	-0.0300	-0.0300	-0.0393
EPfw	kg P eq	-1.35E-05	-1.34E-05	-1.30E-05	-1.49E-05	-1.30E-05	-1.43E-05	-1.74E-05	-1.49E-05	-1.37E-05	-1.37E-05	-1.35E-05
EPm	kg N eq	-0.00397	-0.00545	-0.00446	-0.00330	-0.00446	-0.00241	-0.00591	-0.00330	-0.00227	-0.00227	-0.00397
EPt	Mole of N eq	-0.0450	-0.0608	-0.0501	-0.0384	-0.0501	-0.0286	-0.0672	-0.0384	-0.0269	-0.0269	-0.0450
POCP	kg NMVOC eq	-0.0312	-0.0397	-0.0344	-0.0265	-0.0344	-0.0218	-0.0396	-0.0265	-0.0214	-0.0214	-0.0312
ADPmm*	kg Sb-eq	6.00E-07	3.72E-07	5.34E-07	6.73E-07	5.34E-07	8.24E-07	2.16E-07	6.73E-07	8.57E-07	8.57E-07	6.00E-07
ADPF*	MJ	-2,060	-2,450	-2,220	-1,810	-2,220	-1,610	-2,340	-1,810	-1,610	-1,610	-2,060
WDP	m ³ world equiv	-1.07	-0.684	-0.779	-1.67	-0.779	-1.70	-1.83	-1.67	-1.55	-1.55	-1.07

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

Table 152. Resource use indicators results covering modules D

PARAMETER	UNIT	DG7_WEL104	DG7_WEL105	AC14_WEL002	AC20_WEL001	SMA11_WEL110	DG10_WEL106	AC14_WEL004	DG5_WEL103	DG14_WEL024	DG14_WEL025	DG10-PMB_0
PERE	MJ	-19.9	-16.6	-17.3	-25.2	-17.3	-25.3	-27.1	-25.2	-24.0	-24.0	-19.9
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	-19.9	-16.6	-17.3	-25.2	-17.3	-25.3	-27.1	-25.2	-24.0	-24.0	-19.9
PENRE	MJ	-2,060	-2,450	-2,220	-1,810	-2,220	-1,610	-2,340	-1,810	-1,610	-1,610	-2,060
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	-2,060	-2,450	-2,220	-1,810	-2,220	-1,610	-2,340	-1,810	-1,610	-1,610	-2,060
SM	kg	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	-0.0373	-0.0276	-0.0297	-0.0532	-0.0297	-0.0536	-0.0588	-0.0532	-0.0495	-0.0495	-0.0373

Table 153. Waste categories and output flow indicators covering modules D

PARAMETER	UNIT	DG7_WEL104	DG7_WEL105	AC14_WEL002	AC20_WEL001	SMA11_WEL110	DG10_WEL106	AC14_WEL004	DG5_WEL103	DG14_WEL024	DG14_WEL025	DG10-PMB_0
HWD	kg	-4.56E-09	-4.27E-09	-4.24E-09	-5.30E-09	-4.24E-09	-5.19E-09	-5.96E-09	-5.30E-09	-4.96E-09	-4.96E-09	-4.56E-09
NHWD	kg	-9.86	-12.5	-11.9	-5.66	-11.9	-5.50	-4.41	-5.66	-6.53	-6.53	-9.86
RWD	kg	-0.00495	-0.00372	-0.00404	-0.00684	-0.00404	-0.00694	-0.00728	-0.00684	-0.00649	-0.00649	-0.00495
CRU	kg	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0

Table 154. Additional environmental impact indicators covering modules D

PARAMETER	UNIT	DG7_WEL104	DG7_WEL105	AC14_WEL002	AC20_WEL001	SMA11_WEL110	DG10_WEL106	AC14_WEL004	DG5_WEL103	DG14_WEL024	DG14_WEL025	DG10-PMB_0
GWP-GHG**	kg CO ₂ -eq	-15.8	-18.1	-16.6	-14.7	-16.6	-13.3	-18.7	-14.7	-13.1	-13.1	-15.8
PM	Disease incidences	-2.49E-07	-2.90E-07	-2.61E-07	-2.37E-07	-2.61E-07	-2.10E-07	-3.17E-07	-2.37E-07	-2.04E-07	-2.04E-07	-2.49E-07
IRP***	kBq U235 eq.	-0.830	-0.613	-0.669	-1.16	-0.669	-1.18	-1.24	-1.16	-1.10	-1.10	-0.830
ETP-fw*	CTUe	-300	-354	-321	-267	-321	-238	-348	-267	-237	-237	-300
HTPc*	CTUh	-6.42E-09	-7.52E-09	-6.85E-09	-5.76E-09	-6.85E-09	-5.18E-09	-7.34E-09	-5.76E-09	-5.15E-09	-5.15E-09	-6.42E-09
HTPnc*	CTUh	-2.39E-07	-2.77E-07	-2.55E-07	-2.15E-07	-2.55E-07	-1.96E-07	-2.67E-07	-2.15E-07	-1.95E-07	-1.95E-07	-2.39E-07
SQP*	Pt	-13.3	-10.6	-11.2	-17.8	-11.2	-17.9	-19.4	-17.8	-16.8	-16.8	-13.3

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 155. EN 15804+A1 Environmental impact indicators covering modules D

PARAMETER	UNIT	DG7_WEL104	DG7_WEL105	AC14_WEL002	AC20_WEL001	SMA11_WEL110	DG10_WEL106	AC14_WEL004	DG5_WEL103	DG14_WEL024	DG14_WEL025	DG10-PMB_0
GWP	kg CO ₂ -eq	-13.3	-15.2	-13.9	-12.5	-13.9	-11.4	-15.9	-12.5	-11.2	-11.2	-13.3
ODP	kg CFC ₁₁ -eq.	-3.15E-11	-2.64E-11	-2.77E-11	-3.94E-11	-2.77E-11	-3.98E-11	-4.13E-11	-3.94E-11	-3.79E-11	-3.79E-11	-3.15E-11
AP	kg SO ₂ -eq	-0.0339	-0.0407	-0.0364	-0.0303	-0.0364	-0.0265	-0.0409	-0.0303	-0.0261	-0.0261	-0.0339
EP	kg PO ₃ ⁴⁻ -eq.	-0.00183	-0.00235	-0.00199	-0.00164	-0.00199	-0.00131	-0.00261	-0.00164	-0.00125	-0.00125	-0.00183
POCP	kg C ₂ H ₄ -eq.	-0.0108	-0.0132	-0.0118	-0.00935	-0.0118	-0.00811	-0.0127	-0.00935	-0.00807	-0.00807	-0.0108
ADPE	kg Sb eq.	5.66E-07	3.46E-07	5.06E-07	6.27E-07	5.06E-07	7.78E-07	1.68E-07	6.27E-07	8.14E-07	8.14E-07	5.66E-07
ADPF	MJ	-2,040	-2,430	-2,200	-1,790	-2,200	-1,590	-2,320	-1,790	-1,590	-1,590	-2,040

CHRISTCHURCH RESULTS FOR ONE TONNE OF ASPHALT

MODULES A1-A3

Table 156. EN 15804+A2 Core environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC10_ CHC002	AC14_ CHC003	DG07_ CHC005	AC20_ CHC008	AC20_ CHC009	AC14_0	AC5_ CHC001	SMA9.5_ CHC011	DG10_ CHC006	DG14_ CHC007
GWpt	kg CO ₂ -eq	79.3	75.7	84.9	72.8	104	76.3	88.5	79.5	81.1	77.6
GWpf	kg CO ₂ -eq	79.2	75.5	84.8	72.6	102	76.2	88.3	85.9	80.9	77.5
GWpb	kg CO ₂ -eq	0.1000	0.0957	0.104	0.0927	2.14	0.0982	0.107	-6.51	0.0991	0.0960
GWpluluc	kg CO ₂ -eq	0.0443	0.0436	0.0448	0.0432	0.0456	0.0438	0.0452	0.0613	0.0441	0.0436
ODP	kg CFC-11 eq	6.85E-11	6.80E-11	6.91E-11	6.77E-11	1.92E-10	6.84E-11	6.94E-11	1.28E-10	6.86E-11	6.82E-11
AP	Mole of H+eq	0.370	0.341	0.398	0.320	0.356	0.342	0.416	0.466	0.365	0.344
EPfw	kg P eq	7.64E-05	7.48E-05	7.82E-05	7.36E-05	2.07E-04	7.80E-05	7.93E-05	2.18E-04	7.64E-05	7.51E-05
EPm	kg N eq	0.108	0.1000	0.116	0.0948	0.106	0.101	0.121	0.137	0.107	0.101
EPT	Mole of N eq	1.19	1.11	1.28	1.05	1.17	1.11	1.33	1.50	1.18	1.12
POCP	kg NMVOC eq	0.319	0.295	0.344	0.278	0.338	0.296	0.359	0.398	0.316	0.298
ADPmm*	kg Sb-eq	3.17E-05	2.85E-05	3.43E-05	2.64E-05	2.73E-05	2.87E-05	3.59E-05	3.65E-05	3.07E-05	2.86E-05
ADPf*	MJ	3,510	3,200	3,800	2,990	3,490	3,200	3,980	3,880	3,450	3,230
WDP	m ³ world equiv	6.00	5.97	6.05	5.95	6.57	6.11	6.07	13.8	6.02	5.99

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

Table 157. Resource use indicators results covering modules A1-A3

PARAMETER	UNIT	AC10_ CHC002	AC14_ CHC003	DG07_ CHC005	AC20_ CHC008	AC20_ CHC009	AC14_0	AC5_ CHC001	SMA9.5_ CHC011	DG10_ CHC006	DG14_ CHC007
PERE	MJ	117	116	118	116	174	117	118	275	117	116
PERM	MJ	0	0	0	0	0	0	0	61.9	0	0
PERT	MJ	117	116	118	116	174	117	118	337	117	116
PENRE	MJ	-975	-805	-1,080	-696	-144	-778	-1,150	-1,120	-878	-778
PENRM	MJ	4,570	4,080	4,980	3,750	3,690	4,060	5,220	5,100	4,410	4,080
PENRT	MJ	3,590	3,270	3,890	3,060	3,550	3,280	4,080	3,970	3,530	3,300
SM	kg	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0
FW	m ³	0.301	0.299	0.303	0.298	0.368	0.303	0.304	0.353	0.301	0.300

Table 158. Biogenic Carbon

PARAMETER	UNIT	QUANTITY
Biogenic carbon content in product	kg C	0

Table 159. Waste categories and output flow indicators covering modules A1-A3

PARAMETER	UNIT	AC10_ CHC002	AC14_ CHC003	DG07_ CHC005	AC20_ CHC008	AC20_ CHC009	AC14_0	AC5_ CHC001	SMA9.5_ CHC011	DG10_ CHC006	DG14_ CHC007
HWD	kg	1.28E-08	1.23E-08	1.32E-08	1.20E-08	9.72E-08	1.33E-08	1.34E-08	2.18E-08	1.27E-08	1.24E-08
NHWD	kg	2.54	2.53	2.55	2.52	4.39	2.54	2.56	2.80	2.54	2.53
RWD	kg	0.0132	0.0130	0.0134	0.0129	0.0191	0.0132	0.0135	0.0165	0.0131	0.0130
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	105	105	105	105	105	105	105	105	105	105
MER	kg	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0

Table 160. Additional environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC10_ CHC002	AC14_ CHC003	DG07_ CHC005	AC20_ CHC008	AC20_ CHC009	AC14_0	AC5_ CHC001	SMA9.5_ CHC011	DG10_ CHC006	DG14_ CHC007
GWP-GHG**	kg CO ₂ -eq	79.0	75.3	84.6	72.5	104	76.0	88.1	85.7	80.7	77.3
PM	Disease incidences	4.90E-06	4.48E-06	5.26E-06	4.21E-06	4.67E-06	4.50E-06	5.48E-06	8.37E-06	4.78E-06	4.50E-06
IRP***	kBq U235 eq.	2.01	2.00	2.02	1.99	2.62	2.01	2.03	2.33	2.01	2.00
ETP-fw*	CTUe	1,520	1,390	1,640	1,300	1,440	1,390	1,710	1,710	1,490	1,390
HTPc*	CTUh	2.77E-08	2.55E-08	2.98E-08	2.40E-08	3.28E-08	2.55E-08	3.10E-08	3.23E-08	2.73E-08	2.57E-08
HTPnc*	CTUh	8.18E-07	7.54E-07	8.77E-07	7.10E-07	1.39E-06	7.56E-07	9.13E-07	1.07E-06	8.03E-07	7.58E-07
SQP*	Pt	266	265	267	265	304	266	267	2,890	266	265

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 161. EN 15804+A1 Environmental impact indicators covering modules A1-A3

PARAMETER	UNIT	AC10_ CHC002	AC14_ CHC003	DG07_ CHC005	AC20_ CHC008	AC20_ CHC009	AC14_0	AC5_ CHC001	SMA9.5_ CHC011	DG10_ CHC006	DG14_ CHC007
GWP	kg CO ₂ -eq	75.2	71.8	80.4	69.2	99.7	72.5	83.7	74.7	77.0	73.8
ODP	kg CFC ₁₁ -eq.	8.06E-11	8.01E-11	8.13E-11	7.97E-11	2.26E-10	8.05E-11	8.17E-11	1.51E-10	8.07E-11	8.03E-11
AP	kg SO ₂ -eq	0.288	0.265	0.310	0.249	0.276	0.266	0.324	0.363	0.284	0.267
EP	kg PO ₃ ⁴⁻ -eq.	0.0378	0.0351	0.0405	0.0332	0.0401	0.0353	0.0421	0.0485	0.0374	0.0355
POCP	kg C ₂ H ₄ -eq.	0.0299	0.0269	0.0326	0.0249	0.0316	0.0269	0.0343	0.0341	0.0293	0.0272
ADPE	kg Sb eq.	3.18E-05	2.86E-05	3.44E-05	2.65E-05	2.74E-05	2.88E-05	3.60E-05	3.66E-05	3.08E-05	2.86E-05
ADPF	MJ	3,370	3,070	3,650	2,870	3,360	3,060	3,820	3,720	3,310	3,100



MODULES C1-C4

Modules C1-C4 results are the same for all products and results for each EOL module are presented together per one tonne of product.

Table 162. EN 15804+A2 Core environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWpt	kg CO ₂ -eq	0.625	2.57	0	0
GWpf	kg CO ₂ -eq	0.625	2.58	0	0
GWpb	kg CO ₂ -eq	6.18E-05	-0.0255	0	0
GWpluluc	kg CO ₂ -eq	4.53E-06	0.0176	0	0
ODP	kg CFC-11 eq	4.96E-14	2.56E-13	0	0
AP	Mole of H+eq	0.00297	0.0157	0	0
EPfw	kg P eq	1.10E-07	9.32E-06	0	0
EPm	kg N eq	0.00143	0.00764	0	0
EPt	Mole of N eq	0.0157	0.0846	0	0
POCP	kg NMVOC eq	0.00402	0.0147	0	0
ADPmm*	kg Sb-eq	7.62E-09	2.63E-07	0	0
ADPf*	MJ	8.29	34.3	0	0
WDP	m ³ world equiv	0.00464	0.0292	0	0

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

Table 163. Resource use indicators results covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
PERE	MJ	0.0271	2.37	0	0
PERM	MJ	0	0	0	0
PERT	MJ	0.0271	2.37	0	0
PENRE	MJ	8.29	34.4	0	0
PENRM	MJ	0	0	0	0
PENRT	MJ	8.29	34.4	0	0
SM	kg	0	0	0	0
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	6.98E-05	0.00274	0	0

Table 164. Waste categories and output flow indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
HWD	kg	8.99E-12	1.82E-10	0	0
NHWD	kg	1.18E-04	0.00560	0	0
RWD	kg	1.21E-07	6.39E-05	0	0
CRU	kg	0	0	0	0
MFR	kg	0	0	1,000	0
MER	kg	0	0	0	0
EEE	MJ	0	0	0	0
EET	MJ	0	0	0	0

Table 165. Additional environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP-GHG**	kg CO ₂ -eq	0.622	2.58	0	0
PM	Disease incidences	3.36E-08	5.88E-08	0	0
IRP***	kBq U235 eq.	1.57E-05	0.00964	0	0
ETP-fw*	CTUe	2.08	24.3	0	0
HTPc*	CTUh	3.49E-11	5.01E-10	0	0
HTPnc*	CTUh	2.18E-09	2.90E-08	0	0
SQP*	Pt	0.0190	14.5	0	0

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 166. EN 15804+A1 Environmental impact indicators covering modules C1-C4

PARAMETER	UNIT	C1	C2	C3	C4
GWP	kg CO ₂ -eq	0.615	2.51	0	0
ODP	kg CFC ₁₁ -eq.	5.84E-14	3.02E-13	0	0
AP	kg SO ₂ -eq	0.00206	0.0107	0	0
EP	kg PO ₃ ⁴⁻ -eq.	4.80E-04	0.00268	0	0
POCP	kg C ₂ H ₄ -eq.	2.03E-04	-0.00402	0	0
ADPE	kg Sb eq.	7.63E-09	2.63E-07	0	0
ADPF	MJ	8.29	33.9	0	0

MODULES D

Table 167. EN 15804+A2 Core environmental impact indicators covering modules D

PARAMETER	UNIT	AC10_ CHC002	AC14_ CHC003	DG07_ CHC005	AC20_ CHC008	AC20_ CHC009	AC14_0	AC5_ CHC001	SMA9.5_ CHC011	DG10_ CHC006	DG14_ CHC007
GWpt	kg CO ₂ -eq	-15.5	-14.3	-16.1	-13.5	-13.5	-14.2	-16.4	-17.6	-14.5	-13.9
GWPf	kg CO ₂ -eq	-15.5	-14.3	-16.1	-13.5	-13.5	-14.2	-16.4	-17.5	-14.5	-13.9
GWPb	kg CO ₂ -eq	8.74E-04	0.00145	0.00355	0.00131	0.00131	0.00153	0.00536	-0.00449	0.00476	0.00392
GWPluluc	kg CO ₂ -eq	-0.00388	-0.00422	-0.00233	-0.00466	-0.00466	-0.00422	-0.00132	-0.00543	-0.00252	-0.00324
ODP	kg CFC-11 eq	-2.93E-11	-3.08E-11	-2.41E-11	-3.24E-11	-3.24E-11	-3.08E-11	-2.07E-11	-3.39E-11	-2.51E-11	-2.77E-11
AP	Mole of H+eq	-0.0377	-0.0335	-0.0400	-0.0308	-0.0308	-0.0332	-0.0414	-0.0437	-0.0349	-0.0325
EPfw	kg P eq	-1.40E-05	-1.38E-05	-1.28E-05	-1.39E-05	-1.39E-05	-1.38E-05	-1.19E-05	-1.64E-05	-1.23E-05	-1.27E-05
EPm	kg N eq	-0.00372	-0.00292	-0.00405	-0.00244	-0.00244	-0.00287	-0.00422	-0.00504	-0.00305	-0.00265
EPt	Mole of N eq	-0.0426	-0.0339	-0.0456	-0.0289	-0.0289	-0.0334	-0.0472	-0.0575	-0.0348	-0.0307
POCP	kg NMVOC eq	-0.0295	-0.0250	-0.0322	-0.0223	-0.0223	-0.0248	-0.0338	-0.0353	-0.0269	-0.0243
ADPmm*	kg Sb-eq	6.26E-07	7.55E-07	6.02E-07	8.26E-07	8.26E-07	7.63E-07	5.93E-07	3.73E-07	7.66E-07	8.19E-07
ADPF*	MJ	-1,970	-1,770	-2,120	-1,640	-1,640	-1,760	-2,210	-2,170	-1,890	-1,760
WDP	m ³ world equiv	-1.29	-1.42	-0.825	-1.57	-1.57	-1.42	-0.520	-1.72	-0.914	-1.14

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

Table 168. Resource use indicators results covering modules D

PARAMETER	UNIT	AC10_ CHC002	AC14_ CHC003	DG07_ CHC005	AC20_ CHC008	AC20_ CHC009	AC14_0	AC5_ CHC001	SMA9.5_ CHC011	DG10_ CHC006	DG14_ CHC007
PERE	MJ	-21.9	-22.9	-17.7	-24.2	-24.2	-22.9	-14.9	-25.9	-18.3	-20.3
PERM	MJ	0	0	0	0	0	0	0	0	0	0
PERT	MJ	-21.9	-22.9	-17.7	-24.2	-24.2	-22.9	-14.9	-25.9	-18.3	-20.3
PENRE	MJ	-1,970	-1,770	-2,120	-1,640	-1,640	-1,760	-2,210	-2,170	-1,890	-1,760
PENRM	MJ	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	-1,970	-1,770	-2,120	-1,640	-1,640	-1,760	-2,210	-2,170	-1,890	-1,760
SM	kg	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0
FW	m ³	-0.0433	-0.0464	-0.0307	-0.0502	-0.0502	-0.0464	-0.0225	-0.0554	-0.0326	-0.0386



Table 169. Waste categories and output flow indicators covering modules D

PARAMETER	UNIT	AC10_ CHC002	AC14_ CHC003	DG07_ CHC005	AC20_ CHC008	AC20_ CHC009	AC14_0	AC5_ CHC001	SMA9.5_ CHC011	DG10_ CHC006	DG14_ CHC007
HWD	kg	-4.84E-09	-4.89E-09	-4.23E-09	-5.01E-09	-5.01E-09	-4.88E-09	-3.83E-09	-5.66E-09	-4.19E-09	-4.45E-09
NHWD	kg	-8.26	-7.39	-11.6	-6.38	-6.38	-7.39	-13.7	-5.22	-11.0	-9.40
RWD	kg	-0.00567	-0.00609	-0.00419	-0.00655	-0.00655	-0.00609	-0.00324	-0.00695	-0.00449	-0.00521
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0

Table 170. Additional environmental impact indicators covering modules D

PARAMETER	UNIT	AC10_ CHC002	AC14_ CHC003	DG07_ CHC005	AC20_ CHC008	AC20_ CHC009	AC14_0	AC5_ CHC001	SMA9.5_ CHC011	DG10_ CHC006	DG14_ CHC007
GWP-GHG**	kg CO ₂ -eq	-15.4	-14.2	-16.0	-13.4	-13.4	-14.1	-16.3	-17.4	-14.4	-13.8
PM	Disease incidences	-2.45E-07	-2.22E-07	-2.49E-07	-2.09E-07	-2.09E-07	-2.21E-07	-2.50E-07	-2.90E-07	-2.20E-07	-2.10E-07
IRP***	kBq U235 eq.	-0.957	-1.03	-0.696	-1.11	-1.11	-1.03	-0.527	-1.18	-0.749	-0.876
ETP-fw*	CTUe	-288	-260	-307	-242	-242	-258	-318	-322	-273	-256
HTPc*	CTUh	-6.17E-09	-5.62E-09	-6.57E-09	-5.25E-09	-5.25E-09	-5.59E-09	-6.81E-09	-6.84E-09	-5.91E-09	-5.56E-09
HTPnc*	CTUh	-2.30E-07	-2.11E-07	-2.45E-07	-1.99E-07	-1.99E-07	-2.10E-07	-2.54E-07	-2.50E-07	-2.23E-07	-2.11E-07
SQP*	Pt	-15.0	-15.9	-11.5	-16.9	-16.9	-15.9	-9.14	-18.4	-12.0	-13.7

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

**This indicator is calculated using the characterisation factors from the IPCC AR5 report (IPCC 2013) and has been included in the EPD following the PCR

***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 some construction materials, is also not measured by this indicator.

Table 171. EN 15804+A1 Environmental impact indicators covering modules D

PARAMETER	UNIT	AC10_ CHC002	AC14_ CHC003	DG07_ CHC005	AC20_ CHC008	AC20_ CHC009	AC14_0	AC5_ CHC001	SMA9.5_ CHC011	DG10_ CHC006	DG14_ CHC007
GWP	kg CO ₂ -eq	-13.0	-12.0	-13.4	-11.4	-11.4	-11.9	-13.6	-14.8	-12.1	-11.6
ODP	kg CFC ₁₁ -eq.	-3.45E-11	-3.62E-11	-2.84E-11	-3.82E-11	-3.82E-11	-3.62E-11	-2.44E-11	-3.99E-11	-2.96E-11	-3.26E-11
AP	kg SO ₂ -eq	-0.0325	-0.0290	-0.0346	-0.0268	-0.0268	-0.0288	-0.0358	-0.0374	-0.0303	-0.0283
EP	kg PO ₃ ⁴⁻ -eq.	-0.00176	-0.00148	-0.00184	-0.00131	-0.00131	-0.00146	-0.00188	-0.00228	-0.00148	-0.00135
POCP	kg C ₂ H ₄ -eq.	-0.0103	-0.00908	-0.0112	-0.00828	-0.00828	-0.00901	-0.0117	-0.0116	-0.00977	-0.00900
ADPE	kg Sb eq.	5.88E-07	7.14E-07	5.73E-07	7.83E-07	7.83E-07	7.22E-07	5.70E-07	3.26E-07	7.35E-07	7.84E-07
ADPF	MJ	-1,950	-1,750	-2,110	-1,620	-1,620	-1,740	-2,200	-2,150	-1,880	-1,750



MCI RESULTS FOR ONE TONNE OF ASPHALT

As part of the development of this EPD, thinkstep-anz were commissioned to calculate Material Circularity Indicators (MCIs) for the products in this EPD.

The MCI, developed by the Ellen MacArthur Foundation, has been used to measure the degree to which a product system keeps materials in circulation at their highest form of value. The MCI provides the means to draw together all of the different ways in which circularity can be delivered (e.g. reuse, recycling, bio-materials) and reflects these as a simple score between 0 and 1. The value 0.1 reflects a typical linear system and 1 reflects a perfectly circular system. A value below 0.1 reflect a product with utility worse than that of an industry average product (i.e. have a shorter lifetime or a lower use intensity). The methodology is implemented in GaBi and results in a dimensionless number between 0 and 1.

Table 172. MCI results for Auckland - Silverdale

	AC20_ SLV001	AC14_ SLV002	AC14- PMB_0	PA10_ SLV005
MCI score	0.550	0.550	0.550	0.551

Table 173. MCI Results Auckland -East Tāmaki

	AC14_ AKL102	AC14_ AKL103	AC14_ AKL104	AC20_ AKL105	DG7_ AKL107	DG10_ AKL108	AC20_ AKL115	AC20_ AKL120	AC10_ AKL125	AC14_ HFB_ AKL101	AC20_ AKL113
MCI score	0.614	0.614	0.614	0.614	0.581	0.581	0.549	0.549	0.592	0.613	0.614

Table 174. MCI Results Hamilton

	AC10_ WAK005	AC14_ WAK007	DG7_ WAK107	SMA11_ WAK112	WSMA11_ WAK101	SMA14_ WAK001	SMA14_ WAK012	SMA10_ WAK002	AC20_ WAK114	AC10_ WAK013	DG10_ WAK022
MCI score	0.549	0.549	0.549	0.864	0.551	0.551	0.551	0.551	0.549	0.549	0.549

	AC20_ WAK115	DG7_ WAK109	EPA7_ WAK016	PA10_ WAK108	AC14_ WAK026	AC14- HFB_ WAK004	DG7_ WAK006	AC20_ WAK113
MCI score	0.549	0.549	0.549	0.549	0.549	0.549	0.549	0.549

Table 175. MCI Results Tauranga

	AC10_ BOP001	AC20_ BOP003	DG7_ BOP004	DG10_ BOP005	AC14_ BOP007	AC28_ BOP104	AC20_ BOP106	AC28_0	AC14_0
MCI score	0.549	0.549	0.549	0.549	0.549	0.549	0.549	0.549	0.549

Table 176. MCI Results Taupō

	DG7_ TAU002	AC10_ TAU003	AC14_ TAU001	AC20_ TAU101
MCI score	0.549	0.549	0.549	0.549

Table 177. MCI Results Napier

	SP14_ HBY101	SP14_ HBY102	AC14_ HBY103	DG7_ HBY106	AC14_ HBY108	AC20_0	AC20- PMB_ HBY109	AC10_ HBY112	HPA16_ HBY107
MCI score	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.550	0.551

Table 178. MCI Results Palmerston North

	PA10_ PMN105	DG7_ PMN109	DG10_ PMN113	DG5_ PMN116	AC20_ PMN118	AC14_ PMN119	AC14_ PMN120	DG7 Grader lay_0	SP10_ PMN102	SMA11_ PMN101	AC10_ PMN005
MCI score	0.545	0.543	0.543	0.543	0.543	0.543	0.543	0.543	0.543	0.544	0.543

	Plant Mix_0	DG7_ PMN006	AC14_ HFB_ PMN117	SP10_0
MCI score	0.543	0.543	0.543	0.543

Table 179. MCI Results Masterton

	AC14_ MAS002	DG7 Mix10_ MAS101	DG10 Mix15_0	DG14 Mix20_ MAS103	Mix 6_0
MCI score	0.549	0.549	0.549	0.549	0.549

Table 180. MCI Results Wellington

	DG7_ WEL104	DG7_ WEL105	AC14_ WEL002	AC20_ WEL001	SMA11_ WEL110	DG10_ WEL106	AC14_ WEL004	DG5_ WEL103	DG14_ WEL024	DG14_ WEL025	DG10- PMB_0
MCI score	0.522	0.522	0.532	0.522	0.524	0.522	0.532	0.522	0.522	0.522	0.522

Table 181. MCI Results Christchurch

	AC10_ CHC002	AC14_ CHC003	DG07_ CHC005	AC20_ CHC008	AC20_ CHC009	AC14_0	AC5_ CHC001	SMA9.5_ CHC011	DG10_ CHC006	DG14_ CHC007
MCI score	0.547	0.547	0.547	0.547	0.547	0.548	0.547	0.549	0.547	0.547



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PROGRAMME-RELATED INFORMATION AND VERIFICATION



Declaration owner	Higgins Contractors www.higgins.co.nz/ sustainability@fcc.co.nz
EPD produced by	thinkstep Ltd www.thinkstep-anz.com anz@thinkstep.com thinkstep-anz Ltd, 11 Rawhiti Road, Pukerua Bay, 5026 Wellington, New Zealand
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Independent verification of the declaration and data, according to ISO 14025	<input type="checkbox"/> EPD process certification (Internal) <input checked="" type="checkbox"/> EPD verification (External)
Third party verifier	Hudai Kara, PhD Metsims Sustainability Consulting Oxford (UK) www.metsims.com
Approved by	EPD Australasia
Procedure for follow-up of data during EPD validity involved third-party verifier	<input type="checkbox"/> yes <input checked="" type="checkbox"/> no
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An Environmental Product Declaration, or EPD, is a standardised and verified way of quantifying the environmental impacts of a product based on a consistent set of rules known as a PCR (Product Category Rules).

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

The results for EN15804+A1 compliant EPDs are not comparable with EN15804+A2 compliant studies as the methodologies are different. Results that are A1 compliant are given in the report to this document to assist comparability across EPDs.



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