EPD™

Environmental Product Declaration

Global GreenTag EPD Program:

Compliant to EN15804+A2 2019

Xypex Chemical Corporation

Xypex Admix C-500

13731 Mayfield Place, Richmond
British Columbia, Canada

XYPEX® Concrete Waterproofing by Crystallization™

Compliant to EN 15804+A2, ISO 14025 ISO 21930

Xypex Admix C-500
EPD XYP06 2023EP

Mandatory Disclosures

EPD type	Cradle to grave A1 to C4 + D	**EPD Numbers**	XYP06 2023EP
Issue Date	28 August 2023	**Valid Until**	28 August 2028

Demonstration of Verification

PCR	Standard EN 15804+A2 2019 serves as core Product Category Rules (PCR) [1]. Sub-PCR UCM:2023 Unreinforced Concrete Mixtures and Additives also applies [2].
☑ Internal	Delwyn Jones 22 Aug 2023; 22.08.2023 LCA Developed by Delwyn Jones, The Evah Institute LCA Reviewed by Direshni Naiker The Evah Institute EPD Reviewed by David Baggs, Global GreenTag Pty Ltd
☑ External	22/08/2023 Third Party Verifier[a] Mathilde Vlieg Malaika LCT a. Independent external verification of the declaration and data, mandatory for business-to-consumer communication according to ISO 14025:2010 [2].
Communication	This EPD discloses potential environmental outcomes compliant with EN 15804 for business-to-business communication.
Comparability	Construction product EPDs may not be comparable if not EN15804 compliant. Different program EPDs may not be comparable. Comparability is further dependent on the product category rules and data source used.
Reliability	LCIA results are relative expressions that do not predict impacts on category endpoints, exceeding of thresholds, safety margins or risks.
Owner	This EPD is the property of the declared manufacturer.
Explanations	Further explanatory information is available at info@globalgreentag.com or by contacting certification1@globalgreentag.com [3].

EPD Program Operator	**LCA and EPD Producer**	**Declaration Owner**
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XYPEX® Concrete Waterproofing by Crystallization™

Xypex Admix C-500
EPD XYP06 2023EP

Program Description

EPD type	Cradle to grave A1 to C4 + D as defined by EN 15804 [1]
System boundary	The system boundary with nature includes material and energy acquisition, processing, manufacture, transport, installation, use plus waste arising to end of life.
Stages included	Stages A1-3 A4-5, B1-4, C1 to C2 and C4 D1 to D3
Stages excluded	No stage was excluded but flows and results for B5-B7 and C3 were all zero.
Scope Depiction	Figure 1 depicts all modules being declared including some with zero results. Any module not declared (MND) does not indicate a zero result.

Model Information	Actual					Scenarios Building Life Cycle Assessment											Potential Supplementary		
Stages	Product			Construct		Use							End-of-Life				Benefit & load beyond system		
Data Modules						Fabric					Operation								
Unit Operations	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D1	D2	D3
Cradle to Gate+ Options & Grave	Resources	Transport	Manufacture	Transport	Construct	Use	Maintain	Repair	Replace	Refurbish	Energy use	Water use	Demolish	Transport	Process Waste	Disposal	Reuse	Recovery	Recycling

Figure 1 EPD Life Cycle Modules Cradle to Grave

Data Sources

Primary Data	Data was collected from primary sources 2019 to 2022 including the manufacturer and suppliers' standards, locations, logistics, technology, market share, management system in accordance with EN ISO 14044:2006, 4.3.2, [4]. All are biochemical-physical allocated none are economically allocated.
A1-A3 Stage inclusions	Operations include all known raw material acquisition, refining and processing plus scrap or material reuse from prior systems; electricity generated from all sources with extraction, refining & transport plus secondary fuel energy and recovery processes. Also, transport to factory gate; manufacture of inputs, ancillary material, product, packaging, maintenance, replacement plus flows leaving at end-of-waste boundary and fates of all flows at end of life.
Variability	Significant differences of average LCIA results are declared.
Chemicals of Concern	Contains no substances in the European Chemicals Agency "Authorised or Candidate Lists of Substances of Very High Concern (SVHCs)".

Data Quality

Data cut-off & quality criteria complies with EN 15804 [1] The LCA used background data aged <10 years and quality parameters tabled below.

Background	**Data Quality**	**Parameters and Uncertainty (U)**			
Correlation	**Metric σg**	U ±0.01	U ±0.05	U ±0.10	U ±0.20
Reliability	**Reporting**	Site Audit	Expert verify	Region	Sector
	Sample	>66% trend	>25% trend	>10% batch	>5% batch
Completion	**Including**	>50%	>25%	>10%	>5%
	Cut-off	0.01%w/w	0.05%w/w	0.1%w/w	0.5%w/w
Temporal	**Data Age**	<3 years	≤5 years	<7.5 years	<10 years
	Duration	>3 years	<3 years	<2 years	1 year
Technology	**Typology**	Actual	Comparable	In Class	Convention
Geography	**Focus**	Process	Line	Plant	Corporate
	Range	Continent	Nation	Plant	Line
	Jurisdiction	Representation is Global. Africa, North America, Europe, Pacific Rim			

Product Information

At batching time the XYPEX admixture containing cement, sand, lime, waterproofing and setting agents is added to the concrete mix. In contact with moisture in fresh concrete and cement hydration products these agents react to catalytically generate insoluble crystals. These crystals permanently seal concrete pores and capillary tracts throughout preventing liquid ingress from all directions.

Brand Name & Code	Xypex Admix C-500	**Range Names**	Xypex Admixtures
Factory warranty	One year	**Reference Service Life**	60 years [5,6]
Manufacturer	Xypex Chemical Corporation		
Manufacturer address	13731 Mayfield Place, Richmond British Columbia, Canada		
Site representation	Canadian and Americas		
Function in Building	Xypex products waterproof, protect and improve concrete.		
Functional unit	Cradle to grave concrete repair, remedial & waterproofing/kg 60years		

Product Components

This section summarises factory components, functions, source nation and % mass share. In product content listed below the % mass has a range and confidence interval that is 90% certain to contain true population means at any time. Listing such certainty considers normal resource acquisition, supply chain, sedimentation, seasonal, manufacturing and product variation over this EPD's validity period. This also allows for intellectual property protection whilst ensuring fullest possible transparency.

Function	Component	Cradle	Amount
Cement binder	Portland Cement	Canada	>30 <40
Aggregate	Moraine Sand	Canada	>25 <35
Crystalline waterproofing	Base mix	Canada	>15 <25
Hydration	Hydrated Lime	Canada	>10 <20
Setting Retarder	Proprietary Mineral	Canada	> 1 <10
Packaging			
Pallet wood	Wood	Canada	>1.5 <2.0
Pail, Straps, Wrap & Tape	Polymers	Canada	>0.4 <0.5
Packaging	Cardboard and paper	Canada	>0.2 <0.3

Product Functional & Technical Performance Information

This section provides specifications and data to calculate results factoring different mass and period. For normal conditions, the dosage rate is 2 to 3% by weight of cement in the mix. The recommended minimum dosage rate for regular grade Admix C-500 is 6kg/m^3 and the maximum dosage is 12kg/m^3.

The sequence for addition will vary according to type of batch plant operation and equipment. As it is important to obtain a homogeneous blend of admixture within the concrete avoid adding dry admixture powder directly to wet mixed concrete as this could cause clumping that prevents thorough dispersion.

Safety Procedures	https://www.xypex.com/technical/safety-data
Specifications	https://www.xypex.com/technical/specifications
Practices Reference	https://www.xypex.com/learning-centre/faq
Installation Procedure	https://www.xypex.com/products/installations

System Analysis Scope and Boundaries

Stages A1 to 3 model actual operations. Stage A4 to C4 are model scenarios.

Typical scenarios are assumed to forecast unit operations as described in the next section.

Figure 2. shows included processes in a cradle to grave system boundary to end of life fates to unshown beyond the boundary reuse, recycling or landfill grave.

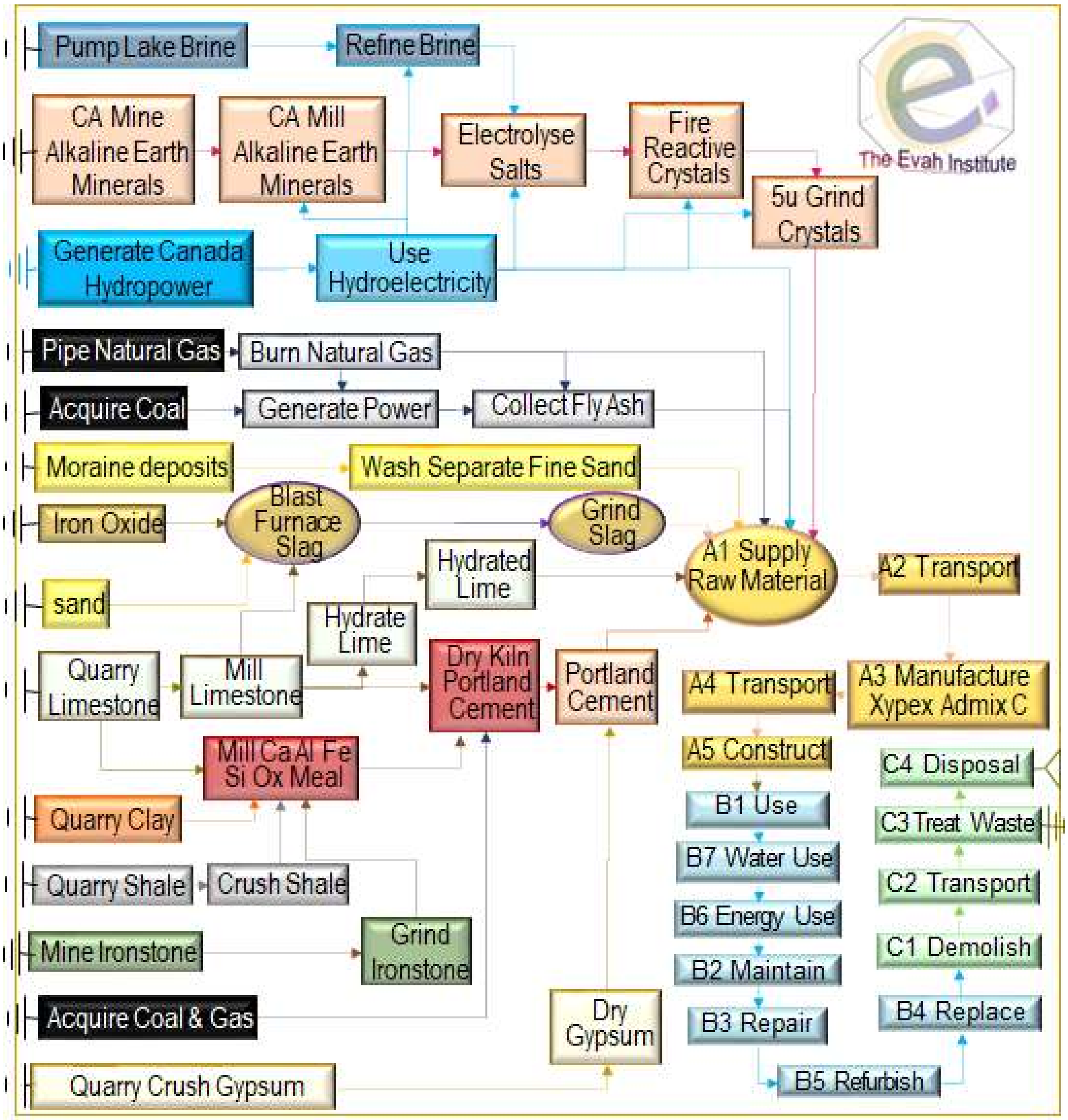

Figure 2. Product Process Flow Chart

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Xypex Admix C-500
EPD XYP06 2023EP

Scenarios for Modules (Units/Functional Unit)

This section defines modelling scenarios beyond actual A1 to A3 operations from stage A4 to D3.

A Construction	Type specified	Amount	Type specified	Amount
A4 Transport to Site	25t semi-trailer	60 km	85% Capacity	Full back load
Volume capacity (<1 to ≥1)	Utilisation factor	1	Uncompressed	Un-nested
A5 Installation utilities	Town water	0.53litre	Grid power	0.0002 MJ
Waste on site	Spill	0.05kg		
Scrap collection & routes	25t semi-trailer	60 km	to landfill	In LCA report

Stage B2 and B3 scenarios are listed below. Stages B1 Use of building fabric, B4 Replacement, B5 Refurbishment, B6 Building Operating Energy and B7 Building Operating Water all have zero flows.

B Building	Type specified	Amount	Type specified	Amount
B2 Maintenance	None typical	nil	Clean cycle	nil
B3 Repair 5%	As per website	Specified	Freight to site	As A5

Stage C1, C2 and C4 scenarios are listed below. Stage C3 Waste Treatment has zero flows.

C End of Life	Type specified	Amount	Type specified	Amount
C1 Demolition	Remove worn area	0.05kg	Collect separately	0.05kg
C2 Transport	25t truck road	50km	85% capacity	No back load
C4 Disposal	Product specific	0.05kg	Collect separately	0.05kg
Recovery system	No recycling	0.0 kg	Not for energy	0.0 kg

Stage D scenarios D1 Reuse and D2 Recovery are listed below. D3 Recycling has zero flows. Because of typical product durability no recycling was modelled. As buildings and infrastructure are demoshished, however, the product is fully recyclable.

D Beyond System Boundary	Type specified	Amount	Type specified	Amount
D1 Reuse	typically	95%	Patch 5%	0.05kg
D2 Recovery	typically	100%	Cleaning	sweep
D3 Recycle	At 60 years	Nil	None	0%

Environmental Impact Terminology

Environmental impacts contributing to risks of social and ecological issues and collapse are tabled below with common names and remedies given for each indicator.

Global warming forcing Climate Change	Greenhouse gases absorb infra-red radiation. This heat reduces thermal energy differentials, from equator to poles, forcing ocean current and wind circulation to blend and regulate climate. Weakly blended "lumpier" weather has more frequent, extreme heat wave, fire-storm, cyclone, rain-storm, flood and blizzard events. Accumulation of carbon dioxide, natural gas methane, nitrous oxides and volatile organic compounds from burning fossil fuels causes global warming. Forest and wilderness growth absorbing air-borne carbon in biomass can drawdown such accumulation. Urgent renewable energy reliance is vital in time to avoid imminent tipping points and the worsening "***climate emergency***".
Ozone layer depletion	Stratospheric ozone loss weakens the planet's solar shield so more shorter wavelength ultraviolet (UVB) light reaching earth damages plants and increases malignant melanoma and skin cancer in humans and animals. Chlorofluorocarbons, hydrochlorofluorocarbons (HCFC), chlorobromomethane, hydrobromofluorocarbons, carbon tetrachloride, methyl chloroform, methyl bromide and halon gas cause ozone layer loss. To repair the *"**ozone hole**"* reliance on ozone-safe refrigerants, aerosols and solvents is essential to avoid further its depletion and enable accumulation of naturally-formed ozone.
Acidification	Acidification reduces soil and waterway pH, impedes nitrogen fixation vital for plant growth and inhibits natural decomposition. It increases rates and incidence of fish kills, forest loss and deterioration of buildings and materials. Chief synthetic causes of "***acid rain***" are emissions of sulphur and nitrogen oxides, hydrochloric and hydrofluoric acids and ammonia from burning fossil fuels polluting precipitation of rain and snow world-wide.
Eutrophication of terrestrial, freshwater and marine life	Eutrophication from excessively high macronutrient levels added to natural waters promotes excessive plant growth that severely reduces oxygen, water and habitat security for aquatic and terrestrial organisms across related ecosystems. Chief synthetic cause of "***algal blooms***" is nitrogen (N, NOx, NH_4) and phosphorus (P, PO_4^{3-}) in rain run-off over-fertilised land catchments.
Photochemical ozone creation	Tropospheric photochemical ozone, called "***summer smog***" near ground level, is created from natural and synthetic compounds in UV sunlight. Low concentration smog damages vegetation and crops. High concentration smog is hazardous to human health. Chief synthetic causes are nitrogen oxides, carbon monoxide and volatile organic compounds (VOC) pollutants. Avoiding reliance on dirtiest coal fuel and volatile chemicals has reduced smog incidence in many areas globally.
Depletion of minerals, metals & water	Abiotic depletion of finite mineral resources increases time, effort and money required to obtain more resources to the point of extinction of naturally viable reserves. This can limit access to available, valuable and scarce elements vital for human-life. The youth movement "***extinction rebellion***" calls on adults to secure climate, reserves and biodiversity for current and future generations.
Depletion of fossil fuel reserves	Abiotic depletion of resources by consuming finite oil, natural gas, coal and yellowcake fossil fuel reserves leaves current and future generations suffering limited available, accessible, plentiful, essential valuable as well as scarce raw material, medicinal, chemical, feedstock and fuel stock. Approaching "***peak oil***" acknowledged fossil fuel reserves are finite and the need for decision-makers to act to avoid market instability, insecurity and or oil and gas wars.

Glossary of Terms, Methods and Units

Acronyms, methods and units of impact potentials plus inventory inputs and outputs, are defined below

Impact Potentials	Acronym	Description of Methods	Units
Climate Change biogenic	GWP_{bio}	GWP biogenic [7]	kg CO_{2eq}
Climate Change luluc	GWP_{luluc}	GWP land use & change [7]	kg CO_{2eq}
Climate Change fossil	GWP_{ff}	GWP fossil fuels [7]	kg CO_{2eq}
Climate Change total	GWP_{t}	Global Warming Potential [7]	kg CO_{2eq}
Stratospheric Ozone Depletion	ODP	Stratospheric Ozone Loss [8]	kg CFC_{11eq}
Photochemical Ozone Creation	POCP	Summer Smog [9]	kg $NMOC_{eq}$
Acidification Potential	AP	Accumulated Exceedance [10]	mol H^{+}_{eq}
Eutrophication Freshwater	EP_{fresh}	Excess nutrients freshwater [11]	kg P_{eq}
Eutrophication Marine	EP_{marine}	Excess marine nutrients [11]	kg N_{eq}
Eutrophication Terrestrial	EP_{land}	Excess Terrestrial nutrients [11]	mol N_{eq}
Mineral & Metal Depletion	ADP_{min}	Abiotic Depletion minerals [12]	kg Sb_{eq}
Fossil Fuel Depletion	ADP_{ff}	Abiotic Depletion fossil fuel [13]	MJ_{ncv}
Water Depletion	WDP	Water Deprivation Scarcity [14, 15]	$m^3_{WDP\ eq}$
Fresh Water Net	FW	Lake, river, well & town water	m^3
Secondary Material	SM	Post-consumer recycled (PCR)	kg
Secondary Renewable Fuel	RSF	PCR biomass burnt	MJ_{ncv}
Primary Energy Renewable Material	PERM	Biomass retained material	MJ_{ncv}
Primary Energy Renewable Not Feedstock	PERE	biomass fuels burnt	MJ_{ncv}
Primary Energy Renewable Total	PERT	Biomass burnt + retained	MJ_{ncv}
Secondary Non-renewable Fuel	NRSF	PCR fossil-fuels burnt	MJ_{ncv}
Primary Energy Non-renewable Material	PENRM	Fossil feedstock retained	MJ_{ncv}
Primary Energy Non-renewable Not Feedstock	PENRE	fossil-fuel used or burnt	MJ_{ncv}
Primary Energy Non-renewable Total	PENRT	Fossil feedstock & fuel use	MJ_{ncv}
Hazardous Waste Disposed	HWD	Reprocessed to contain risks	kg
Non-hazardous Waste Disposed	NHWD	Municipal landfill facility waste	kg
Radioactive Waste Disposed	RWD	Mostly ex nuclear power stations	kg
Components For Reuse	CRU	Product scrap for reuse as is	kg
Material For Recycling	MFR	Factory scrap to remanufacture	kg
Material For Energy Recovery	MER	Factory scrap use as fuel	kg
Exported Energy Electrical	EEE	Uncommon for building products	MJ_{ncv}
Exported Energy Thermal	EET	Uncommon for building products	MJ_{ncv}

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Xypex Admix C-500
EPD XYP06 2023EP

Module A1 to D4 Results Cradle to Site

Table 1 shows A1- A3 Acquisition, Transport and Manufacture then A4 Delivery and A5 Construct results.

Table 1 A1 to A5 Impact & Inventory Results/Functional Unit

Result	A1-3	A4	A5
Climate Change biogenic	-8.6E-03	-1.0E-06	-4.9E-04
Climate Change luluc	3.4E-06	1.7E-09	2.2E-07
Climate Change fossil	1.03	1.9E-02	0.06
Climate Change total	1.02	1.9E-02	0.06
Stratospheric Ozone Depletion	1.6E-08	1.7E-13	1.0E-09
Photochemical Ozone Creation	4.6E-03	1.2E-04	2.8E-04
Acidification Potential	2.2E-03	1.2E-05	1.3E-04
Eutrophication Freshwater	4.7E-08	5.6E-10	9.7E-09
Eutrophication Marine	5.0E-04	2.3E-06	3.1E-05
Eutrophication Terrestrial	1.2E-03	7.9E-06	7.4E-05
Mineral and Metal Depletion	3.2E-04	2.3E-02	2.7E-02
Fossil Depletion	0.45	7.2E-06	2.0E-05
Water Scarcity Depletion	1.2E-02	3.0E-06	7.4E-04
Net Fresh Water Use	7.2E-02	0.02	4.6E-03
Secondary Material	2.4E-02	2.9E-06	1.5E-03
Secondary Renewable Fuel	5.9E-02	6.7E-06	5.0E-04
Primary Renewable Material	-1.1E-04	2.4E-03	3.1E-03
Primary Energy Renewable Not Feedstock	1.5	2.9E-04	0.09
Primary Energy Renewable Total	1.5	2.7E-03	0.09
Secondary Non-renewable Fuel	8.3E-03	7.4E-04	4.9E-04
Primary Energy Non-renewable Material	1.0	0.11	0.06
Primary Non-renewable Energy Not Feedstock	6.9	0.19	0.42
Primary Energy Non-renewable Total	7.9	0.30	0.49
Hazardous Waste Disposed	2.8E-04	3.7E-05	1.7E-05
Non-hazardous Waste Disposed	0.11	3.1E-04	0.06
Radioactive Waste Disposed	3.0E-16	1.1E-31	1.9E-17
Components For Reuse	0	0	0
Material For Recycling	9.7E-03	6.5E-06	6.1E-03
Material For Energy Recovery	1.6E-04	2.3E-07	1.1E-05
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

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Xypex Admix C-500
EPD XYP06 2023EP

Results Module B: Building Fabric and Operations

Table 2 shows B1 Use, B2 Maintain, B3 Repair B4 Replace, B5 Refurbish, B6 Energy Use and B7 Water Use results.

Table 2 B1 to B7 Impact & Inventory Results/Functional Unit

Result	B1	B2	B3	B4	B5	B6	B7
Climate Change biogenic	0	0	-4.3E-04	0	0	0	0
Climate Change luluc	0	0	1.7E-07	0	0	0	0
Climate Change fossil	0	0	5.2E-02	0	0	0	0
Climate Change total	0	0	5.1E-02	0	0	0	0
Stratospheric Ozone Depletion	0	0	8.0E-10	0	0	0	0
Photochemical Ozone Creation	0	0	2.3E-04	0	0	0	0
Acidification Potential	0	0	1.1E-04	0	0	0	0
Eutrophication Freshwater	0	0	9.8E-09	0	0	0	0
Eutrophication Marine	0	0	2.4E-05	0	0	0	0
Eutrophication Terrestrial	0	0	5.9E-05	0	0	0	0
Mineral and Metal Depletion	0	0	1.7E-05	0	0	0	0
Fossil Depletion	0	0	2.4E-02	0	0	0	0
Water Scarcity Depletion	0	0	5.8E-04	0	0	0	0
Net Fresh Water Use	0	0	3.60	0	0	0	0
Secondary Material	0	0	1.1E-03	0	0	0	0
Secondary Renewable Fuel	0	0	4.1E-04	0	0	0	0
Primary Renewable Material	0	0	2.9E-03	0	0	0	0
Primary Energy Renewable Not Feedstock	0	0	6.5E-02	0	0	0	0
Primary Energy Renewable Total	0	0	6.8E-02	0	0	0	0
Secondary Non-renewable Fuel	0	0	5.2E-04	0	0	0	0
Primary Energy Non-renewable Material	0	0	5.7E-02	0	0	0	0
Primary Non-renewable Energy Not Feedstock	0	0	0.37	0	0	0	0
Primary Energy Non-renewable Total	0	0	0.43	0	0	0	0
Hazardous Waste Disposed	0	0	1.6E-05	0	0	0	0
Non-hazardous Waste Disposed	0	0	5.5E-02	0	0	0	0
Radioactive Waste Disposed	0	0	1.5E-17	0	0	0	0
Components For Reuse	0	0	0	0	0	0	0
Material For Recycling	0	0	5.8E-03	0	0	0	0
Material For Energy Recovery	0	0	7.0E-06	0	0	0	0
Exported Energy Electrical	0	0	0	0	0	0	0
Exported Energy Thermal	0	0	0	0	0	0	0

Results Module C: End-of-life

Table 3 shows results for C1 demolish, C2 Transport C3 Waste Processing and C4 Disposal.

Table 3 C1 to C4 Impact & Inventory Results/Functional Unit

Result	C1	C2	C3	C4
Climate Change biogenic	-1.0E-05	-1.0E-05	0	-7.8E-07
Climate Change luluc	4.6E-11	1.4E-09	0	1.2E-09
Climate Change fossil	3E-06	0.006	0	7.4E-03
Climate Change total	3E-06	0.006	0	7.4E-03
Stratospheric Ozone Depletion	2.3E-13	1.1E-13	0	1.1E-13
Photochemical Ozone Creation	2.2E-08	6.0E-05	0	7.5E-05
Acidification Potential	1.4E-08	5.1E-06	0	2.0E-04
Eutrophication Freshwater	3.3E-13	3.1E-10	0	3.4E-10
Eutrophication Marine	4.2E-09	9.5E-07	0	1.2E-06
Eutrophication Terrestrial	7.4E-09	3.4E-06	0	4.0E-06
Mineral and Metal Depletion	3.8E-09	4.0E-06	0	4.9E-06
Fossil Depletion	2.1E-06	7.5E-03	0	9.0E-03
Water Scarcity Depletion	1.6E-07	1.4E-06	0	1.6E-06
Net Fresh Water Use	0	0.01	0	9.7E-03
Secondary Material	3.4E-07	2.2E-06	0	2.1E-06
Secondary Renewable Fuel	1.1E-07	5.1E-06	0	4.7E-06
Primary Renewable Material	1.4E-07	1.6E-03	0	2.0E-04
Primary Energy Renewable Not Feedstock	1.5E-05	2.0E-04	0	2.0E-04
Primary Energy Renewable Total	1.5E-05	1.8E-03	0	1.9E-03
Secondary Non-renewable Fuel	1.4E-08	4.8E-04	0	5.1E-04
Primary Energy Non-renewable Material	2.4E-06	0.04	0	0.04
Primary Non-renewable Energy Not Feedstock	4.3E-05	0.06	0	0.08
Primary Energy Non-renewable Total	4.6E-05	0.10	0	0.12
Hazardous Waste Disposed	7.1E-10	1.2E-05	0	1.5E-05
Non-hazardous Waste Disposed	1.4E-06	9.6E-05	0	1.0
Radioactive Waste Disposed	4.4E-21	8.5E-32	0	7.5E-32
Components For Reuse	0	0	0	0
Material For Recycling	1.5E-08	4.6E-06	0	4.5E-06
Material For Energy Recovery	2.9E-10	1.5E-07	0	1.6E-07
Exported Energy Electrical	0	0	0	0
Exported Energy Thermal	0	0	0	0

Results Module D: Beyond System Boundaries

Table 4 has results for benefit and loads in D1 reuse, D2 recovery and D3 recycling.

Table 4 D1 to D3 Impact & Inventory Results/Functional Unit

Result	D1	D2	D3
Climate Change biogenic	-2.0E-04	-1.9E-4	0
Climate Change luluc	1.7E-07	2.4E-09	0
Climate Change fossil	4.8E-02	0	0
Climate Change total	4.8E-02	0	0
Stratospheric Ozone Depletion	8.2E-10	5.9E-13	0
Photochemical Ozone Creation	2.3E-04	1.2E-06	0
Acidification Potential	1.0E-04	5.3E-07	0
Eutrophication Freshwater	2.2E-09	1.2E-10	0
Eutrophication Marine	2.4E-05	9.4E-08	0
Eutrophication Terrestrial	5.8E-05	6.9E-07	0
Mineral and Metal Depletion	1.8E-05	5.8E-08	0
Fossil Depletion	2.4E-02	1.7E-04	0
Water Scarcity Depletion	6.0E-04	1.8E-05	0
Net Fresh Water Use	3.7	0.11	0
Secondary Material	1.1E-03	1.7E-04	0
Secondary Renewable Fuel	4.0E-04	4.3E-05	0
Primary Renewable Material	4.9E-05	3.0E-05	0
Primary Energy Renewable Not Feedstock	6.9E-02	1.4E-04	0
Primary Energy Renewable Total	6.9E-02	1.7E-04	0
Secondary Non-renewable Fuel	2.9E-04	7.7E-06	0
Primary Energy Non-renewable Material	4.8E-02	0	0
Primary Non-renewable Energy Not Feedstock	0.37	3.1E-03	0
Primary Energy Non-renewable Total	0.42	3.1E-03	0
Hazardous Waste Disposed	1.4E-05	1.9E-07	0
Non-hazardous Waste Disposed	7.3E-03	2.0E-05	0
Radioactive Waste Disposed	1.6E-17	4.9E-21	0
Components For Reuse	0	0	0
Material For Recycling	1.9E-04	1.6E-05	0
Material For Energy Recovery	7.3E-06	6.5E-09	0
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Interpretation Cradle to Gate A1 to A3.

The first interpretation section discusses product results cradle to gate A1 to A3.

Like most lime and cement products derived from roasting fossil limestone, admixtures have significant Global Warming Potential (GWP). Roasting limestone meal in high temperature kilns releases chemically bound carbonates from the mineral and oxides of carbon, nitrogen and sulphur from fuel combustion to air.

Figure 3 charts proprietary base mix mass versus GWP as CO_{2e} kg/kg admixture. Figure 4 charts cement mass versus GWP CO_{2e} kg/kg admixture. Together they show the cement has twice the GWP sensitivity of the next component the base mix. GWP sensitivity to sand and setting agent components were lowest.

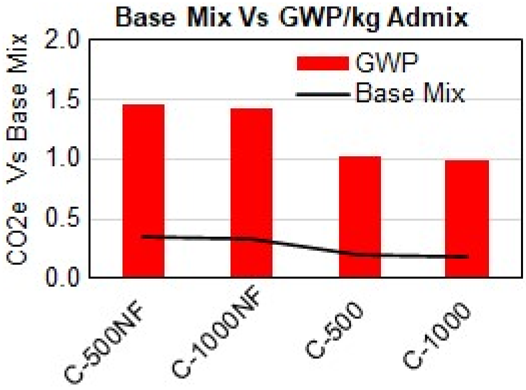

Figure 3 A1-3 Base Mix MJ Vs CO_{2e}/kg Admix

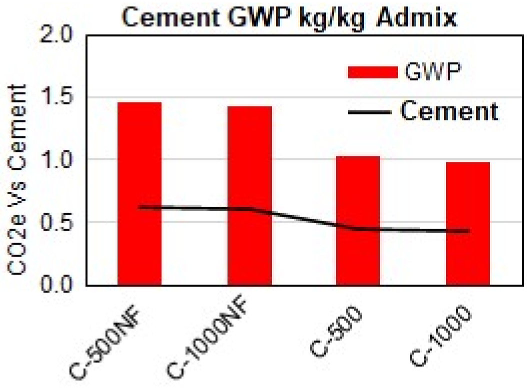

Figure 4 A1-3 Cement Vs CO_{2e}kg/kg Admix

Figure 5 charts the A1-3 abiotic depletion of access to fossil fuels (ADPff) in (MJncv) correlated to GWP CO2e kg/kg admixture. Most such fossil fuel was used in roasting limestone meal in kilns to make clinker for cement and to make lime for hydrated lime.

Interpretation Cradle to Grave and Beyond the System Boundary A1 to D3.

The second interpretation section discusses product results cradle to grave and beyond A1 to D3 Figure 6 shows highest GWP A1-A3 and insignificant A4 to C4 and beyond 60-years.

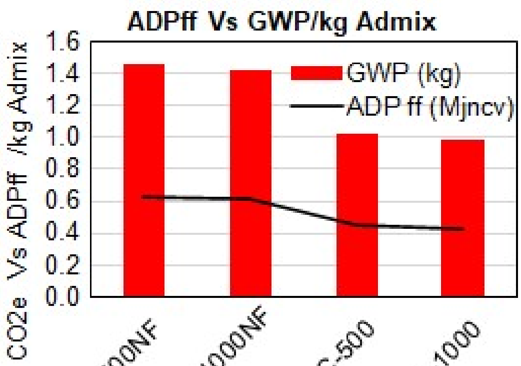

Figure 5 ADPff MJncv) Vs CO2e kg/kg A1-3

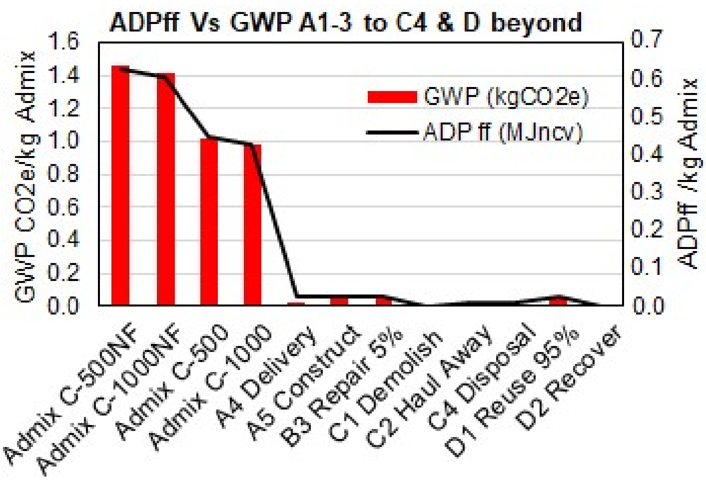

Figure 6 GWP A1 to D3/kg Functional Unit

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