EPC
شركة البتروكيماويات المصرية
Egyptian Petrochemicals Co.

EPD
INTERNATIONAL EPD SYSTEM

EGYPT EPD
INTERNATIONAL EPD SYSTEM

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025:2006 for:

Polyvinyl Chloride (EPD of multiple products, based on a representative product (PVC K-67 and PVC K-70) Egyptian Petrochemicals Company (EPC)

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

Programme operator: EPD International AB

EPD registration number: EPD – IES – 0029207:001

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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.environdec.com

EXTREME ENERGY SOLUTIONS

PROGRAM INFORMATION

PROGRAM OPERATOR

EPD Programme:	**The International EPD® System EPD International AB**
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Product **Category** Rules (PCR):	Product Category Rules (PCR) 2010:16. Plastics in Primary Forms. Version 4.0.0. Published by EPD International AB. Valid until 2028-07-01, UN CPC 347 , PCR Moderators:Anna Bortoluzzi, anna.bortoluzzi@quotasette.it; Maurizio Fieschi, fieschi@studiofieschi.it
PCR review was conducted by:	The Technical Committee of the International EPD® System A full list of members is available at www.environdec.com. Review chair: Paola Borla. The review panel may be contacted via the Secretariat: info@environdec.com
LCA accountability:	LCA and the EPD are prepared by Extreme energy solutions Consultancy team: Ahmed Seyam- Basma Hamdy- Mohamed Farrag- Essam Alcebhy- Aly morsy
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:	**EPD verification by individual verifier**
Third-party verification:	Charnett Chau
Approved by:	**The International EPD® system**
Procedure for follow-up of data during EPD validity involves a 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 ISO 14025, 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 ISO 14025.

Verifier: Freelance Verifier
Signature: _____
Date: 2026-03-23

MANUFACTURER INFORMATION

EPD OWNER

Contact(s):	Mohamed.Elbhery@egy-petrochem.com
Website:	Egyptian Petrochemicals Co.
Owner of the EPD:	Egyptian Petrochemicals Company (EPC)
Name and location of production site(s):	KM 36 Alexandria/Cairo Desert Road El-Amreya – El-Nahda Territory – Alexandria, Egypt.

Egyptian Petrochemicals Company (EPC) is a petrochemical company that specializes in the production of chemicals and petroleum derivatives to support various industries locally and globally. The Egyptian Petrochemicals Company is one of the petroleum sector companies that work in everything related to the field of petrochemicals and supporting industries, and produces caustic Soda, PVC, PVC compound, and others. The company is committed to preserving the environment and the safety and health of its workers, as well as the relevant parties, such as contractors and neighboring companies.

EPC produces products of the highest quality, including (Polyvinyl Chloride, Caustic Soda Liquid, Sodium Hypochlorite, and Hydrochloric Acid), focusing on quality, safety, health, and the environment.

MANUFACTURER INFORMATION

EPC Certificates Overview

Certificate	Standard	Issuing Body	Scope	Certificate Number	Issue Date	Expiry Date
Occupational Health & Safety Management System	ISO 45001:2018	Intertek (UKAS Accredited)	Production of PVC Resin, PVC Compound, caustic soda, chlorine, crosslink, polyethylene, hydrochloric acid and supporting services	155346	6 Sep 2020 (initial) 23 Aug 2023 (renewed)	5 Sep 2026
Environmental Management System	ISO 14001:2015	Intertek (UKAS Accredited)	Same scope as above	155344	6 Sep 2020 (initial) 23 Aug 2023 (renewed)	5 Sep 2026
Quality Management System	ISO 9001:2015	Intertek (UKAS Accredited)	Same scope as above	155347	6 Sep 2020 (initial) / 23 Aug 2023 (renewed)	5 Sep 2026
Energy Management System	ISO 50001:2018	OSS Middle East (EGAC Accredited)	Same scope as above	010822En-1	1 Aug 2025	31 Jul 2028
Guidance on Social Responsibility	ISO 26001:2010	AQAI Accredited	Same scope as above	ARA 24020070	26 Nov 2024	25 Nov 2027
Risk Management System	ISO 31000:2018	OSS Middle East (EGAC Accredited)	Same scope as above	RMS-2211054	26 Nov 2022	25 Nov 2025
General requirements for the competence of testing and calibration laboratories	JSO/IEC 17025:2017	EGAC	In some physical tests of PVC	027015B	17 Jan 2025	16 Dec 2028

MANUFACTURER INFORMATION

EPC Certificates Overview

	Certificate	Standard	Issuing Body	Scope	Certificate Number	Issue Date	Expiry Date
27001 : 2022	Information security management system	ISO 27001 : 2022	OSS Middle East (EGAC Accredited)	Data center and company security department	420723IS	17 Jul 2023	16 Jul 2026
14064– 1:2018	GHG Verification Statement	ISO 14064–1:2018 & EU–GHGS guidlines	Energy up VVB (EGAC Accredited)	GHG Emissions for Egyptian Petrochemicals Co.	EU0005/VVB 25/EGY	30 Jan 2025	-
14064– 2:2019	GHG Sequestration Validation Statement	ISO 14064–2:2019 & EU–GHGS guidlines	Energy up VVB (EGAC Accredited)	Jojoba cultivation project	EU0006/VVB 25/EGY	02 Feb 2025	-
14067:2018	Product Carbon Footprint Verification statement	ISO 14067:2018	Energy up VVB (EGAC Accredited)	Product Carbon footprint for Caustic Soda (NaOH–50%)	EU0007/VVB 25/EGY	07 JUL 2025	-
14067:2018	Product Carbon Footprint Verification statement	ISO 14067:2018 & EU– GHGS guidlines	Energy up VVB (EGAC Accredited)	Product Carbon footprint for PVC Resin (K 67)	EU0006/VVB 25/EGY	07 Jul 2025	-
14067:2018	Product Carbon Footprint Verification statement	ISO 14067:2018& EU– GHGS guidlines	Energy up International VVB (EGAC Accredited)	Product Carbon footprint for PVC Resin (K 70)	EUK 05/VVB25/ EGY	10 Jan 2026	-

PRODUCT INFORMATION

PRODUCT CHARACTERISTICS

Properties of S-PVC K67 Grade

Test Item	Unit	Specification*
Inherent Viscosity (I.V)	dp/gm	0.90 – 0.94
Mass Loss	wt %	0.30 max
Porosity (DOP)	ml/gm	0.20 – 0.32
Sieve Analysis – % Retained # 40	wt %	1 max
Sieve Analysis – % Retained # 60	wt %	5 max
Sieve Analysis – % Retained # 140	wt %	25 max
Sieve Analysis – Average Particle Size (A.P.S)	micron	150 – 170
Apparent Bulk Density (A.B.D)	g/cm³	0.49 – 0.56
Residual VCM Content (RVCM)	ppm	1 max

Properties of S-PVC K70 Grade

Test Item	Unit	Specification*
Inherent Viscosity (I.V)	dp/gm	0.98 – 1.05
Mass Loss	wt %	0.30 max
Porosity (DOP)	ml/gm	0.27 – 0.37
Sieve Analysis – % Retained # 40	wt %	1 max
Sieve Analysis – % Retained # 60	wt %	5 max
Sieve Analysis – % Retained # 140	wt %	25 max
Sieve Analysis – Average Particle Size (A.P.S)	micron	145 – 165
Apparent Bulk Density (A.B.D)	g/cm³	0.47 – 0.53
Residual VCM Content (RVCM)	ppm	1 max

PVC resin should be stored in dry area and prevented from direct exposure to sunlight and storage temperature does not exceed 50°C.

Egyptian Petrochemicals Company (EPC) manufactures PVC under the trade name S-PVC K67 & S-PVC K70. These grades are produced through the suspension polymerization reaction for the VCM in reactors equipped with agitator and jacket cooling system. The PVC grades differ in terms of their mechanical, physical, and processing properties to suit a range of industrial applications such rigid and flexible plastics which are widely used in construction for pipes, profile application and cable insulation.

The present LCA study covers several grades of PVC, which are produced at EPC's facility in Alexandria, Egypt. All grades are delivered in powder form and conform to international specifications depending on their end-use. The grades analyzed in this study and their associated properties are shown in the tables below.

K67 Applications

- ❑ **Window and door profiles**
- ❑ **Pressure and Corrugated pipes.**
- ❑ **Marble Alternative**

K70 Applications

- ❑ **Footwear**
- ❑ **Flexible Film and Sheet**
- ❑ **Electrical Wire Insulation**
- ❑ **Sheath and Filling**
- ❑ **Hoses**

LCA INFORMATION

Declared Unit
1 kg of PVC "Powder Form"

Reference service life
The product does not have an expiry date and can be stored indefinitely under appropriate conditions.

Time Representativeness
January 2024 – December 2024

Geographical Scope : Egypt

UN CPC Code: UN CPC 347

Target Group

The intended audience of this EPD is business-to-business (B2B) stakeholders only. The EPD is not intended for business-to-consumer (B2C) communication.

SYSTEM BOUNDARIES (Cradle-to-Gate)

The study follows the modular life cycle stage structure outlined by the Product Category Rule (PCR) for Plastics in Primary Forms (EPD International, PCR 2010:16). The life cycle is divided into three main stages:

Upstream: Raw material extraction and processing

Core: PVC manufacturing

Upstream processes:(cradle-to-gate);

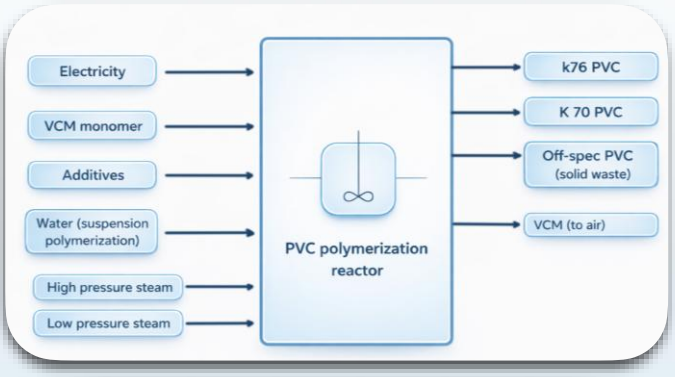
include raw material extraction, preprocessing, and average transportation of inputs to the production facility.

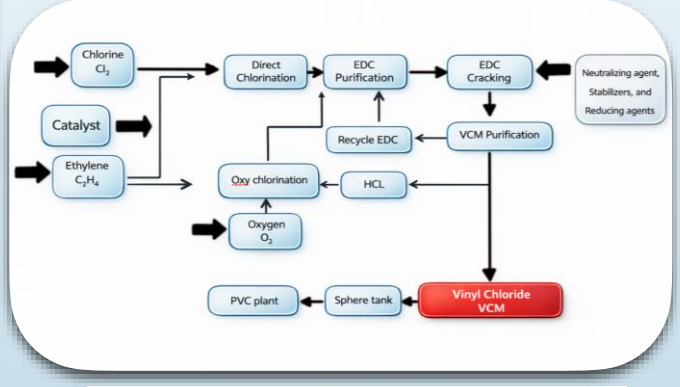
Core processes: (gate-to-gate);

cover all manufacturing activities within the plant, including material conversion, energy use, and internal handling up to the finished product output.

Downstream processes:

Not in Scope as per PCR





PVC system boundary (core processes)

The life cycle impact assessment (LCIA) was performed using the Environmental Footprint method (EF 3.11), Characterization factors and impact assessment methods follow the European Commission Environmental Footprint (EF) methodology as provided in the Ecoinvent EN15804 add-on package.

EPDTYPE	SOFTWARE	DATABASE
EPD of multiple products	openLCA version 2.5	Ecoinvent v3.11

The modules and unit processes included in the scope for PVC

Module Life Cycle Stage	Process Description	Declared (X/ND)	Justification (for ND)
Upstream Processes	Extraction of renewable / non-renewable resources (e.g., salt, natural gas)	X	
	Refining and conversion into ethylene feedstock	X	
	Production of additives, catalysts, solvents, and packaging materials	X	
	Electricity and fuel production used in upstream stages	X	
	All upstream transportation and waste treatment processes	X	
Core Processes	Transport of main raw materials to EPC (Egyptian Petrochemicals Company)	X	
	Chlorine production from caustic soda plant	X	
	Ethylene Dichloride (EDC) production process	X	
	Vinyl Chloride Monomer (VCM) production process	X	
	intermediation raw materials production, secondary and recycled raw materials production,	X	
	VCM polymerization process for PVC production, drying, and packaging	X	
	Energy generation for internal use	X	
	End-of-life treatment of manufacturing waste	X	
	Recycling of waste / secondary materials used in production	ND	No recycled or secondary materials are used as inputs in the PVC production process.
	Storage and maintenance of machines	ND	Storage and maintenance activities are considered negligible as no major maintenance occurred within year 2024 and excluded in line with PCR cut-off rules.
Downstream Processes	Transport of product to customers	ND	Not in Scope as per PCR
	Use phase	ND	Not in Scope as per PCR
	End-of-life (EoL) treatment of product and packaging	ND	Not in Scope as per PCR
	Benefits beyond the system boundary	ND	Not in Scope as per PCR

LCA INFORMATION

Allocation

This study follows the allocation guidelines of ISO 14044 and allocation rules specified in the PCR, as well as GPI Version 4.0 . It minimizes the use of allocation wherever possible. Allocation procedures were necessary in this LCA study to accurately account for the environmental impacts associated with the production of PVC specifically as the plant generates further products. Physical/mass allocation was deemed the most accurate and reproducible way of calculating the allocation.

Cut - off Criteria

The PCR for Plastics in Primary Forms recommends a cut-off rule of 1%, meaning that 99% of the results for each environmental impact category, 99% of the product mass, and 99% of the energy use within the product life cycle should be accounted for in the inventory.
To effectively determine which processes or data points could be excluded based on a 1% cut-off threshold, a comprehensive data collection effort was necessary. Therefore, this study aims for a complete inventory analysis to ensure the most accurate and comprehensive assessment of the environmental impacts associated with the production of PVC. Then, given the huge amount of chemicals included in the process, the mass flows that are less than 1% were omitted in the impact assessment step.

Excluded life cycle stages

Down stream processes (use and end-of-life) were excluded as permitted by the PCR for plastics in primary form.

LCA INFORMATION

Assumptions about Electricity Consumption and Other Relevant Background Data

Electricity consumption in the LCA was modelled using the ecoinvent dataset "market for electricity, medium voltage {EG}". This dataset represents the Egyptian national electricity consumption mix and models the physical electricity available to consumers at the medium-voltage level.

Assumptions and Excluded Lifecycle Stages

Modeling of Compound Materials:

For compound materials consisting of mixtures of different materials, they were modeled based on the constituent with the highest percentage by mass, if available in the databases. If the primary constituent was not available, the next highest constituent was used, and so on. This approach ensures that the most representative material is used in the life cycle inventory (LCI) while maintaining consistency with available data.

Substitution of Unavailable Pure Components:

In cases where a pure component was not available in the database, a component with similar characteristics (e.g., chemical properties, production process) was chosen as a substitute. This ensures that the environmental impacts of the substituted material closely approximate those of the actual component.

CONTENT DECLARATION

Packaging material:

The PVC products are packaged using a dual-layer PP/PET bag system, where polypropylene provides the external mechanical strength and polyethylene terephthalate offers an inner moisture-resistant barrier. This combination ensures product integrity during handling, storage, and transport while minimizing contamination risks. The PP/PET configuration is widely used in the plastics industry due to its durability, stability, and compatibility with bulk powder materials. Overall, this packaging approach delivers reliable protection with an efficient packaging-to-product ratio and supports safe downstream logistics.

Content Declaration:

"The substance corresponding to the registered PVC polymer is not included in the Candidate List of Substances of Very High Concern (SVHC) published by ECHA. Accordingly, the product contains no substances of very high concern above the threshold of 0.1% (w/w)."

PRODUCT RAW MATERIAL COMPOSITION

All raw materials contributing more than 5% to any environmental impact are listed in the following table:

Material / Chemical Substance	Declare	Mass (%)	Post-consumer Recycled Material (%)	Biogenic material, mass-% of product Material (%)	Biogenic Material (weight-% and kgC/kg)
Ethylene	VCM contributors	42.46	0	0	0
Chlorine		57.53	0	0	0
Additives		0.01	0	0	0

Results are per 1 kg PVC Powder form

Packaging materials	Weight (kg) per 1 Kg PVC	Mass-% (versus the product)	Post-consumer Recycled Material (%)	Biogenic material, kg C/product or declared unit
Polypropylene	3.20E-03	0.32%	0	0
Polyethylene terephthalate	8.00E-04	0.08%	0	0
Wooden Pallet	1.02E-02	1.02%	0	6.44E-05
TOTAL	1.42E-02	1.42%	0	6.44E-05

1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO2.

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ENVIRONMENTAL PERFORMANCE INDICATORS

IMPACT CATEGORY INDICATORS

PARAMETER		UNIT	Upstream	Core	TOTAL
Global warming potential (GWP)	**Fossil**	kg CO2 eq.	2.42E+00	2.24E-01	2.65E+00
	Biogenic	kg CO2 eq.	1.29E-03	3.63E-03	4.92E-03
	Land use and land transformation	kg CO2 eq.	3.33E-03	2.60E-04	3.59E-03
	TOTAL	kg CO2 eq.	2.43E+00	2.28E-01	2.65E+00
Ozone layer depletion (ODP)		kg CFC 11 eq.	6.66E-08	7.45E-09	7.40E-08
Acidification potential (AP)		mol H+ eq.	8.58E-03	6.40E-04	9.22E-03
Eutrophication potential (EP)	Aquatic freshwater	kg P eq.	6.09E-05	7.56E-05	1.36E-04
	Aquatic marine	kg N eq.	1.69E-03	9.60E-04	2.65E-03
	Aquatic terrestrial	mol N eq.	1.84E-02	1.65E-03	2.00E-02
Photochemical oxidant creation potential (POCP)		kg NMVOC eq.	1.01E-02	9.90E-04	1.11E-02
Abiotic depletion potential (ADP)*	Metals and minerals	kg Sb eq.	2.12E-05	2.06E-06	2.32E-05
	Fossil resources	MJ, net calorific value	6.14E+01	7.70E+00	6.91E+01
Water deprivation potential (WDP)**		m3 world eq. deprived	4.84E-01	3.48E-02	5.18E-01

Results are per 1 kg PVC Powder form

* Disclaimer : To avoid negative GWP-biogenic results because of the incomplete biogenic carbon balance arising due to the exclusion of the end-of-life stage, the characterization factors of biogenic CO2 uptake and emissions are set to zero (the "0/0 approach")

Biogenic methane emissions (CH_4) were assessed separately within the climate change impact category. Although their contribution to the total Global Warming Potential (GWP) is relatively small, representing approximately 0.185% of the total GWP, these emissions are still reported in the EPD to ensure transparency and completeness of the environmental assessment.

*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.

EXTREME ENERGY SOLUTIONS

ENVIRONMENTAL PERFORMANCE INDICATORS

Resource use indicators

PARAMETER		UNIT	Upstream	Core	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	2.09E+00	2.03E-01	2.30E+00
	Used as raw materials	MJ, net calorific value	2.68E-01	0.00E+00	2.68E-01
	TOTAL	MJ, net calorific value	2.36E+00	2.03E-01	2.57E+00
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	6.14E+01	7.70E+00	6.91E+01
	Used as raw materials	MJ, net calorific value	2.23E+01	-2.65E+00	1.97E+01
	TOTAL	MJ, net calorific value	8.37E+01	5.05E+00	8.88E+01
Secondary material (optional)		kg	2.87E-02	4.90E-03	3.36E-02
Renewable secondary fuels (optional)		MJ, net calorific value	8.87E-03	4.00E-04	9.27E-03
Non-renewable secondary fuels (optional)		MJ, net calorific value	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (optional)		m^3	1.34E-02	-4.38E-02	-3.04E-02

Results are per 1 kg PVC Powder form

ENVIRONMENTAL PERFORMANCE INDICATORS

Waste indicators

PARAMETER	UNIT	Upstream	Core	TOTAL
Hazardous waste disposed	kg	9.05E-02	1.25E-01	2.15E-01
Non-hazardous waste disposed	kg	1.62E+00	4.51E+01	4.67E+01
Radioactive waste disposed	kg	2.60E-05	9.87E-07	2.70E-05

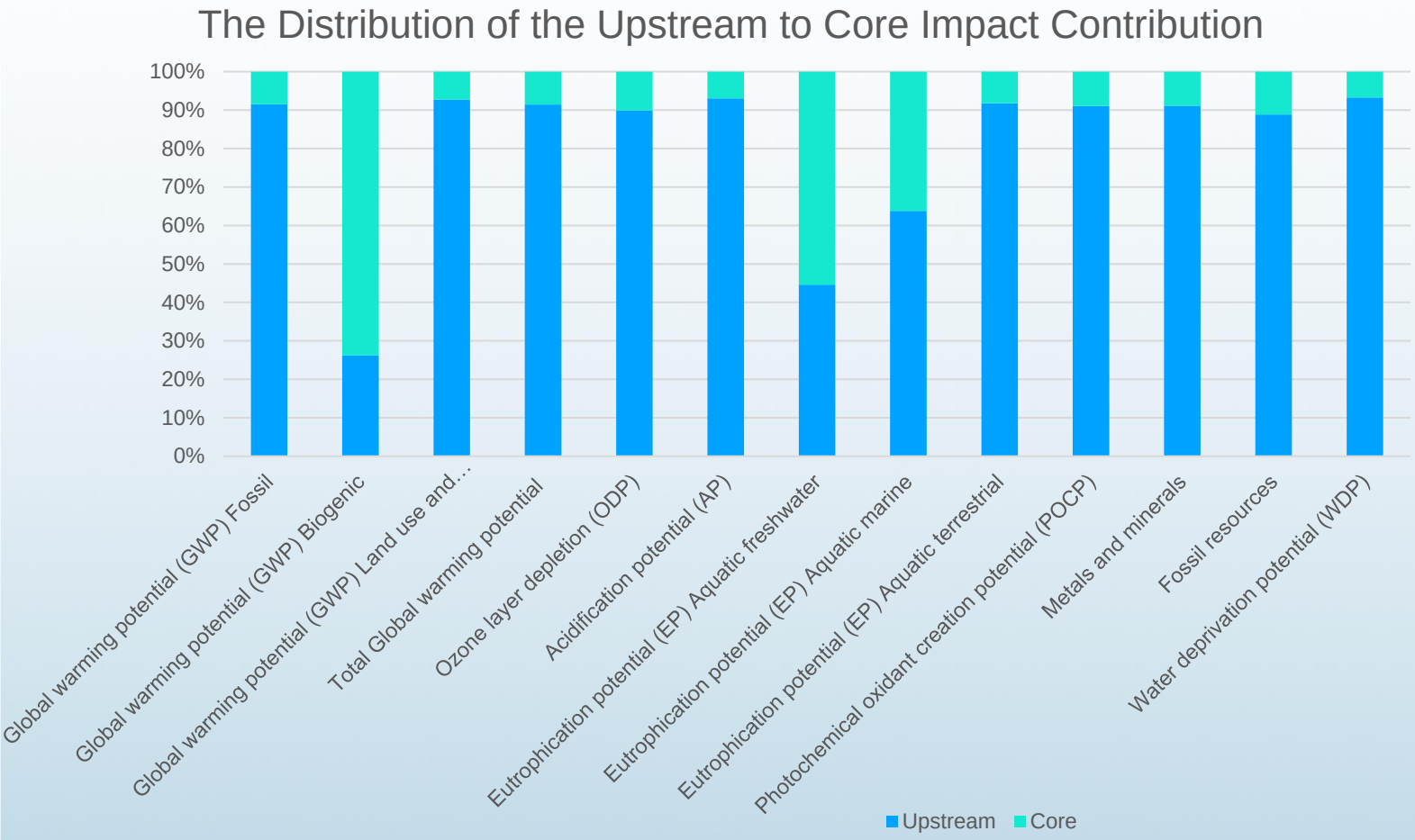
Output flow indicators

PARAMETER	UNIT	Upstream	Core	TOTAL
Components for reuse	kg	-3.47E-23	0.00E+00	-3.47E-23
Material for recycling	kg	2.42E-02	4.82E-03	2.90E-02
Materials for energy recovery	kg	3.98E-06	1.78E-07	4.16E-06
Exported energy, electricity	MJ per energy carrier	8.10E-03	3.30E-04	8.43E-03
Exported energy, thermal	MJ per energy carrier	8.74E-03	4.30E-04	9.17E-03

Results are per 1 kg PVC Powder form

Impact Contribution

The contribution analysis chart for PVC clearly demonstrates that upstream processes dominate the environmental profile across nearly all assessed impact categories. For climate change (GWP fossil and total GWP), ozone depletion, acidification, photochemical ozone formation, abiotic resource depletion (fossil and metals), and water deprivation, the upstream stage consistently accounts for approximately 90–95% of total impacts, indicating that the principal environmental burdens are embedded in vinyl chloride monomer (VCM) and chlorine production as well as fossil-based electricity generation. Marine and terrestrial eutrophication follow the same pattern, with strong upstream dominance driven by nitrogen-related emissions from energy systems. Freshwater eutrophication represents the only category where the core polymerization stage contributes slightly more than half of the total impact, suggesting the relevance of process-related emissions or wastewater streams in this compartment. Overall, the chart confirms that the environmental performance of PVC is primarily determined by upstream raw material and energy supply chains, while the on-site suspension polymerization process plays a comparatively minor role in most impact categories.



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02 Product Category Rules (PCR) 2010:16. Plastics in Primary Forms. Version 4.0.0. Published by EPD International AB. Valid until 2028-07-01, UN CPC 347 . Available at: https://www.environdec.com

03 EN ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures, and European Committee for Standardization (CEN).

04 ISO 14040:2006 Environmental management. Life cycle assessment. Principles and Frameworks , European Commission (2021). Product Environmental Footprint Category Rules and Environmental Footprint Method (EF 3.1).

05 ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

06 Ecoinvent / Ecoinvent Centre, www.Eco-invent.org

07 Egyptian Petrochemicals Company (EPC) – Life Cycle Assessment Background www.egy-petrochem.com

Contact Information

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