Statement of Verification

BREG EN EPD No.: 000068 Issue 02

ECO EPD Ref. No. 000229

This is to verify that the

Environmental Product Declaration

provided by:

Sika Ltd.

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A1:2013

and

BRE Global Scheme Document SD207

This declaration is for:

Sarnafil S327 EL

Company Address

Watchmead
Welwyn Garden City
AL7 1BQ

BUILDING TRUST

Signed for BRE Global Ltd	Emma Baker Operator	24 September 2020 Date of this Issue
27 February 2017 Date of First Issue		23 September 2025 Expiry Date

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Environmental Product Declaration

EPD Number: 000068

General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom www.bre.co.uk	BRE Environmental Profiles 2013 Product Category Rules for Type III environmental product declaration of construction products to EN 15804:2012+A1:2013
Commissioner of LCA study	**LCA consultant/Tool**
Sika Ltd Watchmead Welwyn Garden City AL7 1BQ United Kingdom	Sika Technology AG Tüffenwies 16 8048 Zurich Switzerland www.sika.com/sustainability
Declared/Functional Unit	**Applicability/Coverage**
1 square metre (m^2) of Sarnafil S327 EL	Product Average.
EPD Type	**Background database**
Cradle to Gate with options	Ecoinvent and GaBi

Demonstration of Verification
CEN standard EN 15804 serves as the core PCR [a]
Independent verification of the declaration and data according to EN ISO 14025:2010 ☐Internal ☒ External
(Where appropriate [b])Third party verifier: Pat Hermon
a: Product category rules b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Comparability
Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A1:2013. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A1:2013 for further guidance

Information modules covered

Product			Construction		Use stage							End-of-life					Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building							
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4		D
Raw materials supply	Transport	Manufacturing	Transport to site	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal		Reuse, Recovery and/or Recycling potential
☑	☑	☑	☑	☑	☐	☐	☐	☐	☐	☐	☐	☑	☐	☑	☑		☑

Note: Ticks indicate the Information Modules declared.

Manufacturing site(s)

This environmental product declaration is for 1 square metre (m^2) of Sarnafil S327 EL produced by Sika Ltd. at the following manufacturing facilities:

Sika Manufacturing AG
Murtenstrasse 13
3186 Düdingen
Switzerland

Construction Product:

Product Description

Sarnafil S327-EL is a polyester reinforced, multi-layer, synthetic roof waterproofing sheet based on premium-quality polyvinyl chloride (PVC) containing ultraviolet light stabilizers and flame retardant according to EN 13956.

Sarnafil S327-EL is a hot air weldable roof membrane, formulated for direct exposure and designed for use in a mechanically fastened system. S327-EL is available in various colours and 1.2mm, 1.5mm, 1.8mm & 2.0mm thick variants.

The results in this EPD refer to Sarnafil S327-15 EL, with a mass of 1.8 kg/m2.

Technical Information

Property	Value, Unit
Water tightness as per EN 1847	Pass
Joint peel resistance as per EN 12316-2	≥ 300 N/50mm
Joint shear resistance as per EN 12317-2	≥ 800 N/50mm

Property	Value, Unit
Water vapour transmission properties (μ-value) as per EN 1931	15,000
Elongation, longitudinal (machine direction) as per EN 12311-2	> 12%
Elongation, transversal (cross machine direction) as per EN 12311-2	≥ 12%
Resistance to static load, soft substrate as per EN 12730	≥ 20 kg
Resistance to static loads, rigid substrate as per EN 12730	≥ 20 kg
Tear strength, longitudinal (machine direction) as per 12310-2	≥ 200 N
Tear strength, transversal (cross machine direction) as per EN 12310-2	≥ 200 N
Dimension stability, longitudinal (machine direction)	≤ 0.3%
Dimension stability, transversal (cross machine direction)	≤ 0.2 %
Foldability at low temperature as per EN 495-5	≤ -25 °C
UV exposure (>5000 h) as per EN 1297	Pass

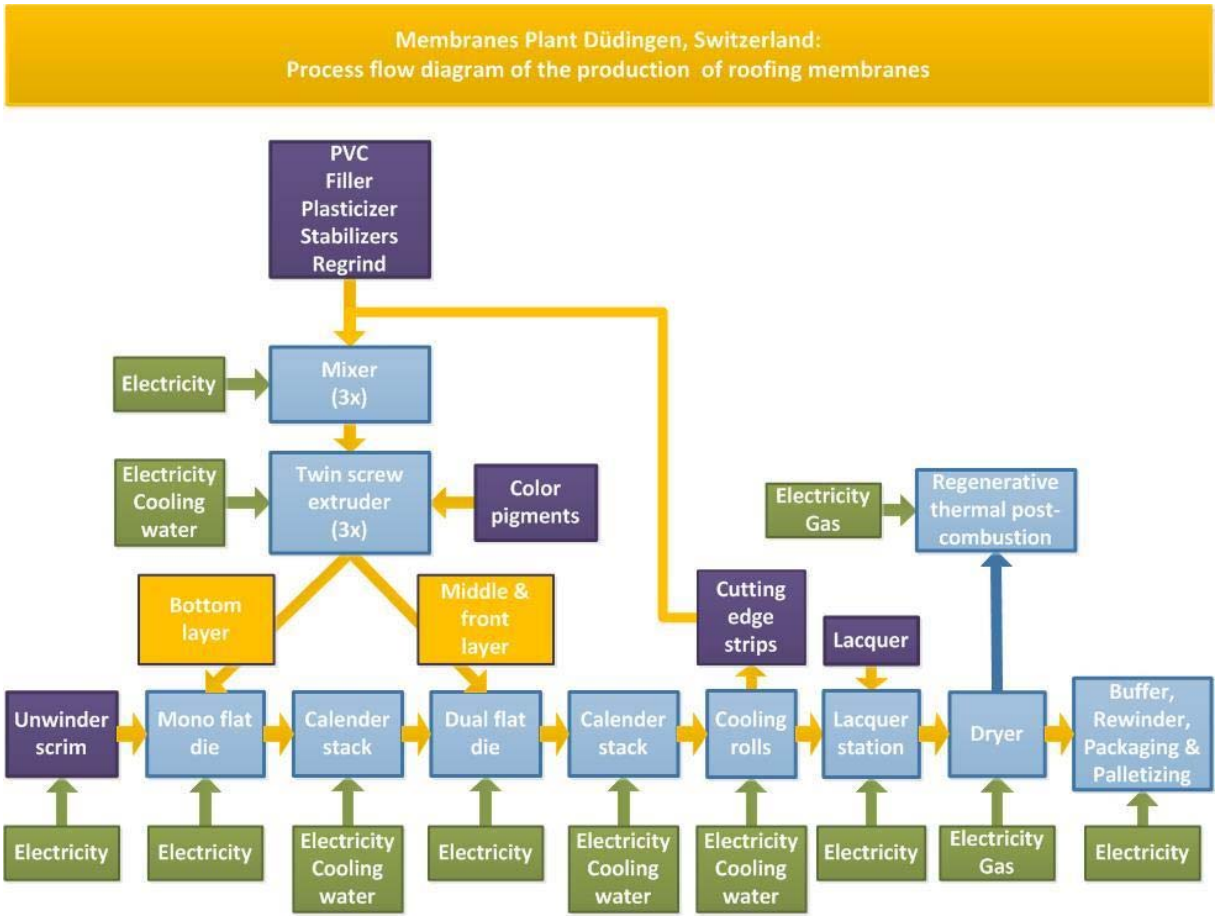
Main Product Contents

Material/Chemical Input	%
Polyvinyl chloride / PVC	50 - 55
Plasticizer	32 - 36
Stabilizers	7 -12
Lubricants	0.4 - 1.7
Pigments	0.01 - 1.0
Flame retardant	1 - 5
Filler	0 - 4
Carrier	2.5 - 7

Manufacturing Process

The Sarnafil PVC membranes are produced in one step from the raw materials directly to membrane master rolls on an extrusion line. This process includes mixing of all raw materials in to a hot dry blend and feeding this dry blend in the same heat in to the corresponding extruders. In the extruders, the dry blend is processed in to a melt and further shaped via flat sheet dies and polishing calenders to a reinforced membrane. Between the second polishing station and the final cooling and winding equipment, the lacquering station is located for finishing of the top layer. The PVC master rolls proceed then for final cutting and packaging to contractor rolls.

Process flow diagram



Construction Installation

Sarnafil S327-EL membrane types are mechanically fastened to suitable substrates by either the Sarnabar (linear bar) or Sarnafast (seam fixed) methods.Roof perimeters are additionally mechanically secured using a Sarnabar (or suitable alternative method), weathered with a welded membrane coverstrip.
All seam overlaps are joined by hot air welding using manual hot air welding machines and pressure rollers, or automatic welding machines.

Use Information

Installation works must be carried out only by Registered Sarnafil Contractors, in accordance with Sika Limited instructions and the Sarnafil Project specification.

End of Life

No input (energy, water) is considered for the dismantling, as it is assumed to be handmade. The membrane can be recycled, or disposed of in incinerator or landfill. As shown in the "Scenarios and Additional Technical Information", for this EPD an incineration scenario was taken.

Reference Service Life

The reference service life of Sarnafil S327-EL membranes is as stated by the BBA Argement Certificate 08/4532.

Available evidence indicates that the membrane will have a service life in excess of 35 years, although a service life in excess of 40 years can be achieved with periodic maintenance. See BBA for details.

Life Cycle Assessment Calculation Rules

Declared / Functional unit description

1 m^2 of reinforced PVC membrane for a reference service life of 35 years.

System boundary

In accordance with the modular approach as defined in EN 15804, this cradle to gate with options EPD includes the product stage (A1-A3), construction process stage (A4-A5), and end-of-life stage (C1-C4, excluding C2). Module D was also modelled.

Data sources, quality and allocation

The primary data provided by Sika derive from the plant at Duedingen, Switzerland for 2013. Background LCI datasets are taken from the databases of GaBi software and ecoinvent Version 2.2. All datasets are less than 10 years old.

Production waste that was reclaimed and reused internally was simulated as closed-loop recycling in Modules A1-A3.

Benefits from incineration of product and for the disposal of packaging are credited in Module D; this also applies to the reuse of wooden pallets.

Cut-off criteria

All data was taken into consideration (recipe constituents, thermal energy used, electricity used). Transportation was considered for all inputs and outputs. The manufacturing of the production machines and systems and associated infrastructure were not taken into account in the LCA

LCA Results

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts									
			GWP	ODP	AP	EP	POCP	ADPE	ADPF
			kg CO_2 equiv.	kg CFC 11 equiv.	kg SO_2 equiv.	kg $(PO_4)^{3-}$ equiv.	kg C_2H_4 equiv.	kg Sb equiv.	MJ, net calorific value.
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	5.18	6.80E-09	0.0351	0.00147	0.0044	9.36E-06	120
Construction process stage	Transport	A4	0.144	1.76E-013	0.000502	0.000136	6.15E-05	7.41E-09	1.95
	Construction	A5	0.709	6.82E-010	0.00374	0.000171	0.000452	9.81E-07	12.5
Use stage	Use	B1	MND	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Transport	C2	MND	MND	MND	MND	MND	MND	MND
	Waste processing	C3	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Disposal	C4	4.97	4.10E-11	0.000675	0.000235	0.000151	2.12E-06	8.72
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.3	-1.10E-09	-0.00294	-2.92E-04	-2.47E-04	-2.07E-07	-20.6

GWP = Global Warming Potential;
ODP = Ozone Depletion Potential;
AP = Acidification Potential for Soil and Water;
EP = Eutrophication Potential;
POCP = Formation potential of tropospheric Ozone;
ADPE = Abiotic Depletion Potential – Elements;
ADPF = Abiotic Depletion Potential – Fossil Fuels;

LCA Results (continued)

Parameters describing resource use, primary energy								
			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	7.47	1.39	8.85	88.4	41.1	129
Construction process stage	Transport	A4	0.00	0.00	0.15	0.00	0.00	1.96
	Construction	A5	0.747	0.139	0.937	8.84	3.69	13.5
Use stage	Use	B1	MND	MND	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00	0.00	0.00	0.00	0.00	0.00
	Transport	C2	MND	MND	MND	MND	MND	MND
	Waste processing	C3	0.00	0.00	0.00	0.00	0.00	0.00
	Disposal	C4	0.00	0.00	1.13	0.00	0.00	9.76
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00	0.00	-2.71	0.00	0.00	-23.4

PERE = Use of renewable primary energy excluding renewable primary energy 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-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 resource

LCA Results (continued)

Parameters describing resource use, secondary materials and fuels, use of water						
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m^3
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.00	0.00	0.00	0.0285
Construction process stage	Transport	A4	0.00	0.00	0.00	8.63E-05
	Construction	A5	0.00	0.00	0.00	0.00328
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00	0.00	0.00	0.00
	Transport	C2	MND	MND	MND	MND
	Waste processing	C3	0.00	0.00	0.00	0.00
	Disposal	C4	0.00	0.00	0.00	0.0103
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00	0.00	0.00	-0.00304

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

LCA Results (continued)

Other environmental information describing waste categories					
			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.00165	0.308	0.00369
Construction process stage	Transport	A4	1.58E-06	0.00049	2.61E-06
	Construction	A5	0.000166	0.0935	0.000441
Use stage	Use	B1	MND	MND	MND
	Maintenance	B2	MND	MND	MND
	Repair	B3	MND	MND	MND
	Replacement	B4	MND	MND	MND
	Refurbishment	B5	MND	MND	MND
	Operational energy use	B6	MND	MND	MND
	Operational water use	B7	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00	0.00	0.00
	Transport	C2	MND	MND	MND
	Waste processing	C3	0.00	0.00	0.00
	Disposal	C4	4.27E-06	3.08	0.000417
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-4.30E-06	-0.00646	-0.00115

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

LCA Results (continued)

Other environmental information describing output flows – at end of life						
			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	AGG	AGG	AGG	AGG
	Transport	A2	AGG	AGG	AGG	AGG
	Manufacturing	A3	AGG	AGG	AGG	AGG
	Total (of product stage)	A1-3	0.00	0.00	0.00	0.00
Construction process stage	Transport	A4	0.00	0.00	0.00	0.00
	Construction	A5	0.00	0.00	0.00	0.699
Use stage	Use	B1	MND	MND	MND	MND
	Maintenance	B2	MND	MND	MND	MND
	Repair	B3	MND	MND	MND	MND
	Replacement	B4	MND	MND	MND	MND
	Refurbishment	B5	MND	MND	MND	MND
	Operational energy use	B6	MND	MND	MND	MND
	Operational water use	B7	MND	MND	MND	MND
End of life	Deconstruction, demolition	C1	0.00	0.00	0.00	0.00
	Transport	C2	MND	MND	MND	MND
	Waste processing	C3	0.00	0.00	0.00	0.00
	Disposal	C4	0.00	0.00	0.00	14.8
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00	0.00	0.00	0.00

CRU = Components for reuse;
MFR = Materials for recycling

MER = Materials for energy recovery;
EE = Exported Energy

Scenarios and additional technical information

Scenarios and additional technical information			
Scenario	Parameter	Units	Results
A4 – Transport to the building site	Fuel consumption (diesel) / Vehicle type (truck)	litres/km	0.000034
	Distance	km	1345
	Capacity utilisation (incl. empty returns)	%	85
	Bulk density of transported products	kg/m^3	1200
A5 – Installation in the building	Ancillary materials for installation: Overlap	%	8
	Energy Use: Welding energy	kWh/m^2	0.016
	Waste materials from installation wastage: Installation losses	%	2
C1, C3 and C4 – End of life	Energy for dismantling	kWh/m^2	0
	Waste for final disposal: Membrane incineration	%	100
D – Reuse/Recovery/Recycling Potential	The benefits from incineration of product and waste are credited in Module D, since in modern incineration plants the energy of combustion is used to produce electricity and thermal energy.		

Summary, comments and additional information

Interpretation

The displayed results apply to Sarnafil S327-15 EL. To calculate results for other thicknesses, please use this formula:
Ix = ((x+0.37)/1.87)*I1.5
[Ix = the unknown parameter value for Sarnafil S327-15 EL products with a thickness of "x" mm (e.g. 2.0 mm)]

The following chart shows the relative contributions of the different modules to the various environmental impact categories and to primary energy use in a dominance analysis. It is clear that most impacts come from Module A1-3, though the incineration of the membrane (C4) also contributes, especially for AP and GWP, due to its greenhouse gas emissions. For this reason, the Product Stage is examined more closely in the following interpretation.

Energy resource use
Pre-product manufacturing (58%), packaging (26%) and the manufacturing process (15%) account for the total of the use of renewable primary energy resources (PERT). The manufacturing of raw materials (96%) has the greatest impact on the use of non-renewable primary energy resources (PENRT), while the impact of the production process (due to electricity consumption) measures 3.4%.

Environmental impacts
The dominant influence in all impact categories for Module A1-A3 comes from pre-product manufacturing, with at least 94% in each case, except for Ozone Depletion Potential (ODP), with 60%. Within pre-product manufacturing, polymers play an important role regarding Global Warming Potential (GWP), Eutrophication Potential (EP), Photochemical Ozone Creation Potential (POCP), Abiotic Depletion Potential - Elements (ADPE) and Abiotic Depletion Potential - Fossil Fuels (ADPF). The plasticiser has significant impact on GWP, EP, POCP and ADPF. In addition, the stabilisers and the lacquers impact the ODP, while the fire retardant contributes mostly to Acidification Potential for Soil and Water (AP), as well as to EP and POCP. The polyester carrier contributes to GWP, EP and ADPF, while and the impacts from processing aids, pigments and fillers are negligible.

The raw materials with the greatest effect on the impacts also show the greatest percentage by mass of the waterproofing membrane: polymers, plasticiser and carrier. The manufacturing process (due to energy use) contributes mostly to ODP (6%) and GWP (4%).

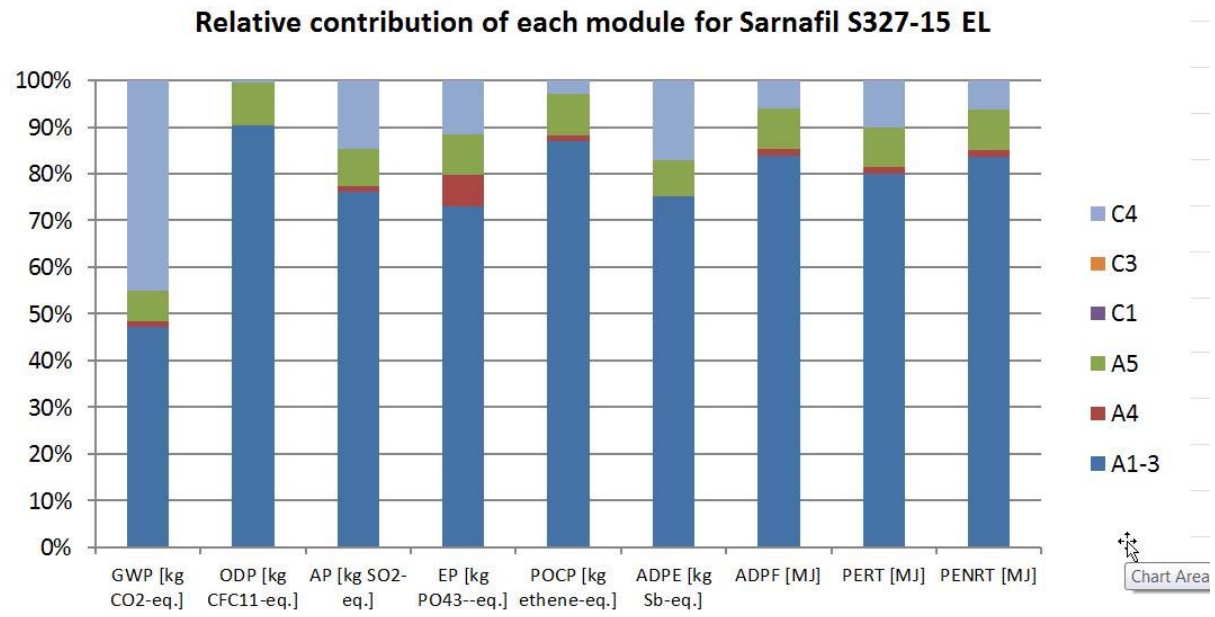


Figure 1

References

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