



Genable™ Pavement Graphene Asphalt Modifier

Environmental Product Declaration Cradle-to-Gate



General information

Manufacturer Name:	Universal Matter UM Inc. 1320 Heine Court Burlington, ON, Canada
Program Operator:	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428-2959, USA
Declaration Number:	EPD 1056
Reference PCR:	ISO 21930: 2017
Date of Issuance:	August 19, 2025
End of Validity:	August 19, 2030
Product Name:	Genable™ Pavement Asphalt Modifier
EPD Owner:	Universal Matter
Declared Unit:	1 kg of Genable™ Pavement Asphalt Modifier
EPD Scope:	Cradle-to-gate (A1, A2, and A3)
Prepared By:	WAP Sustainability Consulting
Verification:	ISO 21930 serves as the core PCR. Independent verification of the declaration according to ISO 14025 and ISO 21930. <input type="checkbox"/> internal <input checked="" type="checkbox"/> external
LCA Reviewer and EPD Verifier:	

Company information

Universal Matter has developed cleaner, faster, and more economical technology to scaleup and commercialize graphene/graphitized carbons, a carbon-based nanomaterial that can provide improved properties for other industrial materials. Their proprietary and patented Flash Joule Heating (FJH) process can convert diverse carbon sources into graphene with tunable characteristics for an almost unlimited number of applications.

Universal Matter's patented FJH process produces high-quality graphene and related advanced materials from sustainable and inexpensive carbon sources in minutes. The short burst of electricity breaks all chemical bonds and reorders the carbon into thin layers of turbostratic graphene and related materials. All non-carbon-based impurities are flashed off and the resulting products are >99% carbon. This new manufacturing process can be used on many carbon-based feedstocks, including petroleum coke, metallurgical coke, biomass, carbon from recycled plastic and rubber, methane-derived carbon, and even food waste. FJH creates high-quality graphene with 3 distinct morphologies providing our graphene superior properties that are critical for large industries.

Headquartered in Burlington, Ontario, Canada, with U.S. and U.K. subsidiaries and Innovation Centers in Houston, TX and Redcar, UK., Universal Matter's vision is to become the leading supplier of high-quality and sustainable graphene and advanced materials to decarbonize our planet. We upcycle diverse solid carbon streams (including waste) into graphene/graphitized carbon to decarbonize major industrial products thereby enabling significant GHG emissions reductions and circular economy creation.

Product information

Genable™ Pavement is a patent-pending formulation based on a graphene polymer composite that stands out as a pioneer in sustainable infrastructure development. This ground-breaking product is born from the fusion of UMI's polyhedral graphene, forging a path toward eco-friendly road development and a circular economy as the asphalt pavement can be readily recycled. Graphene-enabled Polymer Asphalt Modifier designed to enhance the performance, durability, and sustainability of asphalt concrete mixes. Genable™ Pavement combines the strength of graphene and polymers with environmental benefits to address the challenges of modern road construction. It can replace SBS polymer and its associated cross-linker additive, while providing enhanced high and low-temperature mix performance qualities. Genable™ Pavement can be added either during the "dry process" at the asphalt plant or during the "wet process" at the bitumen terminal, offering flexibility in application methods. Based on NCAT test data Genable™ Pavement outperforms other polymeric modifiers such as SBS, rubber crumb and plastics.

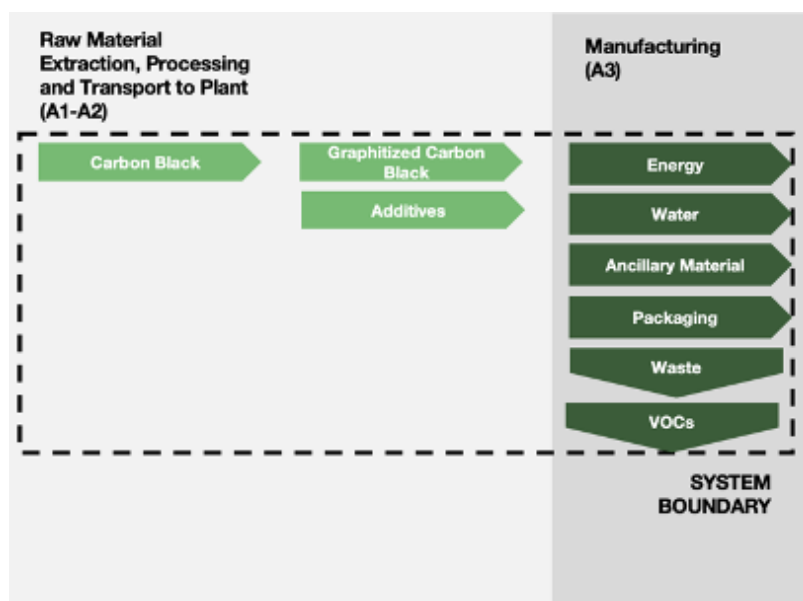
Genable Pavement Graphene Asphalt Modifier Product:

Parameter	Specification
Appearance	Plastic pellets
Density	0.93 g/cm3
Viscosity	Melt Flow Index: 4g/10 min @ 190C

LCA information

Declared unit	1 kg of Genable Pavement Graphene Asphalt Modifier
Reference service life	Not declared as use phase is not included in the study
Description of the system boundaries	Cradle to Gate
Geographical representativeness	A1-A3: Can
Time representativeness	Data collected on batch assumption and calculated to estimate for calendar year 2024.
Cut-off rules	All flows for which data were provided are included in the assessment, accounting for at least 99% of the energy or mass flows and at least 99% of the environmental impacts from the product system. Production of capital equipment is excluded from this assessment.
Database and LCA software used	SimaPro v9.6.0.1 Ecoinvent V3.10
LCA Report	LCA of Genable Pavement Graphene Asphalt Modifier, June 2025
Scenario Description: A2	Primary data of transportation from suppliers: 307 km by truck in Canada, 153-1016 km by rail in Canada
Scenario Description: A3	Electricity Source: Canada-ON region specific grid mix

System diagram:



Modules declared and geographical scope:

	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	Can			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

No substances in the product are on the Candidate List of Substances of Very High Concern (SVHC) which exceed the limits for registration with the Conservation and Recovery Act (RCRA), Subtitle 3. Content information is proprietary and can be obtained, if necessary, by reaching out to Universal Matter directly.

Results of the environmental performance indicators

The results presented here are for 1 declared unit, which is 1 kg of Genable Pavement Graphene Asphalt Modifier Product. Note that environmental claims from different programs may not be comparable. EN 15804 results are included for reference and the potential publication of an EPD for the European marketplace.

Results per ISO21930:

Impact Category	Unit	A1-A3	A1	A2	A3
IPCC AR6					
GWP incl. bio	kg CO ₂ eq	3.11E+00	2.90E+00	1.33E-02	1.91E-01
TRACI LCIA Impacts (North America)					
AP	kg SO ₂ eq	9.49E-03	9.04E-03	1.31E-04	3.20E-04
EP	kg N eq	1.29E-03	9.32E-04	8.58E-06	3.50E-04
ODP	kg CFC 11 eq	1.31E-07	9.72E-08	2.01E-10	3.34E-08
SFP	kg O ₃ eq	1.23E-01	1.13E-01	4.01E-03	5.82E-03
Resource Use Indicators					
RPR _E	MJ	9.37E-01	8.03E-08	4.50E-03	9.33E-01
RPR _M	MJ	1.45E-01	0.00E+00	0.00E+00	1.45E-01
NRPR _E	MJ	9.14E+01	8.33E+01	1.90E-01	7.91E+00
NRPR _M	MJ	4.05E+03	4.05E+03	0.00E+00	7.75E-02
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m ³	7.53E+00	6.31E+00	2.06E-02	1.20E+00
Output Flows and Waste Categories					
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	3.53E-01	0.00E+00	0.00E+00	3.53E-01
HLRW	kg	1.34E-09	1.34E-09	3.06E-14	6.96E-14
ILLRW	kg	6.90E-09	6.88E-09	7.27E-12	1.60E-11
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Results per EN15804+A2:

Impact Category	Units	Total
Additional indicators per EN15804+A2		
GWP-total	kg CO ₂ eq.	3.12E+00
GWP-fossil	kg CO ₂ eq.	3.85E-03
GWP-biogenic	kg CO ₂ eq.	3.11E+00
GWP-luluc	kg CO ₂ eq.	6.04E-03
ODP	kg CFC 11 eq.	1.25E-07
AP	mol H+ eq.	9.07E-03
EP-freshwater	kg P eq.	7.75E-05

Impact Category	Units	Total
EP-marine	kg N eq.	1.97E-03
EP-terrestrial	mol N eq.	2.08E-02
POCP	kg NMVOC eq.	1.34E-02
ADP- min.&metals ²	kg Sb eq.	3.87E-07
ADP-fossil ²	MJ, LHV	8.52E+01
WDP ²	m3 world eq. deprived	1.63E+00
Resource Use Indicators		
RPRE	MJ, LHV	9.37E-01
RPRM	MJ, LHV	1.45E-01
NRPRE	MJ, LHV	9.14E+01
NRPRM	MJ, LHV	4.05E+03
SM	kg	0.00E+00
RSF	MJ, LHV	0.00E+00
NRSF	MJ, LHV	0.00E+00
RE	MJ, LHV	0.00E+00
FW	m3	7.53E+00
Output Flows and Waste Categories		
HWD	kg	0.00E+00
NHWD	kg	3.53E-01
HLRW	kg	1.34E-09
ILLRW	kg	6.90E-09
CRU	kg	0.00E+00
MR	kg	0.00E+00
MER	kg	0.00E+00
EE	MJ, LHV	0.00E+00
Optional Environmental Indicators		
PM ¹	Disease Incidences	1.04E-07
IRP	kBq U235 eq.	0.28026069
ET	CTUe	43.6003767
HTC	CTUh	4.73E-09
HTnc	CTUh	2.09E-08
LU	Pt	2.5840299

Disclaimer 1 – 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 from some construction materials is also not measured by this indicator.

Disclaimer 2 – 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.

Additional environmental information

No additional environmental information is included in this EPD.

References

- CML - Department of Industrial Ecology. (2016, September 05). CML-IA Characterization Factors. Retrieved from <https://www.universiteitleiden.nl/en/research/research-output/science/cml-ia-characterisation-factors>
- IPCC. (2013). Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge, United Kingdom and New York, NY, USA: Cambridge University Press.
- IPCC. (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press. In Press.
- ISO. (2006). ISO 14025: Environmental labels and declarations - Type III environmental declarations - Principles and procedures. Geneva: International Organization for Standardization.
- ISO. (2006). ISO 14040/Amd 1:2020: Environmental management - Life cycle assessment - Principles and framework. Geneva: International Organization for Standardization.
- ISO. (2006). ISO 14044/Amd 1:2017/Amd 2:2020: Environmental Management - Life cycle assessment - Requirements and Guidelines. Geneva: International Organization for Standardization.
- ISO. (2017). ISO 21930: Sustainability in buildings and civil engineering works - Core rules for environmental product declarations of construction products and services. Geneva: International Organization for Standardization.
- US EPA. (2012). TRACI: The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts. Version 2.1 - User Guide. Retrieved from <https://nepis.epa.gov/Adobe/PDF/P100HN53.pdf>
- WAP Sustainability Consulting: 2024 – A Cradle-to-Gate Life Cycle Assessment of Universal Matter Genable Pavement Graphene Asphalt Modifier Product.

