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Environmental Product Declaration

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

Reinforced Concrete Pipes (RCP)



Programme:



EPD Australasia, https://epd-australasia.com/

WWW.HUMES.CO.NZ

An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.epd-australasia.com

EPD - REINFORCED CONCRETE PIPES (RCP)

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HUMES



General Information

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. EN 15804+A1 compliant results are included in this document to assist comparability across EPDs.

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202				
PCR review was conducted by	The Techni	cal Committee of the International EPD® System		
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Independent verification of the	🗆 EPD pro	cess certification (Internal)		
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Procedure for follow-up of data	□ Yes			
during EPD validity involved third-party verifier	⊠ No			

HUMEE







About us

Founded in 1923 by pioneering industrialist, Walter Hume, **Humes Pipeline Systems** is a company built on the principals of innovation, manufacturing expertise and quality products supported by a team of capable people who are proud to serve their customers

For over 100 years, Humes have been sourcing and distributing a range of products of various materials, and also manufactures a range of concrete pipe and precast structures for the infrastructure, drain laying and rural markets throughout New Zealand. Humes is a standalone business unit within the Concrete division of the Fletcher Building Group.

The Humes business is supported by a team of over 250+ employees working across 23 sites (manufacturing and sales) all over New Zealand providing extensive product and service coverage and is supported by a team in their Auckland Support Office.

- Innovative expertise since 1923
- · Connecting communities with smarter solutions
- Cleaning up waterways
- Pioneers in the industry
- Building lifelong assets

Humes holds current certifications under AS/NZS ISO 9001 for Quality Management Systems, as well as being licensed under various product certification schemes.

Product Description

This EPD covers **reinforced concrete pipe products** manufactured by Humes, across three manufacturing locations in New Zealand – Hornby (Christchurch), Papakura (Auckland) and Te Rapa Park (Hamilton).

The product's intended use is for non-pressure stormwater drainage pipelines, sewerage pipelines and watertight pipe applications. Further details on product use and design for different applications can be found in Humes' Concrete Pipe brochure (see www.humes.co.nz). Reinforced Concrete Pipes are made from coarse and fine aggregates, cement, water, and hard-drawn plain or deformed steel reinforcement. Other material used can include supplementary cementitious materials (SCMs) and chemical admixtures which have varied effects on the concrete depending on the admixture used.

Humes manufactures pipes using both vertical casting (RCP - Roller Compacted Pipe and VT - Vibration Technology) and horizontal casting (Spun). Vertical Casting utilises single or double mould casting process to enable high production volumes while maintaining a high degree of accuracy, while spun pipe allows for a great degree of flexibility for specialised and high strength pipe.

Reinforced Concrete Pipes are manufactured with two basic joint types - Flush Joint (FJ) and Rubber Ring Joint (RRJ). FJ pipes provide an interlocking joint which allows for a small degree of flexibility in the pipeline alignment. RRJ pipes, either belled-socket or in-wall joint depending on the diameter of the pipe and its application, are designed to accommodate changes in pipeline alignment and settlement in a pipeline, whilst still maintaining a watertight joint. All of Humes' vertically cast pipe is manufactured in 2.5 metre effective lengths in the DN300 to DN2400 diameter range, with DN225 having an effective length of 2.0 metres. Horizontal pipe effective length varies between 2.4 and 2.45 metres, depending on the pipe diameter and the joint type. Effective length is used to define a Reinforced Concrete Pipe's length as the physical length of the pipe includes the overlap of the joint. Reinforced Concrete Pipes are readily available in Classes 2 & 4, which are included in this EPD. High strength classes of 6 & 8 are available for specific projects in most size ranges and are not included in this EPD.

This EPD does not cover concrete sump and riser products or other precast products (covered under Humes Precast Concrete products EPD S-P-09350 and Humes Precast Concrete Sleepers EPD S-P-09351).

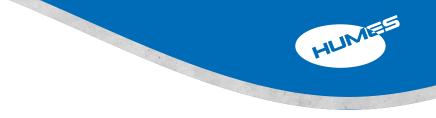


Table 1 – Industry Classification

PRODUCT	CLASSIFICATION	CODE	CATEGORY
Humes Titan Concrete Reinforced Pipe DN225-DN2400	UN CPC Ver.2	37550	Prefabricated structural components for building or civil engineering, of cement, concrete or artificial stone
DN225-DN2400	ANZSIC 2006	2034	Concrete Product Manufacturing

Table 2 – Summary of the Reinforced Concrete Pipe Range

FACTORY	HORNBY	PAPAKURA	TE RAPA PARK
Technology	Spun	Vibration Technology	Roller Compacted Pipe
Nominal Diameter	DN300-DN2300	DN675-DN2400	DN225-DN600
Joint	RRJ/FJ	RRJ	RRJ
Classes	2, 4 (6)	2, 4 (6, 8)	2, 4
Effective Length	2.4-2.45m	2.5m	2.5m DN300-DN600 0.6, 1.8, and 2.0 DN225



Declared Unit

Humes Reinforced Concrete Pipe

is manufactured in accordance with AS/NZS 4058:2007 Precast Concrete Pipes (Pressure and Non-pressure) and is designed for a 100 year service life, when installed according to AS/NZS 3725:2007 Design for Installation of Buried Concrete Pipes.

Specialty pipes are available as required for specific projects, and can include lined pipes, jacking pipes, and pipes for aggressive environments. Unless specifically referenced in the documented information, specialty pipes are not covered by this EPD, although will have similar performance properties to the equivalent design, size and class of standard pipe.

Reinforced concrete pipes are available in various classes (impacting either thickness, reinforcing design or both) and diameters. Given the wide range of factors present, there is no single parameter that allows different pipes to be averaged while presenting impacts across a large part of their life cycle. There is no single functional unit that allows pipe performance to be declared across the different aspects of its life cycle, and so two declared units have been applied:

- For production (A1-A3), distribution (A4), and endof-life (C1-C4 + D), the declared unit is: 1 tonne of reinforced concrete pipework with a given capacity (class, dimensions and length of pipes shall be specified).
- For installation (A5), the declared units is: 1 equivalent metre of reinforced concrete pipework with a given capacity (class, dimensions and mass shall be specified).

A weight conversion factor (tonne/ equivalent metre) is provided for each pipe to ensure the results can be easily converted; e.g. for use in environmental calculators.

This EPD covers 111 pipe products. In order to simplify communication of environmental profiles, it is necessary to group products according to key characteristics. Grouping is based on the type of production process and class strength, with further grouping as needed using joint type, pipe diameter and/or length. The impacts are declared for a representative product for each group.

All products in this EPD are listed in tables 3 to 5, including the product specification and mass, weight conversion factor, and product group.

Product Specifications

Humes' reinforced concrete pipe products included in this EPD are listed below with separate tables for each production site. The tables include the conversion factors for product mass (kg) and for the mass per effective metre length (kg/eff m), and identification of the product group.

Table 3 - Humes Reinforced Concrete Pipes from Hornby - Spun

BRANCH	ITEM NUMBER	LOCATION	DESCRIPTION 1	DESCRIPTION 2	PRODUCT WEIGHT [KG]	MASS/EFF LENGTH (KG/LM)	GROUP	GROUP #
ННҮ	80074142	Hornby	CONCRETE TITAN PIPE	600.2440MM CLASS 2 FJ	561	230	Spun Class 2 FJ	1
ННҮ	80074147	Hornby	CONCRETE TITAN PIPE	900.2440MM CLASS 2 FJ	1063	436	Spun Class 2 FJ	1
ННҮ	80074149	Hornby	CONCRETE TITAN PIPE	1050.2440MM CLASS 2 FJ	1385	568	Spun Class 2 FJ	1
ННҮ	80074151	Hornby	CONCRETE TITAN PIPE	1200.2440MM CLASS 2 FJ	1730	709	Spun Class 2 FJ	1
ННҮ	80074154	Hornby	CONCRETE TITAN PIPE	1500.2440MM CLASS 2 FJ	2330	955	Spun Class 2 FJ	1
ННҮ	80074156	Hornby	CONCRETE TITAN PIPE	1650.2440MM CLASS 2 FJ	2800	1148	Spun Class 2 FJ	1
ННҮ	80074157	Hornby	CONCRETE TITAN PIPE	1800.2440MM CLASS 2 FJ	3275	1342	Spun Class 2 FJ	1
ННҮ	80074161	Hornby	CONCRETE TITAN PIPE	2300.2440MM CLASS 2 FJ	5938	2434	Spun Class 2 FJ	1
ННҮ	80074077	Hornby	CONCRETE TITAN PIPE J2	375.2440MM CLASS 2 RRJ	278	114	Spun Class 2 RRJ Small	2
ННҮ	80074079	Hornby	CONCRETE TITAN PIPE J2	450.2440MM CLASS 2 RRJ	395	162	Spun Class 2 RRJ Small	2
ННҮ	80074086	Hornby	CONCRETE TITAN PIPE J2	525.2440MM CLASS 2 RRJ	513	210	Spun Class 2 RRJ Small	2
ННҮ	80074088	Hornby	CONCRETE TITAN PIPE J2	600.2440MM CLASS 2 RRJ	625	256	Spun Class 2 RRJ Small	2
ННҮ	80074117	Hornby	CONCRETE TITAN PIPE	1350.2440MM CLASS 2 RRJ	2370	971	Spun Class 2 RRJ Large	3
ННҮ	80074121	Hornby	CONCRETE TITAN PIPE	1600.2440MM CLASS 2 RRJ	3100	1270	Spun Class 2 RRJ Large	3
ННҮ	80074123	Hornby	CONCRETE TITAN PIPE J2	1800.2440MM CLASS 2 RRJ	4370	1791	Spun Class 2 RRJ Large	3
ННҮ	80074092	Hornby	CONCRETE TITAN PIPE	675.2440MM CLASS 2 RRJ	755	309	Spun Class 2 RRJ Medium	4
ННҮ	80074096	Hornby	CONCRETE TITAN PIPE J2	750.2440MM CLASS 2 RRJ	900	369	Spun Class 2 RRJ Medium	4
ННҮ	80074099	Hornby	CONCRETE TITAN PIPE	825.2440MM CLASS 2 RRJ	1045	428	Spun Class 2 RRJ Medium	4
ННҮ	80074102	Hornby	CONCRETE TITAN PIPE	900.2440MM CLASS 2 RRJ	1363	559	Spun Class 2 RRJ Medium	4
ННҮ	80074104	Hornby	CONCRETE TITAN PIPE J2	900.2440MM CLASS 2 RRJ	1363	559	Spun Class 2 RRJ Medium	4
ННҮ	80074109	Hornby	CONCRETE TITAN PIPE	1050.2440MM CLASS 2 RRJ	1875	768	Spun Class 2 RRJ Medium	4
ННҮ	80074114	Hornby	CONCRETE TITAN PIPE J2	1200.2440MM CLASS 2 RRJ	2125	871	Spun Class 2 RRJ Medium	4
ННҮ	80089260	Hornby	CONCRETE 2Z PIPES	600MM RRJ	763	313	Spun Class 2 RRJ Medium	4
ННҮ	80074043	Hornby	CONCRETE SHORT TITAN PIPE	600.1220MM CLASS 2 RRJ	265	217	Spun Class 2 RRJ Short	5
ННҮ	80074045	Hornby	CONCRETE SHORT TITAN PIPE	675.1220MM CLASS 2 RRJ	320	262	Spun Class 2 RRJ Short	5
ННҮ	80074048	Hornby	CONCRETE SHORT TITAN PIPE	750.1220MM CLASS 2 RRJ	500	410	Spun Class 2 RRJ Short	5
ННҮ	80074051	Hornby	CONCRETE SHORT TITAN PIPE	825.1220MM CLASS 2 RRJ	586	480	Spun Class 2 RRJ Short	5
ННҮ	80074054	Hornby	CONCRETE SHORT TITAN PIPE	900.1220MM CLASS 2 RRJ	758	621	Spun Class 2 RRJ Short	5
ННҮ	80074056	Hornby	CONCRETE SHORT TITAN PIPE	1050.1220MM CLASS 2 RRJ	1035	848	Spun Class 2 RRJ Short	5
ННҮ	80074058	Hornby	CONCRETE SHORT TITAN PIPE	1200.1220MM CLASS 2 RRJ	1123	920	Spun Class 2 RRJ Short	5
		-						

Table 3 ctd - Humes Reinforced Concrete Pipes from Hornby - Spun

BRANCH	ITEM NUMBER	LOCATION	DESCRIPTION 1	DESCRIPTION 2	PRODUCT WEIGHT [KG]	MASS/EFF LENGTH (KG/LM)	GROUP	GROUP #
ННҮ	80074143	Hornby	CONCRETE TITAN PIPE	600.2440MM CLASS 4 FJ	690	283	Spun Class 4 FJ	6
ННҮ	80074146	Hornby	CONCRETE TITAN PIPE	750.2440MM CLASS 4 FJ	1023	419	Spun Class 4 FJ	6
ННҮ	80074148	Hornby	CONCRETE TITAN PIPE	900.2440MM CLASS 4 FJ	1338	548	Spun Class 4 FJ	6
ННҮ	80074150	Hornby	CONCRETE TITAN PIPE	1050.2440MM CLASS 4 FJ	1788	733	Spun Class 4 FJ	6
ННҮ	80074152	Hornby	CONCRETE TITAN PIPE	1200.2440MM CLASS 4 FJ	2188	897	Spun Class 4 FJ	6
ННҮ	80074153	Hornby	CONCRETE TITAN PIPE	1350.2440MM CLASS 4 FJ	2625	1076	Spun Class 4 FJ	6
ННҮ	80074155	Hornby	CONCRETE PIPE	1500.2440MM CLASS 4 FJ	3138	1286	Spun Class 4 FJ	6
ННҮ	80074158	Hornby	CONCRETE TITAN PIPE	1800.2440MM CLASS 4 FJ	4238	1737	Spun Class 4 FJ	6
ННҮ	80074160	Hornby	CONCRETE PIPE	2050.2440MM CLASS 4 FJ	5625	2305	Spun Class 4 FJ	6
ННҮ	80074162	Hornby	CONCRETE TITAN PIPE	2300.2440MM CLASS 4 FJ	6513	2669	Spun Class 4 FJ	6
ННҮ	80074078	Hornby	CONCRETE TITAN PIPE J2	375.2440MM CLASS 4 RRJ	300	123	Spun Class 4 RRJ	7
ННҮ	80074080	Hornby	CONCRETE TITAN PIPE J2	450.2440MM CLASS 4 RRJ	420	172	Spun Class 4 RRJ	7
ННҮ	80074087	Hornby	CONCRETE TITAN PIPE J2	525.2440MM CLASS 4 RRJ	583	239	Spun Class 4 RRJ	7
ННҮ	80074089	Hornby	CONCRETE TITAN PIPE J2	600.2440MM CLASS 4 RRJ	763	313	Spun Class 4 RRJ	7
ННҮ	80074094	Hornby	CONCRETE TITAN PIPE	675.2440MM CLASS 4 RRJ	910	373	Spun Class 4 RRJ	7
ННҮ	80074098	Hornby	CONCRETE TITAN PIPE J2	750.2440MM CLASS 4 RRJ	1125	461	Spun Class 4 RRJ	7
ННҮ	80074101	Hornby	CONCRETE TITAN PIPE	825.2440MM CLASS 4 RRJ	1298	532	Spun Class 4 RRJ	7
ННҮ	80074103	Hornby	CONCRETE PIPE	900.2440MM CLASS 4 RJ	1520	623	Spun Class 4 RRJ	7
ННҮ	80074106	Hornby	CONCRETE TITAN PIPE J2	900.2440MM CLASS 4 RRJ	1520	623	Spun Class 4 RRJ	7
ННҮ	80074110	Hornby	CONCRETE TITAN PIPE	1050.2440MM CLASS 4 RRJ	2078	852	Spun Class 4 RRJ	7
ННҮ	80074112	Hornby	CONCRETE TITAN PIPE	1200.2440MM CLASS 4 RRJ	2125	871	Spun Class 4 RRJ	7
ННҮ	80074115	Hornby	CONCRETE TITAN PIPE J2	1200.2440MM CLASS 4 RRJ	2495	1023	Spun Class 4 RRJ	7
ННҮ	80074119	Hornby	CONCRETE TITAN PIPE	1350.2440MM CLASS 4 RRJ	2900	1189	Spun Class 4 RRJ	7
ННҮ	80074122	Hornby	CONCRETE TITAN PIPE	1600.2440MM CLASS 4 RRJ	3875	1588	Spun Class 4 RRJ	7
ННҮ	80074124	Hornby	CONCRETE TITAN PIPE J2	1800.2440MM CLASS 4 RRJ	5025	2059	Spun Class 4 RRJ	7
ННҮ	80074040	Hornby	CONCRETE TITAN PIPE SHORT	375.1220MM CLASS 4 RRJ	128	105	Spun Class 4 RRJ Short 375	8
ННҮ	80074041	Hornby	CONCRETE SHORT TITAN PIPE	450.1220MM CLASS 4 RRJ	225	184	Spun Class 4 RRJ Short 450	9
ННҮ	80074042	Hornby	CONCRETE SHORT TITAN	525.1220MM CLASS 4 RRJ	260	213	Spun Class 4 RRJ Short 525	10
ННҮ	80074044	Hornby	CONCRETE SHORT TITAN PIPE	600.1220MM CLASS 4 RRJ	310	254	Spun Class 4 RRJ Short Medium	11
ННҮ	80074047	Hornby	CONCRETE SHORT TITAN	675.1220MM CLASS 4 RRJ	495	406	Spun Class 4 RRJ Short Medium	11
ННҮ	80074050	Hornby	CONCRETE SHORT TITAN	750.1220MM CLASS 4 RRJ	618	507	Spun Class 4 RRJ	11
ННҮ	80074053	Hornby	PIPE CONCRETE SHORT TITAN	825.1220MM CLASS 4 RRJ	705	578	Short Medium Spun Class 4 RRJ	11
ННҮ	80074055	Hornby	PIPE CONCRETE SHORT TITAN	900.1220MM CLASS 4 RRJ	855	701	Short Medium Spun Class 4 RRJ	
	80074057	Hornby	PIPE CONCRETE SHORT TITAN	1050.1220MM CLASS 4 RRJ	1125	922	Short Medium Spun Class 4 RRJ	
HHY		,	PIPE CONCRETE SHORT TITAN		1368	1121	Short Medium Spun Class 4 RRJ	
	80074059	Hornby		1200.1220MM CLASS 4 RRJ			Short Medium	
ННҮ	80074125	Hornby	CONCRETE TITAN PIPE	2100.2440MM CLASS 2 SJ	5900	2418	Spun Skid Joint	12

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Table 4 - Humes Reinforced Concrete Pipes from Papakura - VT

BRANCH	ITEM NUMBER	LOCATION	DESCRIPTION 1	DESCRIPTION 2	PRODUCT WEIGHT [KG]	MASS/EFF LENGTH (KG/LM)	GROUP	GROUP #
НРА	80074191	Papakura	CONCRETE TITAN PIPE VT	675.2500MM CLASS 2 RRJ	1400	560	VT Class 2	13
HPA	80074194	Papakura	CONCRETE TITAN PIPE VT	750.2500MM CLASS 2 RRJ	1572	629	VT Class 2	13
HPA	80074197	Papakura	CONCRETE TITAN PIPE VT	825.2500MM CLASS 2 RRJ	1735	694	VT Class 2	13
НРА	80074200	Papakura	CONCRETE TITAN PIPE VT	900.2500MM CLASS 2 RRJ	1910	764	VT Class 2	13
HPA	80074203	Papakura	CONCRETE TITAN PIPE VT	1050.2500MM CLASS 2 RRJ	2480	992	VT Class 2	13
HPA	80074206	Papakura	CONCRETE TITAN PIPE VT	1200.2500MM CLASS 2 RRJ	3130	1252	VT Class 2	13
НРА	80074209	Papakura	CONCRETE TITAN PIPE VT	1350.2500MM CLASS 2 RRJ	3560	1424	VT Class 2	13
НРА	80074212	Papakura	CONCRETE TITAN PIPE VT	1500.2500MM CLASS 2 RRJ	4030	1612	VT Class 2	13
НРА	80074215	Papakura	CONCRETE TITAN PIPE VT	1800.2500MM CLASS 2 RRJ	5540	2216	VT Class 2	13
НРА	80074220	Papakura	CONCRETE TITAN PIPE VT	2100.2500MM CLASS 2 RRJ	7080	2832	VT Class 2	13
HPA	80074222	Papakura	CONCRETE TITAN PIPE VT	2400.2500MM CLASS 2 RRJ	9400	3760	VT Class 2	13
HPA	80074231	Papakura	CONCRETE TITAN PIPE VT	1800.2500MM CLASS 4 IWJ	8480	3392	VT Class 4 IWJ	14
HPA	80074237	Papakura	CONCRETE TITAN PIPE VT	2400.2500MM CLASS 4 IWJ	13000	5200	VT Class 4 IWJ	14
НРА	80074192	Papakura	CONCRETE TITAN PIPE VT	675.2500MM CLASS 4 RRJ	1400	560	VT Class 4 RRJ Medium	15
HPA	80074195	Papakura	CONCRETE TITAN PIPE VT	750.2500MM CLASS 4 RRJ	1572	629	VT Class 4 RRJ Medium	15
НРА	80074198	Papakura	CONCRETE TITAN PIPE VT	825.2500MM CLASS 4 RRJ	1735	694	VT Class 4 RRJ Medium	15
НРА	80074201	Papakura	CONCRETE TITAN PIPE VT	900.2500MM CLASS 4 RRJ	1910	764	VT Class 4 RRJ Medium	15
НРА	80074204	Papakura	CONCRETE TITAN PIPE VT	1050.2500MM CLASS 4 RRJ	2480	992	VT Class 4 RRJ Medium	15
НРА	80074207	Papakura	CONCRETE TITAN PIPE VT	1200.2500MM CLASS 4 RRJ	3130	1252	VT Class 4 RRJ Medium	15
НРА	80089316	Papakura	CONCRETE TITAN PIPE VT	900.2500MM CLASS4 MICROSILICA	1922.5	769	VT Class 4 RRJ Medium	15
НРА	80089317	Papakura	CONCRETE TITAN PIPE VT	750.2500MM CLASS4 MICROSILICA	1625	650	VT Class 4 RRJ Medium	15
НРА	80089318	Papakura	CONCRETE TITAN PIPE VT	675.2500MM CLASS4 MICROSILICA	1400	560	VT Class 4 RRJ Medium	15
HPA	80074210	Papakura	CONCRETE TITAN PIPE VT	1350.2500MM CLASS 4 RRJ	3560	1424	VT Class 4 RRJ Large	16
НРА	80074213	Papakura	CONCRETE TITAN PIPE VT	1500.2500MM CLASS 4 RRJ	4175	1670	VT Class 4 RRJ Large	16
НРА	80074216	Papakura	CONCRETE TITAN PIPE VT	1800.2500MM CLASS 4 RRJ	5540	2216	VT Class 4 RRJ Large	16
НРА	80074218	Papakura	CONCRETE TITAN PIPE VT	1950.2500MM CLASS 4 RRJ	6190	2476	VT Class 4 RRJ Large	16
НРА	80074221	Papakura	CONCRETE TITAN PIPE VT	2100.2500MM CLASS 4 RRJ	7080	2832	VT Class 4 RRJ Large	16
НРА	80074223	Papakura	CONCRETE TITAN PIPE VT	2400.2500MM CLASS 4 RRJ	9400	3760	VT Class 4 RRJ Large	16
НРА	80089314	Papakura	CONCRETE TITAN PIPE VT	2100.2500MM CLASS4 MICROSILICA	7125	2850	VT Class 4 RRJ Large	16
НРА	80089315	Papakura	CONCRETE TITAN PIPE VT	1500.2500MM CLASS4 MICROSILICA	4050	1620	VT Class 4 RRJ Large	16
HPA	80089332	Papakura	CONCRETE TITAN PIPE VT	1200.2500MM CLASS4 MICROSILICA	3125	1250	VT Class 4 RRJ Large	16

ITEM NUMBER	DESCRIPTION 1	DESCRIPTION 2	PRODUCT WEIGHT [T]	MASS/EFF LENGTH (T/LM)	GROUP	GROUP #
80074062	Concrete Titan Pipe RCP	225.2000MM CLASS 2 RRJ	0.161	0.0805	RCP 225	17
80074063	Concrete Titan Pipe RCP	225.2000MM CLASS 4 RRJ	0.161	0.0805	RCP 225	17
80074066	Concrete Titan Pipe RCP	300.2500MM CLASS 2 RRJ	0.254	0.1016	RCP 300-600 Class 2	18
80074067	Concrete Titan Pipe RCP	300.2500MM CLASS 4 RRJ	0.254	0.1016	RCP 300-600 Class 4	19
80074068	Concrete Titan Pipe RCP	375.2500MM CLASS 2 RRJ	0.313	0.1252	RCP 300-600 Class 2	18
80074070	Concrete Titan Pipe RCP	375.2500MM CLASS 4 RRJ	0.313	0.1252	RCP 300-600 Class 4	19
80074071	Concrete Titan Pipe RCP	450.2500MM CLASS 2 RRJ	0.433	0.1732	RCP 300-600 Class 2	18
80074073	Concrete Titan Pipe RCP	450.2500MM CLASS 4 RRJ	0.433	0.1732	RCP 300-600 Class 4	19
80074084	Concrete Titan Pipe RCP	525.2500MM CLASS 2 RRJ	0.568	0.2272	RCP 300-600 Class 2	18
80074085	Concrete Titan Pipe RCP	525.2500MM CLASS 4 RRJ	0.569	0.2276	RCP 300-600 Class 4	19
80074090	Concrete Titan Pipe RCP	600.2500MM CLASS 2 RRJ	0.726	0.2904	RCP 300-600 Class 2	18
80074091	Concrete Titan Pipe RCP	600.2500MM CLASS 4 RRJ	0.727	0.2908	RCP 300-600 Class 4	19
80074064	Concrete Titan Pipe RCP	225.600MM CLASS 4 RRJ	0.068	0.1133	RCP 225	17
80074065	Concrete Titan Pipe RCP	225.1800MM CLASS 4 RRJ	0.148	0.0822	RCP 225	17

EPD - REINFORCED CONCRETE PIPES (RCP)



Content Declaration

Table 6 - Content Declaration (per 1 tonne product)

PRODUCT COMPONENTS	WEIGHT, KG	POST-CONSUMER RECYCLED MATERIAL, WEIGHT-%	RENEWABLE MATERIAL, WEIGHT-%
Steel (reinforcement)	14.2-78.6	0*	0
Cement	130-150	0	0
Aggregate	735-790	0	0
Admixtures	<0.734	0	0
Fly ash	<15.4	0	0
Silica fume	<11.8	0	0
Plastic sundries	0.0162-6.67	0	0
Galvanised steel	<2.10	0	0
Added Water	45.5-56.6	0	0
Total	1000		

Humes' reinforced concrete pipe products included in this EPD are listed below with separate tables for each production site. The tables include the conversion factors for product mass (kg) and for the mass per effective metre length (kg/eff m), and identification of the product group.

* The composition of the scrap input to the steel reinforcement is not known, so no post-consumer recycled material has been declared. The scrap input is 23.1% for rebar and 6.7% for steel wire, made up of a mix of pre-consumer and post-consumer scrap.

Table 7 – Packaging (per 1 tonne product)

PACKAGING MATERIALS	WEIGHT, KG	WEIGHT-% (VERSUS THE PRODUCT)	WEIGHT BIOGENIC CARBON, KG C/KG
Timber dunnage	2.96	0.3%	0.5
Total	2.96	0.3%	

Table 8 - Composition of Humes' synthetic rubber rings (per 1 tonne product)

PRODUCT COMPONENTS	WEIGHT, KG	POST-CONSUMER RECYCLED MATERIAL, WEIGHT-%	RENEWABLE MATERIAL, WEIGHT-%
Synthetic rubber ring	<1.92	0	0
Total	<1.92	0	

The product as supplied is non-hazardous. The products included in this EPD do not contain any substances of very high concern as defined by European REACH regulation in concentrations >0.1% (m/m). Precast concrete products and pipes are classified as non-dangerous goods according to the Land Transport Rule: Dangerous Goods 2005. When concrete products are cut, sawn, abraded or crushed, dust is created which contains crystalline silica, some of which may be respirable (particles small enough to go into the deep parts of the lung when breathed in), and which is hazardous. Exposure through inhalation should be avoided. Dust from this product is classified as Hazardous under the Hazardous Substances and New Organisms Act 1996 (HSNO Act) and is subject to Workplace Exposure Standards (WorkSafe NZ WES-BEI indices Edition 13, April 2022).

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Manufacturing Process

Humes Spun Titan® Pipe has been manufactured in New Zealand for over 100 years. Spun pipes are manufactured to the AS/NZS4058:2007 standard.

Spun pipes are cast horizontally and normally stay in their moulds for up to 24 hours for the initial curing, which includes steaming. The spun process enables manufacturing of thin wall pipe with a smooth finish and achieves excellent crushing strength and durability characteristics. The spun pipe making process provides the highest degree of flexibility in the pipe making process. It is economical to make small quantities of pipe or specials where pipes require increased cover specifications or strength.

Humes VT Titan[®] Pipe is manufactured to the AS/NZS 4058:2007 standard but also complies with many recognised international standards. Most parts of the British and European standards BSEN 1916:2002 and BS 5911-1:2002 were developed around VT technology. VT pipes are made through a vertical casting process. Each pipe is produced from a dry mix concrete which is placed in the mould and the inner core is vibrated to ensure solid compaction of the concrete. The pipe is removed from the core and taken directly to the curing area by crane, where the outer mould is stripped from the pipe. This means there is minimum movement of the pipe in the initial curing phase of the casting process. As a result of the manufacturing process VT Pipes have a thicker wall providing increased cover to steel.

Humes Titan[®] Roller Compacted Pipe (RCP) is manufactured to the AS/NZS 4058:2007 standard. RCP is cast vertically using low water/cement ratio concrete and effective compaction methods. Compaction is achieved using a well proven computer controlled, counter rotating roller head and trowel (the Bi Directional process or BiDi). The BiDi process ensures consistent and accurate formation of collars and spigots which assures water tightness. The RCP pipe uses a "D" ring jointing system developed by Humes that provides secure and positive jointing. To ensure this is the case, a portion of every batch of the RCP pipe barrels are hydrostatically checked as part of the stringent quality assurance system. Like the VT production process the RCP manufacturing methodology means that substantial pipe numbers of the same diameter can be made each day. Humes has been supplying RCP pipe for over 25 years and RCP pipes are now the most commonly used pipes from DN 225 to DN 600 and are available in Load Class 2 and 4.



Figure 1 – Product lifecycle of steel reinforced pipes



System Boundaries

This EPD is of the type 'cradle-to-gate with options, modules C1-C4, module D, and with additional modules (A1-A3 + C + D and A4 + A5). Distribution (A4) and installation (A5) optional modules are also declared. Use phase (B1-B7) modules are dependent on particular scenarios and best considered at the project level. The modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation are shown in Table 9.

Table 9 - Modules included in the scope of the EPD

		RODU(STAGI		CONSTR PROCES	UCTION S STAGE			US	E STA	GE			E	ND O STA		E	RESOURCE RECOVERY
	Raw material supply	Transport of raw materials	Manufacturing	Transport to customer	Construction / Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport to waste processing	Waste processing	Disposal	Reuse - Recovery- Recycling- potential
Module	A1	A2	A3	A4	A5	B1	B2	В3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	х	Х	Х	х	х	ND	ND	ND	ND	ND	ND	ND	Х	Х	Х	Х	х
Geography	GLO	GLO	NZ	NZ	NZ								NZ	NZ	NZ	NZ	GLO
Specific data		>90%															
Variation - products	-14	%/+1C)%*														
Variation - sites		N/A**															

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

* Most product groups have a variation of less than 10%. This is the maximum variation across the declared product groups. The variation for each product group is provided in the Environmental Performance section.

** The pipe products are unique to each manufacturing site.



Production (Module 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, manufacturing of average product at the exit gate of the manufacturing site and transport of product to customer.

The raw materials are supplied by third parties and typically transported to site by truck. Concrete is batched onsite, and steel wire is shaped into cages onsite.

Distribution (Module A4)

Distribution distances vary from site to site and depend on construction site delivery locations. Transportation to the construction site is based on a scenario that provides the weighted average delivery scenario for each group of Concrete Pipe products. Impacts are inclusive of an empty return transport component. Transport to and from site occurs by articulated truck over a distance of 100 km.

Installation (Module A5)

The installation stage includes environmental impacts associated with a typical trench type installation scenario with an H1 support. The installation scenario is one of several currently in use in New Zealand. Other installation scenarios could lead to significantly different results.

Trench type installation uses imported aggregate for bedding and support (haunch), and with a rubber ring seal between each pipe. The excavated material is typically refilled around the pipe up to a minimum of 150mm above the pipe. Backfill may be placed above the overlay, which will vary depending on the final top surface for the project. This has been assumed as 0 backfill for this EPD.

Figure 2 shows typical pipe installation, where the trench size, excavation volume and aggregate quantity, scale with the outer diameter of the pipe (OD). The key parameters for pipe installation are shown in Table 10.

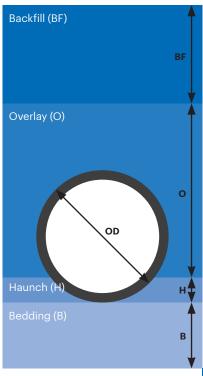
Installation processes include excavation of the trench, transport and placement of bedding materials, with diesel use of 0.309kg per m³ of material production of rubber ring, placement of pipe, filling of the trench, transport of excess spoil for recycling or reuse.

The environmental impact values are expressed per metre of pipe of a particular diameter, regardless of the pipe production method and class.

Table 10 - Pipe Installation parameters, per effective metre

PARAMETER (ABB.)	DESCRIPTION	VALUE	UNITS
Outer Diameter (OD)	Outer diameter of pipe	Varies	mm
Bedding (B)	Underlay, composed of imported aggregate	100 150	mm (min) mm (max)
Haunch (H)	Support, composed of imported aggregate	10	% of OD
Overlay (O)	Excavated material replaced and compacted	90 + 150	% of OD + mm (min)
Backfill (BF)	Related to final surface preparation requirements and will vary by project.	0	Assumed O for EPD
Trench Depth	B + H + O + BF		
Trench Width	0.0013 x OD + 0.171		

Figure 2 – Trench Type Pipe Installation



End of Life (Module C)

At the end of their functional life, concrete pipes may be:

- Abandoned in their original installation site,
- Re-lined in-situ, entering a second life,
- Filled with grout to avoid collapse, or
- Exhumed and sent for recycling.

As all options are possible, they are presented as individual scenarios, allowing the EPD user to consider the impact of each option. All scenarios are currently in use in New Zealand and are representative for one of the most likely scenario alternatives. Actual scenarios will vary from project to project, and the reader should not rely on the listed values without asserting that they are valid for their situation.

The scenarios are summarised in Table 11, per tonne of pipe, including the process considered for each end-oflife module.

Table 11 - End of life scenarios, processes and parameters, per declared unit (1 tonne)

SCENARIO / MODULE	PARAMETER	LEFT IN GROUND	RE-LINED	FILLED WITH GROUT*	EXHUMED AND RECYCLED
DECONSTRUCTION (C1)	Process and assumptions	n/a	n/a	n/a	Lifting of pipe (assumed equivalent to 1m³ using 0.309 kg diesel per m³)
(01)	kg collected separately	0	0	0	1000
TRANSPORT	Process and assumptions	n/a	n/a	n/a	Transport of pipe, 100km by truck
(C2)	kg transported	0	0	0	1000
WASTE PROCESSING (C3)	Process and assumptions	n/a	n/a (re-lining is part of next life cycle)	n/a	Crushing of concrete pipes, separation of reinforcing steel and crushed concrete aggregate using 0.811kg diesel per tonne
	kg for re-use	0	1000	0	0
	kg for recycling	0	0	0	1000
DISPOSAL (C4)	Process and assumptions	Pipe and rubber ring considered to be 'disposed' as inert material	n/a	Pipe is filled with conservative average 1.90m ³ Firth Flowable Fill. Pipe and rubber ring considered to be 'disposed' as inert material	Disposal of rubber rings in landfill; the greatest mass of ring per 1 tonne of pipe is used as a conservative assumption
	kg disposed	1002	0	1002	2

*Firth Flowable Fill is a low-strength mix of sand, cement, fly ash, admixtures and water. The highest volume of fill per tonne of pipe is used as a conservative measure. The type of fill chosen will have significant effect on the environmental impact. When the combined variation of grout volume per tonne of pipe and cement content of the grout are taken into account, it is clear that users of this LCA should look at their specific situation rather than rely on the generic values provided in this LCA.

Recovery and Recycling potential (Module D)

Module D declares a potential credit or burden for the net scrap associated with recyclable materials leaving a product system. The concrete rubble and steel scrap produced in module C3 can replace natural coarse aggregates (crushed rock) and virgin steel (after further processing). The steel credit considers net scrap after subtracting the amount of steel scrap used in production of the reinforcing steel in the first product life cycle. Concrete contains no recycled materials, and thus 100% of the concrete volume has been assumed to replace virgin crushed aggregates in module D. Reinforcing steel contains up to 23.1% recycled content, which means 76.9% of steel is credited in module D.

Module D is only relevant when pipes are exhumed and recycled.



Life cycle assessment methodology

Primary data were used for all manufacturing operations up to the factory gate. Primary data for Humes' operations was sourced from the period 01 July 2018 to 30 June 2019. 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 2021.2 (Sphera, 2021) . Most datasets have a reference year between 2017 and 2020 and all fall within the 10 year limit allowable for generic data under EN 15804.

Upstream data

Data for steel input is taken from worldsteel LCI data. Data for cement input is taken from the Golden Bay cement EPD. Electricity and water were modelled to reflect New Zealand conditions.

Other upstream (supply chain) data used were Australian, or European due to a lack of consistent LCI data for New Zealand at the time this study was conducted.

Electricity

The composition of the electricity grid mix is modelled in GaBi and updated annually. The New Zealand electricity grid consumption mix (2017) is made up of hydro (59.30%), geothermal (17.96%) natural gas (12.93%), wind (4.66%), coal gases (2.15%) hard coal (1.36%), biomass (0.70%), biogas (0.69%), and photovoltaics (0.27%), lignite (0.05%) and fuel oil (0.03%). The emission factor for the New Zealand national grid mix 1kV-60kV for the GWP-GHG indicator is 0.145 kg CO2e/kWh.

Transport

Where transport data was not available for any material, a standard value of 100 km was used.

Explanation of Representative Products & Variation

This EPD covers 111 pipe products. Grouping is based on the type of production process and class strength, with further grouping as needed using joint type, pipe diameter and/or length. The impacts are declared for a representative product for each group.

For many groups, the GWP-GHG impacts for all products in the group fall within ±10% of the average impact. Some groups have products that sit outside this range. The range of GWP-GHG impacts for each group is detailed in the environmental performance section.

Cut off criteria

The cut-off criteria applied are 1% of cumulative mass input and 1% of cumulative energy usage, providing the minor flows do not have significant environmental relevance.

Inputs knowingly excluded from the inventory are packaging materials for minor inputs such as mould oil, which is used in small quantities. These materials are well below the materiality cut-off and have been excluded.

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

Allocation

Humes' Papakura and Hornby production sites produce both pipes and other precast products. Where possible, data was collected to cover only a single production type, such as for Papakura pipe production. Where data was only available on a site-wide basis (e.g. waste), this was allocated by mass across all production from the site. Hornby site data covered both the open air cured precast products and the diesel cured pipes. Diesel is used for other processes as well as pipe curing, and the diesel used for curing was not specifically measured. Papakura precast's diesel consumption per tonne was used to estimate the usage for Hornby precast, with the remainder allocated to Hornby pipes for curing.

The inputs and outputs for Te Rapa Park cover the total production for Humes and other resellers. All products use the same production line and there is no difference between the processes. No valuable by-products are produced and there is no meaningful difference in the value of the products between the various brands. All inputs and outputs were allocated by mass.

Allocation for input materials that contain secondary material occurs in the upstream datasets. Fly ash and silica fume used in the concrete mixes have environmental impacts allocated based on economic value in the background data.

Assumptions

The concrete composition for each product is taken from Humes' BOMs and is specific to each product and site.

All sites run on mains water, but not all sites have water meters, as water is often not charged on a usage basis in New Zealand. The measured water input for Papakura has been used as a proxy for water usage per tonne for Hornby and Te Rapa Park. Wastewater outputs are assumed to the be same as water inputs as a conservative assumption. No data was available for the quantity or waste treatment of excess reinforcing steel or concrete, and these have not been modelled.

The installation scenario for module A5 is based on a set of assumptions that may influence the outcome of the assessment. The end-of-life assumptions for the grout scenario consider an average volume of flowable fill, with a specific mix design, which will influence the results.

It is important to understand the scenarios before drawing conclusions based on this EPD.



Assessment Indicators

The results tables describe the different environmental indicators for each product per declared unit, for each declared module.

Tables 6 to 11 present the covered indicators, including the core and additional environmental impact indicators, life cycle inventory indicators, describing resource use and waste and other outputs, indicators used in the previous standard (EN15804+A1), and the biogenic carbon content of the product and its packaging. For concrete pipes, the following indicators are not relevant, hence result in zero values:

- Components for re-use (CRU) is zero since there are none produced.
- Materials for recycling (MFR) is zero since no waste is available for recycling.
- Materials for energy recovery (MER) is zero since no waste is available for energy recovery.
- Exported electrical energy (EEE) is zero since there is none produced.
- Exported thermal energy (EET) is zero since there is none produced.

Table 12 - Assessment indicators

INDICATOR	INDICATORS, ABBR.	UNITS
EN15804+A2 CORE ENVIRONMENTAL IMPACT INDICATORS		
Climate change - total	GWP-total	kg CO ₂ -eq.
Climate change - fossil	GWP-fossil	kg CO_2 eq.
Climate change - biogenic	GWP-biogenic	kg CO_2 eq.
Climate change – land use and land use change	GWP-luluc	kg CO_2 eq.
Ozone depletion	ODP	kg CFC11-eq.
Acidification	AP	Mole of H⁺ eq.
Eutrophication aquatic freshwater	EP-freshwater	kg P eq.
Eutrophication aquatic marine	EP-marine	kg N eq.
Eutrophication aquate maine	EP-terrestrial	Mole of N eq.
Photochemical ozone formation	POCP	kg NMVOC eq.
Depletion of abiotic resources – minerals and metals*	ADP-m&m	kg Sb-eq.
Depletion of abiotic resources – fossil fuels*	ADP-fossil	kg Sb-eq. MJ
· ·	WDP	m ³ world equiv.
Water Depletion Potential* EN15804+A2 RESOURCE USE INDICATORS	WDP	m ⁻ wond equiv.
	PERE	MJ
Renewable primary energy as energy carrier		MJ
Renewable primary energy resources as material utilization	PERM	
Total use of renewable primary energy resources	PERT	MJ
Non-renewable primary energy as energy carrier	PENRE	MJ
Non-renewable primary energy as material utilization	PENRM	MJ
Total use of non-renewable primary energy resources	PENRT	MJ
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ
Use of non-renewable secondary fuels	NRSF	MJ
Use of net fresh water	FW	m ³
EN15804+A2 WASTE MATERIAL AND OUTPUT FLOW INDICATORS		
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	RWD	kg
Components for reuse	CRU	kg
Materials for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported electrical energy	EEE	MJ
Exported thermal energy	EET	MJ
EN15804+A2 ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS		
IPCC AR5 Global Warming Potential **	GWP-GHG	kg CO ₂ -eq.
Particulate Matter emissions	PM	Disease incidences
Ionising Radiation - human health ***	IRP	kBq U235 eq.
Eco-toxicity (freshwater)	ETP-fw	CTUe
Human Toxicity, cancer *	HTPc	CTUh
Human Toxicity, non-cancer *	HTPnc	CTUh
Lan use related impacts / soil quality *	SQP	Pt
EN15804+A2 BIOGENIC CARBON CONTENT INDICATORS		
Biogenic carbon content - product	BCC-prod	kg C
Biogenic carbon content - packaging	BCC-pack	kg C
EN15804+A1 ENVIRONMENTAL IMPACT INDICATORS		
Global warming potential	GWP	kg CO_2 eq.
Ozone depletion potential	ODP	kg CFC 11 eq.
Acidification potential	AP	kg SO_2 eq.
Eutrophication potential	EP	kg (PO ₄) ³⁻ eq.
Photochemical ozone creation potential	POCP	kg C_2H_4 eq.
Abiotic depletion potential for non-fossil resources	ADPe	kg Sb eq.
Abiotic depletion potential for fossil resources	ADPf	MJ

* 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. The indicator is more likely to be in line with other GHG reporting in Australia and New Zealand.

*** 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 indicative. indicator.

Environmental Performance

Table 13 - Cradle-to-gate (A1-A3) per tonne

REP PRODUCT		HHY-80074151	HHY-80074077	HHY-80074096	HHY-80074121	HHY-80074048
GROUP DESCRIPTION		SPUN CLASS 2 FJ	SPUN CLASS 2	SPUN CLASS 2	SPUN CLASS 2	SPUN CLASS 2
			RRJSMALL	RRJ MEDIUM	RRJ LARGE	RRJ SHORT GROUP 5
GROUP	UNITS	GROUP1	GROUP 2	GROUP 3	GROUP 4	GROUP 5
	VIRONMENTAL IMPACT I					
GWP-TOTAL	kg CO ₂ -eq.	271	242	266	287	274
GWP-FOSSIL	kg CO_2 -eq.	270	242	264	286	273
GWP-BIOGENIC	kg CO_2 -eq.	1.30	1.53	1.46	1.31	1.48
GWP-LULUC	kg CO_2 -eq.	0.0522	0.0481	0.0525	0.0551	0.0541
ODP	kg CFC11-eq.	1.39E-13	1.23E-13	1.38E-13	1.42E-13	1.37E-13
AP	Mole of H⁺ eq.	0.837	0.807	0.860	0.887	0.892
EP-FRESHWATER	kg P eq.	2.34E-04	2.29E-04	2.37E-04	2.39E-04	2.39E-04
EP-MARINE	kg N eq.	0.329	0.310	0.325	0.338	0.329
EP-TERRESTRIAL	Mole of N eq.	3.58	3.38	3.54	3.68	3.58
POCP	kg NMVOC eq.	0.941	0.892	0.939	0.975	0.955
ADP-M&M	kg Sb-eq.	9.85E-05	6.30E-05	1.94E-04	1.22E-04	1.89E-04
ADP-FOSSIL	MJ	2,200	2,040	2,260	2,390	2,370
WDP	m ³ world equiv.	44.3	47.2	49.2	50.9	56.8
	CE USE PARAMETERS, MO			40.2	00.0	00.0
PERE	MJ	490	461	476	492	476
PERM	MJ	0	0	0	0	0
PERT	MJ	490	461	476	492	476
PENRE	MJ	2,190	2,010	2,230	2,380	2,350
PENRM	MJ	10.6	27.7	26.2	7.58	22.9
PENRT	MJ	2,200	2,040	2,260	2,390	2,370
SM	kg	2.15	3.46	2.92	2.39	3.98
RSF	MJ	326	270	291	325	285
NRSF	MJ	0	0	0	0	0
FW	m ³	1.74	1.76	1.83	1.89	2.01
	ATERIAL AND OUTPUT FI					
HWD	kg	3.18E-07	3.13E-07	3.60E-07	3.92E-07	4.12E-07
NHWD	kg	18.1	18.7	17.1	18.3	17.8
RWD	kg	0.00777	0.00671	0.00746	0.00772	0.00733
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
EN15804+A2 ADDITION	AL ENVIRONMENTAL IM	IPACT INDICATORS, MO	ODULES A1-A3, PER T	ONNE OF PIPE		
GWP-GHG	kg CO ₂ -eq.	269	239	263	285	272
PM	Disease incidences	1.49E-05	1.46E-05	1.52E-05	1.54E-05	1.55E-05
IRP	kBq U235 eq.	1.18	1.03	1.11	1.16	1.09
ETP-FW						
	CTUe	1,130	1,060	1,120	1,150	1,120
HTPC	CTUe CTUh	1,130 5.09E-08	1,060 3.86E-08	1,120 5.70E-08	1,150 6.46E-08	1,120 5.87E-08
HTPC HTPNC						
	CTUh	5.09E-08	3.86E-08	5.70E-08	6.46E-08	5.87E-08
HTPNC SQP	CTUh CTUh	5.09E-08 1.17E-06 2,680	3.86E-08 1.09E-06	5.70E-08 1.30E-06	6.46E-08 1.38E-06	5.87E-08 1.40E-06
HTPNC SQP	CTUh CTUh Pt	5.09E-08 1.17E-06 2,680	3.86E-08 1.09E-06	5.70E-08 1.30E-06	6.46E-08 1.38E-06	5.87E-08 1.40E-06
HTPNC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack	CTUh CTUh Pt CARBON CONTENT IND kg C kg C	5.09E-08 1.17E-06 2,680 DICATORS 0 3.75	3.86E-08 1.09E-06 2,670 0 3.75	5.70E-08 1.30E-06 2,680 0 3.75	6.46E-08 1.38E-06 2,690	5.87E-08 1.40E-06 2,690
HTPNC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack	CTUh CTUh Pt CARBON CONTENT INE kg C kg C WENTAL IMPACT INDICA	5.09E-08 1.17E-06 2,680 DICATORS 0 3.75	3.86E-08 1.09E-06 2,670 0 3.75	5.70E-08 1.30E-06 2,680 0 3.75	6.46E-08 1.38E-06 2,690 0	5.87E-08 1.40E-06 2,690 0
HTPNC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack	CTUh CTUh Pt CARBON CONTENT IND kg C kg C	5.09E-08 1.17E-06 2,680 DICATORS 0 3.75	3.86E-08 1.09E-06 2,670 0 3.75	5.70E-08 1.30E-06 2,680 0 3.75	6.46E-08 1.38E-06 2,690 0	5.87E-08 1.40E-06 2,690 0
HTPNC SQP EN15804+A2 BIOGENIO BCC-prod BCC-pack EN15804+A1 ENVIRON	CTUh CTUh Pt CARBON CONTENT INE kg C kg C WENTAL IMPACT INDICA	5.09E-08 1.17E-06 2,680 DICATORS 0 3.75 TORS, MODULES A1-A3	3.86E-08 1.09E-06 2,670 0 3.75 9, PER TONNE OF PIPE	5.70E-08 1.30E-06 2,680 0 3.75	6.46E-08 1.38E-06 2,690 0 3.75	5.87E-08 1.40E-06 2,690 0 3.75
HTPNC SQP EN15804+A2 BIOGENIG BCC-prod BCC-pack EN15804+A1 ENVIRON GWP	CTUh CTUh Pt CARBON CONTENT INE kg C kg C MENTAL IMPACT INDICAT kg CO ₂ eq.	5.09E-08 1.17E-06 2,680 DICATORS 0 3.75 TORS, MODULES A1-A3 266	3.86E-08 1.09E-06 2,670 0 3.75 PER TONNE OF PIPE 237	5.70E-08 1.30E-06 2,680 0 3.75 261	6.46E-08 1.38E-06 2,690 0 3.75 282	5.87E-08 1.40E-06 2,690 0 3.75 269
HTPNC SQP EN15804+A2 BIOGENIO BCC-prod BCC-pack EN15804+A1 ENVIRON GWP ODP	CTUh CTUh Pt CARBON CONTENT INE kg C kg C MENTAL IMPACT INDICA kg CO ₂ eq. kg CFC 11 eq.	5.09E-08 1.17E-06 2,680 DICATORS 0 3.75 TORS, MODULES A1-A3 266 1.86E-13	3.86E-08 1.09E-06 2,670 0 3.75 , PER TONNE OF PIPE 237 1.64E-13	5.70E-08 1.30E-06 2,680 0 3.75 261 1.84E-13	6.46E-08 1.38E-06 2,690 0 3.75 282 1.90E-13	5.87E-08 1.40E-06 2,690 0 3.75 269 1.82E-13
HTPNC SQP EN15804+A2 BIOGENIO BCC-prod BCC-pack EN15804+A1 ENVIRONI GWP ODP AP	CTUh CTUh Pt CARBON CONTENT IND kg C kg C MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq.	5.09E-08 1.17E-06 2,680 DICATORS 0 3.75 TORS, MODULES A1-A3 266 1.86E-13 0.617	3.86E-08 1.09E-06 2,670 0 3.75 , PER TONNE OF PIPE 237 1.64E-13 0.597	5.70E-08 1.30E-06 2,680 0 3.75 261 1.84E-13 0.639	6.46E-08 1.38E-06 2,690 0 3.75 282 1.90E-13 0.658	5.87E-08 1.40E-06 2,690 0 3.75 269 1.82E-13 0.667
HTPNC SQP EN15804+A2 BIOGENIO BCC-prod BCC-pack EN15804+A1 ENVIRON GWP ODP AP EP	CTUh CTUh Pt CARBON CONTENT IND kg C kg C WENTAL IMPACT INDICA kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq. kg (PO ₄) ^{3.} eq.	5.09E-08 1.17E-06 2,680 DICATORS 0 3.75 TORS, MODULES A1-A3 266 1.86E-13 0.617 0.119	3.86E-08 1.09E-06 2,670 0 3.75 , PER TONNE OF PIPE 237 1.64E-13 0.597 0.112	5.70E-08 1.30E-06 2,680 0 3.75 261 1.84E-13 0.639 0.117	6.46E-08 1.38E-06 2,690 0 3.75 282 1.90E-13 0.658 0.122	5.87E-08 1.40E-06 2,690 0 3.75 269 1.82E-13 0.667 0.118

Table 13 ctd - Cradle-to-gate (A1-A3) per tonne

REP PRODUCT		HHY-80074153	HHY-80074106	HHY-80074040	HHY-80074041	HHY-8007404
GROUP DESCRIPTION		SPUN CLASS 4 FJ	SPUN CLASS 4 RRJ	SPUN CLASS 4 RRJ SHORT 375	SPUN CLASS 4 RRJ SHORT 450	SPUN CLASS RRJ SHORT 52
GROUP		GROUP 6	GROUP 7	GROUP 8	GROUP 9	GROUP 1
INDICATORS, ABBR.	UNITS					
EN15804+A2 CORE ENV	IRONMENTAL IMPACT II	NDICATORS, MODULES	6 A1-A3, PER TONNE (OF PIPE		
GWP-TOTAL	kg CO ₂ -eq.	272	295	430	278	34
GWP-FOSSIL	kg CO ₂ -eq.	271	294	429	277	34
GWP-BIOGENIC	kg CO ₂ -eq.	1.31	1.34	0.764	1.63	1.0
GWP-LULUC	kg CO ₂ -eq.	0.0524	0.0570	0.0802	0.0553	0.06
ODP	kg CFC11-eq.	1.39E-13	1.58E-13	1.81E-13	1.28E-13	1.35E-
AP	Mole of H⁺ eq.	0.838	1.12	1.26	0.938	1
EP-FRESHWATER	kg P eq.	2.35E-04	2.44E-04	2.72E-04	2.41E-04	2.61E-
EP-MARINE	kg N eq.	0.329	0.354	0.422	0.331	0.3
EP-TERRESTRIAL	Mole of N eq.	3.58	3.86	4.58	3.60	4.
РОСР	kg NMVOC eq.	0.943	1.04	1.23	0.975	1
ADP-M&M	kg Sb-eq.	9.98E-05	1.16E-04	1.87E-04	1.40E-04	2.13E-
ADP-FOSSIL	MJ	2,210	2,820	3,660	2,540	3,3
WDP	m³ world equiv.	44.5	51.5	95.6	66.6	1
EN15804+A2 RESOURC	E USE PARAMETERS, MC	DULES A1-A3, PER TOM	NNE OF PIPE			
PERE	MJ	489	498	578	460	4
PERM	MJ	0	0	0	0	
PERT	MJ	489	498	578	460	4
PENRE	MJ	2,200	2,500	3,620	2,510	3,3
PENRM	MJ	6.98	325	39.8	24.6	20
PENRT	MJ	2,210	2,820	3,660	2,540	3,3
SM	kg	2.03	2.49	6.76	4.44	8.
RSF	MJ	325	325	458	250	2
NRSF	MJ	0	0	0	0	
FW	m ³	1.74	1.91	3.09	2.21	3.
EN15804+A2 WASTE MA	ATERIAL AND OUTPUT FL	OW PARAMETERS, MO	DULES A1-A3, PER TO	ONNE OF PIPE		
HWD	kg	3.25E-07	3.75E-07	7.31E-07	5.22E-07	8.27E-
NHWD	kg	18.0	18.5	32.1	18.7	2
RWD	kg	0.00772	0.00835	0.0102	0.00634	0.006
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	
EN15804+A2 ADDITION	AL ENVIRONMENTAL IM	PACT INDICATORS, MC	DULES A1-A3, PER T	ONNE OF PIPE		
GWP-GHG	kg CO ₂ -eq.	270	293	427	275	3
PM	Disease incidences	1.49E-05	1.72E-05	1.93E-05	1.61E-05	1.86E-
RP	kBq U235 eq.	1.17	1.21	1.57	0.940	0.9
		1100	1,620	1,520	1,100	1,2
ETP-FW	CTUe	1,130	1,020			1.11E-
ETP-FW HTPC	CTUe CTUh	1,130 5.33E-08	6.79E-08	1.01E-07	7.53E-08	1.116
НТРС	CTUh	5.33E-08	6.79E-08	1.01E-07	7.53E-08 1.66E-06	2.41E-
HTPC HTPNC						2.41E-
HTPC HTPNC SQP	CTUh CTUh Pt	5.33E-08 1.20E-06 2,680	6.79E-08 1.56E-06	1.01E-07 2.26E-06	1.66E-06	2.41E-
HTPC HTPNC SQP EN15804+A2 BIOGENIC	CTUh CTUh Pt CARBON CONTENT IND	5.33E-08 1.20E-06 2,680	6.79E-08 1.56E-06	1.01E-07 2.26E-06	1.66E-06	2.41E-
HTPC HTPNC 6QP EN15804+A2 BIOGENIC 8CC-prod	CTUh CTUh Pt	5.33E-08 1.20E-06 2,680 DICATORS	6.79E-08 1.56E-06 2,690	1.01E-07 2.26E-06 2,750	1.66E-06 2,690	2.41E- 2,7
HTPC HTPNC 6QP EN15804+A2 BIOGENIC 8CC-prod 8CC-pack	CTUh CTUh Pt CARBON CONTENT IND kg C	5.33E-08 1.20E-06 2,680 DICATORS 0 3.75	6.79E-08 1.56E-06 2,690 0 3.75	1.01E-07 2.26E-06 2,750 0 3.75	1.66E-06 2,690 0	2.41E- 2,7
HTPC HTPNC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack EN15804+A1 ENVIRONN	CTUh CTUh Pt CARBON CONTENT IND kg C kg C	5.33E-08 1.20E-06 2,680 DICATORS 0 3.75	6.79E-08 1.56E-06 2,690 0 3.75	1.01E-07 2.26E-06 2,750 0 3.75	1.66E-06 2,690 0	2.41E- 2,7 3
HTPC HTPNC SQP EN15804+A2 BIOGENIC 3CC-prod 3CC-pack EN15804+A1 ENVIRONN GWP	CTUh CTUh Pt CARBON CONTENT IND kg C kg C	5.33E-08 1.20E-06 2,680 DICATORS 0 3.75 TORS, MODULES A1-A3	6.79E-08 1.56E-06 2,690 0 3.75 , PER TONNE OF PIPE	1.01E-07 2.26E-06 2,750 0 3.75	1.66E-06 2,690 0 3.75	2.41E- 2,7 3 3
HTPC HTPNC SQP EN15804+A2 BIOGENIC 3CC-prod 3CC-pack EN15804+A1 ENVIRONN GWP ODP	CTUh CTUh Pt CARBON CONTENT INE kg C kg C IENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq.	5.33E-08 1.20E-06 2,680 DICATORS 0 3.75 TORS, MODULES A1-A3 267 1.86E-13	6.79E-08 1.56E-06 2,690 0 3.75 , PER TONNE OF PIPE 290 2.11E-13	1.01E-07 2.26E-06 2,750 0 3.75 421 2.42E-13	1.66E-06 2,690 0 3.75 272 1.70E-13	2.41E- 2,7 3 3 1.80E
HTPC HTPNC SQP EN15804+A2 BIOGENIC 3CC-prod 3CC-pack EN15804+A1 ENVIRONN GWP DDP AP	CTUh CTUh Pt CARBON CONTENT INE kg C kg C IENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq.	5.33E-08 1.20E-06 2,680 0 CATORS 0 3.75 CORS, MODULES A1-A3 267 1.86E-13 0.617	6.79E-08 1.56E-06 2,690 0 3.75 , PER TONNE OF PIPE 290	1.01E-07 2.26E-06 2,750 0 3.75 421 2.42E-13 0.959	1.66E-06 2,690 0 3.75 272 1.70E-13 0.709	2.41E- 2,7 3 3 1.80E 0.9
HTPC HTPNC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack EN15804+A1 ENVIRONN GWP DDP AP EP	CTUh CTUh Pt CARBON CONTENT IND kg C kg C IENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq. kg SO ₂ eq.	5.33E-08 1.20E-06 2,680 DICATORS 0 3.75 TORS, MODULES A1-A3 267 1.86E-13 0.617 0.119	6.79E-08 1.56E-06 2,690 0 3.75 , PER TONNE OF PIPE 290 2.11E-13 0.861 0.128	1.01E-07 2.26E-06 2,750 0 3.75 421 2.42E-13 0.959 0.153	1.66E-06 2,690 0 3.75 272 1.70E-13 0.709 0.118	2.41E- 2,7 3 3 1.80E 0.9 0.9
HTPC HTPNC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack	CTUh CTUh Pt CARBON CONTENT INE kg C kg C IENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq.	5.33E-08 1.20E-06 2,680 0 CATORS 0 3.75 CORS, MODULES A1-A3 267 1.86E-13 0.617	6.79E-08 1.56E-06 2,690 0 3.75 , PER TONNE OF PIPE 290 2.11E-13 0.861	1.01E-07 2.26E-06 2,750 0 3.75 421 2.42E-13 0.959	1.66E-06 2,690 0 3.75 272 1.70E-13 0.709	

Table 13 ctd - Cradle-to-gate (A1-A3) per tonne

Table 13 ctd - Crad						
REP PRODUCT		HHY-80074044	HHY-80074125	HPA-80074206	HPA-80074237	HPA-80074201 VT CLASS 4 RRJ
GROUP DESCRIPTION		SPUN CLASS 4 RRJ SHORT MEDIUM	SPUN SKID JOINT	VT CLASS 2	VT CLASS 4 IWJ	MEDIUM
GROUP		GROUP 11	GROUP 12	GROUP 13	GROUP 14	GROUP 15
INDICATORS, ABBR.	UNITS					
EN15804+A2 CORE EN	/IRONMENTAL IMPACT I	NDICATORS, MODULE	S A1-A3, PER TONNE	OF PIPE		
GWP-TOTAL	kg CO ₂ -eq.	258	256	184	201	210
GWP-FOSSIL	kg CO ₂ -eq.	257	255	185	201	210
GWP-BIOGENIC	kg CO ₂ -eq.	1.66	1.44	-0.160	-0.159	-0.162
GWP-LULUC	kg CO ₂ -eq.	0.0526	0.0500	0.0338	0.0368	0.0387
ODP	kg CFC11-eq.	1.32E-13	1.32E-13	1.71E-10	1.71E-10	1.72E-10
AP	Mole of H⁺ eq.	0.886	0.812	0.403	0.455	0.483
EP-FRESHWATER	kg P eq.	2.39E-04	2.32E-04	2.18E-04	2.22E-04	2.25E-04
EP-MARINE	kg N eq.	0.320	0.320	0.120	0.129	0.135
EP-TERRESTRIAL	Mole of N eq.	3.48	3.48	1.29	1.39	1.44
POCP	kg NMVOC eq.	0.935	0.919	0.349	0.383	0.401
ADP-M&M	kg Sb-eq.	2.51E-04	9.99E-05	1.52E-04	1.65E-04	2.03E-04
ADP-FOSSIL	MJ	2,330	2,120	1,370	1,560	1,660
WDP	m³ world equiv.	57.1	43.4	38.3	46.0	49.8
	E USE PARAMETERS, MC					
PERE	MJ	455	473	229	232	235
PERM	MJ	0	0	0	0	0
PERT	MJ	455	473	229	232	235
PENRE	MJ	2,300	2,120	1,370	1,560	1,660
PENRM	MJ	37.8	2.16	1.30	0.892	2.13
PENRT	MJ	2,340	2,120	1,370	1,560	1,660
SM	kg	4.07	1.88	1.97	2.54	2.88
RSF	MJ	242	293	245	246	247
NRSF	MJ	0	0	0	0	0
FW	m ³	1.98	1.69	1.42	1.61	1.70
HWD	ATERIAL AND OUTPUT FI	4.27E-07	3.28E-07	0.00155	0.00155	0.00156
NHWD	kg kg	4.272-07	16.3	28.9	29.5	30.0
RWD	kg	0.00673	0.00711	0.00457	0.00454	0.00467
CRU	kg	0.00073	0.00711	0.00437	0.00434	0.00407
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
	IAL ENVIRONMENTAL IM	-		-	, i i i i i i i i i i i i i i i i i i i	
GWP-GHG	kg CO₂-eq.	256	254	184	200	209
PM	Disease incidences	1.55E-05	1.46E-05	4.69E-06	5.26E-06	5.56E-06
IRP	kBq U235 eq.	0.977	1.07	0.630	0.622	0.634
ETP-FW	CTUe	1,080	1,070	647	671	687
HTPC	CTUh	6.36E-08	5.49E-08	4.45E-08	5.52E-08	6.05E-08
HTPNC	CTUh	1.47E-06	1.19E-06	8.86E-07	1.07E-06	1.17E-06
SQP	Pt	2,680	2,680	1,120	1,120	1,130
EN15804+A2 BIOGENIC	CARBON CONTENT INC					
BCC-prod	kg C	0	0	0	0	0
BCC-pack	kg C	3.75	3.75	0.247	0.247	0.247
	MENTAL IMPACT INDICA	TORS, MODULES A1-A	3, PER TONNE OF PIPI	Ξ		
ENTROUGHTATENTIKON			050	181	197	205
GWP	kg CO ₂ eq.	253	252			
	kg CO ₂ eq. kg CFC 11 eq.	253 1.75E-13	252 1.76E-13	3.20E-10	3.21E-10	3.23E-10
GWP	-					3.23E-10 0.382
GWP ODP	kg CFC 11 eq.	1.75E-13	1.76E-13	3.20E-10	3.21E-10	
GWP ODP AP	kg CFC 11 eq. kg SO ₂ eq.	1.75E-13 0.666	1.76E-13 0.598	3.20E-10 0.315	3.21E-10 0.358	0.382
GWP ODP AP EP	kg CFC 11 eq. kg SO ₂ eq. kg (PO ₄) ^{3.} eq.	1.75E-13 0.666 0.114	1.76E-13 0.598 0.115	3.20E-10 0.315 0.0473	3.21E-10 0.358 0.0505	0.382 0.0523
GWP ODP AP EP POCP	kg CFC 11 eq. kg SO ₂ eq. kg (PO ₄) ³⁻ eq. kg C ₂ H ₄ eq.	1.75E-13 0.666 0.114 0.0669	1.76E-13 0.598 0.115 0.0574	3.20E-10 0.315 0.0473 0.0325	3.21E-10 0.358 0.0505 0.0392	0.382 0.0523 0.0425

Table 13 ctd - Cradle-to-gate (A1-A3) per tonne

	_		11111 00074000		111114 00074004
		HPA-80074221 VT CLASS 4 RRJ	HHM-80074062	HHM-80074068 RCP CLASS 2	HHM-80074091 RCP CLASS 4
GROUP DESCRIPTION		LARGE	RCP 225	300-600	300-600
GROUP		GROUP 16	GROUP 17	GROUP 18	GROUP 19
INDICATORS, ABBR.	UNITS				
					070
GWP-TOTAL	kg CO ₂ -eq.	260	235	239	272
GWP-FOSSIL	kg CO ₂ -eq.	260	233	237	270
GWP-BIOGENIC	kg CO ₂ -eq.	-0.154	1.51	1.52 0.0404	1.53
GWP-LULUC ODP	kg CO ₂ -eq.	0.0478 1.72E-10	0.0394 4.06E-10	3.99E-10	0.0467 3.96E-10
AP	kg CFC11-eq. Mole of H ⁺ eq.	0.645	0.618	0.637	0.752
EP-FRESHWATER	kg P eq.	2.39E-04	2.39E-04	2.41E-04	2.50E-04
EP-MARINE	kg N eq.	0.163	0.218	0.219	0.236
EP-TERRESTRIAL	Mole of N eq.	1.75	2.37	2.39	2.57
POCP	kg NMVOC eq.	0.505	0.616	0.624	0.685
ADP-M&M	kg Sb-eq.	2.40E-04	1.17E-04	1.17E-04	1.25E-04
ADP-FOSSIL	MJ	2,250	1,880	1,940	2,330
WDP	m³ world equiv.	73.8	52.4	57.0	80.8
	E USE PARAMETERS, MO	•	•	07.0	00.0
PERE	MJ	245	400	399	407
PERM	MJ	0	0	0	0
PERT	MJ	245	400	399	407
PENRE	MJ	2,250	1,880	1,940	2,330
PENRM	MJ	1.31	0	0	0
PENRT	MJ	2,250	1,880	1,940	2,330
SM	kg	4.63	5.60	6.27	9.72
RSF	MJ	247	283	278	276
NRSF	MJ	0	0	0	0
FW	m ³	0.00	4.07	4.07	0.55
1 4 4	m-	2.28	1.87	1.97	2.55
	TERIAL AND OUTPUT FL				2.55
					0.00361
EN15804+A2 WASTE MA	ATERIAL AND OUTPUT FL	OW PARAMETERS, M	ODULES A1-A3, PER T	ONNE OF PIPE	
EN15804+A2 WASTE MA HWD	ATERIAL AND OUTPUT FL	OW PARAMETERS, M 0.00156	ODULES A1-A3, PER T 0.00369	ONNE OF PIPE 0.00363	0.00361
EN15804+A2 WASTE MA HWD NHWD	ATERIAL AND OUTPUT FL kg kg	OW PARAMETERS, M 0.00156 31.7	ODULES A1-A3, PER T 0.00369 40.3	ONNE OF PIPE 0.00363 40.3	0.00361 43.2
EN15804+A2 WASTE MA HWD NHWD RWD	ATERIAL AND OUTPUT FL kg kg kg	OW PARAMETERS, M 0.00156 31.7 0.00456	ODULES A1-A3, PER T 0.00369 40.3 0.00542	ONNE OF PIPE 0.00363 40.3 0.00535	0.00361 43.2 0.00535
EN15804+A2 WASTE MA HWD NHWD RWD CRU	ATERIAL AND OUTPUT FL kg kg kg kg	OW PARAMETERS, M 0.00156 31.7 0.00456 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0	ONNE OF PIPE 0.00363 40.3 0.00535 0	0.00361 43.2 0.00535 0
EN15804+A2 WASTE MA HWD NHWD RWD CRU MFR	TERIAL AND OUTPUT FL kg kg kg kg kg	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0	0.00361 43.2 0.00535 0 0
EN15804+A2 WASTE M/ HWD NHWD RWD CRU MFR MER	TERIAL AND OUTPUT FL kg kg kg kg kg kg	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0	0.00361 43.2 0.00535 0 0 0
EN15804+A2 WASTE MA HWD NHWD RWD CRU MFR MER EEE EET	TERIAL AND OUTPUT FL kg kg kg kg kg MJ	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0
EN15804+A2 WASTE MA HWD NHWD RWD CRU MFR MER EEE EET	TERIAL AND OUTPUT FL kg kg kg kg kg MJ MJ	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0
EN15804+A2 WASTE MA HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION	ATERIAL AND OUTPUT FL kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0
EN15804+A2 WASTE MA HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG	ATERIAL AND OUTPUT FL kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq.	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0 258	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0 0 2 3 3	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 237	0.00361 43.2 0.00535 0 0 0 0 0 0 0 270
EN15804+A2 WASTE MA HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM	ATERIAL AND OUTPUT FL kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 270 1.15E-05
EN15804+A2 WASTE MA HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP	TERIAL AND OUTPUT FL kg kg kg kg kg MJ AL ENVIRONMENTAL IMI kg CO2-eq. Disease incidences kBq U235 eq.	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 258 7.31E-06 0.606	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 0 0 270 1.15E-05 0.720
EN15804+A2 WASTE MA HWD NHWD RWD CRU CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW	TERIAL AND OUTPUT FL kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 PACT INDICATORS, M 258 7.31E-06 0.606 759	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
EN15804+A2 WASTE MA HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP	TERIAL AND OUTPUT FL kg kg kg kg kg kg kg kg MJ AL ENVIRONMENTAL IM kg CO2-eq. Disease incidences kBq U235 eq. CTUE CTUH CTUH Pt	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
EN15804+A2 WASTE MA HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP	ATERIAL AND OUTPUT FL kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt CARBON CONTENT IND	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
EN15804+A2 WASTE MA HWD NHWD RWD CRU CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A2 BIOGENIC BCC-prod	TERIAL AND OUTPUT FL kg kg kg kg kg kg kg MJ AL ENVIRONMENTAL IMI kg CO2-eq. Disease incidences kBq U235 eq. CTUe CTUh Pt CARBON CONTENT IND kg C	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
EN15804+A2 WASTE MA HWD NHWD RWD CRU CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack	TERIAL AND OUTPUT FL kg kg kg kg kg kg kg kg MJ AL ENVIRONMENTAL IMI kg C2_eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt CARBON CONTENT IND kg C kg C kg C kg C	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
EN15804+A2 WASTE MA HWD NHWD RWD CRU MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack EN15804+A1 ENVIRONM	Image: Second system kg MJ AL ENVIRONMENTAL IM kg CO2-eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh CTUN Pt CARBON CONTENT IND kg C kg C kg C KENTAL IMPACT INDICAT	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 270 1.15E-05 0.720 1,000 1.94E-08 1.24E-06 2,490 0 2.71
EN15804+A2 WASTE M/ HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A2 BIOGENIC BCC-pack EN15804+A1 ENVIRONN GWP	TERIAL AND OUTPUT FL kg kg kg kg kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO2-eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt CARBON CONTENT IND kg C kg C kg CQ2 eq.	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
EN15804+A2 WASTE M/ HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack EN15804+A1 ENVIRONN GWP ODP	TERIAL AND OUTPUT FL kg kg kg kg kg kg kg kg kg MJ AL ENVIRONMENTAL IMI kg CO2-eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt CARBON CONTENT IND kg C kg C kg CO2 eq. kg CO2 eq. kg CC11 eq.	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 0 0 0 1.15E-05 0.720 1.000 1.94E-08 1.24E-06 2.490 0 0 2.71
EN15804+A2 WASTE MA HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack EN15804+A1 ENVIRONM GWP ODP AP	TERIAL AND OUTPUT FL kg kg kg kg kg kg kg kg MJ AL ENVIRONMENTAL IMI kg CO2-eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt CARBON CONTENT IND kg C kg C kg CO2 eq. kg SO2 eq.	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 0 0 1.15E-05 0.720 1.15E-05 0.720 1.000 1.94E-08 1.24E-06 2,490 0 0 0 2.71 0 0 2.71
EN15804+A2 WASTE MA HWD NHWD RWD CRU CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack EN15804+A1 ENVIRONN GWP ODP AP	TERIAL AND OUTPUT FL kg kg kg kg kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IMI kg CO2-eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUN Pt CARBON CONTENT IND kg C kg C kg CO2 eq. kg SO2 eq. kg (PC 11 eq. kg SO2 eq. kg (PO4) ³ eq.	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 0 0 1.15E-05 0.720 1.15E-05 0.720 1.000 1.94E-08 1.24E-06 2,490 0 0 2.71 0 0 2.71
EN15804+A2 WASTE MA HWD NHWD RWD CRU CRU MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPC HTPC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack EN15804+A1 ENVIRONN GWP ODP AP EP POCP	TERIAL AND OUTPUT FL kg MJ MJ AL ENVIRONMENTAL IM kg CO2-eq. Disease incidences kBq U235 eq. CTUe CTUh CTUH CTUN Pt CARBON CONTENT IND kg C kg CQ2 eq. kg CO2 eq. kg CO2 eq. kg CO2 eq. kg CPO4) ³⁻ eq. kg C2H4 eq.	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 1.0 1.15E-05 0.720 1.000 1.94E-08 1.24E-06 2,490 0 0 2.71 0 0 2.71 0 0 2.71
EN15804+A2 WASTE MA HWD NHWD RWD CRU CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A2 BIOGENIC BCC-prod BCC-pack EN15804+A1 ENVIRONN GWP ODP AP	TERIAL AND OUTPUT FL kg kg kg kg kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IMI kg CO2-eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUN Pt CARBON CONTENT IND kg C kg C kg CO2 eq. kg SO2 eq. kg (PC 11 eq. kg SO2 eq. kg (PO4) ³ eq.	OW PARAMETERS, M 0.00156 31.7 0.00456 0 0 0 0 0 0 0 0 0 0 0 0 0	ODULES A1-A3, PER T 0.00369 40.3 0.00542 0 0 0 0 0 0 0 0 0 0 0 0 0	ONNE OF PIPE 0.00363 40.3 0.00535 0 0 0 0 0 0 0 0 0 0 0 0 0	0.00361 43.2 0.00535 0 0 0 0 0 0 0 0 0 0 1.15E-05 0.720 1.15E-05 0.720 1.000 1.94E-08 1.24E-06 2,490 0 0 2.71 0 0 2.71

EPD - REINFORCED CONCRETE PIPES (RCP)



Pipe grouping and variation (A1-A3) per tonne

Table 14 - Range in GWP-GHG results (modules A1-A3)

GROUP #	GROUP NAME	REPRESENTATIVE PRODUCT CODE	PRODUCTION FACILITY	MIN DEV	MAX DEV
1	Spun Class 2 FJ	HHY-80074151	Hornby	-8%	7%
2	Spun Class 2 RRJ Small	HHY-80074077	Hornby	-3%	8%
3	Spun Class 2 RRJ Medium	HHY-80074096	Hornby	-7%	9%
4	Spun Class 2 RRJ Large	HHY-80074121	Hornby	-8%	0%
5	Spun Class 2 RRJ Short	HHY-80074048	Hornby	-11%	6%
6	Spun Class 4 FJ	HHY-80074153	Hornby	-13%	9%
7	Spun Class 4 RRJ	HHY-80074106	Hornby	-10%	6%
8	Spun Class 4 RRJ Short 375	HHY-80074040	Hornby	0%	0%
9	Spun Class 4 RRJ Short 450	HHY-80074041	Hornby	0%	0%
10	Spun Class 4 RRJ Short 525	HHY-80074042	Hornby	0%	0%
11	Spun Class 4 RRJ Short Medium	HHY-80074044	Hornby	-5%	8%
12	Spun Skid Joint	HHY-80074125	Hornby	0%	0%
13	VT Class 2	HPA-80074206	Papakura	-11%	10%
14	VT Class 4 IWJ	HPA-80074237	Papakura	-10%	0%
15	VT Class 4 RRJ Medium	HPA-80074201	Papakura	-12%	10%
16	VT Class 4 RRJ Large	HPA-80074221	Papakura	-9%	4%
17	RCP 225	HHM-80074063	Te Rapa Park (Interpipe)	-2%	1%
18	RCP Class 2 300-600	HHM-80074068	Te Rapa Park (Interpipe)	-2%	3%
19	RCP Class 4 300-600	HHM-80074091	Te Rapa Park (Interpipe)	-6%	6%

Distribution (A4) per tonne

Table 15 - Distribution (A4) per tonne

INDICADE, ARIARINITSCNUESDA 4.4 CORE UNICATIONAL CATOR ADDULES AA, PER JOINT CO FPECNUESDA 4.2 CORE UNICATIONAL INDECT INDICATORS. MODULES AA, PER JOINT CO FPEGOV-PTOTALkg CO, eq.GOV-PTOTALkg PCO, eq.GOV-PTOTALMJGOV-PTOTALGOVGOV-PTOTALGOVGOV-PTOTALGOVGOV-PTOTALGOVGOV-PTOTALGOVGOV-PTOTALGOVGOV-PTOTALGOVGOV-PTOTALGOVGOV-PTOTALGOVGOV-PTOTALGOV	FROM SITE		PAPAKURA (HPA)	HORNBY (HHY)	TE RAPA (INTERPIPE JV)
CVM-TOTALkg CO, eq.9.2216.413.6CVM-FOSCILkg CO, eq.0.004850.00830.00683CVM-BLOCENCkg CO, eq.1.865-043.301-042.731-04CVM-BLOCENCkg CO, eq.1.865-152.415-152.421-15APMole of Heq.0.01650.02340.0245CVM-BLOCENCkg CH-eq.1.855-162.215-062.231-06EP-MARNEkg Neq.0.01610.02240.0101EP-RESINALMole of Heq.0.07580.01350.0131COMPOkg Neq.0.07080.01320.0101EP-RESINALMole of Neg.0.07080.01320.0101COMPOSILkg Neq.0.07080.01370.0886ENREGO-AVERESINALMJ0.5971.060.0781CNP-ROSILMJ0.05971.060.0781PEREMJ0.5971.060.0781PEREMJ0.5971.060.0781PEREMJ0.1222.0171.80SM kg 20.0190.000.00.0ROSINMJ0.220.00.0ROSINMJ0.020.00.0ROSINMJ0.220.00.0ROSINMJ0.05971.060.00ROSINMJ0.05971.060.00ROSINMJ0.000.00.0ROSINMJ0.000.00.0ROSINMJ0.000.0 <td< th=""><th>INDICATORS, ABBR.</th><th>UNITS</th><th></th><th></th><th></th></td<>	INDICATORS, ABBR.	UNITS			
CVM-TOTALkg CO, eq.9.2216.413.6CVM-FOSCILkg CO, eq.0.004850.00830.00683CVM-BLOCENCkg CO, eq.1.865-043.301-042.731-04CVM-BLOCENCkg CO, eq.1.865-152.415-152.421-15APMole of Heq.0.01650.02340.0245CVM-BLOCENCkg CH-eq.1.855-162.215-062.231-06EP-MARNEkg Neq.0.01610.02240.0101EP-RESINALMole of Heq.0.07580.01350.0131COMPOkg Neq.0.07080.01320.0101EP-RESINALMole of Neg.0.07080.01320.0101COMPOSILkg Neq.0.07080.01370.0886ENREGO-AVERESINALMJ0.5971.060.0781CNP-ROSILMJ0.05971.060.0781PEREMJ0.5971.060.0781PEREMJ0.5971.060.0781PEREMJ0.1222.0171.80SM kg 20.0190.000.00.0ROSINMJ0.220.00.0ROSINMJ0.020.00.0ROSINMJ0.220.00.0ROSINMJ0.05971.060.00ROSINMJ0.05971.060.00ROSINMJ0.000.00.0ROSINMJ0.000.00.0ROSINMJ0.000.0 <td< th=""><th>EN15804+A2 CORE EN</th><th>VIRONMENTAL IMPACT II</th><th>NDICATORS, MODULES A4, PER TO</th><th>NNE OF PIPE</th><th></th></td<>	EN15804+A2 CORE EN	VIRONMENTAL IMPACT II	NDICATORS, MODULES A4, PER TO	NNE OF PIPE	
OWN-BLOCENSILkg CO, eq.9.2216.413.6OWN-BLOCENICkg CO, eq.0.004850.006250.00625OPFkg CFC11-eq.1.36 E+152.41E+162.0021+5APMole of Hrep.0.016150.02240.0221DEP-FLESHWITERkg P eq.1.52E-062.23E-062.325E-06EP-FLESHWITERkg P eq.0.00580.03230.0111DCOPkg MMYOC eq.0.01610.02840.02210.0101PCRPkg MMYOC eq.0.01610.02860.02780.0788ADP-MAMkg Sb-eq.1.416-072.92771.0680.0788PCRSMJ0.05671.060.0780.0788PRENEMJ0.5371.060.078PERMEMJ0.5371.060.078PERMEMJ0.020.00.0PERMEMJ0.020.00.0PERMEMJ0.020.00.0PERMEMJ0.00.00.0PERMEMJ0.00.00.0PERMEMJ0.00.00.0PERMEMJ0.00.00.0PERMEMJ0.00.00.0PERMEMJ0.00190.00210.0014PERMEMJ0.00.00.0PERMEMJ0.00190.00190.0014PERMEMJ0.00190.00160.0PERMEMJ0.00190.00174 <td>GWP-TOTAL</td> <td>kg CO₂-eq.</td> <td>9.22</td> <td>16.4</td> <td>13.6</td>	GWP-TOTAL	kg CO ₂ -eq.	9.22	16.4	13.6
GWP-BIOENIC By CO, eq.0.004630.004830.0083GWP-LULUCkg CO, eq.1.86E-043.30E-042.215E-04GDPkg CO, eq.1.35E-152.41E-152.00E-15APMole of Hr eq.0.01650.02940.0243EP-MANNEkg Pe, eq.1.51E-162.23E-062.33E-06EP-MANNEkg Pe, eq.0.01610.02620.0101EP-IEMESTRIALMole of Neq.0.01610.02230.0101EP-IEMESTRIALMole of Neq.0.01610.02230.0101EP-IEMESTRIALMole of Neq.0.01610.02230.0237ADP MAMkg Sh-eq.1.43E-072.53E-072.10E-07ADP MAMKg Sh-eq.0.01070.0688ENISSOLAZ RESOURCEUSE PARAMETERS, MOULES AL, PERTONNE OF PIPE0.01070.0688ENISSOLAZ RESOURCEUSE PARAMETERS, MOULES AL, PERTONNE OF PIPE0.01070.0678PEREMJ0.0571.060.078PEREMJ0.0170.08780.017PEREMJ0.0190.0100.010PEREMJ0.0190.01010.0101PEREMJ0.0190.00110.0011PEREMJ0.0190.00110.0011PEREMJ0.0190.00110.0011PEREMJ0.0190.00110.0011PEREMJ0.0190.00110.0011PEREMJ0.0190.001010.0010PEREMJ0.019<	GWP-FOSSIL		9.22	16.4	13.6
GWF-LULCO kg CO, eq. 188E+04 3.36E+04 2.37E+04 GPP kg CO, eq. 1.36E+15 2.00E15 2.00E15 AP Mole of H eq. 0.0165 0.0294 0.0243 EP-RESTRAL kg P eq. 1.52E+05 2.27E+05 2.23E+05 EPAMAINE kg P eq. 0.0058 0.0325 0.0111 POCP kg MOvO eq. 0.0016 0.0226 0.0227 ADP MSM kg Sh-eq. 1.43E+07 2.53E+07 2.10E+07 ADP FOSSL MU 0.0004 0.017 0.0888 EMISS0A422ESOURE USE FARAMETERS, MODULES AL PER TONNE OF PIPE T 0.878 PERM MJ 0.597 1.06 0.878 PERM MJ 0.0 0 0 SM kg G 0 0 0 0 PERM MJ 0 0 0 0 0 SM kg G 0 0 0 0 0 0 PERM <td>GWP-BIOGENIC</td> <td>-</td> <td>0.00465</td> <td>0.00825</td> <td>0.00683</td>	GWP-BIOGENIC	-	0.00465	0.00825	0.00683
OPFig CPC11-aq.1.38E+152.4E+752.4E+75APMoleo H + eq.0.01650.02240.0216EP-ARSHWATEKkg P eq.1.52E+062.70E+062.23E+06EP-ARSHWATEKMoleo H eq.0.00580.01220.0101FDTERRESTALLMole OH eq.0.00580.01250.0117PCDEkg NM/OC eq.0.001610.02860.0227ADP-M&Mkg Sb + eq.1.43E+072.53E+072.10E+07ADP-M&Mm' world equiv.0.05040.1070.088RUNSDOLAZ RESOURCE USE PRAMITERS.MODULES A4. PER TONNE OF PPE0.0878PERKMJ0.5971.060.078PERKMJ0.5971.060.078PERKMJ0.5971.060.078PERKMJ0.0210.0180.0018PERKMJ0.0210.00180.0018PERKMJ0.00190.00110.0018SMkg0.00190.00210.0010PENKMJ00.0010.0018SMkg0.002330.002030.0021SMkg0.002330.005200.0041SM0000PENKMJ000PENKkg0.002330.005200.0041SM00000PERMJ0000PENKMJ0000PENK	GWP-LULUC		1.86E-04	3.30E-04	2.73E-04
EPFRESHWATER kg P eq. 1.52E-06 2.70E-06 2.23E-06 EPAAANNE kg N eq. 0.0068 0.0110 0.0111 POEP kg N MVOC eq. 0.00161 0.0286 0.0237 ADP-MSM kg Sb-eq. 1.43E-07 2.53E-07 2.10E-07 ADP-MSM kg Sb-eq. 1.43E-07 2.53E-07 0.0088 ENISSO4-A22 RESOUCE USE PARAMETERS, MODULES A4, PER TONNE OF PIPE V 0.0684 0.107 0.0888 ENISSO4-A22 RESOUCE USE PARAMETERS, MODULES A4, PER TONNE OF PIPE V 0.037 1.06 0.378 PERM MJ 0.537 1.06 0.378 PERM MJ 0.397 1.06 0.378 PERM MJ 0.397 1.06 0.378 PERM MJ 0.22 217 180 SM kg 0.00 0 0 SM kg 0.00 0 0 SM kg 0.0018 0.0021 0.00174 ENISSO4-A22 MODITORUTEL	ODP		1.36E-15	2.41E-15	2.00E-15
EP-MARINE kg N eq. 0.00668 0.0122 0.0101 EP-TERRESTRIAL Mole of N eq. 0.0758 0.135 0.0111 EP-TERRESTRIAL Mole of N eq. 0.0761 0.0286 0.0337 ADP-MAM kg Sh-eq. 1.43E-07 2.53E-07 2.10E-07 ADP-FOSSIL MJ 0.0264 0.0107 0.0888 ENTEGOL422 2.017 1.06 0.878 PERE MJ 0.0504 0.00 0.0 PERE MJ 0.597 1.06 0.878 PERE MJ 0.597 1.06 0.878 PERE MJ 0.00 0 0 PERE MJ 0.012 0.010 0 PENR MJ 0.0 0 0 SM kg 0.0019 0.00211 0.00174 PENRE MJ 0 0 0 0 SM kg 0.0019 0.00211 0.00174 PENREM	AP	Mole of H⁺ eq.	0.0165	0.0294	0.0243
EP-TERRESTRIALMole of N eq.0.07580.1350.111POCPkg NM/OC eq.0.01610.02800.0227ADP-MSMkg Sb-eq.1.43E-O72.53E-072.05E-07ADP-FOSSILMJ122217180WDPm* world equiv.0.00640.07270.088ENISS04-AZ RESOURCE UE PRAMETERS.NOULES AL, PER TONNE OF FIPET00.0778PERREMJ0.5971.060.078PERREMJ0.5971.060.078PERREMJ0.5971.060.078PERREMJ0.05971.060.078PERREMJ0.05971.060.078PENREMJ0.0120.0100.010SMkg0.00190.00190.0010NRSFMJ0.000SMkg0.00190.00210.0010NRSFMJ0.000RVDkg0.06180.002500.00430RWDkg0.00190.00190.0010NHVDkg0.00190.002500.00430RWDkg GO_eq.9.2116.813.8-07RWDkg CO_eq.9.2116.813.78-07ISSD44A2 ADDITIONAL LINFACT INDICATORS, MODULES AL PER TONNE OF PIPE0.002520.00291RWDkg CO_eq.9.2116.813.78-07ISSD44A2 ADDITIONAL LINFACT INDICATORS, MODULES AL PER TONNE OF PIPE0.00210.0021RWDkg CO_eq. </td <td>EP-FRESHWATER</td> <td>kg P eq.</td> <td>1.52E-06</td> <td>2.70E-06</td> <td>2.23E-06</td>	EP-FRESHWATER	kg P eq.	1.52E-06	2.70E-06	2.23E-06
POCP kg NMVOC eq. 0.0161 0.0286 0.0237 ADP-MAM kg Sb-eq. 1.43E-07 2.58E-07 2.10E-07 ADP-FOSSIL MJ 122 277 180 WDP m² world equiv. 0.0664 0.107 0.0888 ENISG04A22 RESOURCE USE PARAMETERS.MODULES AL PER TONIC OF PIPE U 0.078 PERK MJ 0.597 1.06 0.378 PERK MJ 0.597 1.06 0.378 PERK MJ 0.0 0 0 PENK MJ 0.0019 0.00174 0.00174 PENK MJ 0 0 0 0 NRF MJ 0.0019 0.00211 0.00174 PMO kg 0.00253 <td>EP-MARINE</td> <td>kg N eq.</td> <td>0.00688</td> <td>0.0122</td> <td>0.0101</td>	EP-MARINE	kg N eq.	0.00688	0.0122	0.0101
ADP-M8M kg Sb-eq. 1.43E-07 2.53E-07 2.10E-07 ADP-COSSIL MJ 122 2.17 1080 ADP-COSSIL MJ 0.0604 0.107 0.0888 ENISBO4-A2 RESOURCE USE PARAMETERS, MODULES AL, PER TONNE OF PIRE V 0.0688 0.073 PERM MJ 0.597 1.06 0.878 PERM MJ 0.597 1.06 0.878 PERME MJ 0.597 1.06 0.878 PENRE MJ 0.010 0.0 0 PENRE MJ 0.021 0.001 0.0 SM kg 0.001 0.001 0.0 0 FINRT MJ 0.011 0.0021 0.0017 FINRT MJ 0.011 0.0021 0.0017 FINRT MJ 0.0019 0.0021 0.0017 FINRT MJ 0.0019 0.0021 0.0017 FINRT MJ 0.0019 0.0021 0.0017	EP-TERRESTRIAL	Mole of N eq.	0.0758	0.135	O.111
ADP-FOSSIL NJ 122 217 (180) WDP m*world equiv. 0.0604 0.07 0.0888 ENISG04-22 RESOURCE UEF RAAMETERS, MOULES A4, PER TONNE OF PIFE 0.0678 PERM MJ 0.597 1.066 0.678 PERM MJ 0.597 1.066 0.478 PERM MJ 0.22 217 180 PENRE MJ 122 217 180 PENRT MJ 0 0 0 SM kg 0 0 0 SM kg 0.0019 0.0021 0.0017 SM kg 0.0019 0.0021 0.0017 SM kg 0.0019 0.0021 0.0017 SM kg 0.0019 0.0021 0.0014 SM kg 0.0023 0.0052 0.00430 RWD kg 0.0023 0.0052 0.00430 RWD kg 0.002 0	РОСР	kg NMVOC eq.	0.0161	0.0286	0.0237
WDP m world equiv. 0.0604 0.107 0.0888 ENISOU-422 RESOURC-USE PARAMETERS, MODULES A4, PER TONNE OF IPIE	ADP-M&M	kg Sb-eq.	1.43E-07	2.53E-07	2.10E-07
EN15804+A2 RESOURCE USE PARAMETERS, MODULES A4, PER TONNE OF PIPE PERE MJ 0.597 1.06 0.678 PERM MJ 0.597 1.06 0.678 PERM MJ 0.597 1.06 0.678 PENR MJ 0.597 1.06 0.678 PENR MJ 0.597 1.06 0.678 PENRM MJ 0 0 0 SM Kg 0 0 0 SM Kg 0 0 0 SM Kg 0.00119 0.00211 0.00174 EN15804+A2 WASTE MATERIAL ND OUTPUT FLOW PARAMETERS, MODULES A4, PER TONNE OF PIPE 0 0 0 HWD Kg 4.422 to 7.84E-10 6.49E-10 6.49E-10 NHWD Kg 0.00233 0.00520 0.00430 0 0 RWD kg 0.00233 0.00520 0.00430 0 0 NHWD kg 0.00233 0.00520 0.00430	ADP-FOSSIL	MJ	122	217	180
PERE MJ 0.597 1.06 0.878 PERM MJ 0.597 1.06 0.878 PENRE MJ 0.597 1.06 0.878 PENRE MJ 0.22 2.17 180 PENRE MJ 0.0 0 0 PENRE MJ 0.0 0 0 SM Kg 0 0 0 SM Kg 0.00 0 0 SM Kg 0.0019 0.0017 0 FW MJ 0.0019 0.00211 0.0017 FW M3 0.00293 0.00230 0.00430 NHWD Kg 4.42E-10 7.84E-10 6.49E-10 NHWD Kg 0.00293 0.00430 0 RWD kg 0.00293 0.00430 0 GRWD kg 0.0034 0.0018 0.0018 GWP-GHG Kg CO_, eq. 9.21 16.3 13.5	WDP	m³ world equiv.	0.0604	0.107	0.0888
PERM MJ 0 0 0 PERT MJ 0.557 1.06 0.878 PENRE MJ 122 217 180 PENRT MJ 0 0 0 SM Kg 0 0 0 SM kg 0 0 0 NSF MJ 0 0 0 NRSF MJ 0 0 0 NSF MJ 0 0 0 NRSF MJ 0 0 0 NSF MJ 0.00019 0.0021 0.0014 NSF MJ 0 0 0 0 NHWD kg 0.0023 0.00520 0.0014 0 0 0 0 0	EN15804+A2 RESOURC	CE USE PARAMETERS, MC	DULES A4, PER TONNE OF PIPE		
PERT MJ 0.597 1.06 0.878 PENRE MJ 122 217 180 PENRM MJ 0 0 0 SM kg 0.0019 0.00211 0.00174 SMSF MJ 0.0019 0.00211 0.00174 FW m ³ 0.0019 0.00211 0.00174 FWD kg 0.00293 0.00520 0.00430 NHWD kg 0 0 0 0 NHWD kg 0.00293 0.00520 0.00430 RER kg 0.0019 0.0019 0.0010 RFR kg 0.0019 0.00 0 0 MFR kg 0.0019 0.0019 0.0019 0.0019 ETIS804+A2 ADDITIONELTUNINENT INDICATORS, MODULES AL, PER T	PERE	MJ	0.597	1.06	0.878
PENREMJ122217180PENRMMJ122217180PENRYMJ122217180SMkg000RSFMJ000RSFMJ000FWm³0.00190.00110.0017FWDkg4.42E107.84E106.49E10NHVDkg0.002930.00500.00430RWDkg1.69E-053.00E-052.48E-05CRUkg0000MFRkg0000EEMJ0000EEMJ0000MS04-42 DDITOX-EVTROMENTAL INF/CT INDICATORS, MODULES A4, PER TONNE OF PIPE113.5CMP-GHGkg Q:000ETMJ0000ETMJ0000ETMJ0000ETMJ0.001980.003520.00291IRPkg Q: 26:qc9.2116.313.5IRPkg Q: 25:qc9.2116.313.22IRPkg Q: 25:qc0.3140.550.462SQPPt0.3140.550.462CTUh7.99E101.42E:091.42E:091.42E:09SQPPt0.3140.550.462CTUh2.99E:011.42E:090.003520.00251	PERM	MJ	0	0	0
PENRMMJ000PENRTMJ122217180SMkg000SMkg000RFMJ000RVm³0.00190.002110.00174ENIS604+A2 WASTE MALE NOL DUTPUT FLOW PARAMETERS, MODULES A4, PER TONNE OF PIPE00HWDkg0.002930.005200.00430NHWDkg0.002930.005200.00430RWDkg0.002930.005200.00430RWDkg0000RFRkg0000MFRkg0000EEEMJ00000EVIS504+A2 ADDITONAL ENVRONMENTAL INDICATORS, MODULES A4, PER TONNE OF PIPE000GWP-GHGkg CO_eat9.2116.31.551.56PMDisease incidences1.18E-072.09E-071.73E-07IRPKBq U235 eq.0.001980.003520.005200.00211IRP-FWCTUle4.688.30.968.71.72E-07IRPKg CO_eat9.101.42E-072.09E-071.73E-07IRPKg CO_eat9.101.621.34ODPkg CO_eat9.101.621.34ODPkg CO_eat9.101.621.34ODPkg CO_eat0.0190.0210.00341ODPkg CO_eat0.019<	PERT	MJ	0.597	1.06	0.878
PENRTMJ122217180SMkg000RSFMJ000RSFMJ0.00190.002110.00174FMm³0.00190.002110.00174ENTSS04+A2 WASTE MATERIAL AND OUTPUT FLOW PARAMETERS, MODULES A4, PER TONNE OF PIPETHWDkg0.002930.00520NHWDkg0.002930.00520CRUkg0.002930.00520CRUkg00MERkg00EEMJ000EEMJ000EGGO_red,9.2116.31.35PMDisease incidences1.18E-072.09E-071.73E-07IRPKbq U235 eq.0.001980.003520.00291HTPCCTUh7.99E-101.42E-091.7E-09HTPCCTUh2.89E-085.13E-084.25E-08SQPFt0.3140.5070.428ODPkg CC_red,9.1016.21.34ODPkg CC_red,0.0190.0210.0175EPkg CC_red,0.0190.0210.0175GWPkg CC_red,0.0190.0210.0175GWPkg CC_red,0.0190.0210.0175EPkg CC_red,0.0190.0210.0175APkg CC_red,0.0190.0210.0175EPkg CC_red,0.0190.0210.0175 <td>PENRE</td> <td>MJ</td> <td>122</td> <td>217</td> <td>180</td>	PENRE	MJ	122	217	180
SM kg 0 0 RSF MJ 0 0 0 NRSF MJ 0 0 0 FW m³ 0.00119 0.00211 0.00174 ENISB04-A2 WASTE MATERIAL AND OUTPUT FLOW PARAMETERS, MODULES A4, PERTONNE OF PIPE 6.49E-10 HWD kg 4.42E-10 7.84E-10 6.49E-10 NHWD kg 0.00293 0.00520 0.00430 RWD kg 0.00293 0.00520 0.00430 MER kg 0.00293 0.00520 0.00430 EEE MJ 0 0 0 0 EVP-GHG kg CO_req. 9.21 16.3 13.5 PM Disease incidences 1.18E-07 2.09E-07 1.73E-07 IRP-RW	PENRM	MJ	0	0	0
RSFMJ000NRSFMJ0.00190.002110.0017FWm³0.00190.002110.0017ENISS04+A2 MSTEMATERIA AND OUTPUT FLOW PARAMETERS, MODULES AA, PER TONNE OF PIPEHWDkg4.42E+107.84E+10NHWDkg0.002930.00520NHWDkg0.002930.00520RWDkg0.002930.00520RWDkg0.00190.0010RFRkg0.000MERkg0.000EEEMJ0.000ETMJ0.000ETMJ0.00180.0013EVP-GHGkg CO_req.9.2116.3PMDisease incidences1.18E-072.09E-07IRPkg U23 eq.0.00180.00251CTUCTUh7.99E+101.42E-09HTPCCTUh7.99E+101.42E-09SQPPt0.3140.557SQPPt0.3140.42ESQPPt0.3140.621CTUSMDULES AA, PER TONNE OF PIEGWP-GHAPINENT LINDICATIONS, MODULES AA, PER TONNE OF SIZE0.621CTUS7.99E+101.42E-091.17E+03IRPkg CO_req.9.101.42E-05GUPkg CO_req.9.101.42E-05GUPkg CO_req.9.101.42E-05CTUS7.99E+101.42E-053.22E+15CTUS7.91E3.32E+153.22E+15	PENRT	MJ	122	217	180
NRSFMJ000FWm³0.00190.002110.00174ENISG04A2 WASTE MATTERIAL AND OUTPUT FLOW PARAMETERS, MODULES A4, PER TONNE OF PIPE0.00174HWDkg4.42E107.84E106.49E10HWDkg0.002930.005200.004030RWDkg1.69E-053.00E-052.48E-05CRUkg0.000930.005200.0010MFRkg0.0000MERkg0.0000EETMJ0.0000EETMJ0.00182.09E-071.73E-07GWP-GHGkg C0_erq.9.2116.313.5PMDisease incidences1.18E-072.09E-071.73E-07IRPKB (J225 eq.0.001980.003520.00211GVP-GHGkg C0_srq.9.99E-101.42E-091.17E-09HTPCCTUh7.99E-101.42E-091.17E-09GVPkB (J225 eq.0.31E0.5570.462SQPPt0.3140.5570.462SQPPt0.3140.5570.462SQPkg C0_eq.9.01016.21.34E-15APkg C0_eq.9.01016.21.34E-15APkg C0_eq.0.0190.00180.00326APPCPkg C0_eq.0.0190.002160.00381APEkg C0_eq.9.01016.21.34E-15APCPkg C0_eq.0.00190.00381	SM	kg	0	0	0
FW m³ 0.00119 0.00211 0.00174 ENI5804+A2 WASTE MATERIAL AND OUTPUT FLOW PARAMETERS, MODULES A4, PETONNE OF PIPE	RSF	MJ	0	0	0
EN15804+A2 WASTE WA	NRSF	MJ	0	0	0
HWDkg4.42E-107.84E-106.49E-10NHWDkg0.002930.005200.00430RWDkg1.69E-053.00E-052.48E-05CRUkg000MFRkg000MERkg000MERkg000EEEMJ000EEEMJ000BYP-GHGkg CO2-eq.9.2116.313.5PMDisease incidences1.18E-072.09E-071.73E-07IRPkBq U235 eq.0.001980.003520.00291HTPCCTUh7.99E-101.42E-091.17C-09HTPCCTUh2.89E-085.13E-084.42E-50SQPPt0.3140.5570.462PMkg CO2-eq.9.101.621.34ODPkg CO2-eq.9.1016.21.34ODPkg CO2-eq.9.101.622.66E-15APkg SO2-eq.0.01190.0212.66E-15APkg CC11eq.1.81E-153.22E-152.66E-15APkg SO2-eq.0.01190.0210.0175APCkg C2, H, eq.0.01910.003390.00344POCPkg Sb eq.1.43E-072.53E-072.10E-07	FW	m ³	0.00119	0.00211	0.00174
NHWD kg 0.00293 0.00520 0.00430 RWD kg 1.69E-05 3.00E-05 2.48E-05 CRU kg 0 0 0 MFR kg 0 0 0 MER kg 0 0 0 MER kg 0 0 0 EEE MJ 0 0 0 ET MJ 0 0 0 EN15804+A2 ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PER TONNE OF PIPE 16.3 13.5 PM Disease incidences 1.18E-07 2.09E-07 1.73E-07 IRP KBQ C02-eq. 9.21 16.3 13.5 PM Disease incidences 1.18E-07 2.09E-07 1.73E-07 IRP KBQ C02-eq. 0.00198 0.00352 0.00291 ETP-FW CTUe 46.8 83.0 68.7 SQP Pt 0.314 0.557 0.462 SQP Pt 0.314	EN15804+A2 WASTE M	ATERIAL AND OUTPUT FL	OW PARAMETERS, MODULES A4, P	ER TONNE OF PIPE	
RWD kg 1.69E-05 3.00E-05 2.48E-05 CRU kg 0 0 0 MFR kg 0 0 0 MFR kg 0 0 0 0 MER kg 0 0 0 0 0 MER kg 0	HWD	kg	4.42E-10	7.84E-10	6.49E-10
CRU kg 0 0 0 MFR kg 0 0 0 MER kg 0 0 0 MER kg 0 0 0 0 EEE MJ 0 0 0 0 EET MJ 0 0 0 0 EN15804+A2 ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PERTONNE OF PIPE 0 0 0 EN15804+A2 ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PERTONNE OF PIPE 0 13.5 13.5 PM Disease incidences 1.18E-07 2.09E-07 1.73E-07 IRP Kg Q1235 eq. 0.00198 0.00352 0.00291 ETP-FW CTUe 4.68.8 8.3.0 6.8.7 SQP CTUb 7.99E-10 1.42E-09 1.17E-09 HTPC CTUh 2.89E-08 5.155 0.257 SQP Pt 0.314 0.557 0.557 GWP kg C0_2 eq. 9.10	NHWD	kg	0.00293	0.00520	0.00430
MFR kg 0 0 0 MER kg 0 0 0 MER kg 0 0 0 EEE MJ 0 0 0 EET MJ 0 0 0 ET MJ 0.00198 0.00352 0.00291 GWP-GHG kg CO2, eq. 0.00198 0.00352 0.00291 IRP kBq U235 eq. 0.00198 0.00352 0.00291 ETP-FW CTUe 46.8 83.0 68.7 HTPC CTUh 7.99E-10 1.42E-09 1.17E-09 HTPNC CTUh 2.89E-08 0.557 0.462 SQP Pt 0.34 0.55 2.66E-15 GWP kg CO_2 eq. 9.10 16.2 13.4	RWD	kg	1.69E-05	3.00E-05	2.48E-05
MER kg 0 0 0 EEE MJ 0 0 0 ET MJ 0.001E 0 0 ET Kg CO2req. 9.21 16.3 13.5 PM Disease incidences 1.18E-07 2.09E-07 1.73E-07 IRP KBq U235 eq. 0.00198 0.00352 0.00291 ETP-FW CTUe 46.8 83.0 68.7 HTPC CTUh 7.99E-10 1.42E-09 1.17E-09 HTPNC CTUh 2.89E-08 5.13E-08 4.25E-08 SQP Pt 0.314 0.557 0.462 ENI5804+A1 ENVIRONENTAL IMPACT INDICATUREST, MODULES A4, PER TONNE OF PIEE 2.66E-15 3.22E-15 2.66E-15 AP kg CO_2 eq.	CRU	kg	0	0	0
EEE MJ 0 0 0 ET MJ 0 0 0 EN15804+A2 ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PERTONNE OF PIPE 0 0 GWP-GHG kg CO ₂ -eq. 9.21 16.3 13.5 PM Disease incidences 1.18E-07 2.09E-07 1.73E-07 IRP kBq U235 eq. 0.00198 0.00352 0.00291 ETP-FW CTUe 46.8 83.0 68.7 HTPC CTUh 7.99E-10 1.42E-09 1.17E-09 HTPNC CTUh 2.89E-08 5.13E-08 4.25E-08 SQP Pt 0.314 0.557 0.462 EN15804+A1 ENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PER TONNE OF FIVE 0.425 1.425 GWP kg CO2 eq. 9.10 16.2 1.34 ODP kg CFC 11 eq. 1.81E-15 3.22E-15 2.66E-15 AP kg SO2 eq. 0.0119 0.0211 0.0134 POCP kg CO, H ₄ eq. 0.0019	MFR	kg	0	0	0
EET MJ 0 0 0 EN15804+A2 ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PER TONNE OF PIPE 16.3 13.5 GWP-GHG kg CO ₂ req. 9.21 16.3 13.5 PM Disease incidences 1.18E-07 2.09E-07 1.73E-07 IRP kBq U235 eq. 0.00198 0.00352 0.00291 ETP-FW CTUe 46.8 83.0 668.7 HTPC CTUh 7.99E-10 1.42E-09 1.17E-09 HTPNC CTUh 2.89E-08 5.13E-08 4.25E-08 SQP Pt 0.314 0.557 0.462 GWP kg CO ₂ eq. 9.10 16.2 13.4 ODP kg CP_2 eq. 9.10 16.2 2.66E-15 AP kg SO ₂ eq. 0.0119 0.0211 0.0175 EP kg (PO ₄) ⁵ eq. 0.0119 0.0211 0.00344 POCP kg SO ₂ eq. 0.0119 0.00339 0.00280 ADPE kg Sb eq. </td <td>MER</td> <td>kg</td> <td>0</td> <td>0</td> <td>0</td>	MER	kg	0	0	0
EN15804+A2 ADDITIONALENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PETTONNE OF PIPE GWP-GHG kg CO ₂ -eq. 9.21 16.3 13.5 PM Disease incidences 1.18E-07 2.09E-07 1.73E-07 IRP kBq U235 eq. 0.00198 0.00352 0.00291 ETP-FW CTUe 46.8 83.0 68.7 HTPC CTUh 7.99E-10 1.42E-09 1.17E-09 HTPNC CTUh 2.89E-08 5.13E-08 4.25E-08 SQP Pt 0.314 0.557 0.462 GWP kg CO ₂ eq. 9.10 16.2 13.4 ODP kg CO ₂ eq. 9.10 3.22E-15 2.66E-15 AP kg SO ₂ eq. 0.0119 0.0211 0.0175 EP kg (PO ₄) ³⁺ eq. 0.0191 0.0233 0.00344 POCP kg Sb eq. 1.43E-07 2.53E-07 2.10E-07	EEE	MJ	0	0	0
GWP-GHGkg CO2-eq.9.2116.313.5PMDisease incidences1.18E-072.09E-071.73E-07IRPkBq U235 eq.0.001980.003520.00291ETP-FWCTUe 0.00291 0.002910.00291ETP-FWCTUh $7.99E-10$ 1.42E-091.17E-09HTPCCTUh $7.99E-10$ 1.42E-091.42E-09SQPPt 0.314 0.557 0.462 SQPPt 0.314 0.557 0.462 GWPkg CO2 eq. 9.10 16.2 $2.66E-15$ APkg SO2 eq. 9.10 0.0211 0.0211 0.00344 PCCPkg CP_4 eq. 0.00191 0.00339 0.00280 ADPEkg Sb eq. $1.43E-07$ $2.53E-07$ $2.53E-07$	EET	MJ	0	0	0
PM Disease incidences 1.18E-07 2.09E-07 1.73E-07 IRP kBq U235 eq. 0.00198 0.00352 0.00291 ETP-FW CTUe 46.8 83.0 68.7 HTPC CTUh 7.99E-10 1.42E-09 1.17E-09 HTPNC CTUh 2.89E-08 5.13E-08 4.25E-08 SQP Pt 0.314 0.557 0.462 EN15804+A1 ENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PER TONNE OF FET 3.22E-15 2.66E-15 GWP kg CO ₂ eq. 9.10 16.2 3.22E-15 2.66E-15 AP kg SO ₂ eq. 0.0119 0.0211 0.0175 2.66E-15 AP kg SO ₂ eq. 0.0119 0.0211 0.0175 EP kg (PO ₄) ^{3*} eq. 0.0191 0.0211 0.00344 POCP kg Sb eq. 1.43E-07 2.53E-07 2.10E-07	EN15804+A2 ADDITION	NAL ENVIRONMENTAL IM	PACT INDICATORS, MODULES A4, F	PER TONNE OF PIPE	
IRPkBq U235 eq.0.001980.003520.00291ETP-FWCTUeCTUe46.883.066.7HTPCCTUh7.99E-101.42E-091.17E-09HTPNCCTUh0.03140.5570.462SQPPt0.3140.5570.462EN15804+A1 ENVIRONMENTAL IMPACT INDICATOR MODULES A4, PER TONNE OF THE16.21.3.2GWPkg CO2 eq.9.1016.22.66E-15APkg SO2 eq.0.01190.02110.00344POCPkg (PO4) ³⁻ eq.0.00190.003490.00339ADPEkg Sb eq.1.43E-072.53E-072.10E-07	GWP-GHG	kg CO ₂ -eq.	9.21	16.3	13.5
ETP-FWCTUe46.883.068.7HTPCCTUh7.99E-101.42E-091.42E-09HTPNCCTUh2.89E-085.13E-084.25E-08SQPPt0.3140.5570.462EN15804+A1 ENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PER TONNE OF FUEGWPkg CO2 eq.9.1016.22.66E-15APkg SO2 eq.0.01190.02110.00344PCCPkg (PO4)3 eq.0.001910.003390.00280ADPEkg Sb eq.1.43E-072.53E-072.10E-07	PM	Disease incidences	1.18E-07	2.09E-07	1.73E-07
HTPCCTUh7.99E-101.42E-091.17E-09HTPNCCTUh $2.89E-08$ $5.13E-08$ $4.25E-08$ SQPPt 0.314 0.557 0.462 EN15804+A1 ENVIRONEUTAL IMPACT INDICATOR SAUPER TONNE OF FEEGWPkg CO2 eq. 9.10 16.2 $2.66E-15$ ODPkg CPC 11 eq. $1.81E-15$ $3.22E+15$ $2.66E-15$ APkg SO2 eq. 0.0119 0.0211 0.00344 POCPkg C2H4 eq. 0.00191 -0.00339 -0.00280 ADPEkg Sb eq. $1.43E-07$ $2.53E-07$ $2.10E-07$	IRP	kBq U235 eq.	0.00198	0.00352	0.00291
HTPNC CTUh $2.89E-08$ $5.13E-08$ $4.25E-08$ SQP Pt 0.314 0.557 0.462 EN15804+A1 ENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PER TONNE OF FIFE 0.462 0.462 GWP kg CO ₂ eq. 9.10 16.2 $2.66E+15$ ODP kg CFC 11 eq. $1.81E+15$ $3.22E+15$ $2.66E+15$ AP kg SO ₂ eq. 0.0119 0.0211 0.0175 EP kg (PO ₄) ³ eq. 0.00191 0.00339 0.00344 POCP kg Sb eq. $1.43E-07$ $2.53E-07$ $2.10E-07$	ETP-FW	CTUe	46.8	83.0	68.7
SQP Pt 0.314 0.557 0.462 EN15804+A1 ENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PER TONNE OF FIRE 13.4 GWP kg CO2 eq. 9.10 16.2 13.4 ODP kg CF C11 eq. 1.81E-15 3.22E-15 2.66E-15 AP kg SO2 eq. 0.0119 0.0211 0.0175 EP kg (PO4) ³ eq. 0 0 0.0344 POCP kg S2_H4 eq. -0.00191 -0.00339 -0.00280 ADPE kg Sb eq. 1.43E-07 2.53E-07 2.10E-07	HTPC	CTUh	7.99E-10	1.42E-09	1.17E-09
EN15804+A1 ENVIRONMENTAL IMPACT INDICATORS, MODULES A4, PER TONNE OF IPE GWP kg CO2 eq. 910 16.2 13.4 ODP kg CFC 11 eq. 1.81E-15 3.22E-15 2.66E-15 AP kg SO2 eq. 0.0119 0.0211 0.00344 POCP kg CP_4 eq. 0.00191 0.00339 -0.00280 ADPE kg Sb eq. 1.43E-07 2.53E-07 2.10E-07	HTPNC	CTUh	2.89E-08	5.13E-08	4.25E-08
GWP kg CO2 eq. 9.10 16.2 13.4 ODP kg CFC 11 eq. 1.81E-15 3.22E-15 2.66E-15 AP kg SO2 eq. 0.0119 0.0211 0.0175 EP kg (PO4) ^{3.} eq. 0 0 0.00344 POCP kg C2H4 eq. -0.00191 -0.00339 -0.00280 ADPE kg Sb eq. 1.43E-07 2.53E-07 2.10E-07	SQP	Pt	0.314	0.557	0.462
ODP kg CFC 11 eq. 1.81E-15 3.22E-15 2.66E-15 AP kg SO ₂ eq. 0.0119 0.0211 0.0175 EP kg (PO ₄) ^{3.} eq. 0 0 0 0.0344 POCP kg C ₂ H ₄ eq. -0.00191 -0.00339 -0.00280 ADPE kg Sb eq. 1.43E-07 2.53E-07 2.10E-07	EN15804+A1 ENVIRON	MENTAL IMPACT INDICAT	ORS, MODULES A4, PER TONNE OF	PIPE	
AP kg SO ₂ eq. 0.0119 0.0211 0.0175 EP kg (PO ₄) ^{3.} eq. 0 0 0 0.0344 POCP kg C ₂ H ₄ eq. -0.00191 -0.00339 -0.00280 ADPE kg Sb eq. 1.43E-07 2.53E-07 2.10E-07	GWP	kg CO ₂ eq.	9.10	16.2	13.4
EP kg (PO ₄) ³ · eq. 0 0 0.00344 POCP kg C ₂ H ₄ eq. -0.00191 -0.00339 -0.00280 ADPE kg Sb eq. 1.43E-07 2.53E-07 2.10E-07	ODP	kg CFC 11 eq.	1.81E-15	3.22E-15	2.66E-15
POCP kg C ₂ H ₄ eq. -0.00191 -0.00339 -0.00280 ADPE kg Sb eq. 1.43E-07 2.53E-07 2.10E-07	AP	kg SO ₂ eq.	0.0119	0.0211	0.0175
ADPE kg Sb eq. 1.43E-07 2.53E-07 2.10E-07	EP	kg (PO ₄) ³⁻ eq.	0	0	0.00344
	POCP	kg C_2H_4 eq.	-0.00191	-0.00339	-0.00280
ADPF MJ 122 217 180	ADPE	kg Sb eq.	1.43E-07	2.53E-07	2.10E-07
	ADPF	MJ	122	217	180

Table 16 - Installation (A5) per effective lineal meter of pipe

PIPE DIAMETER (mm)		225	300	375	450	525	600
INDICATORS, ABBR.	UNITS	223	300	3/3	430	323	000
	/IRONMENTAL IMPACT II		LES AS DED LINE		;		
GWP-TOTAL	kg CO ₂ -eq.	6.78	8.49	10.4	13.4	16.2	19.2
GWP-FOSSIL	kg CO_2 eq.	6.84	8.54	10.4	13.5	16.2	19.2
GWP-BIOGENIC	kg CO_2 eq.	-0.0704	-0.0746	-0.0808	-0.0853	-0.0935	-0.104
GWP-LULUC	kg CO_2 eq.	0.0184	0.0206	0.0229	0.0264	0.0297	0.0334
ODP	kg CFC11-eq.	1.55E-14	1.91E-14	2.24E-14	2.91E-14	3.39E-14	3.88E-14
AP	Mole of H⁺ eq.	0.0181	0.0217	0.0258	0.0318	0.0376	0.0440
EP-FRESHWATER	kg P eq.	8.89E-06	1.03E-05	1.18E-05	1.44E-05	1.65E-05	1.87E-05
EP-MARINE	kg N eq.	0.00778	0.00924	0.0109	0.0134	0.0158	0.0185
EP-TERRESTRIAL	Mole of N eq.	0.0863	0.103	0.121	0.148	0.175	0.205
POCP	kg NMVOC eq.	0.0204	0.0241	0.0283	0.0346	0.0406	0.0473
ADP-M&M	kg Sb-eq.	5.17E-07	6.58E-07	7.79E-07	1.10E-06	1.28E-06	1.47E-06
ADP-FOSSIL	MJ	98.4	125	153	203	244	287
WDP	m³ world equiv.	0.427	0.502	0.581	0.676	0.793	0.910
	E USE PARAMETERS, MC	· ·					
PERE	MJ	6.70	8.02	9.28	11.6	13.5	15.4
PERM	MJ	0	0	0	0	0	0
PERT	MJ	6.70	8.02	9.28	11.6	13.5	15.4
PENRE	MJ	98.5	125	153	203	244	287
PENRM	MJ	0	0	0	0	0	0
PENRT	MJ	98.5	125	153	203	244	287
SM	kg	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0
FW	m ³	0.0152	0.0184	0.0214	0.0272	0.0316	0.0361
EN15804+A2 WASTE M	ATERIAL AND OUTPUT FL	OW PARAMETERS,	MODULES A5, PEI	R LINEAL METER C	OF PIPE		
HWD	kg	2.42E-08	3.59E-08	4.39E-08	7.76E-08	8.96E-08	1.02E-07
NHWD	kg	0.0188	0.0243	0.0288	0.0422	0.0489	0.0557
RWD	kg						
CRU		0.00153	0.00183	0.00212	0.00261	0.00305	0.00348
CKU	kg	0.00153 0	0.00183 0	0.00212	0.00261	0.00305 0	
MFR							0.00348
	kg	0	0	0	0	0	0.00348 0
MFR	kg kg	0 0	0 0	0 0	0 0	0 0	0.00348 0 0
MFR MER	kg kg kg	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0.00348 0 0 0
MFR MER EEE EET	kg kg kg MJ	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0.00348 0 0 0 0
MFR MER EEE EET	kg kg kg MJ MJ	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0.00348 0 0 0 0
MFR MER EEE EET EN15804+A2 ADDITION	kg kg MJ MJ IAL ENVIRONMENTAL IM	0 0 0 0 9 PACT INDICATORS,	0 0 0 0 0 MODULES A5, PE	0 0 0 0 R LINEAL METER (0 0 0 0 0	0 0 0 0	0.00348 0 0 0 0 0
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG	kg kg MJ MJ IAL ENVIRONMENTAL IM kg CO ₂ -eq.	0 0 0 0 PACT INDICATORS , 6.83	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 R LINEAL METER 0 10.4	0 0 0 0 0 0 0 0 0 13.5	0 0 0 0 16.2	0.00348 0 0 0 0 0 0
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM	kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences	0 0 0 0 PACT INDICATORS, 6.83 2.36E-07	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 R LINEAL METER (10.4 3.24E-07 0.340 71.2	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 16.2 4.58E-07	0.00348 0 0 0 0 0 0 19.2 5.29E-07
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP	kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq.	0 0 0 0 PACT INDICATORS, 6.83 2.36E-07 0.246	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 R LINEAL METER (10.4 3.24E-07 0.340	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 16.2 4.58E-07 0.483	0.00348 0 0 0 0 0 19.2 5.29E-07 0.551
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW	kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe	0 0 0 0 0 0 0 0 0 0 0 0 2.36E-07 0.246 47.9	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 R LINEAL METER (10.4 3.24E-07 0.340 71.2	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 13.5 0 3.92E-07 0.414 0.2.8	0 0 0 0 16.2 4.58E-07 0.483 110	0.00348 0 0 0 0 0 0 19.2 5.29E-07 0.551 129
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP	kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 R LINEAL METER 0 10.4 3.24E-07 0.340 71.2 1.50E-09 7.53E-08 17.0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 16.2 4.58E-07 0.483 110 2.35E-09	0.00348 0 0 0 0 0 19.2 5.29E-07 0.551 129 2.73E-09
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP	kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 R LINEAL METER 0 10.4 3.24E-07 0.340 71.2 1.50E-09 7.53E-08 17.0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 16.2 4.58E-07 0.483 110 2.35E-09 1.16E-07	0.00348 0 0 0 0 0 19.2 5.29E-07 0.551 129 2.73E-09 1.33E-07
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP	kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 R LINEAL METER 0 10.4 3.24E-07 0.340 71.2 1.50E-09 7.53E-08 17.0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 16.2 4.58E-07 0.483 110 2.35E-09 1.16E-07	0.00348 0 0 0 0 0 19.2 5.29E-07 0.551 129 2.73E-09 1.33E-07
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP	kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 0 1 6.2 4.58E-07 0.483 10 2.35E-09 1.16E-07 22.9 1.16E-07 22.9	0.00348 0 0 0 0 0 0 19.2 5.29E-07 0.551 129 2.73E-09 1.33E-07 25.9 1.33E-07 25.9
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP AP	kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 1 6.2 4.58E-07 0.483 10 2.35E-09 1.16E-07 22.9 1.16E-07 22.9	0.00348 0 0 0 0 0 0 0 0 0 0 5.29E-07 0.551 129 0.551 129 0.2,73E-09 1.33E-07 25.9 1.33E-07 25.9
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP AP EP	kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq. kg (PO ₄) ³⁻ eq.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 0 1 6.2 4.58E-07 0.483 100 2.35E-09 1.16E-07 22.9 1.16E-07 22.9 1.16E-07 22.9	0.00348 0 0 0 0 0 0 0 0 0 0 0 5.29E-07 0.551 129 2.73E-09 1.33E-07 25.9 1.33E-07 25.9
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPC SQP EN15804+A1 ENVIRONM GWP ODP AP EP POCP	kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq. kg (PO ₄) ^{3.} eq. kg C ₂ H ₄ eq.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 0 1 6.2 4.58E-07 0.483 110 2.35E-09 1.16E-07 22.9 1.16E-07 22.9 1.16E-07 22.9 1.16E-07 22.9 1.16E-07 1.9 1.16E-07 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9 1.9	0.00348 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP AP EP	kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq. kg (PO ₄) ³⁻ eq.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 1 0 1 6.2 4.58E-07 0.483 100 2.35E-09 1.16E-07 22.9 1.16E-07 22.9 1.16E-07 22.9	0.00348 0 0 0 0 0 0 0 0 0 0 5.29E-07 0.551 129 2.73E-09 1.33E-07 25.9 1.33E-07 25.9

Table 16 ctd - Installation (A5) per effective lineal meter of pipe

PIPE DIAMETER (mm)		675	750	825	900	1050	1200
INDICATORS, ABBR.	UNITS	0/5	/30	625	900	1050	1200
	/IRONMENTAL IMPACT IN		ES A5 PER LINEA				
GWP-TOTAL	kg CO ₂ -eq.	22.2	26.8	29.8	35.4	46.1	55.3
GWP-FOSSIL	kg CO ₂ -eq.	22.3	26.9	29.9	35.5	46.2	55.4
GWP-BIOGENIC	kg CO_2 eq.	-0.117	-0.122	-0.131	-0.142	-0.165	-0.191
GWP-LULUC	kg CO ₂ -eq.	0.0373	0.0421	0.0451	0.0513	0.0626	0.0722
ODP	kg CFC11-eq.	4.24E-14	5.23E-14	5.59E-14	6.63E-14	8.44E-14	9.69E-14
AP	Mole of H⁺ eq.	0.0508	0.0597	0.0659	0.0772	0.0988	0.118
EP-FRESHWATER	kg P eq.	2.07E-05	2.45E-05	2.64E-05	3.08E-05	3.87E-05	4.48E-05
EP-MARINE	kg N eq.	0.0214	0.0250	0.0276	0.0322	0.0412	0.0492
EP-TERRESTRIAL	Mole of N eq.	0.237	0.276	0.305	0.357	0.456	0.544
РОСР	kg NMVOC eq.	0.0544	0.0636	0.0701	0.0819	0.104	0.124
ADP-M&M	kg Sb-eq.	1.53E-06	2.05E-06	2.20E-06	2.70E-06	3.55E-06	4.06E-06
ADP-FOSSIL	MJ	326	404	446	535	701	834
WDP	m³ world equiv.	1.06	1.18	1.27	1.43	1.74	2.04
EN15804+A2 RESOURC	E USE PARAMETERS, MC	DULES A5, PER LINI	EAL METER OF PIP	ΡE			
PERE	MJ	17.0	20.4	21.8	25.5	32.1	37.0
PERM	MJ	0	0	0	0	0	0
PERT	MJ	17.0	20.4	21.8	25.5	32.1	37.0
PENRE	MJ	326	404	446	536	701	834
PENRM	MJ	0	0	0	0	0	0
PENRT	MJ	326	404	446	536	701	834
SM	kg	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0
FW	m³	0.0399	0.0482	0.0516	0.0606	0.0765	0.0880
EN15804+A2 WASTE M	ATERIAL AND OUTPUT FL	OW PARAMETERS,	MODULES A5, PEF	R LINEAL METER C	OF PIPE		
HWD	kg	9.38E-08	1.52E-07	1.60E-07	2.09E-07	2.87E-07	3.20E-07
NHWD	kg	0.0569	0.0785	0.0837	0.104	0.137	0.156
RWD	kg	0.00391	0.00458	0.00489	0.00566	0.00704	0.00811
CRU	kg	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0
EN15804+A2 ADDITION	AL ENVIRONMENTAL IM						
		PACT INDICATORS,					
GWP-GHG	kg CO ₂ -eq.	22.3	26.8	29.9	35.5	46.1	55.3
PM	kg CO ₂ -eq. Disease incidences	22.3 6.07E-07	26.8 7.02E-07	29.9 7.66E-07	35.5 8.88E-07	1.12E-06	1.32E-06
PM IRP	kg CO ₂ -eq. Disease incidences kBq U235 eq.	22.3 6.07E-07 0.623	26.8 7.02E-07 0.721	29.9 7.66E-07 0.772	35.5 8.88E-07 0.889	1.12E-06 1.10	1.32E-06 1.27
PM IRP ETP-FW	kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe	22.3 6.07E-07 0.623 146	26.8 7.02E-07 0.721 179	29.9 7.66E-07 0.772 197	35.5 8.88E-07 0.889 235	1.12E-06 1.10 305	1.32E-06 1.27 361
PM IRP ETP-FW HTPC	kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh	22.3 6.07E-07 0.623 146 3.03E-09	26.8 7.02E-07 0.721 179 3.79E-09	29.9 7.66E-07 0.772 197 4.14E-09	35.5 8.88E-07 0.889 235 4.96E-09	1.12E-06 1.10 305 6.46E-09	1.32E-06 1.27 361 7.59E-09
PM IRP ETP-FW HTPC HTPNC	kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh	22.3 6.07E-07 0.623 146 3.03E-09 1.46E-07	26.8 7.02E-07 0.721 179 3.79E-09 1.83E-07	29.9 7.66E-07 0.772 197 4.14E-09 1.99E-07	35.5 8.88E-07 0.889 235 4.96E-09 2.38E-07	1.12E-06 1.10 305 6.46E-09 3.08E-07	1.32E-06 1.27 361 7.59E-09 3.60E-07
PM IRP ETP-FW HTPC HTPNC SQP	kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt	22.3 6.07E-07 0.623 146 3.03E-09 1.46E-07 28.8	26.8 7.02E-07 0.721 179 3.79E-09 1.83E-07 33.2	29.9 7.66E-07 0.772 197 4.14E-09 1.99E-07 35.6	35.5 8.88E-07 0.889 235 4.96E-09	1.12E-06 1.10 305 6.46E-09	1.32E-06 1.27 361 7.59E-09
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONM	kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt KENTAL IMPACT INDICAT	22.3 6.07E-07 0.623 146 3.03E-09 1.46E-07 28.8 ORS, MODULES A5	26.8 7.02E-07 0.721 179 3.79E-09 1.83E-07 33.2 PER LINEAL MET	29.9 7.66E-07 0.772 197 4.14E-09 1.99E-07 35.6 ER OF PIPE	35.5 8.88E-07 0.889 235 4.96E-09 2.38E-07 40.9	1.12E-06 1.10 305 6.46E-09 3.08E-07 50.4	1.32E-06 1.27 361 7.59E-09 3.60E-07 58.1
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONM GWP	kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt KENTAL IMPACT INDICAT kg CO ₂ eq.	22.3 6.07E-07 0.623 146 3.03E-09 1.46E-07 28.8 ORS, MODULES A5 21.8	26.8 7.02E-07 0.721 179 3.79E-09 1.83E-07 33.2 PER LINEAL MET 26.3	29.9 7.66E-07 0.772 197 4.14E-09 1.99E-07 35.6 ER OF PIPE 29.2	35.5 8.88E-07 0.889 235 4.96E-09 2.38E-07 40.9	1.12E-06 1.10 305 6.46E-09 3.08E-07 50.4 45.2	1.32E-06 1.27 361 7.59E-09 3.60E-07 58.1
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONM GWP ODP	kg CO_2 -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO_2 eq. kg CFC 11 eq.	22.3 6.07E-07 0.623 146 3.03E-09 1.46E-07 28.8 ORS, MODULES A5 21.8 5.66E-14	26.8 7.02E-07 0.721 179 3.79E-09 1.83E-07 33.2 PER LINEAL MET 26.3 6.98E-14	29.9 7.66E-07 0.772 197 4.14E-09 1.99E-07 35.6 ER OF PIPE 29.2 7.46E-14	35.5 8.88E-07 0.889 235 4.96E-09 2.38E-07 40.9 34.7 8.84E-14	1.12E-06 1.10 305 6.46E-09 3.08E-07 50.4 45.2 1.13E-13	1.32E-06 1.27 361 7.59E-09 3.60E-07 58.1 54.3 1.29E-13
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP AP	$\begin{tabular}{lllllllllllllllllllllllllllllllllll$	22.3 6.07E-07 0.623 146 3.03E-09 1.46E-07 28.8 *ORS, MODULES A5 21.8 5.66E-14 0.0363	26.8 7.02E-07 0.721 179 3.79E-09 1.83E-07 33.2 PER LINEAL MET 26.3 6.98E-14 0.0427	29.9 7.66E-07 0.772 197 4.14E-09 1.99E-07 35.6 ER OF PIPE 29.2 7.46E-14 0.0472	35.5 8.88E-07 0.889 235 4.96E-09 2.38E-07 40.9 	1.12E-06 1.10 305 6.46E-09 3.08E-07 50.4 45.2 1.13E-13 0.0709	1.32E-06 1.27 361 7.59E-09 3.60E-07 58.1 54.3 1.29E-13 0.0846
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONM GWP ODP AP EP	kg CO_2 -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt KENTAL IMPACT INDICAT kg CO_2 eq. kg CFC 11 eq. kg SO ₂ eq. kg $(PO_4)^3$ - eq.	22.3 6.07E-07 0.623 146 3.03E-09 1.46E-07 28.8 ORS, MODULES A5 21.8 5.66E-14 0.0363 0.00753	26.8 7.02E-07 0.721 179 3.79E-09 1.83E-07 33.2 PER LINEAL MET 26.3 6.98E-14 0.0427 0.00881	29.9 7.66E-07 0.772 197 4.14E-09 1.99E-07 35.6 ER OF PIPE 29.2 29.2 7.46E-14 0.0472 0.00973	35.5 8.88E-07 0.889 235 4.96E-09 2.38E-07 40.9 34.7 8.84E-14 0.0554 0.0114	1.12E-06 1.10 305 6.46E-09 3.08E-07 50.4 45.2 1.13E-13 0.0709 0.0145	1.32E-06 1.27 361 7.59E-09 3.60E-07 58.1 54.3 1.29E-13 0.0846 0.0173
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP AP EP POCP	kg CO_2 -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt KENTAL IMPACT INDICAT kg CO_2 eq. kg CFC 11 eq. kg SO_2 eq. kg (PO_4) ^{3.} eq. kg C_2H_4 eq.	22.3 6.07E-07 0.623 146 3.03E-09 1.46E-07 28.8 ORS, MODULES A5 21.8 5.66E-14 0.0363 0.00753 -0.00169	26.8 7.02E-07 0.721 179 3.79E-09 1.83E-07 33.2 PER LINEAL MET 26.3 6.98E-14 0.0427 0.00881 -0.00198	29.9 7.66E-07 0.772 197 4.14E-09 1.99E-07 35.6 EROF PIPE 29.2 7.46E-14 0.0472 0.00973 -0.00237	35.5 8.88E-07 0.889 235 4.96E-09 2.38E-07 40.9 34.7 8.84E-14 0.0554 0.0114 -0.00284	1.12E-06 1.10 305 6.46E-09 3.08E-07 50.4 45.2 1.13E-13 0.0709 0.0145 -0.00387	1.32E-06 1.27 361 7.59E-09 3.60E-07 58.1 54.3 1.29E-13 0.0846 0.0173 -0.00497
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONM GWP ODP AP EP	kg CO_2 -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt KENTAL IMPACT INDICAT kg CO_2 eq. kg CFC 11 eq. kg SO ₂ eq. kg (PO ₄) ³⁻ eq.	22.3 6.07E-07 0.623 146 3.03E-09 1.46E-07 28.8 ORS, MODULES A5 21.8 5.66E-14 0.0363 0.00753	26.8 7.02E-07 0.721 179 3.79E-09 1.83E-07 33.2 PER LINEAL MET 26.3 6.98E-14 0.0427 0.00881	29.9 7.66E-07 0.772 197 4.14E-09 1.99E-07 35.6 ER OF PIPE 29.2 29.2 7.46E-14 0.0472 0.00973	35.5 8.88E-07 0.889 235 4.96E-09 2.38E-07 40.9 34.7 8.84E-14 0.0554 0.0114	1.12E-06 1.10 305 6.46E-09 3.08E-07 50.4 45.2 1.13E-13 0.0709 0.0145	1.32E-06 1.27 361 7.59E-09 3.60E-07 58.1 54.3 1.29E-13 0.0846 0.0173

Table 16 ctd - Installation (A5) per effective lineal meter of pipe

PIPE DIAMETER (mm)		1350	1500	1600	1650	1800	1950
INDICATORS, ABBR.	UNITS		1000	1000	1000	1000	1000
	VIRONMENTAL IMPACT II	NDICATORS, MODU	ILES A5. PER LINE	AL METER OF PIPE	:		
GWP-TOTAL	kg CO ₂ -eq.	66.2	84.0	91.9	104	118	139
GWP-FOSSIL	kg CO ₂ -eq.	66.3	84.2	92.1	104	118	139
GWP-BIOGENIC	kg CO ₂ -eq.	-0.224	-0.248	-0.286	-0.292	-0.352	-0.402
GWP-LULUC	kg CO ₂ -eq.	0.0845	0.103	0.112	0.126	0.144	0.166
ODP	kg CFC11-eq.	1.13E-13	1.47E-13	1.54E-13	1.89E-13	2.06E-13	2.40E-13
AP	Mole of H⁺ eq.	0.141	0.176	0.193	0.217	0.249	0.291
EP-FRESHWATER	kg P eq.	5.25E-05	6.66E-05	7.11E-05	8.19E-05	9.12E-05	1.06E-04
EP-MARINE	kg N eq.	0.0587	0.0729	0.0805	0.0899	0.103	0.121
EP-TERRESTRIAL	Mole of N eq.	0.650	0.807	0.891	0.994	1.14	1.34
POCP	kg NMVOC eq.	0.148	0.184	0.203	0.226	0.260	0.304
ADP-M&M	kg Sb-eq.	4.73E-06	6.62E-06	6.67E-06	7.84E-06	8.24E-06	9.80E-06
ADP-FOSSIL	MJ	994	1,290	1,390	1,570	1,760	2,080
WDP	m³ world equiv.	2.40	2.77	3.12	3.92	4.54	5.17
	E USE PARAMETERS, MC						
PERE	MJ	43.2	55.0	58.3	70.9	78.3	90.9
PERM	MJ	0	0	0	0	0	0
PERT	MJ	43.2	55.0	58.3	70.9	78.3	90.9
PENRE	MJ	994	1,290	1,390	1,580	1,760	2,080
PENRM	MJ	0	0	0	0	0	0
PENRT	MJ	994	1,290	1,390	1,580	1,760	2,080
SM	kg	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0
FW	m ³	0.103	0.132	0.139	0.171	0.187	0.217
EN15804+A2 WASTE MA	ATERIAL AND OUTPUT FL	OW PARAMETERS,	MODULES A5, PE	R LINEAL METER	OF PIPE		
HWD	kg	3.68E-07	5.74E-07	5.41E-07	6.38E-07	6.23E-07	7.59E-07
NHWD	kg	0.181	0.258	0.256	0.304	0.315	0.375
RWD	kg	0.00947	0.0117	0.0126	0.0158	0.0176	0.0202
CRU	kg	0	0	0	0	0	0
MFR	kg		-		•	-	0
	ĸġ	0	0	0	0	0	0
MER	kg	0		0 0			
EEE			0		0	0	0
	kg	0	0 0	0	0 0	0 0	0 0
EEE EET	kg MJ	0 0 0	0 0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
EEE EET	kg MJ MJ	0 0 0	0 0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
EEE EET EN15804+A2 ADDITION	kg MJ MJ AL ENVIRONMENTAL IM	0 0 0 PACT INDICATORS,	0 0 0 0 •	O O R LINEAL METER	0 0 0 0 0	0 0 0	0 0 0
EEE EET EN15804+A2 ADDITION GWP-GHG	kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq.	0 0 PACT INDICATORS, 66.3	0 0 0 MODULES A5, PE 84.1	0 0 R LINEAL METER 92.1	0 0 0 0 0 0 0 0	0 0 0 0	0 0 0 0 139
EEE EET EN15804+A2 ADDITION GWP-GHG PM	kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences	0 0 PACT INDICATORS 66.3 1.56E-06	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 R LINEAL METER 92.1 2.11E-06	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 118 2.78E-06	0 0 0 139 3.24E-06
EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP	kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq.	0 0 PACT INDICATORS, 66.3 1.56E-06 1.48	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 R LINEAL METER 92.1 2.11E-06 1.96	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 118 2.78E-06 2.76	0 0 0 139 3.24E-06 3.17
EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW	kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe	0 0 PACT INDICATORS, 66.3 1.56E-06 1.48 429	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 R LINEAL METER 92.1 2.11E-06 1.96 597	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1118 2.78E-06 2.76 758	0 0 0 139 3.24E-06 3.17 893
EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC	kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh	0 0 PACT INDICATORS 66.3 1.56E-06 1.48 429 8.97E-09	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 R LINEAL METER 92.1 2.11E-06 1.96 597 1.25E-08	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 118 2.78E-06 2.76 758 1.58E-08	0 0 0 139 3.24E-06 3.17 893 1.87E-08
EEE EET GWP-GHG PM IRP ETP-FW HTPC HTPNC	kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh	0 0 PACT INDICATORS 66.3 1.56E-06 1.48 429 8.97E-09 4.23E-07 68.0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 R LINEAL METER 92.1 2.11E-06 1.96 597 1.25E-08 5.88E-07 90.6	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1118 2.78E-06 2.76 758 1.58E-08 7.42E-07	0 0 0 139 3.24E-06 3.17 893 1.87E-08 8.76E-07
EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPPC SQP	kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh	0 0 PACT INDICATORS 66.3 1.56E-06 1.48 429 8.97E-09 4.23E-07 68.0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 R LINEAL METER 92.1 2.11E-06 1.96 597 1.25E-08 5.88E-07 90.6	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1118 2.78E-06 2.76 758 1.58E-08 7.42E-07	0 0 0 139 3.24E-06 3.17 893 1.87E-08 8.76E-07
EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONM	kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt MENTAL IMPACT INDICAT	0 0 PACT INDICATORS, 66.3 1.56E-06 1.48 429 8.97E-09 4.23E-07 68.0 TORS, MODULES AS	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 8 LINEAL METER 92.1 2.11E-06 1.96 597 1.25E-08 5.88E-07 90.6 ER OF PIPE	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 118 2.78E-06 2.76 758 1.58E-08 7.42E-07 118	0 0 0 139 3.24E-06 3.17 893 1.87E-08 8.76E-07 137
EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP	kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt KENTAL IMPACT INDICAT kg CO ₂ eq.	0 0 PACT INDICATORS, 66.3 1.56E-06 1.48 429 8.97E-09 4.23E-07 68.0 TORS, MODULES AS	0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 R LINEAL METER 92.1 2.11E-06 1.96 597 1.25E-08 5.88E-07 90.6 ER OF PIPE 90.3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 118 2.78E-06 2.76 758 1.58E-08 1.58E-08 7.42E-07 118	0 0 0 139 3.24E-06 3.17 893 1.87E-08 8.76E-07 137
EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP	kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt KENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq.	0 0 PACT INDICATORS 66.3 1.56E-06 1.48 429 8.97E-09 4.23E-07 68.0 FORS, MODULES AS 65.0 1.51E-13	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 R LINEAL METER 92.1 2.11E-06 1.96 597 1.25E-08 5.88E-07 90.6 ER OF PIPE 90.3 2.05E-13	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 118 2.78E-06 2.76 758 1.58E-08 7.42E-07 118	0 0 0 139 3.24E-06 3.17 893 1.87E-08 8.76E-07 137
EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP AP	kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq.	0 0 PACT INDICATORS 66.3 1.56E-06 1.48 429 8.97E-09 4.23E-07 68.0 CORS, MODULES AS 65.0 1.51E-13 0.101	0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 R LINEAL METER 92.1 2.11E-06 1.96 597 1.25E-08 5.88E-07 90.6 ER OF PIPE 90.3 2.05E-13 0.139	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 1118 2.78E-06 2.76 758 1.58E-08 7.42E-07 118 	0 0 0 139 3.24E-06 3.17 893 1.87E-08 8.76E-07 137 136 3.20E-13 0.209
EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP AP EP	kg MJ MJ AL ENVIRONMENTAL IM kg CO_2 -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO_2 eq. kg CFC 11 eq. kg CO_2 eq. kg $(PO_4)^3$ - eq.	0 0 PACT INDICATORS 66.3 1.56E-06 1.48 429 8.97E-09 4.23E-07 68.0 CORS, MODULES AE 65.0 1.51E-13 0.101 0.0206	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 R LINEAL METER 92.1 2.11E-06 1.96 597 1.25E-08 5.88E-07 90.6 ER OF PIPE 90.3 2.05E-13 0.139 0.0283	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 118 2.78E-06 2.76 758 1.58E-08 7.42E-07 118 	0 0 0 139 3.24E-06 3.17 893 1.87E-08 8.76E-07 137 136 3.20E-13 0.209 0.0426

Table 16 ctd - Installation (A5) per effective lineal meter of pipe

		0050	010.0		
PIPE DIAMETER (mm)		2050	2100	2300	2400
INDICATORS, ABBR.	UNITS				
	IRONMENTAL IMPACT IN			-	
GWP-TOTAL	kg CO ₂ -eq.	151	157	183	200
GWP-FOSSIL	kg CO ₂ -eq.	151	158	184	201
GWP-BIOGENIC	kg CO ₂ -eq.	-0.442	-0.462	-0.541	-0.603
GWP-LULUC	kg CO ₂ -eq.	0.180	0.187	0.215	0.235 3.23E-13
ODP	kg CFC11-eq.	2.57E-13	2.65E-13	3.01E-13	
	Mole of H ⁺ eq.	0.317 1.15E-04	0.330 1.19E-04	0.385	0.421
EP-FRESHWATER	kg P eq.		0.137	1.37E-04	1.48E-04 0.175
EP-MARINE	kg N eq.	0.132	1.52	0.160	1.94
EP-TERRESTRIAL	Mole of N eq.				
POCP ADP-M&M	kg NMVOC eq.	0.331 1.05E-05	0.345 1.08E-05	0.402 1.22E-05	0.439 1.30E-05
	kg Sb-eq. MJ				
ADP-FOSSIL		2,260	2,350	2,720	2,960
	m ³ world equiv. E USE PARAMETERS, MO	5.59	5.80	6.69	7.28
PERE	MJ	97.6	101	115	124
PERM	MJ	97.0	0	0	0
PERT	MJ	97.6	101	115	124
PENRE	MJ	2,260	2,350	2,720	2,960
PENRM	MJ	2,200	2,330	0	2,900
PENRT	MJ	2,260	2,350	2,720	2,960
SM	kg	2,200	2,330	0	2,900
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m ³	0.233	0.241	0.274	0.295
EN15804+A2 WASTE M	ATERIAL AND OUTPUT FL	OW PARAMETERS	S MODULES A5 P	FRIINFAI METER	OF PIPE
EN15804+A2 WASTE MA					
HWD	kg	7.99E-07	8.20E-07	9.01E-07	9.43E-07
HWD NHWD	kg kg	7.99E-07 0.399	8.20E-07 0.412	9.01E-07 0.461	9.43E-07 0.490
HWD NHWD RWD	kg kg kg	7.99E-07 0.399 0.0217	8.20E-07 0.412 0.0225	9.01E-07 0.461 0.0256	9.43E-07 0.490 0.0276
HWD NHWD RWD CRU	kg kg kg kg	7.99E-07 0.399 0.0217 0	8.20E-07 0.412 0.0225 0	9.01E-07 0.461 0.0256 0	9.43E-07 0.490 0.0276 0
HWD NHWD RWD CRU MFR	kg kg kg kg kg	7.99E-07 0.399 0.0217 0 0	8.20E-07 0.412 0.0225	9.01E-07 0.461 0.0256 0 0	9.43E-07 0.490 0.0276 0 0
HWD NHWD RWD CRU MFR MER	kg kg kg kg	7.99E-07 0.399 0.0217 0	8.20E-07 0.412 0.0225 0 0	9.01E-07 0.461 0.0256 0	9.43E-07 0.490 0.0276 0
HWD NHWD RWD CRU MFR MER EEE	kg kg kg kg kg	7.99E-07 0.399 0.0217 0 0 0	8.20E-07 0.412 0.0225 0 0 0	9.01E-07 0.461 0.0256 0 0 0	9.43E-07 0.490 0.0276 0 0 0
HWD NHWD RWD CRU MFR MER EEE EET	kg kg kg kg kg MJ MJ	7.99E-07 0.399 0.0217 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0	9.01E-07 0.461 0.0256 0 0 0 0 0	9.43E-07 0.490 0.0276 0 0 0 0 0
HWD NHWD RWD CRU MFR EEE EET EET EN15804+A2 ADDITION	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM	7.99E-07 0.399 0.0217 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0	9.01E-07 0.461 0.0256 0 0 0 0 0	9.43E-07 0.490 0.0276 0 0 0 0 0
HWD NHWD RWD CRU MFR MER EEE EET	kg kg kg kg kg MJ MJ	7.99E-07 0.399 0.0217 0 0 0 0 0 0 PACT INDICATOR 151	8.20E-07 0.412 0.0225 0 0 0 0 0 0 0 0 0 0	9.01E-07 0.461 0.0256 0 0 0 0 0 0 0	9.43E-07 0.490 0.0276 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq.	7.99E-07 0.399 0.0217 0 0 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0 0 5, MODULES A5, F	9.01E-07 0.461 0.0256 0 0 0 0 0 PER LINEAL METER 184	9.43E-07 0.490 0.0276 0 0 0 0 0 8 0 F PIPE
HWD NHWD RWD CRU MFR EEE EEE EET EN15804+A2 ADDITION GWP-GHG PM	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences	7.99E-07 0.399 0.0217 0 0 0 0 0 PACT INDICATOR 151 3.51E-06	8.20E-07 0.412 0.0225 0 0 0 0 0 5, MODULES A5, F 158 3.65E-06	9.01E-07 0.461 0.0256 0 0 0 0 0 PER LINEAL METER 184 4.23E-06	9.43E-07 0.490 0.0276 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
HWD NHWD RWD CRU MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq.	7.99E-07 0.399 0.0217 0 0 0 0 0 PACT INDICATOR 151 3.51E-06 3.41	8.20E-07 0.412 0.0225 0 0 0 0 0 5, MODULES A5, I 158 3.65E-06 3.53	9.01E-07 0.461 0.0256 0 0 0 0 0 PER LINEAL METER 184 4.23E-06 4.03	9.43E-07 0.490 0.0276 0 0 0 0 0 COF PIPE 200 4.62E-06
HWD NHWD CRU CRU MFR EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe	7.99E-07 0.399 0.0217 0 0 0 0 0 PACT INDICATOR 151 3.51E-06 3.41 968	8.20E-07 0.412 0.0225 0 0 0 0 0 5, MODULES A5, 1 158 3.65E-06 3.53 1,010	9.01E-07 0.461 0.0256 0 0 0 0 2ER LINEAL METER 184 4.23E-06 4.03 1,160	9.43E-07 0.490 0.0276 0 0 0 0 0 CFPIPE 200 4.62E-06 4.35 1,270
HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUH	7.99E-07 0.399 0.0217 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9.01E-07 0.461 0.0256 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9.43E-07 0.490 0.0276 0 0 0 0 0 0 0 0 0 0 0 0 0
HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh	7.99E-07 0.399 0.0217 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9.01E-07 0.461 0.0256 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9.43E-07 0.490 0.0276 0 0 0 0 0 0 0 0 0 0 0 0 0
HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt	7.99E-07 0.399 0.0217 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9.01E-07 0.461 0.0256 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9.43E-07 0.490 0.0276 0 0 0 0 0 0 0 0 0 0 0 0 0
HWD NHWD RWD CRU MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONM	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt	7.99E-07 0.399 0.0217 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0 0 5, MODULES A5, F 158 3.65E-06 3.53 1,010 2.09E-08 9.78E-07 153 45, PER LINEAL M	9.01E-07 0.461 0.0256 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	9.43E-07 0.490 0.0276 0 0 0 0 0 0 0 0 0 0 0 0 0
HWD NHWD RWD CRU MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq.	7.99E-07 0.399 0.0217 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0 0 5, MODULES A5, 1 158 3.65E-06 3.53 1,010 2.09E-08 9.78E-07 153 45, PER LINEAL MI	9.01E-07 0.461 0.0256 0 0 0 0 2 2 2 2 2 2 2 3 3 4 3 3 4 2 3 4 3 3 1,160 2.41E-08 1,12E-06 176 2 3 2 4 3 3 1,12E-06 176 180	9.43E-07 0.490 0.0276 0 0 0 0 0 CFPIPE 200 4.62E-06 4.35 1,270 2.61E-08 1.21E-06 191
HWD NHWD RWD CRU MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt KENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq.	7.99E-07 0.399 0.0217 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0 0 0 5, MODULES A5, F 158 3.65E-06 3.53 1,010 2.09E-08 9.78E-07 153 45, PER LINEAL MI 55 3.54E-13	9.01E-07 0.461 0.0256 0 0 0 0 0 0 0 0 0 0 0 0 0	9.43E-07 0.490 0.0276 0 0 0 0 0 0 0 0 0 0 0 0 0
HWD NHWD RWD CRU MFR MER EEE EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP AP	kg kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg CO ₂ eq. kg (PO ₄) ³⁻ eq.	7.99E-07 0.399 0.0217 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0 0 0 0 0 0 0 0 0	9.01E-07 0.461 0.0256 0 0 0 0 0 0 0 0 0 0 0 0 0	9.43E-07 0.490 0.0276 0 0 0 0 0 0 0 0 0 0 0 0 0
HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONM GWP ODP AP EP	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq.	7.99E-07 0.399 0.0217 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0 0 0 0 0 0 0 0 0	9.01E-07 0.461 0.0256 0 0 0 0 0 0 0 0 0 0 0 0 0	9.43E-07 0.490 0.0276 0 0 0 0 0 0 0 0 0 0 0 0 0
HWD NHWD RWD CRU MFR MER EEE EET EET EN15804+A2 ADDITION GWP-GHG PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONN GWP ODP AP EP POCP	kg kg kg kg kg MJ MJ AL ENVIRONMENTAL IM kg CO ₂ -eq. Disease incidences kBq U235 eq. CTUe CTUh CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq. kg (PO ₄) ³ · eq. kg C ₂ H ₄ eq.	7.99E-07 0.399 0.0217 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	8.20E-07 0.412 0.0225 0 0 0 0 0 0 0 0 0 0 0 0 0	9.01E-07 0.461 0.0256 0 0 0 0 0 0 0 0 0 0 0 0 0	9.43E-07 0.490 0.0276 0 0 0 0 0 0 0 0 0 0 0 0 0

Table 17 - Left in ground

-		C1	C2	C3	C4	D	
INDICATORS, ABBR.	UNITS		02			U	
INDICATORS, ABBR. UNITS EN15804+A2 CORE ENVIRONMENTAL IMPACT INDICATORS, MODULES C1-C4 AND D, PER TONNE OF PIPE							
GWP-TOTAL	kg CO ₂ -eq.	0	0	0	0	0	
GWP-FOSSIL	kg CO ₂ -eq.	0	0	0	0	0	
GWP-BIOGENIC	kg CO ₂ -eq.	0	0	0	0	0	
GWP-LULUC	kg CO_2 -eq.	0	0	0	0	0	
ODP	kg CFC11-eq.	0	0	0	0	0	
AP	Mole of H⁺ eq.	0	0	0	0	0	
EP-FRESHWATER	kg P eq.	0	0	0	0	0	
EP-MARINE	kg N eq.	0	0	0	0	0	
EP-TERRESTRIAL	Mole of N eq.	0	0	0	0	0	
РОСР	kg NMVOC eq.	0	0	0	0	0	
ADP-M&M	kg Sb-eq.	0	0	0	0	0	
ADP-FOSSIL	MJ	0	0	0	0	0	
WDP	m³ world equiv.	0	0	0	0	0	
EN15804+A2 RESOURC	E USE PARAMETERS, MC	DULES C1-C4 AND D	PER TONNE OF PIPE				
PERE	MJ	0	0	0	0	0	
PERM	MJ	0	0	0	0	0	
PERT	MJ	0	0	0	0	0	
PENRE	MJ	0	0	0	0	0	
PENRM	MJ	0	0	0	0	0	
PENRT	MJ	0	0	0	0	0	
SM	kg	0	0	0	0	0	
RSF	MJ	0	0	0	0	0	
NRSF	MJ	0	0	0	0	0	
FW	m³	0	0	0	0	0	
EN15804+A2 WASTE M	ATERIAL AND OUTPUT FL	OW PARAMETERS, M	ODULES C1-C4 AND	D, PER TONNE OF PIP	E		
HWD	kg	0	0	0	0	0	
NHWD	kg	0	0	0	1,000	0	
RWD	kg	0	0	0	0	0	
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	
	IAL ENVIRONMENTAL IM						
GWP-GHG	kg CO ₂ -eq.	0	0	0	0	0	
PM	Disease incidences	0	0	0	0	0	
IRP	kBq U235 eq.	0	0	0	0	0	
ETP-FW	CTUe	0	0	0	0	0	
HTPC	CTUh	0	0	0	0	0	
HTPNC	CTUh	0	0	0	0	0	
SQP	Pt	0	0	0	0	0	
	MENTAL IMPACT INDICAT				<u>^</u>		
GWP	kg CO_2 eq.	0	0	0	0	0	
ODP AP	kg CFC 11 eq.	0	0	0	0	0	
EP	kg SO ₂ eq. kg (PO ₄) ^{3.} eq.	0	0	0	0	0	
POCP	kg $(PO_4)^\circ$ eq. kg C_2H_4 eq.	0	0	0	0	0	
ADPE	kg $C_2 H_4$ eq. kg Sb eq.	0	0	0	0	0	
	kg Sb eq. MJ	0	0	0	0	0	
ADPF							

Table 18 - Re-Lined

		C1	C2	C3	C4	D		
INDICATORS, ABBR.	UNITS							
EN15804+A2 CORE EN	EN15804+A2 CORE ENVIRONMENTAL IMPACT INDICATORS, MODULES C1-C4 AND D, PER TONNE OF PIPE							
GWP-TOTAL	kg CO ₂ -eq.	0	0	0	0	0		
GWP-FOSSIL	kg CO ₂ -eq.	0	0	0	0	0		
GWP-BIOGENIC	kg CO ₂ -eq.	0	0	0	0	0		
GWP-LULUC	kg CO ₂ -eq.	0	0	0	0	0		
ODP	kg CFC11-eq.	0	0	0	0	0		
AP	Mole of H⁺ eq.	0	0	0	0	0		
EP-FRESHWATER	kg P eq.	0	0	0	0	0		
EP-MARINE	kg N eq.	0	0	0	0	0		
EP-TERRESTRIAL	Mole of N eq.	0	0	0	0	0		
POCP	kg NMVOC eq.	0	0	0	0	0		
ADP-M&M	kg Sb-eq.	0	0	0	0	0		
ADP-FOSSIL	MJ	0	0	0	0	0		
WDP	m³ world equiv.	0	0	0	0	0		
EN15804+A2 RESOURC	E USE PARAMETERS, MC	DULES C1-C4 AND D, P	ER TONNE OF PIPE					
PERE	MJ	0	0	0	0	0		
PERM	MJ	0	0	0	0	0		
PERT	MJ	0	0	0	0	0		
PENRE	MJ	0	0	0	0	0		
PENRM	MJ	0	0	0	0	0		
PENRT	MJ	0	0	0	0	0		
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	0	0	0	0		
	ATERIAL AND OUTPUT FL							
HWD	kg	0	0	0	0	0		
NHWD	kg	0	0	0	0	0		
RWD	kg	0	0	0	0	0		
CRU	kg	0	0	1,000	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		
EN15804+A2 ADDITION	IAL ENVIRONMENTAL IM	PACT INDICATORS, MO	DULES C1-C4 AND	D, PER TONNE OF PIF				
						0		
GWP-GHG	kg CO ₂ -eq.	0	0	0	0			
PM	Disease incidences	0	0	0	0	0		
PM IRP	Disease incidences kBq U235 eq.	0 0 0	0	0 0	0 0	0		
PM IRP ETP-FW	Disease incidences kBq U235 eq. CTUe	0 0 0 0	0 0 0	0 0 0	0 0 0	0 0		
PM IRP ETP-FW HTPC	Disease incidences kBq U235 eq. CTUe CTUh	0 0 0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		
PM IRP ETP-FW HTPC HTPNC	Disease incidences kBq U235 eq. CTUe CTUh CTUh	0 0 0 0 0	0 0 0 0	0 0 0 0	0 0 0 0	0 0 0		
PM IRP ETP-FW HTPC HTPNC SQP	Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt	0 0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0	0 0 0	0 0 0		
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONI	Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt MENTAL IMPACT INDICAT	0 0 0 0 0 0 0 0	0 0 0 0 0 0 0	0 0 0 0 0 0	0 0 0 0 0	0 0 0 0 0		
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONI GWP	Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq.	0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0		0 0 0 0 0		
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONI GWP ODP	Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq.	0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 AND D, PER TONNE 0 0	0 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0		
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONI GWP ODP AP	Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt WENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0 0 0 0 0 0 0 0 0		
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONI GWP ODP AP EP	Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq. kg (PO ₄) ^{3.} eq.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 7 0 7 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0		
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONI GWP ODP AP EP POCP	Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt VENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq. kg (PO ₄) ³ · eq. kg $(PO_4)^3$ · eq.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0			
PM IRP ETP-FW HTPC HTPNC SQP EN15804+A1 ENVIRONI GWP ODP AP EP	Disease incidences kBq U235 eq. CTUe CTUh CTUh Pt MENTAL IMPACT INDICAT kg CO ₂ eq. kg CFC 11 eq. kg SO ₂ eq. kg (PO ₄) ^{3.} eq.	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 7 0 7 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0 0	0 0 0 0 0 0 0 0 0 0		

Table 19 - Filled with Grout

		C1	C2	C3	C4	D	
INDICATORS, ABBR.	UNITS		02				
INDICATORS, ABBR. UNITS EN15804+A2 CORE ENVIRONMENTAL IMPACT INDICATORS, MODULES C1-C4 AND D, PER TONNE OF PIPE							
GWP-TOTAL	kg CO ₂ -eq.	0	0	0	129	0	
GWP-FOSSIL	kg CO_2 -eq.	0	0	0	129	0	
GWP-BIOGENIC	kg CO_2 eq.	0	0	0	0.0912	0	
GWP-LULUC	kg CO ₂ -eq.	0	0	0	0.100	0	
ODP	kg CFC11-eq.	0	0	0	1.42E-12	0	
AP	Mole of H⁺ eq.	0	0	0	0.156	0	
EP-FRESHWATER	kg P eq.	0	0	0	6.53E-05	0	
EP-MARINE	kg N eq.	0	0	0	0.0549	0	
EP-TERRESTRIAL	Mole of N eq.	0	0	0	0.613	0	
POCP	kg NMVOC eq.	0	0	0	0.151	0	
ADP-M&M	kg Sb-eq.	0	0	0	7.32E-06	0	
ADP-FOSSIL	MJ	0	0	0	1,810	0	
WDP	m³ world equiv.	0	0	0	9.38	0	
EN15804+A2 RESOURC	E USE PARAMETERS, MC	DULES C1-C4 AND D	, PER TONNE OF PIPE				
PERE	MJ	0	0	0	110	0	
PERM	MJ	0	0	0	0	0	
PERT	MJ	0	0	0	110	0	
PENRE	MJ	0	0	0	1,810	0	
PENRM	MJ	0	0	0	0	0	
PENRT	MJ	0	0	0	1,810	0	
SM	kg	0	0	0	0	0	
RSF	MJ	0	0	0	2.20	0	
NRSF	MJ	0	0	0	0	0	
FW	m³	0	0	0	0.358	0	
EN15804+A2 WASTE M	ATERIAL AND OUTPUT FL	OW PARAMETERS, M	ODULES C1-C4 AND	D, PER TONNE OF PIP	E		
HWD	kg	0	0	0	2.32E-05	0	
NHWD	kg	0	0	0	2,020	0	
RWD	kg	0	0	0	0.0327	0	
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	
EN15804+A2 ADDITION	IAL ENVIRONMENTAL IM	PACT INDICATORS, M	IODULES C1-C4 AND	D, PER TONNE OF PIF	ЪЕ		
GWP-GHG	kg CO ₂ -eq.	0	0	0	128	0	
PM	Disease incidences	0	0	0	2.96E-06	0	
IRP	kBq U235 eq.	0	0	0	5.29	0	
ETP-FW	CTUe	0	0	0	277	0	
HTPC	CTUh	0	0	0	1.44E-08	0	
HTPNC	CTUh	0	0	0	7.42E-07	0	
SQP	Pt	0	0	0	115	0	
	MENTAL IMPACT INDICAT						
GWP	kg CO_2 eq.	0	0	0	126	0	
ODP	kg CFC 11 eq.	0	0	0	2.50E-12	0	
AP	kg SO_2 eq.	0	0	0	0.116	0	
EP	kg (PO ₄) ³⁻ eq.	0	0	0	0.0223	0	
POCP	kg C_2H_4 eq.	0	0	0	0.00922	0	
ADPE	kg Sb eq.	0	0	0	7.52E-06	0	
ADPF	MJ	0	0	0	1,710	0	

Table 20 - Exhumed and recycled

		C1	C2	C3	C4	D
INDICATORS, ABBR.	UNITS					
	/IRONMENTAL IMPACT II	NDICATORS, MODULI	ES C1-C4 AND D, PER	TONNE OF PIPE		
GWP-TOTAL	kg CO ₂ -eq.	1.11	8.79	2.94	0.0295	-32.6
GWP-FOSSIL	kg CO ₂ -eq.	1.15	8.79	2.94	0.0302	-32.6
GWP-BIOGENIC	kg CO ₂ -eq.	-0.0505	0.00443	3.52E-04	-8.79E-04	-0.0406
GWP-LULUC	kg CO ₂ -eq.	0.00910	1.77E-04	4.45E-05	8.89E-05	-0.0270
ODP	kg CFC11-eq.	1.42E-16	1.29E-15	3.32E-16	1.18E-16	-1.50E-13
AP	Mole of H⁺ eq.	0.00548	0.0158	0.0140	2.15E-04	-0.0634
EP-FRESHWATER	kg P eq.	3.30E-06	1.45E-06	5.18E-07	5.08E-08	-2.33E-05
EP-MARINE	kg N eq.	0.00258	0.00656	0.00676	5.59E-05	-0.0147
EP-TERRESTRIAL	Mole of N eq.	0.0285	0.0723	0.0740	6.14E-04	-0.157
РОСР	kg NMVOC eq.	0.00725	0.0154	0.0189	1.69E-04	-0.0546
ADP-M&M	kg Sb-eq.	8.46E-08	1.36E-07	4.80E-08	2.85E-09	-6.61E-05
ADP-FOSSIL	MJ	14.8	117	39.2	0.401	-358
WDP	m³ world equiv.	0.00965	0.0576	0.0229	0.00325	-73.9
EN15804+A2 RESOURC	E USE PARAMETERS, MC	DULES C1-C4 AND D	, PER TONNE OF PIPE			
PERE	MJ	0.826	0.569	0.113	0.0541	-15.7
PERM	MJ	0	0	0	0	0
PERT	MJ	0.826	0.569	0.113	0.0541	-15.7
PENRE	MJ	14.8	117	39.2	0.401	-359
PENRM	MJ	0	0	0	0	0
PENRT	MJ	14.8	117	39.2	0.401	-359
SM	kg	0	0	0	0	0
RSF	MJ	0	0	0	0	0
NRSF	MJ	0	0	0	0	0
FW	m³	9.45E-04	0.00113	3.44E-04	9.90E-05	-1.74
EN15804+A2 WASTE M	ATERIAL AND OUTPUT FL	OW PARAMETERS, M	ODULES C1-C4 AND	D, PER TONNE OF PIP	E	
HWD	kg	7.47E-10	4.21E-10	1.18E-10	4.26E-11	3.65E-08
NHWD	kg	0.00220	0.00279	6.20E-04	2.00	3.21
RWD	kg	1.79E-05	1.61E-05	9.18E-07	4.21E-06	-0.00966
CRU	kg	0	0	0	0	0
MFR	kg	0	0	1,000	0	0
MER	kg	0	0	0	0	0
EEE	MJ	0	0	0	0	0
EET	MJ	0	0	0	0	0
EN15804+A2 ADDITION	IAL ENVIRONMENTAL IM	PACT INDICATORS, M	ODULES C1-C4 AND	D, PER TONNE OF PIP	ΡE	
GWP-GHG	kg CO ₂ -eq.	1.15	8.78	2.93	0.0301	-32.0
PM	Disease incidences	6.20E-08	1.12E-07	1.59E-07	2.68E-09	-1.48E-06
IRP	kBq U235 eq.	0.00257	0.00189	1.03E-04	4.43E-04	-1.11
ETP-FW	CTUe	10.7	44.6	10.5	0.229	-69.8
HTPC	CTUh	2.16E-10	7.61E-10	1.77E-10	3.37E-11	-1.57E-08
HTPNC	CTUh	1.30E-08	2.76E-08	1.08E-08	3.72E-09	-4.06E-07
SQP	Pt	5.08	0.299	0.0815	0.0810	-28.5
EN15804+A1 ENVIRONM	MENTAL IMPACT INDICAT	FORS, MODULES C1-C	4 AND D, PER TONNE	OF PIPE		
GWP	kg CO_2 eq.	1.08	8.68	2.90	0.0287	-31.3
ODP	kg CFC 11 eq.	1.89E-16	1.73E-15	4.43E-16	1.57E-16	-2.00E-13
AP	kg SO $_2$ eq.	0.00381	0.0114	0.00970	1.71E-04	-0.0512
EP	kg (PO ₄) ³⁻ eq.	9.04E-04	0.00223	0.00226	1.94E-05	-0.00515
РОСР	kg C_2H_4 eq.	3.87E-04	-0.00182	9.41E-04	1.32E-05	-0.0117
ADPE	kg Sb eq.	8.47E-08	1.36E-07	4.80E-08	2.88E-09	-6.61E-05
ADPF	MJ	14.7	117	39.1	0.390	-336



Calculating the life cycle impact of a product

An example calculation is provided for the life cycle impact of a product, per effective linear metre of pipe. The example given is to calculate GWP-GHG, but the calculation methodology is the same regardless of the desired indicator. The calculations require the product specifications, including diameter and conversion factor from tonnes to linear metre, and the product group. The intended endof-life scenario must also be selected.

Example Calculation

Product	Papakura 80074191 Concrete Titan Pipe VT 675.2500mm Class 2 RRJ
Product group	VT Class 2 (Group 13)
Mass per effective linear metre	0.560 t/eff m
Site (for transportation)	Papakura
Diameter (for installation)	675mm (from specification)
End-of-life scenario	Exhumed and Recycled

Table 21 - Example, calculation of GWP-GHG per effective metre of pipe

MODULE	GWP-GHG [KG CO2E-EQ.]	UNIT	CONVERSION FACTOR (TO EFFECTIVE LINEAR METRE)	RESULT PER EFFECTIVE LINEAR METRE OF PIPE
A1-A3	184	per tonne	0.560	103
A4	9.21	per tonne	0.560	5.16
A5	22.3	per metre	1	22.3
C1	1.15	per tonne	0.560	0.64
C2	8.78	per tonne	0.560	4.92
C3	2.93	per tonne	0.560	1.64
C4	0.0301	per tonne	0.560	0.0169
D	-32.0	per tonne	0.560	-17.9
Total (A-C)		per metre		138

Module D declares the potential impacts or benefits of recycling or reuse of the product in the next life cycle. These impacts are beyond the scope of the current life cycle of the product, and so should not be included when calculating life cycle impacts. The life cycle impact of a product are the impacts related to modules A, B, and C.

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7

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Humes pipes are manufactured to AS/NZS 4058 under an AS/NZS ISO9001:2016 Certified Quality Management System, and are designed to be installed according to AS/NZS 3725:2007



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