EPD Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Rajawali PPC

PT Indocement Tunggal Prakarsa Tbk.

Palimanan Plant

Programme:
The International EPD® System, www.environdec.com

Programme operator:
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An EPD should provide current information and may be updated if conditions change.

EPD®

Southeast Asia EPD

ECO PLATFORM EPD VERIFIED

General information

Programme information

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com EPD registered through the fully aligned international hub: **EPD Southeast Asia** Kencana Tower Level M, Business Park Kebon Jeruk Jl. Raya Meruya Ilir No. 89, Jakarta Barat 11620 Indonesia www.epd-southeastasia.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): 2019:14 Construction Products Version 1.3.1, 2023-07-08 (valid until 2024-12-20) Complementary Product Category Rules (c-PCR): c-PCR-001 Cement and Building Lime (EN 16908:2017+A1:2022), 2022-05-18 (valid until 2024-12-20) Product group classification: UN CPC 374
PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, Addere Consultores. The review panel may be contacted via the Secretariat www.environdec.com/contact
Life Cycle Assessment (LCA)
LCA accountability: Dr. Muhammad Mufti Azis, LKFT Universitas Gadjah Mada (UGM) Andi Louis Kalza, PT Indocement Tunggal Prakarsa Tbk. (PT ITP) Unit Palimanan

Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: Gloria FJ Kartikasari, Life Cycle Indonesia Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

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

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

Company information

Owner of the EPD

PT Indocement Tunggal Prakarsa Tbk. (PT ITP) Unit Palimanan

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Description of the organisation

PT Indocement Tunggal Prakarsa Tbk., was incorporated based on Deed No. 227 dated 16 January 1985, made before Notary Ridwan Suselo, S.H., which has been announced in the Official Gazette of the Republic of Indonesia (BNRI) No. 57, Supplement No. 946 dated 16 July 1985, under the name PT Inti Cahaya Manunggal.

In 1989, the Company entered a new phase by launching an Initial Public Offering and became a public company by listing all its shares on Indonesia Stock Exchange with the ticker code "INTP" on 5 December 1989. In order to anticipate the increasingly strong market growth, Indocement continues to increase the number of factories in order to expand its production capacity. The Company acquired Plant 9 in 1991 and completed the construction of Plant 10 in Cirebon Factory, West Java in 1996. Furthermore, in 1997, the construction of Plant 11 was completed in Citeureup Factory, Bogor, West Java.

In 2009, Birchwood Omnia Ltd. sold 14.1% of its shares to public; and therefore, of HeidelbergCement AG's share ownership in Indocement through Birchwood Omnia Ltd. became 51%.

The Company currently has 13 plants with a total annual production capacity of 25.5 million tons of cement. Ten plants are located in Citeureup Factory, Bogor, West Java; two plants are in Cirebon Factory, Cirebon, West Java; and one plant is in Tarjun Factory, Kotabaru, South Kalimantan.

Indocement as a pioneer of MASTERTECH FORMULA in the cement industry continuously improves the implementation of the latest cement manufacturing technology. This effort has made Indocement the first cement company in Indonesia that started to implement Industry 4.0 to produce high quality, solid, and environmentally responsible cement products.

Indocement has updated its New Purpose from "Better Shelter for a Better Life" to "Material to Build Our Future". Through this update, Indocement mainstreams sustainable development and establishes synergy to foster co-creation together with stakeholders to develop future solutions for a better world based on the Company's values. This spirit is realized by Indocement by implementing a low-emission production process, introducing environmentally conscious products, as well as mainstreaming excellence in service for customer satisfaction.

Indocement is committed to implementing a responsible environmental approach in all of its operational areas. In 2022, we strove to reduce scope 1, 2, and 3 carbon emissions as well as pollutants generated from production and transportation processes; increase energy efficiency and optimize the use of alternative fuels; improve biodiversity protection and sustainable land management; optimize circular economy; as well as increase the efficiency of water utilization in every daily operational activity.

The Company is committed to providing equal services to all customers for its products and services. Furthermore, the Company ensures that all products meet customer health and safety criteria, as evidenced by obtaining the Indonesian National Standard (SNI) Certificate. Indocement has produced cement with more environmentally responsible process, namely PCC, PPC, slag cement, and hydraulic cement. The cement production process prioritizes the use of alternative materials and alternative fuels that can potentially reduce CO_2 emissions. Indocement's innovation is also in line with the Instruction of the Minister of Public Works and Housing (PUPR) No. 4 of 2020 concerning Use of Non-Ordinary Portland Cement (Non-OPC), which is more environmentally responsible in Construction Works at the Ministry of Public Works and Housing.

Product-related or management system-related certifications:

- SNI PPC 0302:2015
- ISO 9001:2015
- ISO 14001:2015
- ISO17025:2017
- ISO 28000:2007
- ISO 45001:2018
- Green Label Indonesia
- Green Industry

Name and location of production site(s):

Plant 9, PT. Indocement Tunggal Prakarsa Tbk. Cirebon Factory
Jl. Raya Cirebon - Bandung Km. 20, Palimanan Bar., Kec. Gempol, Cirebon Regency, West Java Province 45161, Indonesia

Product information

Product name

Rajawali PPC

Product identification

The additional label of the product is SNI 0302:2014 NRP 113-002-160931.

Product description:

Rajawali PPC is a SNI 0302:2014 Portland Pozzolan Cement produced from Plant 9, PT. Indocement Tunggal Prakarsa Tbk. Cirebon Factory. Rajawali PPC is suitable to be utilized for various types of buildings for affordable prices. It comprises of different materials and constituents such as clinker, gypsum, clay, limestone, and trass.

The specific applications of Rajawali PPC include:

- Simple concrete construction
- Plastering mortar
- Bricks jointing
- Grout components

Product specification standard

SNI 0302:2014

UN CPC code:

3744

Geographical scope:

The Rajawali PPC manufacturing site is in Plant 9, PT. Indocement Tunggal Prakarsa Tbk. Cirebon Factory, Palimanan, Cirebon Regency, West Java Province, Indonesia.

LCA information

Functional unit / declared unit

The functional unit is 1 metric ton of Rajawali PPC produced from Plant 9, PT Indocement Tunggal Prakarsa Tbk. Cirebon Factory. The reference flow is according to the production data in year 2022 (January – December).

Reference service life

Not applicable

Time representativeness

The production data from January to December 2022 are used. The generic data is mainly obtained from the ecoinvent 3.8 database where the time representativeness is between 2014 – 2022. However, as the primary data dominate the total data sources, the time representativeness of the overall data in this study is appropriate.

Database(s) and LCA software used

ecoinvent 3.8 and openLCA version 2.0.

Description of system boundaries:

The EPD covers cradle-to-gate with following modules: A1 (Raw material supply), A2 (Transport), and A3 (manufacturing). The omission of other modules met the conditions specified in the PCR 2019:14 Construction Products v1.3.1:

- Rajawali PPC is physically integrated with other products during installation (e.g., aggregates and other building material components) and they cannot be physically separated from them at the end-of-life,
- Rajawali PPC is no longer identifiable at the end-of-life as a result of a physical transformation processes (e.g., mixing with other aggregates and building material components), and
- Rajawali PPC does not contain biogenic carbon. The packaging contains a small amount of biogenic carbon but is less than 5% of the total mass of the product and packaging.

Assumptions

The key assumptions in this study are:

- The electricity used in the production of Rajawali PPC is assumed to be low voltage electricity that is equivalent to that available in the ecoinvent database v3.8 (Treyer, K. Market for electricity, low voltage | electricity, low voltage | Cutoff, U – ID, ecoinvent database version 3.8). The climate impact of the used electricity is 1.21 kg CO_2-eq/kWh (GWP-GHG). The main energy sources behind this electricity mix include lignite (58.7%), natural gas (25.4%) and hydropower (6.1%). The rest (8.9%) comes from of oil, deep geothermal, and heat and power co-generation. A small fraction of energy sources (<1%) is also imported.
- A small portion of the lubricating oil waste from Suspension Preheater, Rotary Kiln, and Grate Cooler are stored within the Plant 9 site.
- The lubricating oil waste from the Limestone Mine, Clay Mine, Raw Water Extraction, Raw Mill, Suspension Preheater, Rotary Kiln, and Grate Cooler are managed by the third party. Generic data are used for the waste treatment of lubricating oil.

Limitations

The key limitations in this study are:

- No direct measurement of emissions from limestone mine, clay mine, silica, silica sand delivery, copper slag delivery, trass delivery, bottom ash delivery, fly ash delivery, gypsum delivery, coal delivery, alternative fuel delivery, raw mill, coal mill, dan cement mill. Emission results are only obtained from GHG calculation based on IPCC (2006).

Cut-off criteria

The cut-off criteria are 1% for each unit processes and 5% for all modules and inventory data for resources, energy, emissions, and other environmental aspects. For the case of missing site-specific data, generic data from the life cycle inventory database and literature were used.

Allocation

Allocation is not applied here, as only one product (Rajawali PPC) is involved.

Data Quality

Data quality assessment was carried out using a semi-quantitative method utilizing six data quality indicators: technological coverage, time coverage, completeness, consistency, and precision. The scores for each indicator were based on the Pedigree Matrix and Data Quality Rating (DQR) (European Commission, 2010). The DQR results are 1.40, which indicates that the collected data can be classified as high quality (≤ 1.6).

System diagram:

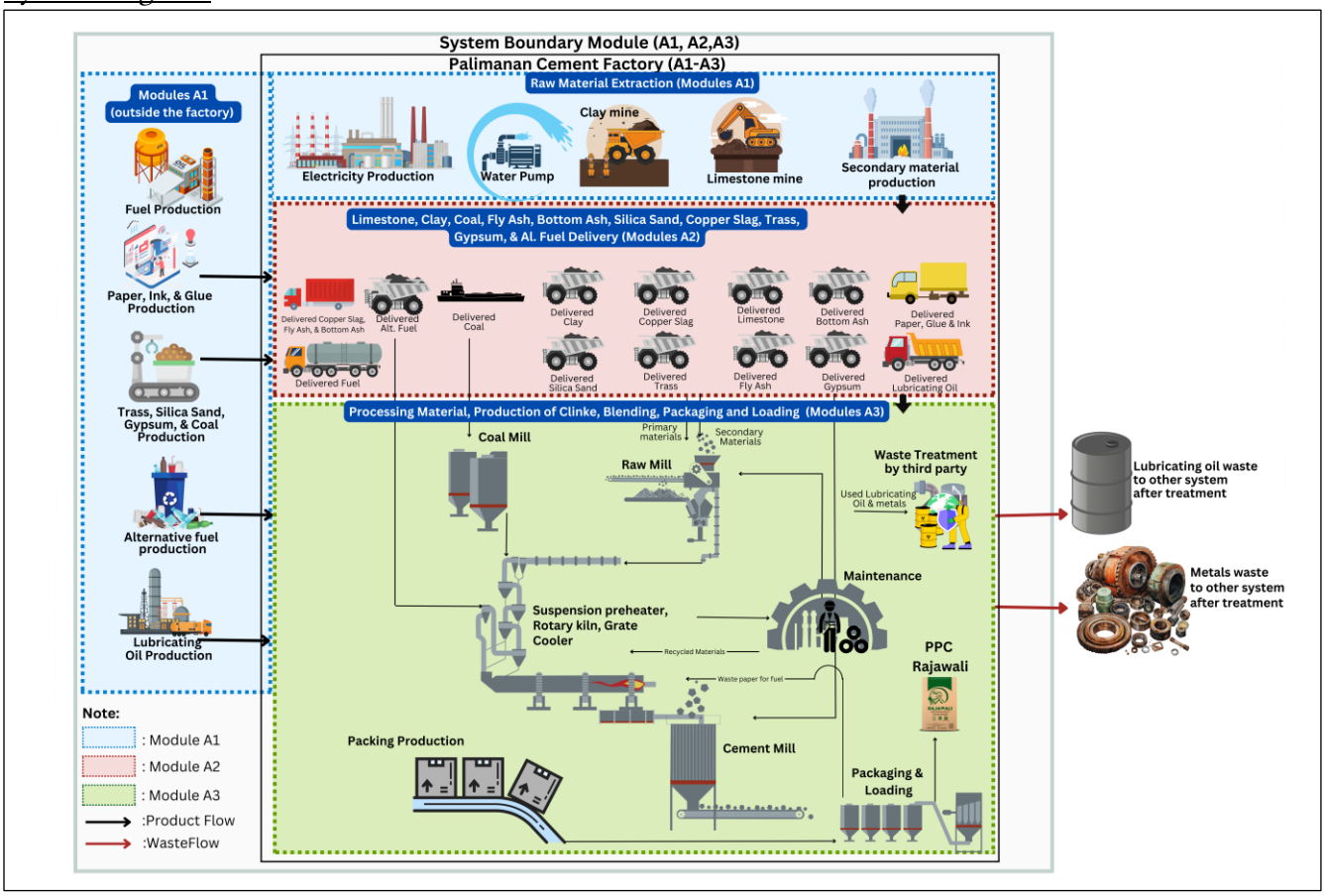

Figure 1. System diagram that illustrates the Rajawali PPC manufacturing processes in Plant 9, PT Indocement Tunggal Prakarsa Tbk., Palimanan Cirebon Factory. Modules A1-A3 are within the system boundary in this study.

Product life cycle

This study covers upstream and core processes (A1-A3), starting with clay and limestone mining (Module A1). Module A1 also covers trass, silica sand, gypsum, copper slag, paper, ink, glue, fuel, lubricating oil, coal, and electricity productions. The delivered raw materials and fuels are transported to Plant 9, Palimanan Cirebon Factory (Module A2). The transported raw materials, such as limestone and clay, are further processed in Module A3 with other constituents (e.g., silica sand, copper slag, trass, etc.) in the Raw Mill. Next, in Module A3, the Raw Meal is processed through Suspension Preheater, Kiln, and Grate Cooler to form clinker. Together with the

limestone, trass, fly ash, and gypsum, the clinker is processed and blended in the Cement Mill. The products are sent to packaging and loading sections and packed as 'Rajawali PPC' product before being transported and distributed to the customers.

This study does not cover the transport and construction installation during the construction process stage (Module A4-A5), product use and maintenance (Module B1-B7) as cement is an intermediate product. The end-of-life modules (C1-C4 and D) of this product is also excluded. Our study includes the infrastructure aspects in Module A1, which are from the database use of lubricating oil, explosive, and fuel. In module A1, we also include the infrastructure aspects from the bag filter, paper, ink, glue, refractory, insulation, fabric, and metal for maintenance. In Module A2, we include the transportation of raw materials and fuel (silica sand, trass, gypsum, coal, and fuel) which has embedded infrastructure aspects that originated from Module A1. Meanwhile, the infrastructure in the manufacturing sites is not included in Module A3.

Table 1. Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	ID	ID	ID	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 2. Content declaration

Product components	Weight, kg	Post-consumer recycled material, weight-%	Biogenic material, weight-% and kg C/kg
Clinker	600 – 640	0	0
Limestone	0 – 50	0	0
Trass (Pozzolan)	200 – 350	0	0
Gypsum	20 – 40	0	0
Fly Ash	0 – 150	0	0
TOTAL	**1000**	**0**	**0**
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Paper	2.56	0.256	0.386
Glue	0.04	0.004	0
Ink	0.02	0.002	0
TOTAL	2.62	0.262	0.386

Note:

- *1 kg biogenic carbon is equivalent to 44/12 kg CO_2.*
- *Biogenic carbon content in limestone is excluded, as the limestone formation occurs much longer than the Time Horizon commonly used in LCA (e.g., 100 years).*
- *The biogenic carbon content in packaging (in kg C/kg) was obtained from the conversion factor from IPCC (2014) (in dry mass).*

Table 3. Physical properties and technical specifications

Parameter	UoM	Value	Standard Reference
MgO content	%	≤ 6,0	Standar Nasional Indonesia (Indonesian National Standard) SNI 0302:2014 Semen Portland Pozzolan
SO_3 content	%	≤ 4,0	
Lost on ignition	%	≤ 5,0	
Fineness with Blaine	m^2/kg	≥ 280	
Initial set	Minute	≥ 45	
Final set	Hour	≤ 7	

Parameter	UoM	Value	Standard Reference
Expansion	%	≤ 0,8	
Shrinkage	%	≤ 0,2	
3 days compressive strength	kg/cm^2	≥ 130	
7 days compressive strength	kg/cm^2	≥ 200	
28 days compressive strength	kg/cm^2	≥ 280	
Air content in mortar	% volume	≤ 12	

Results of the environmental performance indicators

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Table 4. Mandatory impact category indicators according to EN 15804

Results per functional or declared unit		
Indicator	**Unit**	**A1-A3**
GWP-fossil	kg CO_2 eq.	$6.00*10^{2}$
GWP-biogenic*	kg CO_2 eq.	$4.98*10^{-1}$
GWP-luluc	kg CO_2 eq.	$2.57*10^{-1}$
GWP-total	kg CO_2 eq.	$6.00*10^{2}$
ODP	kg CFC 11 eq.	$8.34*10^{-6}$
AP	mol H^+ eq.	1.59
EP-freshwater	kg P eq.	$2.95*10^{-1}$
EP-marine	kg N eq.	0.35
EP-terrestrial	mol N eq.	3.33
POCP	kg NMVOC eq.	0.85
ADP-minerals&metals**	kg Sb eq.	$3.90*10^{-4}$
ADP-fossil**	MJ	$3.35*10^{3}$
WDP**	m^3	$2.66*10^{1}$
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption	

** Notes: The GWP-biogenic results were balanced out according to the guideline in the PCR 2019:14 Construction Products Version 1.3.1.*
*** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Table 5. Additional mandatory and voluntary impact category indicators

Results per functional or declared unit		
Indicator	**Unit**	**A1-A3**
GWP-GHG[1]	kg CO_2 eq.	$6.00*10^2$

Table 6. Resource use indicators

Results per functional or declared unit		
Indicator	**Unit**	**A1-A3**
PERE	MJ	$1.63*10^2$
PERM	MJ	$4.45*10^1$
PERT	MJ	$2.07*10^2$
PENRE	MJ	$3.35*10^3$
PENRM	MJ	0.00
PENRT	MJ	$3.35*10^3$
SM	kg	$5.35*10^1$
RSF	MJ	$6.84*10^2$
NRSF	MJ	$6.10*10^1$
FW	m^3	$7.14*10^{-1}$
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-	

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

	renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

Table 7. Waste indicators

Results per functional or declared unit		
Indicator	**Unit**	**A1-A3**
Hazardous waste disposed	kg	$1.35*10^{-1}$
Non-hazardous waste disposed	kg	$3.17*10^{-3}$
Radioactive waste disposed	kg	0.00

Table 8. Output flow indicators

Results per functional or declared unit		
Indicator	**Unit**	**A1-A3**
Components for re-use	kg	0.00
Material for recycling	kg	0.00
Materials for energy recovery	kg	0.00
Exported energy, electricity	MJ	0.00
Exported energy, thermal	MJ	0.00

Additional information on Environmental Initiatives

PT Indocement Tunggal Prakarsa Tbk. (PT ITP) implements a series of initiatives, commitments, and policies through, among others, HeidelbergCement Group Sustainability Commitment 2030, applied through the Master Plan Development for SC2030 Actions in Indocement. PT ITP also complies with the ISO 14001:2015 Environmental Management Systems and a series of national environmental regulations, including Presidential Regulation No. 61 of 2011 on the National Action Plan for Reducing Greenhouse Gas Emissions and Factory Operational Conditions and The Regulation of the Minister of Environment and Forestry No. P.19/MENLHK/ SETJEN/KUM.1/2/2017 on Emission Quality Standards for Businesses and/or Activities of the Cement Industry.

The company commits to supporting Government Programs toward green industry and environmental sustainability through the Green rating in the assessment of the annual Company Performance Rating Program in Environmental Management (PROPER) awarded by the Indonesian Ministry of Environment and Forestry (KLHK). The PROPER assessment includes environmental pollution and greenhouse gas (GHG) emissions reduction, water and energy efficiency, life cycle assessment, and management of hazardous and toxic waste.

PT ITP implements specific initiatives and appropriate technologies to lower GHG emissions and other conventional gas emissions, among others, by reducing the clinker factor, using alternative fuel and renewable energy, as well as increasing the level of thermal substitution. In addition, the company also identifies sources of emissions periodically and optimizes production processes by using expert systems to improve energy efficiency. Furthermore, PT ITP initiates and implements waste processing into energy through the Waste Management Units (UPS), a village-owned business entity in Palimanan that processes waste into products sold to Indocement. This program can help the community to reduce waste generation by involving the community.

Further information about the company's environmental work can be found in its Sustainability Report on the website (https://www.indocement.co.id/Keberlanjutan/Laporan-Keberlanjutan).

References

- EPD International (2021) General Programme Instructions for the International EPD® System. Version 4.0. www.environdec.com.
- PCR 2019:14. Construction Products Version 1.3.1
- c-PCR-001 Cement and Building Lime (EN 16908:2017+A1:2022)
- ISO 14040: 2006 Environmental Management – Life Cycle Assessment – Principles and Framework
- ISO 14044: 2006 Environmental Management – Life Cycle Assessment – Requirements and Guidelines
- IPCC (2014). 2013 Revised Supplementary Methods and Good Practice Guidance Arising from the Kyoto Protocol (Intergovernmental Panel on Climate Change).
- PT Indocement Tunggal Prakarsa Tbk. (2022). Laporan Keberlanjutan (Sustainability Report), Energizing for A Greener Future.
- Treyer, K. Market for electricity, low voltage | electricity, low voltage | Cutoff, U – ID, ecoinvent database version 3.8.

Background Data LCA

The Ecoinvent database version 3.8, Swiss Centre for Life Cycle Inventories

LCA Modelling Software

OpenLCA 2.0, Green Delta GmBH

Contact Information

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