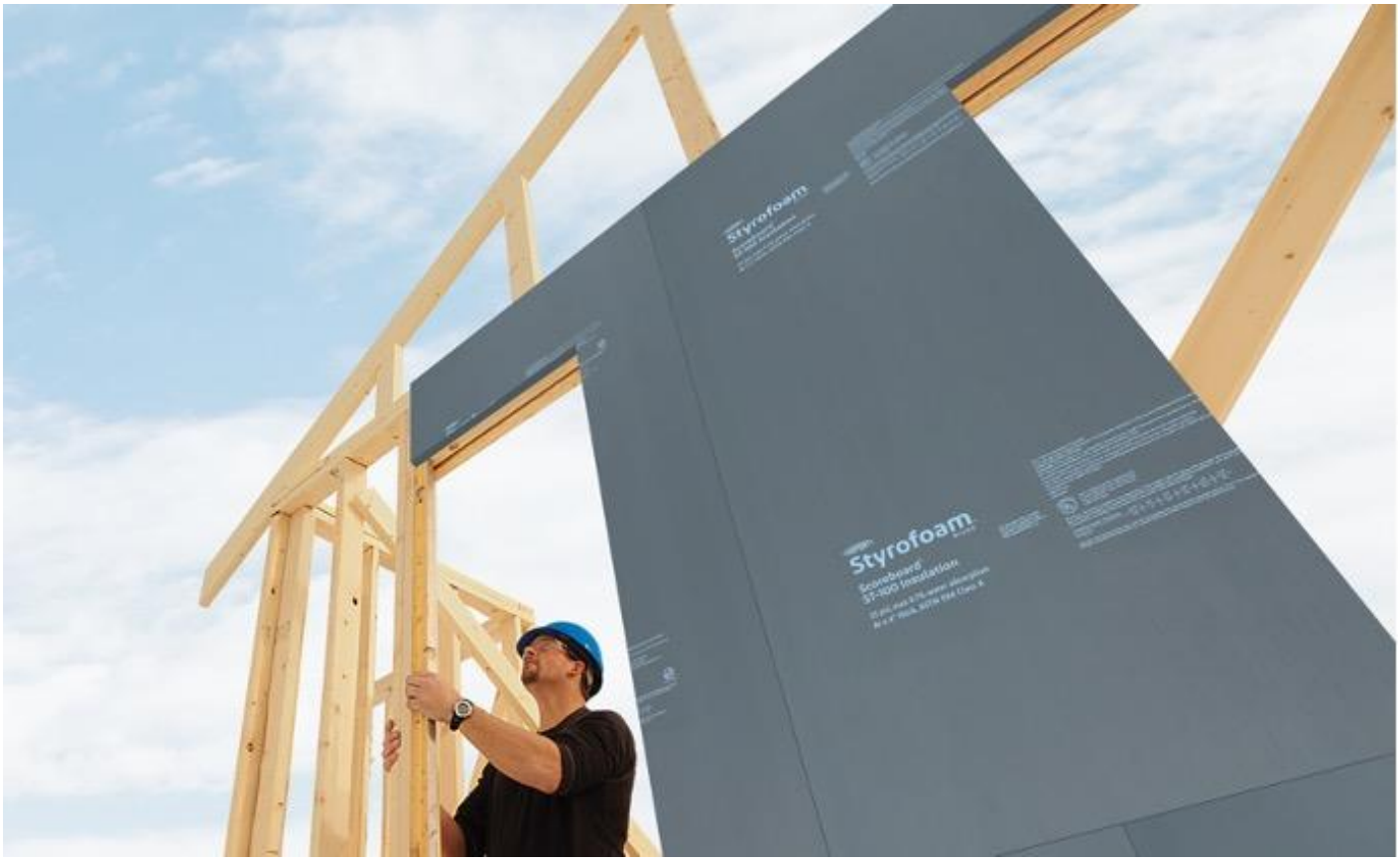

Styrofoam™ Brand ST-100 Products
Extruded Polystyrene Foam Insulations

Date of Issue: October 27, 2021
Date of Expiration: October 26, 2024

EPD Optimization Assessment

Product Information		
Manufacturer Name	DuPont de Nemours, Inc.	
Product Name	Styrofoam Brand ST-100 Extruded Polystyrene Foam Insulations	
Impact Comparison Parameters		
Type of Comparison	Current Product vs Previous Version of Product	
Current EPD	Low GWP Styrofoam Brand XPS ST-100 Products, Declaration Number 4789868895.101.1, UL Environment https://spot.ul.com/main-app/products/detail/612fbfb8166bd618793d176f?page_type=Products%20Catalog	
Previous EPD	Styrofoam Brand XPS Products https://spot.ul.com/main-app/products/detail/602e64fd0f3b5a51a2cacd5a?page_type=Products%20Catalog	
Life Cycle Stages Reviewed	Cradle-to-Grave (A1-C4)	
Functional Unit	1 m2 of insulation with a thickness that gives an average thermal resistance RSI = 1 m2K/W for a period of 75 years	
Impact Assessment (TRACI)		
	Current EPD of Product	Previous EPD of Product
GWP [kg CO_2eq]	6.24E+00	1.00E+02
Resources [MJ]	8.55E+00	9.32E+00
POCP [kg O_3 eq]	1.13E-01	1.29E-01
Impact Comparison Results		
Comparison Summary	The current DuPont product has greater than 20% GWP impact reduction, and more than 5% Resources and POCP impact reduction than the historical product.	
LEED Credit Achieved	☒LEED v4.0 @ 100% cost ☐LEED v4.1 @ 100% cost/1 product	☐LEED v4.1 @ 150% cost/1.5 products ☒LEED v4.1 @ 200% cost/2 products
Verifier	Matt Van Duinen, LCACP Sustainability Director, WAP Sustainability	
Date of Issue	10/27/2021	
Expiration Date	10/26/2024	

Third Party LEED Verification Statement

It is WAP Sustainability's professional opinion that the product(s) in question meets the following LEED Materials and Resource Credit, Environmental Product Declaration, Option 2 criteria:

☐ Product Does Not Meet LEED Option 2 Criteria
☒ Impact Reduction in 3+ Categories (value at 100% by cost for LEED v4.0)
☐ GWP Reduction >0% (value at 100% by cost or 1 product for LEED v4.1)
☐ GWP Reduction 10+% (value at 150% by cost or 1.5 products for LEED v4.1)
☒ GWP Reduction 20+% and Impact Reduction 5+% in 2+ Additional Categories (value at 200% by cost or 2 products for LEED v4.1)

This determination was made for the following reasons:

- A comparison of the LCAs and EPDs was conducted. This analysis showed reductions in the footprint outlined in this document. This level of reduction was the basis for determining optimization.
- GWP reductions of at least 20%, and more than 5% Resources and POCP reductions were shown.
- DuPont has provided a timeline for publishing this report publicly and given direction as to the location that this report will be published.

Matt Van Duinen, LCACP
Sustainability Director
WAP Sustainability Consulting, LLC

Assessment of Impact Results

Life Cycle Stages Under Review

Sourcing and Manufacturing	Transportation and Installation	Use Phase	End of Life	Other
☒ A1 ☒ A2 ☒ A3	☒ A4 ☒ A5	☒ B1 ☒ B5 ☒ B2 ☒ B6 ☒ B3 ☒ B7 ☒ B4	☒ C1 ☒ C2 ☒ C3 ☒ C4	☐ D

Functional Unit

The functional unit used in the LCAs and EPDs are shown in the table below.

	Functional Unit	Product Reference Service Life
Current LCA/EPD	1 m2 of insulation with a thickness that gives an average thermal resistance RSI = 1 m^2K/W for a period of 75 years	75 years
Baseline LCA/EPD	1 m2 of insulation with a thickness that gives an average thermal resistance RSI = 1 m^2K/W for a period of 75 years	75 years

Assessment Results

The baseline and current life cycle assessments for the products in question were performed in a similar manner. As such, the results are directly comparable.

	AP [kg SO_2 eq]	EP [kg N eq]	GWP [kg CO_2 eq]	Resources [MJ]	POCP [kg O_3 eq]
ST-100 Extruded Polystyrene Foam Insulations (Current)	5.61E-03	5.20E-04	6.24E+00	8.55E+00	1.13E-01
Styrofoam Brand XPS Products (Baseline)	6.49E-03	5.97E-04	1.00E+02	9.32E+00	1.29E-01
Impact Change	-14%	-13%	-94%	-8%	-12%

WAP Sustainability's Criteria for Comparability

Per ISO14025, "Type III environmental declarations are intended to allow a purchaser or user to compare the environmental performance of products on a life cycle basis. Therefore, comparability of Type III environmental declarations is critical. The information provided for this comparison shall be transparent in order to allow the purchaser or user to understand the limitations of comparability inherent in the Type III environmental declarations."
WAP Sustainability takes this requirement very seriously. No EPD is an exact replica of another. Due to the human element and the embodied uncertainty in complex supply chain, there are nearly always limitations to comparability. The goal is to limit those limitations. It is important for the user of an EPD to understand that the environmental impact values presented are ballpark figures based on the best available science, expert decisions and available budgets. At WAP Sustainability, we agree with the above statement taken from ISO14025 and believe that "comparability of Type III environmental declarations is critical". Without comparability, the power of LCAs and EPDs to help facilitate a transition to an environmentally sustainable economy will always be limited. The key is for the comparison to be done in a manner that is critically reviewed and open.
To facilitate transparency, we have presented our entire criteria for the assessment of comparability in the table below.

	Data is not at all comparable	Data is significantly not comparable. Modification may need to be made.	Data is comparable but opportunities for improvement exist.	Data is highly comparable.
Score Category	Score = 0	Score = 1	Score = 2	Score = 3
Count	0	0	0	25

Note: A single score of 0 will result in LCA/EPD not being able to be compared. Additionally, multiple scores of 1 will result in LCA/EPD not being able to be compared.

Comparability Findings

☒ Comparable for the Purposes of LEED Credit Achievement

☐ Not Comparable for the Purposes of LEED Credit Achievement

The products in question are similar in application, size, and use scenarios. The production method in manufacturing is similar. The boundary conditions are the same between the studies. Additionally, further LCA modeling and expert analysis was conducted to account for the difference in PCRs. It is because of these facts that the EPDs are comparable.

	Current EPD	Previous EPD	Comparability
General			
Program Operator	UL Environment	UL Environment	3
PCR	Part A: LCA Calculation Rules and Report Requirements (UL, V3.2, 2018) Part B: Building Envelope Thermal Insulation EPD Requirements (UL, V2.0, 2018)	Part A: LCA Calculation Rules and Report Requirements (UL, V3.2, 2018) Part B: Building Envelope Thermal Insulation EPD Requirements (UL, V2.0, 2018)	3
Product Category Definition			
Product Type	Extruded Polystyrene Foam	Extruded Polystyrene Foam	3
Manufacturing Description	Continuous extrusion, melting, pressure, expansion, cooling, trimming	Continuous extrusion, melting, pressure, expansion, cooling, trimming	3
Functional Unit	1 m2 of insulation with a thickness that gives an average thermal resistance RSI = 1 m2K/W for a period of 75 years	1 m2 of insulation with a thickness that gives an average thermal resistance RSI = 1 m2K/W for a period of 75 years	3
Weight Per Functional Unit	0.744 kg	0.681 kg	3
Reference Service Life (Product)	75 years	75 years	3
Estimated Service Life (Building)	75 years	75 years	3
Materials and Substances			

Raw Materials and Percent Listed in LCA or EPD	-	-	3
Polystyrene (Virgin) - (%)	40-60%	40-60%	-
Polystyrene (Recycled) - (%)	15-25%	15-25%	-
Blowing Agent – (%)	9-12%	8-11%	-
Colorant – (%)	0-3%	0-7%	-
Flame Retardant - (%)	0-3%	0-3%	-
Film/Facer – (%)	0-8%	0-8%	-
Goal and Scope			
Stated Goal of LCA or EPD	Better characterize environmental performance of products, create EPD	Better characterize environmental performance of products, create EPD	3
Stated Scope of LCA or EPD	Cradle-to-Grave	Cradle-to-Grave	3
Format for Declaration			
LCA or EPD	EPD	EPD	3
ISO 14025 Series Compliance	Yes (same model as previous EPD)	Yes	3
ISO 21930 Compliance	Yes (same model as previous EPD)	Yes	3
EN 15804 Compliance	Yes (same model as previous EPD)	Yes	-
Data Collection			
Assessed Data Quality	Data within 10 years, US datasets when possible, appropriate technologies used	Data within 10 years, US datasets when possible, appropriate technologies used	3
Vintage of Primary Data	2019	2019	3
Key Assumptions, Overall	A portion of blowing agent emissions are emitted during the manufacturing stage; Allocation based on production volume at plants	A portion of blowing agent emissions are emitted during the manufacturing stage; Allocation based on production volume at plants	3

Key Assumptions, Use Phase	A portion of blowing agent emissions are emitted during the use stage	A portion of blowing agent emissions are emitted during the use stage	-
Key Assumptions, EOL	A portion of blowing agent emissions are emitted during the end-of-life stage	A portion of blowing agent emissions are emitted during the end-of-life stage	-
Defined Cut Off Rule	<1% mass <1% energy <5% total	<1% mass <1% energy <5% total	3
Percent of Materials Left Out of Study	-	-	3
Software Used to Model LCA	GaBi 9.5.2.49	GaBi 9.5.2.49	3
Source of Secondary Datasets	Sphera	Sphera	3
Vintage of Secondary Datasets	SP40	SP40	3
Reporting Categories			
LCIA Impacts Assessment Methodology	TRACI 2.1	TRACI 2.1	3
Description of Any Modifications Made to Reporting Categories That Were Necessary to Facilitate Comparison	None	None	3
Equivalency of Stages			
Description of Any Modifications Made to Life Cycle Stages That Were Necessary to Facilitate Comparison	None	None	3

Appendix: Manufacturer Narrative of Impact Reductions

DuPont™ believes all buildings play a critical role in mitigating and adapting to climate change and in achieving net zero carbon emissions to manage the climate crises. The introduction of low-GWP offerings within the Styrofoam™ Brand XPS Insulation product line supports the DuPont Performance Building Solutions and Corian® Design goal to achieve a 75 percent reduction in GHG emissions from operations by 2030 (based on 2019 levels). These actions also contribute to DuPont's corporate Acting on Climate goal to reduce GHG emissions from the company's overall operations by 30 percent by 2030 (relative to 2019) and to achieve carbon neutrality by 2050. Together with the introduction of low-GWP offerings within other brands, DuPont is taking significant steps to deliver solutions that enable the total building carbon to move toward zero – through innovation to develop low embodied carbon products and insulation and air sealing solutions that help enable energy efficiency and reduce operational carbon.

The reduction in LCA impact categories between Styrofoam™ Brand XPS ("blue") products and Low-GWP Styrofoam™ Brand XPS ST-100 is the result of product innovation focused specifically on achieving reduced embodied carbon through use of a lower GWP blowing agent package. Historical blowing agents used in the industry have had relatively large (>1000 kg CO2eq/kg) GWPs. DuPont innovation has enabled a viable low-GWP solution that delivers the same thermal performance, moisture resistance, durability and ease of use expected by our customers, but with a substantial 94% reduction in carbon footprint as measured by the A1-C4 results of the EPD. In addition, the Styrofoam™ Brand XPS ST-100 delivers lower LCA impact category results in Acidification Potential, Eutrophication Potential, Resources, and Photochemical Ozone Creation Potential. As a result, Styrofoam™ Brand XPS ST-100 provides customers with the LEED v4.1 credit at 200% cost or equivalent to two products.