

Certified Environmental Product Declaration

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ENVIRONMENTAL PRODUCT DECLARATION

Owner of the Declaration	Atlas EPS: A divison of Atlas Roofing
EPD Program Operator	NSF International
PCR Program Operator	UL Environment
Declaration number	EPD10153
Issue date	November 7, 2018
Period of Validity	5 years

Atlas ThermalStar[®] GX with BASF Neopor[®] GPS







1.0 General Information

NSF International Tools Number NSF International Tools Number NSF International Tools Number EPD Program Operator Ann Actor Multipan 49105 USA www.nsf.org Declaration Holder Ann Actor Multipan 49105 USA www.nsf.org EAA and Declaration Prepared by Base Corporation 100 PRA Avenue Fortom Declaration Number Fortom Park, NJ 07822 Declaration Number Fortom Park, NJ 07822 Declared Product and Functional Unit Polytyrens (OPS) Type I insulation material with a thickness that gives an average throat resistance (RS) of 1 mVKV (IS 681 (PrNT-FETU per Incl.)) with a building service life of 75 years (packaging included). Product Category and Subcategory (category) Building Ervelope Thermal Insulation View Product Category and Subcategory (category) Building Ervelope Thermal Insulation View Product Category Autor for Multiding-Related Products and Services (subcategory) Rules for Building-Related Products and Services, Part A (Standard 10010 version 3 1 4" edition, My 2 2.018) and Product Category Rule (PCR) Guidance for Building-Related Products and Services, Part B. Building There of Issue November 7, 2018 Product Category Rules or DR advir Micro (PCR) Guidance for Building-Related Products and Services, Part B. Building This EPD was independently verified by November 7, 2018 Deternal System from date or Issue Product Gategory Building Becof Drom (Bedpendently verified by System remoradine de		
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2.1 Description of Companies

Neopor[®] Plus GPS (**G**raphite **P**oly**S**tyrene) resin is produced by BASF in Ludwigshafen, Germany. The Neopor[®] Plus GPS resin is then further processed by Atlas EPS into insulation boards (ThermalStar[®] GX) at one of their four North American manufacturing locations: (1) 8240 Byron Center Ave SW, Byron Center, Michigan 49315; (2) 445 Industrial Park Drive, Martinsville, Virginia 24148; (3) 911 Industrial Drive, Perryville, Missouri 63775; and (4) Privada Misiones No. 1108 Tijuana, Baja California 22244 (Mexico).

2.2 Product description

Atlas ThermalStar® GX featuring Neopor® Plus (GPS) insulation boards are graphite polystyrene (GPS) with a polymeric flame retardant in uniform distribution (blowing agent: pentane).



2.3 Application

The performance properties of Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards make them suitable for use in many applications. The product described in this document is used in applications such as wall insulation, roof insulation, External Insulation and Finish System (EIFS), cavity wall insulation, interior insulation, insulation for building equipment and industrial installations.

2.4 Technical Data

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to ASTM C578 Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation.

Name	Value	Value	Value	Value	Unit
ASTM C578 Classification	Type I	Type VIII	Type II	Type IX	
Density ASTM C303	0.90	1.15	1.45	1.80	lbs. / ft ³
Thermal Conductivity (lambda) ASTM C518	0.18	0.18	0.18	0.18	BTU*ft/hr.*ft ² *F
Thermal Resistance ASTM C518	4.7	4.7	4.7	4.7	ft ^{2*} hr.*F/BTU/in
Compressive Resistance ASTM D1621	10	14	20	25	At yield of 10% deformation in psi (min)
Water Absorption by Total Immersion ASTM C272	1.1	1.1	1.1	1.1	Max volume % absorbed

Overall, Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards were evaluated for the following properties:

 Surface Burning Characteristics (ANSI/UL723, ASTM E84)

- Physical Properties (ASTM C578)
- Roofing Systems for Exterior Fire Exposure (ANSI/UL790, ASTM E108)

We create chemistry

- Roof Deck Construction Material with Resistance to Internal Fire Exposure (ANSI/UL1256)
- Flammability Testing for Use in Attics and Crawl Spaces (AC12, App. A and B)
- For Use on Exterior Commercial Walls (NFPA 285)
- Material Emissions (UL2818 and California Department of Public Health, CDPH/EHLB/Standard Method

2.5 Delivery status

Neopor® F5300 Plus GPS resin is supplied to Atlas EPS at their North American manufacturing locations listed in section 2.1 as lens-shaped granules. Atlas EPS provides ThermalStar® GX insulation boards at various densities and shapes to the construction industry. Atlas EPS is a verified molder under the BASF Neopor® Brand Marketing Agreement that utilize BASF Neopor® resins in their UL certified enduse products.

2.6 Base materials / Ancillary materials

Atlas ThermalStar® GX insulation boards are made from the expansion of Neopor® resin through the use of a blowing agent. The Neopor® F5300 Plus GPS resin consists of polystyrene, a blowing agent, graphite and a flame retardant. The composition range for the resin is: polystyrene (85% - 90% by weight), pentane/isopentane (3% - 7% by weight), graphite (3% - 7% by weight) and a polymeric flame retardant (0.5% - 2.0% by weight).

For the preparation of flame-retardant polystyrene granules, a polymeric flame retardant (polymer FR) with about 1.1% by mass is added. Polymer-FR is a brominated styrene-butadiene copolymer (CAS No 1195978-93-8) that is not subject to the REACH Regulation for Substances of Very High Concern. To improve the insulation performance, graphite is added. As a result, the reflection and absorption behavior of heat radiation is changed, whereby the insulating performance of the product is improved with low layer thickness and density. The pentane assists in the expansion process and is released partly during and shortly after production (ageing process).

In addition to the basic materials, the manufacturer does not use any secondary polystyrene material that is reused during the production process. No other additives are used in relevant amounts. Polystyrene and pentane are produced from oil and natural gas, and therefore linked to the availability of these raw materials.

2.7 Manufacture

For the production of Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS)

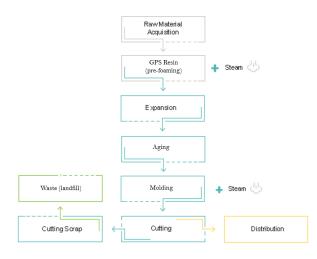


insulation boards, a multi-stage process is carried out. At the beginning Neopor[®] Plus GPS resin is produced by BASF SE at their Verbund site in Ludwigshafen, Germany followed by the foaming and molding processes at Atlas EPS in various sites across North America. The conversion process of GPS granules to foamed insulation boards consists of the following manufacturing stages: pre-foaming, conditioning, block molding and finally cutting into the desired sizes.

During the pre-foaming stage, the resin is foamed with the aid of steam and the blowing agent pentane. Subsequently, the expanded granules are stored in airpermeable silos. Due to the diffusing air, the GPS foam particles receive the necessary stability for further processing.

The most commonly used method of producing GPS insulation boards is block molding followed by cutting. In this process, the GPS foam particles are filled into large block-shaped forms and foamed with steam. Then the blocks are cut into boards using mechanical or thermal cutting equipment. Additional edge profiling (tongue and groove or shiplap) can be added through milling machining.

Cut offs are disposed of as waste to landfill.



2.8 Environment and health during manufacturing

During the storage (aging) and processing of Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards, pentane escapes the panels. Especially when cutting the foam with heated wires, good ventilation in the working area is necessary. This is because the vapor contains pentane and small amounts of styrene. Therefore, manufacturing areas should be well-ventilated and maximum workplace concentrations for styrene and pentane must be considered.

No ozone depleting substances as regulated by the EPA, such as CFC or HCFCs, are used as blowing agents for the production of Atlas ThermalStar® GX insulation materials.

This product contains styrene, which is listed as a hazardous air pollutant (Clean Air Act). This product



contains pentane and residual styrene monomer, which OSHA defines as a hazardous chemical (SARA Title III Regulations). This product may be portable under SARA sections 311 and 312, depending on the maximum on-site storage volumes. This product contains a substance subject to a Significant New Use Rule (SNUR) or consent order restriction: TSCA § 5(a) final Significant New Use Restriction (SNUR) 40 CFR 721.10280. Pentane has a CERCLA recordable quantity (RQ) of 100 pounds. All ingredients are listed on the TSCA inventory. This material contains detectable amounts of some chemicals known to the State of California to cause cancer. Styrene oxide is listed as known to the State of California to cause cancer. Styrene oxide is a metabolite of styrene monomer. Pentane, isopentane and graphite are covered by PA, MA and NJ Right To Know (RTK) acts.

2.9 Product processing/Installation

Thermally insulating a building with Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards products is an effective path toward sustainable energy savings. Additionally, Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards are relatively light weight making them easy to process and to work with.

The insulation boards are dimensionally stable and absorb virtually no moisture. This is not only of great importance for the entire life cycle of the building but also for the construction phase.

For all applications, the relevant standards and building codes as well as manufacturer instructions must be observed. Compliance with model building codes does not always ensure compliance with state or local building codes, which may be amended versions of these model codes. Always check with local building code officials to confirm compliance

Depending on the application, Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation panels can be adhered to a wall with system approved adhesives or can be mechanically fastened. Different systems require different fastening requirements so consult your system supplier guidelines. Installation does not require any energy or water usage.

2.10 Packaging

External factors, such as solar energy conveyed via reflective surfaces, can create excessive heat build-up within insulation products made of Neopor® GPS foam. Excessive heat-build-up can damage insulation products made of Neopor® GPS foam. Precautionary measures taken in the packaging, storage, transportation and installation of insulation products made of Neopor® GPS foam can help minimize the potential for damage. Insulation products and foam surfaces should be protected at all times from reflected sunlight and prolonged solar





exposure. Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards should be packed in white opaque polyethylene plastic bags. Finally, this opaque film packaging is recyclable and can be recycled where suitable return systems exist. However, the recycling of the packaging film is not considered in this EPD.

2.11 Condition of use

Water pick up by capillarity does not occur with Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) foams, due to the closed cell structure. The thermal insulation performance of Atlas ThermalStar® GX is practically unaffected by exposure to water or water vapor due to its drying capability should it ever become wet.

Properly installed Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards are durable with respect to their insulation, structural and dimensional properties. They are water resistant, resistant against microorganisms and against most chemical substances. It should not, however, be brought into contact with organic solvents.

The application of insulation material has a positive impact on energy efficiency of buildings. Quantification is only possible in context with the construction system of the building.

Dependent on the specific material and the frame conditions of installation, residual pentane may diffuse. Quantified measurements and release profiles cannot be declared.

2.12 Environment and health during use

Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards in most applications are neither in direct contact with the environment nor with indoor air. However, when naked EPS/GPS products were tested for VOC emissions, the emissions proved to be below the limit values in countries with such regulation (see section 6.1). Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards have also achieved GREENGUARD Gold certification to UL 2818, product certification for low chemical emissions for building materials, finishes and furnishings.

2.13 Reference service life

If applied correctly, the lifetime of Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation board is equal to the building life time, usually without requiring any maintenance. The reference service life considered is 75 years.

2.14 Extraordinary effects

The following is a listing of the standards required for the testing, evaluation and approval of Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation board for use in the intended applications and markets as identified in this document.

Fire

Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards are fire and code approved by UL and ICC for ASTM E84, NFPA 285 and NFPA 286 for use in commercial cavity wall with a wide range of cladding approvals.

Finished Atlas ThermalStar® GX insulation boards manufactured from Neopor® F5300 Plus GPS resins up to a maximum density of 2.0 lbs./ft³ and a maximum thickness of 6 ins. are qualified to bear a label with a flame-spread index of 25 or less and a smoke-developed index of 450 or less when tested in accordance with ANSI/UL723 (ASTM E84), provided the finished boards are listed and labeled by an approved agency.

Neopor® F5300 Plus GPS granules achieve the fire classification Euroclass E according to [DIN EN 13501-1] and according to B1 [DIN 4102-1].

Water

Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards are chemically neutral and not water soluble. No watersoluble substances are released, which could lead to pollution of ground water, rivers or lakes. Because of the closed cell structure, Atlas ThermalStar® GX insulation boards can be used even under moist conditions. In the case of unintended water ingress, e.g. through leakage, there is normally no need for replacement of the insulation board. The insulation value of the board remains almost unchanged in moist conditions and the insulation will dry when the source of moisture is removed.

Mechanical destruction

Not relevant for Neopor® Plus GPS based products that have superior mechanical properties.

In summary, a listing of all standards required for testing, evaluation and approval of Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards for use in the applications and markets identified are:

- ICC-ES Acceptance Criteria for Foam Plastic Insulation (AC12), dated June 2012
- ICC-ES Acceptance Criteria for Quality Documentation (AC10), dated June 2014
- ANSI/UL723 (ASTM E84), Test for Surface Burning Characteristics of Building Materials
- ANSI/UL790 (ASTM E108), Standard Test Methods for Fire Tests of Roof Coverings
- ANSI/UL1256, Standard for Fire Test of Roof Deck Constructions
- ASTM C578, Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
- UL2818, GREENGUARD Certification Program for Chemical Emissions for Building Materials, Finishes and Furnishings
- NFPA 285, Standard Fire Test for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Assemblies Containing Combustible Components
- California Department of Public Health, CDPH/EHLB/Standard Method V.1.1





2.15 Re-use phase

The reuse of GPS foam from production waste has been working for many years and has proven itself very well. Production residues due to cut-outs or edge profiles can be reused in the production plants. However, for this analysis, re-use of GPS scrap was not included in the calculation of the LCA results. For End-of-Life options, construction techniques can be employed to maximize the separation of GPS insulation boards at the end of life of a building to maximize the potential for re-use. Another option for re-use is to leave the GPS insulation boards in place when the existing construction is thermally upgraded.

2.16 Disposal

Finished insulation boards are not regulated by either RCRA or CERCLA. Disposal of ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards should be in accordance with national, state and local regulations. Product should not be discharged into waterways or sewer systems without proper authorization.

The recycling of GPS waste to produce new GPS insulating materials is possible if a separation of building materials by type is guaranteed. Ground recycled material can easily be used as a lightweight aggregate for mortar and concrete. It is also used as an additive for PS-light concrete, plaster for

3.0 LCA: Calculation rules

3.1 Declared Unit

The declared unit calculated in the LCA is in conformance with EN 15804 and the relevant subcategory PCR (Part B) for Building Envelope Thermal Insulation and is defined as 1 m² of installed ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) Type I insulation board with a thickness that gives an average thermal resistance (RSI) of 1 m²*K/W (5.68 ft²*hr.*F/BTU per inch) with a building service life of 75 years (packaging included). Relative to this declared unit, the mass of the described insulation board is 0.433 kg (0.98 lbs.).

Conversion factors are listed in the table below to convert the functional unit to 1 kg and 1 m^3 of material.

Name	Value	Unit
Functional Unit (FU)	0.98 (0.43)	lbs. (kgs.)
Functional Unit (FU)	1.21 (0.0307)	ins. (m)
Gross density	0.9	lbs./ft ³
Conversion factor to 1 m ³	32.6	-
Conversion factor to 1 kg	2.3	-

3.2 System boundary

Type of EPD: Cradle-to-gate (installation) - with options (end-of-life).

The modules considered in the Life Cycle Assessment are:

containment and light plaster as well as in the clay industry.

Recycling of GPS though has not been included in the calculation of the LCA or this EPD.

At the end of its life cycle, ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards can be disposed of to landfill or thermally incinerated. Embedded energy in GPS insulation boards can be recovered in municipal waste incinerators equipped with energy recovery units for steam and electricity generation and for district heating where available.

In this EPD EoL is considered with 100% landfill disposal which is currently the most common practice. Within the landfill modeling, a portion of the landfill gas is collected for combustion via flare or for direct use as steam and/or electricity production.

For domestic transportation purposes, this product is not regulated as a hazardous material by the US Department of Transportation (DOT) under Title 49 of the Code of Federal Regulations.

2.17 Further information

Additional information can be found at <u>http://www.neopor.basf.us/</u> and <u>www.atlaseps.com</u>

- A1: Raw materials supply
- A2: Transport to manufacturer
- A3: Manufacturing
- A4: Transport to construction site
- A5: Assembly
- C1: Demolition
- C2: Transport to waste treatment
- C3: Waste processing
- C4: Disposal
- D: Reuse, recovery or recycling potential

The analysis of the product life cycle includes production of the basic materials, transport of the basic materials, manufacture of the product and the packaging materials and is declared in module A1-A3. Transport of the product is declared in module A4, and disposal of the packaging materials and any insulation trim in module A5. The use stage is not considered in the LCA calculations. The end-of-life scenarios include the transport to end-of-life stage (C2), effort of material treatment (C3) and emissions of landfilling of waste (C4). Due to a non-existing separation of C3 and C4 in the background data, the environmental impacts are shown in sum in module C3/C4. For waste disposal, gained energy from any recovery of landfill gas and subsequent use in generating thermal energy or electricity are declared in module D, beyond the system boundary.





3.3 Estimates and assumptions

All inputs and outputs of the production of Neopor® F5300 Plus GPS resin in Ludwigshafen, Germany by BASF and the production of thermal insulation boards by Atlas EPS in North America, were considered in the calculation. Generic data were used for externally purchased raw materials from suppliers as these materials are not produced by BASF SE or Atlas EPS. Assumptions were made for modules A2, A5, C2 and D. Transport distances of key raw materials to the manufacturing site (A2) were determined using the supplier's postal addresses. For A5 (assembly) around 1.5% installation/construction trim waste was assumed and a distance of 175 miles by diesel truck with an adjusted utilization ratio of 6.7% was used. Credits for the avoided production of electricity and steam in another product system, due to landfill gas recovery, were considered for manufacturing trim waste (A3) and construction waste (A5).

3.4 Cut-off criteria

All major inputs and outputs to processes where data was available related to the scope defined by this assessment were included in the analysis. There was coverage of at least 95 % of mass and energy of the input and output flows, and 98 % of their environmental relevance. There were no critical uncertainties or gaps in the data collection or assessment process. Primary data of the production processes were considered. In the case of module C1 (deconstruction), insufficient data for the process was available but expert opinion felt the impacts during this module would fall under the cut off criteria of 1% of the total energy or total mass input assessed in this LCA. No known flows were deliberately excluded from the LCA and subsequent EPD.

3.5 Period under review

The period under review for the BASF primary data related to the production of the Neopor® F5300 PLUS GPS resin, was 2017. For the production of Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation boards, the period under review was 2014 for the four Atlas EPS manufacturing locations.

3.6 Allocation

During the production of Atlas ThermalStar® GX insulation board no co-products are produced therefore no allocation was necessary for the processes under the manufacturers control. All credits from exported thermal energy or electricity generated at the landfill sites containing packaging or product waste are allocated to module D.

3.7 Comparability

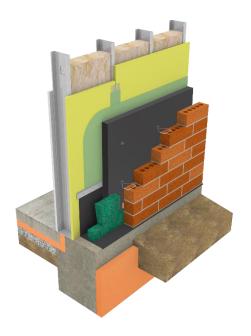
Environmental declarations from different programs (ISO 14025) many not be comparable. Comparison of the environmental performance of thermal insulation using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building energy use phase as instructed under this PCR. EPD comparability is only possible when all stages of a life cycle have been considered, when they comply with all referenced standards, use the same subcategory PCR, and use equivalent scenarios with respect to construction works. However, some deviations and variations are possible. Example of variations could be different LCA software and background LCI datasets which may lead to different results for upstream or downstream life cycle stages declared.

3.8 Background data

For life cycle modelling of the declared ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation board, the software solution GaBi ts 8.5 of thinkstep AG was used. Only background data from the GaBi ts 8.5 software were considered in the calculation to ensure the comparability of the results.

3.9 Data quality

For life cycle assessment of the considered products, the GaBi ts Software System for Life Cycle Engineering and GaBi ts database were used. An overall data quality assessment is provided in the table below.





GRAPHITE ENHANCED EXPANDED POLYSTYRENE





Data Quality Assessment

Name of data set	unit	Source	Reference year	Region	Technological Representativeness	Overall Quality Assessment Score
Energy Carriers - Electricity						
Heavy fuel oil at refinery from crude oil (1.0wt.% S)	kg	Gabl thinkstep	2014	EU-27	Very Good	Good
Diesel mix at filling station from crude oil and biocomponent	kg	Gabl thinkstep	2014	US	Very Good	Good
Mexico Electricity grid mix AC, technology mix consumption mix, to consumer <1KV	MJ	Gabl thinkstep	2014	Mexico	Good	Good
Electricity grid mix – SRMV	MJ	Gabl thinkstep	2014	SRMV, eGrid	Excellent	Good
Electricity grid mix – RFCM	MJ	Gabl thinkstep	2014	RFCM, eGrid	Excellent	Good
Electricity grid mix – SRVC (without PJM)	MJ	Gabl thinkstep	2014	SRVC, eGrid	Excellent	Good
Electricity grid mix (production mix, US eGRID)	MJ	Gabl thinkstep	2014	US	Excellent	Good
Thermal energy from natural gas (eGrid)	MJ	Gabl thinkstep	2014	US	Excellent	Good
wood chips, from industry, mixed, burned in furnace	MJ	econvent	2000	Switzerland	Good	Good
Thermal energy from LPG technology mix production mix, at heat plant	kg	Gabl thinkstep	2014	US	Good	Good
Transport	-					
Heavy Heavy-duty Diesel Truck / 53,333 lb payload - 8b	kg	Gabl thinkstep	2017	US	Very Good	Good
Container ship, 27500 dwt payload capacity, ocean going	kg	Gabl thinkstep	2017	Global	Good	Good
Rall transport cargo - average, average train, gross tonne weight 1000t / 726t payload capacity	kg	Gabl thinkstep	2018	Global	Good	Good
Material Inputs						
Neopor F 5300 Base Plus resin with additives	kg	BASE	2017	Germany	Excellent	Very Good
Neopor F 5300 Base Plus resin	kg	BASE	2017	Germany	Excellent	Very Good
Packaging						
Polyethylene Film (PE-HD) without additives technology mix	kg	Gabl thinkstep	2014	Germany	Very Good	Good
Corrugated board (2012) technology mix	kg	Gabi thinkstep, FEFCO	2017	EU-27	Good	Good
wooden pallet	kg	BASE	2016	Global	Good	Good
Utility Inputs	1					
Tap water from groundwater (for regionalization)	kg	Gabl thinkstep	2014	global	Very Good	Good
Ground water, input regionalization dummy	kg	Gabl thinkstep	2017	global	Very Good	Good
Compressed air 10 bar (medium power consumption) 10 bar, medium efficiency	Nm3	Gabl thinkstep	2014	Global	Good	Good
Lubricants at refinery from crude oil production mix, at refinery	kg	Gabl thinkstep	2014	US	Good	Good
Disposal	-					
Landfill, wet climate treatment of leachate, production of electricity	kg	Gabl thinkstep	2017	US	Very Good	Good
Plastic waste on landfill, post-consumer	kg	Gabl thinkstep	2017	US	Very Good	Good
Landfill, moderate climate treatment of leachate, production of electricity	kg	Gabl thinkstep	2017	US	Very Good	Good
					,	







4.0 LCA: Scenarios and additional technical information

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND). The values refer to the declared functional unit of 1 m² of installed Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation material with a thickness that gives an average thermal resistance (RSI) of 1 m²*K/W (5.68 ft²*hr.*F/BTU per inch) with a building service life of 75 years (packaging included).

Transport to the construction site (A4) - by truck

Name	Value	Unit
Truck Type	Heavy Duty Diesel 8b	
Fuel Type	Diesel	
Liters of Fuel	5.6	Miles/gallon
Transport distance	175	miles
Capacity utilization (including empty runs)	6.7*	%
Gross density of products transported	0.9	lbs/ft ³
Capacity utilisation volume factor	1	-

* Adapted according to density Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) insulation board

Installation in the building (A5)

The amount of installation trim waste varies. For the calculation of the environmental impacts of Atlas ThermalStar® GX insulation board around 1.5% installation waste was considered.

End of life (C1-C4)

Waste disposal for this assessment was determined to be 100% to landfill, per regional practice and PCR Part A guidance. The transport distance to the disposal site is around 100 miles. Some percentage of landfills in the United States, capture a portion of the landfill gas (methane) and produce steam and/or electricity. This results in benefits, beyond the system boundary and is capture in module D.

Reuse, recovery and/or recycling potentials (D),

Module D includes the benefits of the landfill gas capture process.







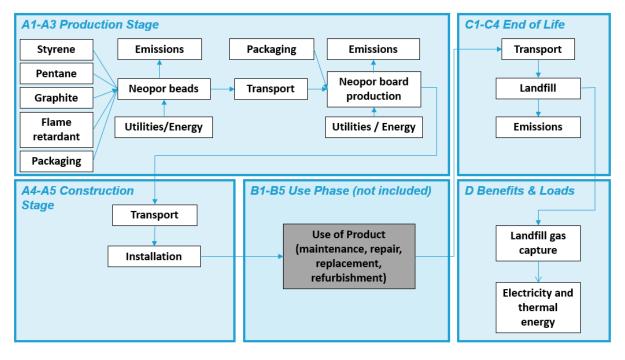
5.0 LCA: Results

The following tables display the environmental relevant results according to /EN 15804/ for the assessed base case functional unit of: 1 m² of installed Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) Type I insulation material with a thickness that gives an average thermal resistance (RSI) of 1 m²*K/W (5.68 ft²*hr.*F/BTU per inch) with a building service life of 75 years (packaging included).

The environmental impact categories reported below are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development, however the EPD users shall not use additional measures for comparative purposes. Additionally, LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. Finally, many factors affect the comparability of EPDs. End users should be extremely cautious when comparing or evaluating EPD data of different EPD publishers. Such comparison or evaluation is only possible if all conditions for comparability listed in ISO 14025 (Section 6.7.2) are met.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PROI	DUCT S	TAGE	CONST ON PRO STA	OCESS			U	SE STAC	ЭЕ			EN	D OF LI	FE STA		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling- potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Х	Х	Х	Х	Х	MND	MND	MND	MND	MND	MND	MND	Х	Х	Х	Х	Х







Base Case LCA results for Type I insulation board

	RESULTS O	F THE LCA - E	ENVIRONMEN	ITAL IMPACT	for a function	nai unit or T	in or instant	ed Atlas The		(leaturing i	
		olystyrene (G						erage therm	al resistanc	e (RSI) of 1 r	n ² *K/W (5.68
	ft ² *hr.*F/BTl	J per inch) w	ith a building	service life	of 75 years	(packaging i	ncluded).			1	Dece file and
TRACI 2	2.1		Raw material supply	Transport	Manufacturing	Transport	Construction – Installation	Demolition	Transport	Disposal	Benefits and Loads beyond system boundary
Parameter		Unit	A1	A2	A3	A4	A5	C1	C2	C3/C4	D
GWP		[kg CO ₂ -eq.]	1.15E+00	8.86E-02	4.91E-01	7.56E-02	6.27E-03	0.00E+00	2.25E-02	1.95E-02	-4.38E-04
AP		[kg SO2-eq.]	2.59E-03	1.72E-03	1.15E-03	4.02E-04	3.70E-05	0.00E+00	1.20E-04	3.08E-04	-9.88E-07
EP		[kg N-eq.]	1.62E-04	6.44E-05	8.05E-05	3.18E-05	1.34E-05	0.00E+00	9.46E-06	1.18E-04	-5.08E-08
ODP		[kg CFC11-eq.]	1.28E-10	1.32E-14	3.82E-10	2.59E-15	1.14E-16	0.00E+00	7.72E-16	3.59E-15	-2.53E-14
POCP		[kg O ₃ -eq.]	4.11E-02	3.37E-02	4.72E-02	1.34E-02	4.05E-03	0.00E+00	3.99E-03	2.58E-03	-1.19E-05
ADP _{Fossil}		[MJ, LHV]	5.55E+00	1.50E-01	8.95E-01	1.43E-01	1.37E-03	0.00E+00	4.26E-02	3.90E-02	-5.60E-04
Caption			GWP = Global		I; ODP = Ozone de ne photochemical						
	RESULTS	OF THE LCA	- ENVIRONM	ENTAL IMPA	CT for a fun	ctional unit o	of 1 m ² of inst	alled Atlas T	hermal Star®	GX featurin	g Neopor®
		ite Polystyre							nermal resist	ance (RSI) o	f 1 m ² *K/W
	(5.68 ft**hr.*	F/BTU per in	ch) with a bu	ilding servic	e life of 75 ye	ears (packag	ing included).		1	Dura file and
CML 200	01 (2016)		Raw material supply	Transport	Manufacturing	Transport	Construction – Installation	Demoliton	Transport	Disposal	Benefits and Loads beyond system
Parameter		Unit	A1	A2	A3	A4	A5	C1	C2	C3/C4	boundary D
GWP		[kg CO ₂ -eq.]	1.16E+00	8.88E-02	4.94E-01	7.57E-02	6.75E-03	0.00E+00	2.25E-02	1.96E-02	-4.41E-04
ODP		[kg CFC11-eq.]	1.04E-10	1.32E-14	3.10E-10	2.59E-15	1.14E-16	0.00E+00	7.72E-16	3.59E-15	-2.38E-14
AP		[kg SO2-eq.]	2.55E-03	1.60E-03	1.10E-03	2.98E-04	1.47E-05	0.00E+00	8.87E-05	2.68E-04	-1.00E-06
EP		[kg PO4 ³⁻ -eq.]	2.63E-04	1.81E-04	1.41E-04	7.96E-05	1.63E-05	0.00E+00	2.37E-05	1.20E-04	-7.81E-08
POCP		[kg ethene-eq.]	5.83E-04	9.17E-05	8.90E-03	2.93E-05	1.19E-03	0.00E+00	8.74E-06	1.23E-04	-6.62E-08
ADPE		[kg Sb-eq.]	2.81E-07	8.41E-09	1.70E-07	1.38E-08	2.77E-10	0.00E+00	4.11E-09	8.44E-09	-1.24E-10
ADPF		[MJ]	3.98E+01	1.13E+00	7.27E+00 ential: ODP = Dep	1.07E+00	1.06E-02	0.00E+00	3.17E-01	3.04E-01	-5.86E-03
Caption					= Formation pote	ntial of troposphe		hemical oxidants;	ADPE = Abiotic o		
	Neopor® Pl	I ntal Paramete lus Graphite I i8 ft ² *hr.*F/B1	Polystyrene	(GPS) Type I	CE USE for F insulation m	unctional Ur aterial with a	nit of 1 m ² of i In thickness th	nstalled Atla nat gives an a			-
	Neopor® Pl		Polystyrene	(GPS) Type I	CE USE for F insulation m	unctional Ur aterial with a	nit of 1 m ² of i In thickness th	nstalled Atla nat gives an a			Ce (RSI) of 1 Benefits and Loads beyond system
Parameter	Neopor® Pl	lus Graphite I	Polystyrene (TU per inch) v Raw material	(GPS) Type I vith a buildin	CE USE for F insulation m ig service life	unctional Un aterial with a of 75 years	nit of 1 m ² of i thickness th (packaging i Construction –	nstalled Atla nat gives an a ncluded).	average ther	mal resistan	Ce (RSI) of 1 Benefits and Loads beyond
PERE	Neopor® Pl	lus Graphite 8 ft ² *hr.*F/B1 Unit [MJ]	Polystyrene (U per inch) v Raw material supply A1 4.81E-01	(GPS) Type I vith a buildin Transport A2 2.68E-02	CE USE for F insulation m g service life Manufacturing A3 1.52E+00	unctional Un aterial with a of 75 years Transport <u>A4</u> 2.65E-02	hit of 1 m ² of i thickness the (packaging i Construction – Installation A5 7.16E-04	nstalled Atla nat gives an a ncluded). Demolition C1 0.00E+00	Transport C2 7.89E-03	Disposal C3/C4 2.20E-02	Benefits and Loads beyond system boundary D 5.30E-04
PERE PERM	Neopor® Pl	Us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 4.81E-01 0.00E+00	(GPS) Type I with a buildin Transport A2 2.68E-02 0.00E+00	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00	unctional Un aterial with a of 75 years Transport A4 2.65E-02 0.00E+00	hit of 1 m ² of i thickness the (packaging i Construction – Installation A5 7.16E-04 0.00E+00	nstalled Atla nat gives an a ncluded). Demolition C1 0.00E+00 0.00E+00	Transport C2 7.89E-03 0.00E+00	C3/C4 2.20E-02 0.00E+00	Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00
PERE PERM PERT	Neopor® Pl	Us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 4.81E-01 0.00E+00 4.81E-01	(GPS) Type I vith a buildin Transport 2.68E-02 0.00E+00 2.68E-02	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00	unctional Un aterial with a of 75 years Transport <u>A4</u> 2.65E-02 0.00E+00 2.65E-02	hit of 1 m ² of i thickness the (packaging i Construction – Installation A5 7.16E-04 0.00E+00 7.16E-04	nstalled Atla nat gives an a ncluded). Demolition C1 0.00E+00 0.00E+00 0.00E+00	c2 7.89E-03 0.00E+00 7.89E-03	mal resistan Disposal C3/C4 2.20E-02 0.00E+00 2.20E-02	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 5.30E-04
PERT PENRE	Neopor® Pl	Ius Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01	(GPS) Type I vith a buildin Transport 2.68E-02 0.00E+00 2.68E-02 1.17E+00	A3 1.52E+00 0.00E+00 1.52E+00 7.72E+00	Autoctional Unaterial with a cof 75 years Transport A4 2.65E-02 0.00E+00 2.65E-02 1.07E+00	Att of 1 m ² of i thickness th (packaging i Construction – Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02	nstalled Atla nat gives an a ncluded). Demolition C1 0.00E+00 0.00E+00 0.00E+00	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01	mal resistan Disposal C3/C4 2.20E-02 0.00E+00 2.20E-02 3.12E-01	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 5.30E-04 -6.97E-03
PERE PERM PERT PENRE PENRM	Neopor® Pl	Uus Graphite 8 ft ² *hr.*F/B1 [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01	(GPS) Type I vith a buildin Transport 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00	A3 1.52E+00 0.00E+00 1.52E+00 1.52E+00 7.72E+00 1.27E-01 1.27E-01	Attended Attended attended of 75 years Transport Attended 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 0.00E+00	Att of 1 m ² of i thickness ti (packaging i Construction – Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02 0.00E+00	nstalled Atla nat gives an a ncluded). Demolition 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00	mal resistan Disposal C3/C4 2.20E-02 0.00E+00 2.20E-02 3.12E-01 0.00E+00	Ce (RSI) of 1 Benefits and Loads beyond system boundary 5.30E-04 0.00E+00 5.30E-04 -6.97E-03 0.00E+00
PERE PERM PERT PENRE PENRM PENRT	Neopor® Pl	Uus Graphite 8 ft ² *hr.*F/B1 [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01	(GPS) Type I vith a buildin Transport 2.68E-02 0.00E+00 2.68E-02 1.17E+00	A3 1.52E+00 0.00E+00 1.52E+00 7.72E+00	Autoctional Unaterial with a cof 75 years Transport A4 2.65E-02 0.00E+00 2.65E-02 1.07E+00	Att of 1 m ² of i thickness th (packaging i Construction – Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02	nstalled Atla nat gives an a ncluded). Demolition C1 0.00E+00 0.00E+00 0.00E+00	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01	C3/C4 2.20E-02 0.00E+00 2.20E-02 3.12E-01	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 5.30E-04 -6.97E-03
PERE PERM PERT PENRE PENRM PENRT SM	Neopor® Pl	Uus Graphite 8 ft ² *hr.*F/B1 [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01	(GPS) Type I vith a buildin Transport 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 1.17E+00	A3 1.52E+00 0.00E+00 1.52E+00 0.02E+00 1.52E+00 7.72E+00 1.27E-01 7.85E+00	Autocitional Unaterial with a second secon	Att of 1 m ² of i thickness th (packaging i Construction – Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02 0.00E+00 1.09E-02	C1 0.00E+00	c2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01	mal resistan Disposal C3/C4 2.20E-02 0.00E+00 2.20E-02 3.12E-01 0.00E+00 3.12E-01	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 5.30E-04 -6.97E-03 0.00E+00 -6.97E-03
PERE PERM PERT PENRE PENRM PENRT SM RSF	Neopor® Pl	Us Graphite 8 ft ² hr. *F/B1 [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00	(GPS) Type I vith a buildin Transport 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 1.17E+00 0.00E+00	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 7.72E+00 1.27E-01 7.85E+00 0.00E+00	Autoctional Unaterial with a second state aterial with a second state of 75 years Transport A4 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 1.07E+00 0.00E+00	Att of 1 m ² of i thickness th (packaging i Construction – Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02 0.00E+00 1.09E-02 0.00E+00	C1 0.00E+00	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00	mal resistan Disposal 2.20E-02 0.00E+00 2.20E-02 3.12E-01 0.00E+00 3.12E-01 0.00E+00	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 5.30E-04 -6.97E-03 0.00E+00 -6.97E-03 0.00E+00
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF	Neopor® Pl	Us Graphite 8 ft ² *hr.*F/B1 (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ)	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.98E-03	(GPS) Type I vith a buildin Transport 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 7.72E+00 1.28E+00 0.00E+00 2.45E+00 0.00E+00 2.43E+12 2.51E+11 2.07E-03	Attended Attended aterial with a of 75 years Transport Attended 2.65E-02 0.00E+00 2.65E-02 0.00E+00 1.07E+00 0.00E+00 0.00E+00 0.00E+00 1.07E+00 0.00E+00 1.07E+00 0.00E+00 1.07E+01 1.07E+00 0.00E+02 1.07E+00 1.07E+03 1.18E-29 1.29E-04 1.29E-04	Att of 1 m ² of i thickness ti (packaging i Construction – Installation A5 7.16E-04 0.00E+00 7.16E-02 0.00E+00 1.09E-02 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 2.01E-06	C1 0.00E+00	C2 7.89E-03 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.20E-31 3.51E-30 3.84E-05	C3/C4 2.20E-02 0.00E+00 2.12E-01 0.00E+00 3.12E-01 0.00E+00 8.52E-24 1.00E-22 3.78E-05	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 5.30E-04 -6.97E-03 0.00E+00 -6.97E-03 0.00E+00 0.00E+00 0.00E+00 -1.63E-06
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF FW	Neopor® Pl	Us Graphite 8 ft ² *hr.*F/B1 (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ)	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.99E-03 PERE = Renew resources, PE	GP S) Type I vith a buildin Transport A2 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 able primary enel ME = Non-renev	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 7.72E+00 1.27E-01 7.85E+00 0.00E+00 2.13E-12 2.51E-11	A4 2.65E-02 0.00E+00 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 7.40E-31 1.18E-29 1.29E-04 ier, PERM = Ren. rgy as energy call	att of 1 m² of i thickness th (packaging i Construction – Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 2.01E-06 ewable primary etrier, PENRM = Nc	C1 0.00E+00	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00 2.20E-31 3.51E-30 3.84E-05 utilization; PERT mary energy as m	C3/C4 2.20E-02 0.00E+00 2.20E-02 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.52E-24 1.00E-22 3.78E-05 = Total renewablaterial utilization	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5:30E-04 -6:97E-03 0:00E+00 -6:97E-03 0:00E+00 -6:97E-03 0:00E+00 -6:97E-03 0:00E+00 -1:63E-06 e primary energy PENRT = Total
PERE PERM PERT PENRE PENRM PENRT	Neopor® PI m ² *K/W (5.6	Us Graphite 8 ft ² *hr.*F/B1 (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ)	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.98E-03 PERE = Renew resources; PE non-renewable	GPS) Type I vith a buildin Transport A2 2.68E-02 0.00E+00 2.68E-02 0.00E+00 1.17E+00 0.00E+00 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 able primary energy reergy respectively. - OUTPUT F	CE USE for F finsulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 7.72E+01 7.85E+00 0.00E+00 2.13E-12 2.51E-11 2.07E-03 make permagnation of the second seco	A4 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 1.07E+00 0.00E+00 1.07E+00 0.00E+00 1.07E+01 0.00E+00 1.07E+01 0.00E+00 1.07E+01 0.00E+00 1.07E+01 0.00E+00 1.07E+01 0.00E+00 1.07E+01 0.00E+00 7.40E-31 1.18E-29 1.29E-04 eof secondary n FW = SETE CATECO SETE CATECO Te (GPS) Type	att of 1 m ² of i atthickness th (packaging i Installation A5 7.16E-04 0.00E+00 7.16E-04 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 2.01E-06 wrable primary errier, PENRM = Nk naterial; RSF = Re Use of net fresh GORIES for F be linsulatior	nstalled Atla bat gives an and gives an and gives and and	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.20E-31 3.51E-30 3.84E-05 utilization, PERT ary energy as m ary fuels; NRSF = it of 1 m ² of i h a thicknes	Disposal C3/C4 2.20E-02 0.00E+00 2.22E-02 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.52E-24 1.00E+22 3.78E-05 = Total renewable Non-renewable	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 .5.30E-04 .6.97E-03 0.00E+00 .0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 .1.63E-06 primary energy PENRT = Total secondary fuels; san average).
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF FW	Neopor® PI m ² *K/W (5.6	Us Graphite 8 ft ² hr.*F/B1 Unit [MJ] [M] [M] [M] [M] [M] [M] [M] [M	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.98E-03 PERE = Renew resources; PE non-renewable	GPS) Type I vith a buildin Transport A2 2.68E-02 0.00E+00 2.68E-02 0.00E+00 1.17E+00 0.00E+00 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 able primary energy reergy respectively. - OUTPUT F	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 7.72E+01 7.85E+00 0.00E+00 2.13E-12 2.51E-11 2.07E-03 mabe primary energy carry able primary energy carry sources; SM = US ELOWS & WA	A4 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 1.07E+00 0.00E+00 1.07E+00 0.00E+00 1.07E+01 0.00E+00 1.07E+01 0.00E+00 1.07E+01 0.00E+00 1.07E+01 0.00E+00 1.07E+01 0.00E+00 1.07E+01 0.00E+00 7.40E-31 1.18E-29 1.29E-04 eof secondary n FW = SETE CATECO SETE CATECO Te (GPS) Type	att of 1 m ² of i atthickness th (packaging i Installation A5 7.16E-04 0.00E+00 7.16E-04 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 2.01E-06 wrable primary errier, PENRM = Nk naterial; RSF = Re Use of net fresh GORIES for F be linsulatior	nstalled Atla bat gives an and gives an and gives and and	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.20E-31 3.51E-30 3.84E-05 utilization, PERT ary energy as m ary fuels; NRSF = it of 1 m ² of i h a thicknes	Disposal C3/C4 2.20E-02 0.00E+00 2.22E-02 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.52E-24 1.00E+22 3.78E-05 = Total renewable Non-renewable	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 0.00E+01 secondary fuels; s an average
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF FW Caption	Neopor® PI m ² *K/W (5.6	Us Graphite 8 ft ² hr.*F/B1 Unit [MJ] [M] [M] [M] [M] [M] [M] [M] [M	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.99E-03 PERE = Renew resources; PE non-renewable ers from LCA ing Neopor® of 1 m ²⁻ K/W Raw material	(GPS) Type I vith a buildin Transport A2 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 1.17E+00 0.00E+00 1.17E+00 0.00E+00 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 able primary energy re primary energy re Plus Graphi (5.68 ft ² *hr.*F	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 7.72E+00 1.27E-01 7.85E+00 0.00E+00 2.13E-12 2.51E-11 2.07E-03 rgy as energy carr vable primary energy carr sources; SM = US FLOWS & W// te Polystyrer F/BTU per ind	A4 2.65E-02 0.00E+00 2.65E-02 0.00E+00 2.65E-02 0.00E+00 2.65E-02 0.00E+00 1.07E+00 0.00E+00 1.07E+00 0.00E+00 1.07E+01 0.00E+02 1.07E+03 1.07E+04 0.00E+00 7.40E-31 1.18E-29 1.29E-04 ier, PEM = Renirgy as energy care se of secondary n FW = ASTE CATECO De (GPS) Typp ch) with a bu	it of 1 m² of i thickness th (packaging i Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 ewable primary energies wable primary energies GORIE S for F el insulation Iding servic Construction –	nstalled Atla bat gives an analysis ncluded). Demolition C1 0.00E+00	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.49E-05 utilization, PERT mary energy as m ary fuels; NRSF = it of 1 m ² of i h a thicknes mars (packagi	Disposal C3(C4 2.20E-02 0.00E+00 2.20E-02 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.12E-01 0.00E+00 8.52E-24 1.00E-22 3.78E-05 = Total renewable installed Attla s that gives ing included	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 -6.97E-03 0.00E+00 -6.97E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 -1.63E-06 e primary energy PENRT = Total secondary fuels; s an average b Benefits and Loads beyond system
PERE PERM PERT PENRE PENRM PENRT SM RSF SM Caption Caption	Neopor® PI m ² *K/W (5.6	Us Graphite I 8 ft ²⁺ hr.*F/B1 [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 4.02E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.98E-03 PERE = Renew resources; PE non-renewable of 1 m ²⁺ K/W Raw material supply	GPS) Type I vith a buildin Transport A2 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 able primary energy re Plus Graphi (5.68 ft ² hr.*f Transport	CE USE for F insulation m insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 7.72E+00 1.27E-01 7.85E+00 0.00E+00 2.13E-12 2.51E-11 2.07E-03 gy as energy car asources; SM = Us ELOWS & W/ te Polystyrer /BTU per ind Manufacturing	A4 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 1.07E+00 0.00E+00 1.07E+00 0.00E+01 1.07E+02 0.00E+03 1.07E+04 1.07E+04 1.18E-29 1.29E-04 ler, PERM = Rendry as energy card any set of secondary as energy card any set of secondary as energy card any set of secondary any secondary any set of se	it of 1 m ² of i thickness th (packaging i Construction – Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 2.01E-06 ewable primary er trier, PENRM = N- auterial; RS F N- SORIES for F el Insulation ilding servic: Construction – Installation	Installed Atla nat gives an analysis Demolition C1 0.00E+00 nerewable prinerewable prinerewable prinerewable second water unctional Unn material witter Demolition	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 2.20E-31 3.51E-30 3.44E-05 utilization, PERT ary fuels; NRSF = it of 1 m² of i h a thicknes ars (packagi Transport	Disposal C3/C4 2.20E-02 0.00E+00 2.20E-02 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.12E-01 0.00E+00 8.52E-24 1.00E-22 3.78E-05 = Total renewable installed Atta s that gives ing included Disposal	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 5.30E-04 -6.97E-03 0.00E+00 -6.97E-03 0.00E+00 0.00E+00 0.00E+00 -1.63E-06 primary energy PENRT = Total secondary fuels; S Benefits and Loads beyond boundary
PERE PERM PERT PENRE PENRT PENRT SM PENRT SM VRSF - W Caption Caption Parameter HWD NHWD	Neopor® PI m ² *K/W (5.6	Us Graphite 8 ft ² *hr.*F/B1 (MJ) (MJ	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.98E-03 PERE = Renew resources; PE non-renewable PERE = Renew resources; PE non-renewable of 1 m ²⁻ K/W Raw material supply A1 8.06E-09 8.16E-02	(GPS) Type I vith a buildin Transport A2 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 1.17E+00 0.00E+00 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 able primary energy re Plus Graphi (5.68 ft ² -hr.*F Transport A2 3.52E-09 5.83E-05	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 7.72E+00 1.27E-01 7.85E+00 0.00E+00 2.13E-12 2.51E-11 2.51E-11 3g as energy carr wable primary energy carr sources; SM = Us FLOWS & WA te Polystyreer //BTU per inter Manufacturing A3 3.58E-09 3.15E-02	unctional Ur aterial with a of 75 years Transport A4 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 1.07E+00 0.00E+00 1.07E+00 0.00E+00 7.40E-31 1.18E-29 1.29E-04 lef; PERM = Rent- rgy as energy cal se of secondary n FW = STE CATEG the (GPS) Typ ch) with a bu Transport A4 8.34E-09 4.03E-05	it of 1 m² of i thickness th (packaging i construction – Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 2.01E-06 ewable primary entrier, PENRM = Nr naterial; RSF = Re Use of net fresh GORIES for F re I insulation Installation A5 4.33E-11 1.21E-02	Installed Atla bat gives an analysis ncluded). Demolition C1 0.00E+00 unctional Un metrial wite bife of 75 ye Demolition C1 0.00E+00	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00 2.20E-31 3.51E-30 3.84E-05 utilization; PERT mary energy as mary fuels; NRSF = it of 1 m² of i h a thicknes ears (packagi Transport C2 2.48E-09 1.20E-05	Ispace Disposal C3/C4 2.20E-02 0.00E+00 2.20E-02 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.12E-01 0.00E+00 8.52E-24 1.00E-22 3.78E-05 Total renewable Installed Atlass that gives ing included Disposal C3/C4 1.07E-09 4.41E-01	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 5.30E-04 -6.97E-03 0.00E+00 0.00E+
PERE PERM PERT PENRE PENRT SM RSF SM Caption Caption Caption Parameter HWD NHWD RWD	Neopor® PI m ² *K/W (5.6	Us Graphite 8 ft ² hr. *F/B1 (MJ) (M	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.98E-03 PERE = Renew resources; PE non-renewable PERE = Renew resources; PE non-renewable ers from LCA ing Neopor® of 1 m ²⁺ K/W Raw material supply A1 8.06E-09 8.16E-02 1.16E-04	GP S) Type I vith a buildin Transport A2 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 1.17E +00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 1.20E-05	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 0.00E+00 1.52E+00 0.00E+00 1.27E-01 7.75E+00 0.00E+00 2.13E-12 2.51E-11 2.07E-03 gva se nergy car wable primary energy car vable primary energy car vable primary energy car waburdituring Hanufacturing A3 3.58E-09 3.15E-02 2.12E-04	unctional Ur aterial with a of 75 years Transport A4 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 2.65E-02 1.07E+00 0.00E+00 1.07E+00 0.00E+00 7.40E-31 1.18E-29 1.29E-04 ier, PERM = Rentry rgy as energy cal se of secondary n FW = ASTE CATEG the (GPS) Typ ch) with a bu Transport A4 8.34E-09 4.03E-05 2.36E-06	it of 1 m² of i thickness ti (packaging i Installation A5 7.16E-04 0.00E+00 7.16E-04 0.00E+00 7.16E-04 0.00E+00 7.16E-04 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 ewable primary entries Construction = Installation Installation Construction = Installation Installation A5 4.33E-11 1.21E-02 1.02E-07	Installed Atla bat gives an analysis Demolition C1 0.00E+00	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00 2.20E-31 3.51E-30 3.84E-05 utilization, PERT ary fuels, NRSF = it of 1 m ² of i h a thicknes ars (packagi Transport C2 2.48E-09 1.20E-05 7.02E-07	Ispace Disposal C3/C4 2.20E-02 0.00E+00 2.20E-02 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.12E-01 0.00E+00 8.52E-24 1.00E-22 3.78E-05 = Total renewable Installed Atlast gives ing included Disposal C3/C4 1.07E-09 4.41E-01 3.20E-06	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 5.30E-04 -6.97E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.6.3E-06 primary energy PENRT = Total secondary fuels; Benefits and Loads beyond system boundary D -3.05E-12 -1.67E-06 -4.33E-07
PERE PERM PERT PENRE PENRT SM RSF SM Caption Caption Parameter HWD NHWD RWD CRU	Neopor® PI m ² *K/W (5.6	Us Graphite 8 ft ² hr. *F/B1 Unit (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ)	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.98E-03 PERE = Renew resources; PE non-renewable PER Strom LCA ing Neopor® of 1 m ²⁺ K/W Raw material supply A1 8.06E-09 8.16E-02 1.16E-04 0.00E+00	GP S) Type I vith a buildin Transport A2 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 able primary energy reprimary energy reprimar	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 0.00E+00 1.52E+00 0.00E+00 1.52E+00 0.00E+00 1.27E-01 7.75E+00 0.00E+00 2.13E-12 2.51E-11 2.07E-03 gy as energy car vable primary energy car sources; SM = US FLOWS & W/ te Polystyrer // BTU per inc Manufacturing A3 3.58E-09 3.15E-02 2.12E-04 0.00E+00	At 2.65E-02 0.00E+00 2.65E-02 0.00E+00 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 1.07E+00 0.00E+00 7.40E-31 1.18E-29 1.29E-04 1.67FERM = Renerry as energy caller of secondary in FW= STEC CATEGORIE (GPS) Type che (GPS) Type che (SPS) Type che (SA4E-09) 4.03E-05 2.36E-06 0.00E+00	it of 1 m² of i thickness ti (packaging i Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 ewable primary entries; RSF = Re; Use of net fresh GORIES for Feel insulation Installation A5 4.33E-11 1.21E-02 1.002E-07 0.00E+00	Installed Atla bat gives an analysis ncluded). Demolition C1 0.00E+00 neterial wite bife of 75 yet Demolition C1 0.00E+00	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00 2.20E-31 3.51E-30 3.84E-05 utilization; PERT ary energy as m ary theis; NRSF = it of 1 m ² of i h a thicknes ars (packagi Transport C2 2.48E-09 1.20E-05 7.02E-07 0.00E+00	Image: Second	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 0.00E+00 5.30E-04 -6.97E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.6.3E-06 primary nengry PENRT = Total secondary fuels; Benefits and Loads beyond system boundary D -3.05E-12 -1.67E-06 -4.33E-07 0.00E+00
PERE PERM PERT PENRE PENRT SM RSF FW Caption Caption Parameter HWD NHWD RWD CRU	Neopor® PI m ² *K/W (5.6	Us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.98E-03 PERE = Renew resources, PE non-renewable of 1 m ²⁺ K/W Raw material supply A1 8.06E-09 8.16E-02 1.16E-04 0.00E+00 0.00E+00	GPS) Type I vith a buildin Transport A2 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 able primary energy reprimary energy reprimary energy reprimary energy for a state of the	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 0.00E+00 1.52E+00 0.00E+00 1.52E+00 0.00E+00 2.13E+12 2.51E+11 2.07E-03 rgvabe primary end sources; SM = US FLOWS & W/t te Polystyrer /BTU per inc Manufacturing A3 3.58E-09 3.15E-02 2.12E-04 0.00E+00	unctional Ur aterial with a of 75 years Transport A4 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 2.65E-02 1.07E+00 0.00E+00 7.40E-31 1.18E-29 1.29E-04 ier, PERM = Rener Try as energy car ier of secondary n FW= STE CATEG Te (GPS) Typ ch) with a bu Transport A4 8.34E-09 4.03E-05 2.36E-06 0.00E+00 0.00E+00	it of 1 m² of i thickness ti (packaging i Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 2.01E-06 wable primary et errier, PENRM = Nr. construction - Installation Construction - Installation A5 4.33E-11 1.21E-02 1.02E-07 0.00E+00	Installed Atla bat gives an annotation Demolition C1 0.00E+00	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00 2.20E-31 3.51E-30 3.84E-05 utilization; PERT ary fuels; NRSF = it of 1 m ² of i h a thicknes ars (packagi Transport C2 2.48E-09 1.20E-05 7.02E-07 0.00E+00	Ispace Disposal C3/C4 2.20E-02 0.00E+00 2.20E-02 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.12E-01 0.00E+00 8.52E-24 1.00E-22 3.78E-05 Total renewable Installed Atta s that gives ing included Disposal C3/C4 1.07E-09 4.41E-01 3.20E-06 0.00E+00	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 -6.97E-03 0.00E+00 -6.97E-03 0.00E+00 -6.97E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 System boundary Benefits and Loads beyond system boundary D -3.05E-12 -1.67E-06 -4.33E-07 0.00E+00 0.00E+00 0.00E+00
PERE PERM PERT PENRE PENRM PENRT SM RSF FW Caption Caption Parameter HWD NHWD RWD CRU MFR MER	Neopor® PI m ² *K/W (5.6	Us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [M] [M] [M] [M] [M] [M] [M] [M	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.99E-03 PERE = Renew resources, PE non-renewable of 1 m ²⁺ K/W Raw material supply A1 8.06E-09 8.16E-02 1.16E-04 0.00E+00 0.00E+00 0.00E+00	GPS) Type I vith a buildin Transport A2 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 2.68E-02 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 able primary energy reprimary energy reprimary energy reprimary energy for the state of the stat	CE USE for F insulation m insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 0.72E+00 1.27E-01 7.85E+00 0.00E+00 2.13E+12 2.51E-11 2.07E-03 rgy as energy carr vable primary energy carr vable primary energy carr FLOWS & W// te Polystyrer F/BTU per ind Manufacturing A3 3.58E-09 3.15E-02 2.12E-04 0.00E+00 0.00E+00	At 2.65E-02 0.00E+00 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 2.65E-02 1.07E+00 0.00E+00 2.65E-02 1.07E+00 0.00E+00 7.40E-31 1.18E-29 1.29E-04 ier, PERM = Renergy as energy carries of secondary n FW = STE CATEGONE (GPS) Type the (GPS) Type the data 2.36E-05 2.36E-06 0.00E+00 0.00E+00 0.00E+00 0.00E+00	att of 1 m ² of i atthickness ti (packaging i construction – Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 2.01E-06 wable primary efficiency errier, PENRM = Nc anterial; RSF = RE USe of net fresh CORSTRUCtion – Installation A5 4.33E-11 1.21E-02 1.02E-07 0.00E+00 0.00E+00	Installed Atla bat gives an analysis ncluded). Demolition C1 0.00E+00	average ther Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00 3.19E-01 0.00E+00 2.20E-31 3.51E-30 3.84E-05 utilization; PERT mary energy as m ary fuels; NRSF = it of 1 m ² of i h a thicknes ars (packagi Transport C2 2.48E-09 1.20E-05 7.02E-07 0.00E+00 0.00E+00 0.00E+00	Isposal Disposal 2.20E-02 0.00E+00 2.20E-02 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.12E-01 0.00E+00 8.52E-24 1.00E-22 3.78E-05 = Total renewable installed Atta s that gives ing included Disposal C3/C4 1.07E-09 4.41E-01 3.20E-06 0.00E+00 0.00E+00	Ce (R SI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 -6.97E-03 0.00E+00 -6.97E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 System boundary tells; Benefits and Loads beyond system boundary D D -3.05E-12 -1.67E-06 -4.33E-07 0.00E+00 0.0
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF FW	Neopor® PI m ² *K/W (5.6	Us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) (Raw material supply A1 4.81E-01 0.00E+00 4.81E-01 2.13E+01 1.89E+01 4.02E+01 0.00E+00 6.12E-20 7.19E-19 3.98E-03 PERE = Renew resources, PE non-renewable of 1 m ²⁺ K/W Raw material supply A1 8.06E-09 8.16E-02 1.16E-04 0.00E+00 0.00E+00	GPS) Type I vith a buildin Transport A2 2.68E-02 0.00E+00 2.68E-02 1.17E+00 0.00E+00 1.17E+00 0.00E+00 3.01E-31 4.79E-30 9.33E-05 able primary energy reprimary energy reprimary energy reprimary energy for a state of the	CE USE for F insulation m g service life Manufacturing A3 1.52E+00 0.00E+00 1.52E+00 0.00E+00 1.52E+00 0.00E+00 1.52E+00 0.00E+00 2.13E+12 2.51E+11 2.07E-03 rgvabe primary end sources; SM = US FLOWS & W/t te Polystyrer /BTU per inc Manufacturing A3 3.58E-09 3.15E-02 2.12E-04 0.00E+00	unctional Ur aterial with a of 75 years Transport A4 2.65E-02 0.00E+00 2.65E-02 1.07E+00 0.00E+00 2.65E-02 1.07E+00 0.00E+00 7.40E-31 1.18E-29 1.29E-04 ier, PERM = Rener Try as energy car ier of secondary n FW= STE CATEG Te (GPS) Typ ch) with a bu Transport A4 8.34E-09 4.03E-05 2.36E-06 0.00E+00 0.00E+00	it of 1 m² of i thickness ti (packaging i Installation A5 7.16E-04 0.00E+00 7.16E-04 1.09E-02 0.00E+00 1.09E-02 0.00E+00 2.66E-25 3.12E-24 2.01E-06 wable primary et errier, PENRM = Nr. construction - Installation Construction - Installation A5 4.33E-11 1.21E-02 1.02E-07 0.00E+00	Installed Atla bat gives an analysis ncluded). Demolition C1 0.00E+00	Transport C2 7.89E-03 0.00E+00 7.89E-03 3.19E-01 0.00E+00 3.19E-01 0.00E+00 2.20E-31 3.51E-30 3.84E-05 utilization; PERT ary fuels; NRSF it of 1 m ² of i h a thicknes ars (packagi Transport C2 2.48E-09 1.20E-05 7.02E-07 0.00E+00	Ispace Disposal C3/C4 2.20E-02 0.00E+00 2.20E-02 3.12E-01 0.00E+00 3.12E-01 0.00E+00 3.12E-01 0.00E+00 8.52E-24 1.00E-22 3.78E-05 Total renewable Installed Atta s that gives ing included Disposal C3/C4 1.07E-09 4.41E-01 3.20E-06 0.00E+00	Ce (RSI) of 1 Benefits and Loads beyond system boundary D 5.30E-04 -6.97E-03 0.00E+00 -6.97E-03 0.00E+00 -6.97E-03 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 System boundary Benefits and Loads beyond system boundary D -3.05E-12 -1.67E-06 -4.33E-07 0.00E+00 0.00E+00 0.00E+00

Besides Type I insluation boards, Neopor[®] can also be molded into Type VIII, Type II and Type IX insulation boards. The environmental relevant results for these insulation boards are provided below.





LCA Results for Type VIII insulation board:

LCA Re		OF THE LCA	- ENVIRONM	ENTAL IMPA	ACT for a fund						
	m ² *K/W (5.6	8 ft ² *hr.*F/BT	U per inch) v	vith a buildin	ng service life	of 75 years	(packaging i	ncluded).			
TRACI 2	2.1		Raw material supply	Transport	Manufacturing	Transport	Construction – Installation	Demolition	Transport	Disposal	Benefits and Loads beyond system boundary
Parameter		Unit	A1	A2	A3	A4	A5	C1	C2	C3/C4	D
GWP		[kg CO ₂ -eq.]	1.47E+00	1.13E-01	6.28E-01	9.68E-02	8.03E-03	0.00E+00	2.88E-02	2.50E-02	-5.61E-04
AP		[kg SO2-eq.]	3.32E-03	2.20E-03	1.47E-03	5.15E-04	4.74E-05	0.00E+00	1.54E-04	3.94E-04	-1.26E-06
EP		[kg N-eq.]	2.07E-04	8.24E-05	1.03E-04	4.07E-05	1.72E-05	0.00E+00	1.21E-05	1.51E-04	-6.50E-08
ODP		[kg CFC11-eq.]	1.64E-10	1.69E-14	4.89E-10	3.32E-15	1.46E-16	0.00E+00	9.88E-16	4.60E-15	-3.24E-14
POCP		[kg O ₃ -eq.]	5.26E-02	4.31E-02	6.04E-02	1.72E-02	5.18E-03	0.00E+00	5.11E-03	3.30E-03	-1.52E-05
ADPF		[MJ, LHV]	7.10E+00	1.92E-01	1.15E+00	1.83E-01	1.75E-03	0.00E+00	5.45E-02	4.99E-02	-7.17E-04
Caption					; ODP = Ozone de ne photochemical						
					ACT for a fund tion material \						
	m ² *K/W (5.6	8 ft ² *hr.*F/BT	U per inch) v	with a buildin	ng service life	of 75 years	(packaging i	ncluded).			
CML 200	01 (2016)		Raw material supply	Transport	Manufacturing	Transport	Construction – Installation	Demoliton	Transport	Disposal	Benefits and Loads beyond system boundary
Parameter		Unit	A1	A2	A3	A4	A5	C1	C2	C3/C4	D
GWP		[kg CO ₂ -eq.]	1.48E+00	1.14E-01	6.32E-01	9.69E-02	8.64E-03	0.00E+00	2.88E-02	2.51E-02	-5.64E-04
ODP		[kg CFC11-eq.]	1.33E-10	1.69E-14	3.97E-10	3.32E-15	1.46E-16	0.00E+00	9.88E-16	4.60E-15	-3.05E-14
AP		[kg SO2-eq.]	3.26E-03	2.05E-03	1.41E-03	3.81E-04	1.88E-05	0.00E+00	1.14E-04	3.43E-04	-1.28E-06
EP		[kg PO4 ³⁻ -eq.]	3.37E-04	2.32E-04	1.80E-04	1.02E-04	2.09E-05	0.00E+00	3.03E-05	1.54E-04	-1.00E-07
POCP		[kg ethene-eq.]	7.46E-04	1.17E-04	1.14E-02	3.75E-05	1.52E-03	0.00E+00	1.12E-05	1.57E-04	-8.47E-08
ADPE		[kg Sb-eq.]	3.60E-07	1.08E-08	2.18E-07	1.77E-08	3.55E-10	0.00E+00	5.26E-09	1.08E-08	-1.59E-10
ADPF		[MJ]	5.09E+01	1.45E+00	9.31E+00 ential; ODP = Dep	1.37E+00 letion potential of	1.36E-02	0.00E+00	4.06E-01	3.89E-01	-7.50E-03
Caption					P = Formation pote	ential of troposph	eric ozone photoc		ADPE = Abiotic d		
	of 1 m ^z *K/W	(5.68 ft²*hr.*l	F/BTU per inc Raw material supply	ch) with a bu Transport	Manufacturing	e life of 75 ye	Construction – Installation	Demolition). Transport	Disposal	Benefits and Loads beyond system boundary
Parameter		Unit	A1	A2	A3	A4	A5	C1	C2	C3/C4	D
PERE		[MJ]	6.16E-01	3.43E-02	1.95E+00	3.39E-02	9.16E-04	0.00E+00	1.01E-02	2.82E-02	6.78E-04
PERM		[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT		[MJ]	6.16E-01	3.43E-02	1.95E+00	3.39E-02	9.16E-04	0.00E+00	1.01E-02	2.82E-02	6.78E-04
PENRE		[MJ]	2.72E+01	1.50E+00	9.89E+00	1.37E+00	1.40E-02	0.00E+00	4.08E-01	3.99E-01	-8.92E-03
PENRM		[MJ]	2.42E+01	0.00E+00	1.62E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT		[MJ]	5.15E+01	1.50E+00	1.00E+01	1.37E+00	1.40E-02	0.00E+00	4.08E-01	3.99E-01	-8.92E-03
SM		[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF		[MJ]	7.83E-20	3.85E-31	2.73E-12	9.47E-31	3.40E-25	0.00E+00	2.82E-31	1.09E-23	0.00E+00
NRSF		[MJ]	9.20E-19	6.13E-30	3.21E-11	1.51E-29	3.99E-24	0.00E+00	4.49E-30	1.28E-22	0.00E+00
FW Caption		[m³]	resources; PEI	NRE = Non-renev	2.65E-03 rgy as energy carr wable primary ene esources; SM = Us	ergy as energy ca se of secondary n	rrier; PENRM = N	on-renewable prir enewable second	mary energy as m	naterial utilization;	; PENRT = Total
	ThermalSta	r® GX featuri	ing Neopor®	Plus Graphi	FLOWS & WA ite Polystyrer i8 ft ² *hr.*F/BT	ASTE CATEO ne (GPS) Typ	GORIES for F be VIII insulat	unctional Un ion material \	with a thickn	ess that give	es an
			Raw material supply	Transport	Manufacturing	Transport	Construction – Installation	Demolition	Transport	Disposal	Benefits and Loads beyond system boundary
Parameter		Unit	A1	A2	A3	A4	A5	C1	C2	C3/C4	D
HWD		[kg]	1.03E-08	4.51E-09	4.58E-09	1.07E-08	5.54E-11	0.00E+00	3.17E-09	1.37E-09	-3.90E-12
NHWD		[kg]	1.04E-01	7.46E-05	4.03E-02	5.16E-05	1.55E-02	0.00E+00	1.54E-05	5.64E-01	-2.14E-06
RWD		[kg]	1.48E-04	1.54E-05	2.71E-04	3.02E-06	1.31E-07	0.00E+00	8.99E-07	4.10E-06	-5.54E-07
CRU		[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR		[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE		[MJ]	0.00E+00	0.00E+00	9.22E-04	0.00E+00	1.48E-03	0.00E+00	0.00E+00	5.09E-03	0.00E+00
EET		[MJ]	0.00E+00	0.00E+00	5.54E-04	0.00E+00	1.62E-03	0.00E+00	0.00E+00	4.51E-03	0.00E+00
					ed; NHWD = Non-						





LCA Results for Type II insulation board:

LCA Re	RESULTS C Plus Graphi	te Polystyrei		e II insulatio	CT for a fund n material wit se life of 75 ye	th a thicknes	s that gives	an average t			
TRACI 2			Raw material supply	Transport	Manufacturing	Transport	Construction – Installation	Demolition	Transport	Disposal	Benefits and Loads beyond system
Parameter		Unit	A1	A2	A3	A4	A5	C1	C2	C3/C4	boundary D
GWP		[kg CO ₂ -eq.]	1.85E+00	1.43E-01	7.91E-01	1.22E-01	1.01E-02	0.00E+00	3.62E-02	3.14E-02	-7.05E-04
AP		[kg SO2-eq.]	4.17E-03	2.77E-03	1.85E-03	6.47E-04	5.96E-05	0.00E+00	1.93E-04	4.96E-04	-1.59E-06
EP		[kg N-eq.]	2.61E-04	1.04E-04	1.30E-04	5.12E-05	2.16E-05	0.00E+00	1.52E-05	1.90E-04	-8.18E-08
ODP		[kg CFC11-eq.]	2.06E-10	2.13E-14	6.15E-10	4.17E-15	1.84E-16	0.00E+00	1.24E-15	5.78E-15	-4.07E-14
POCP		[kg O ₃ -eq.]	6.62E-02	5.43E-02	7.60E-02	2.16E-02	6.52E-03	0.00E+00	6.42E-03	4.15E-03	-1.92E-05
ADP _{FOSSII}		[MJ, LHV]	8.94E+00	2.42E-01	1.44E+00	2.30E-01	2.21E-03	0.00E+00	6.86E-02	6.28E-02	-9.02E-04
Caption			GWP = Global w of t	arming potential; ropospheric ozor	ODP = Ozone de le photochemical	pletion potential; oxidants; ADP _{Fost}	AP = Acidification all, Abiotic Depletio	potential; EP = E n Potential of Nor	utrophication pote n-renewable (foss	ential; POCP = Fo sil) energy resour	rmation potential ces
	Plus Graphi	ite Polystyre	ne (GPS) Typ	e II insulatio	CT for a fund n material wit e life of 75 ye	th a thicknes	s that gives	an average t			
CML 200	01 (2016)		Raw material supply	Transport	Manufacturing	Transport	Construction – Installation	Demoliton	Transport	Disposal	Loads beyond system boundary
Parameter		Unit	A1	A2	A3	A4	A5	C1	C2	C3/C4	D
GWP		[kg CO ₂ -eq.]	1.87E+00	1.43E-01	7.95E-01	1.22E-01	1.09E-02	0.00E+00	3.62E-02	3.16E-02	-7.10E-04
ODP		[kg CFC11-eq.]	1.67E-10	2.13E-14	4.99E-10	4.17E-15	1.84E-16	0.00E+00	1.24E-15	5.78E-15	-3.83E-14
AP		[kg SO2-eq.]	4.11E-03	2.58E-03	1.77E-03	4.80E-04	2.37E-05	0.00E+00	1.43E-04	4.31E-04	-1.61E-06
EP		[kg PO4 ³⁻ -eq.]	4.23E-04	2.91E-04	2.27E-04	1.28E-04	2.62E-05	0.00E+00	3.82E-05	1.93E-04	-1.26E-07
POCP		[kg ethene-eq.]	9.39E-04	1.48E-04	1.43E-02	4.72E-05	1.92E-03	0.00E+00	1.41E-05	1.98E-04	-1.07E-07
ADPE		[kg Sb-eq.]	4.52E-07	1.35E-08	2.74E-07	2.22E-08	4.46E-10 1.71E-02	0.00E+00 0.00E+00	6.62E-09	1.36E-08	-2.00E-10
ADPF		[MJ]	6.41E+01 GWP = Glo	1.82E+00 bal warming pote	1.17E+01 ential; ODP = Depl	1.72E+00 etion potential of			5.10E-01 Acidification pote	4.89E-01 ential of land and	-9.43E-03 water: EP =
Caption			Eutrophication	1 potential; POCP	= Formation pote		eric ozone photoci itic depletion pote			lepletion potentia	l for non-fossil
	Environmer	tal Paramete	ers from LCA	- RESOUR						ar® GX featu	rina
	Neopor® Pl	us Graphite	Polystyrene	GPS) Type I	CE USE for Fi I insulation m Ing service life	unctional Ur naterial with	nit of 1 m ² of i a thickness t	nstalled Atla hat gives an	s ThermalSta		
	Neopor® Pl	us Graphite	Polystyrene	GPS) Type I	CE USE for Fi I insulation m	unctional Ur naterial with	nit of 1 m ² of i a thickness t	nstalled Atla hat gives an	s ThermalSta		Benefits and Loads beyond system
	Neopor® Pl	us Graphite	Polystyrene (TU per inch) v Raw material	(GPS) Type I vith a buildir	CE USE for F I insulation m ng service life	unctional Ur naterial with of 75 years	nit of 1 m ² of i a thickness t (packaging i Construction –	nstalled Atla hat gives an ncluded).	s ThermalSta average the	rmal resistar	Benefits and Loads beyond
	Neopor® Pl	us Graphite 8 ft ² *hr.*F/B1	Polystyrene (TU per inch) v Raw material supply	(GPS) Type I vith a buildin Transport	CE USE for F I insulation m og service life Manufacturing	unctional Ur naterial with of 75 years Transport	hit of 1 m ² of i a thickness t (packaging i Construction – Installation	nstalled Atla hat gives an ncluded).	s ThermalSta average the Transport	rmal resistar	Benefits and Loads beyond system boundary
Parameter	Neopor® Pl	us Graphite 8 ft ² *hr.*F/B1 Unit	Polystyrene (IU per inch) v Raw material supply A1	(GPS) Type I vith a buildin Transport A2	CE USE for F I insulation m g service life Manufacturing A3	unctional Ur naterial with o of 75 years Transport A4	hit of 1 m ² of i a thickness t (packaging i Construction – Installation A5	nstalled Atla hat gives an ncluded). Demolition	s Thermal Sta average the Transport C2	Disposal	Benefits and Loads beyond system boundary D
Parameter PERE	Neopor® Pl	us Graphite 8 ft ² *hr.*F/B1 Unit [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01	GPS) Type I vith a buildir Transport A2 4.31E-02	CE USE for F Insulation m g service life Manufacturing A3 2.45E+00	unctional Ur aterial with of 75 years Transport <u>A4</u> 4.27E-02	hit of 1 m ² of i a thickness t (packaging i Construction – Installation A5 1.15E-03	nstalled Atla hat gives an ncluded). Demolition C1 0.00E+00	s ThermalSta average the Transport C2 1.27E-02	Disposal C3/C4 3.54E-02	Benefits and Loads beyond system boundary D 8.53E-04
Parameter PERE PERM	Neopor® Pl	us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00	GPS) Type I vith a buildin Transport A2 4.31E-02 0.00E+00	CEUSE for F I insulation m ing service life Manufacturing A3 2.45E+00 0.00E+00	At 2.27E-02 0.00E+00	hit of 1 m ² of i a thickness t (packaging i Construction – Installation A5 1.15E-03 0.00E+00	nstalled Atla hat gives an ncluded). Demolition C1 0.00E+00 0.00E+00	s ThermalSt average the Transport C2 1.27E-02 0.00E+00	Disposal C3/C4 3.54E-02 0.00E+00	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00
Parameter PERE PERM PERT PENRE PENRM	Neopor® Pl	us Graphite 8 ft ² *hr.*F/B 1 Unit [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.05E+01	GPS) Type I vith a buildir Transport 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00	All All Manufacturing A3 2.45E+00 0.00E+00 2.45E+00 1.24E+01 2.04E-01 2.04E-01	Autocional Ur aterial with a of 75 years Transport A4 4.27E-02 0.00E+00 4.27E-02 1.72E+00 0.00E+00	hit of 1 m ² of i a thickness t (packaging i Construction – Installation A5 1.15E-03 0.00E+00 1.15E-03 1.75E-02 0.00E+00	nstalled Atla hat gives an ncluded). Demolition C1 0.00E+00 0.00E+00 0.00E+00 0.00E+00	s ThermalSta average ther Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00	Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00
Parameter PERE PERM PERT PENRE PENRM PENRT	Neopor® Pl	us Graphite 8 ft ² *hr.*F/B1 [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.05E+01 6.47E+01	GPS) Type I vith a buildin Transport A2 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 1.88E+00	A3 2.45E+00 2.45E+00 0.00E+00 2.45E+00 1.24E+01 1.24E+01 2.04E-01 1.26E+01 1.26E+01	Additional Units of 75 years Transport A4 4.27E-02 0.00E+00 4.27E-02 1.72E+00 0.00E+00 1.72E+00 1.72E+00	Anit of 1 m² of i a thickness t (packaging i Construction - Installation A5 1.15E-03 0.00E+00 1.15E-03 0.00E+00 1.15E-03 0.00E+00 1.15E-03 1.75E-02 0.00E+00 1.75E-02	nstalled Atla hat gives an ncluded). Demolition C1 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	s ThermalSt average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 5.14E-01	C3/C4 0.00E+00 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01	Description Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00
Parameter PERE PERM PERT PENRE PENRM PENRT SM	Neopor® Pl	us Graphite 8 ft ² *hr.*F/B1 [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.05E+01 6.47E+01 0.00E+00	GPS) Type I vith a buildin Transport A2 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 1.88E+00 0.00E+00	A3 2.45E+00 0.00E+00 2.45E+00 1.24E+01 2.04E+01 1.26E+01 0.00E+00	Attended Attended Transport Attended A4 4.27E-02 0.00E+00 4.27E-02 1.72E+00 0.00E+00 1.72E+00 0.00E+00 0.00E+00 0.00E+00	atic of 1 m ² of i a thickness t (packaging i Construction – Installation A5 1.15E-03 0.00E+00 1.15E-03 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00	nstalled Atla hat gives an ncluded). Demolition 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	s ThermalSt average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 5.14E-01 0.00E+00	C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 5.02E-01 0.00E+00	Description Description Benefits and Loads beyond system boundary D B 53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 0.112E-02 0.00E+00
Parameter PERE PERM PERT PENRE PENRM PENRT SM RSF	Neopor® Pl	us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [Kg] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.05E+01 6.47E+01 0.00E+00 9.85E-20	GPS) Type I vith a buildir Transport 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 1.88E+00 0.00E+00 4.85E-31	A3 A3 2.45E+00 0.00E+00 2.45E+00 1.24E+01 1.26E+01 1.26E+01 0.00E+00 3.43E+12	A4 4.27E-02 0.00E+00 4.27E-02 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+03 0.00E+00	Anit of 1 m² of i a thickness t (packaging i Construction - Installation A5 1.15E-03 0.00E+00 1.15E-02 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25	C1 0.00E+00	s ThermalSta average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 5.14E-01 0.00E+00 3.54E-31	Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -0.00E+00 0.00E+00
Parameter PERE PERM PERT PENRE PENRR PENRT SM RSF NRSF	Neopor® Pl	us Graphite 8 ft ² *hr.*F/B1 (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ)	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.43E+01 0.00E+00 9.85E-20 1.16E-18	A2 4.31E-02 0.00E+00 4.31E-02 0.00E+00 1.88E+00 0.00E+00 1.88E+00 0.00E+00 4.85E-31 7.71E-30	A3 2.45E+00 0.00E+00 2.45E+00 1.24E+01 2.04E+01 1.26E+01 0.00E+00 3.43E-12 4.04E-11	A4 4.27E-02 0.00E+00 4.27E-02 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+01 0.00E+00 1.72E+01 0.00E+00 1.72E+01 0.00E+02 1.72E+03 1.90E-29	Anticology Anticol	Nstalled Atla hat gives an ncluded). Demolition 0.00E+00	s ThermalSta average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 5.14E-01 0.00E+00 3.54E-31 5.65E-30	Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00
Parameter PERE PERM PERT PENRE PENRM PENRT SM	Neopor® Pl	us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [Kg] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.43E+01 0.00E+00 9.85E+20 1.16E-18 6.41E-03 PERE = Renew resources, PEI	A2 4.31E-02 0.00E+00 4.31E-02 0.00E+00 4.38E+00 0.00E+00 1.88E+00 0.00E+00 4.85E-31 7.71E-30 1.50E-04 able primary ene WKE = Non-reney	A3 A3 2.45E+00 0.00E+00 2.45E+00 1.24E+01 1.26E+01 1.26E+01 0.00E+00 3.43E+12	A4 4.27E-02 0.00E+00 4.27E-02 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.19E-30 1.90E-29 2.08E-04 err, PERM = Ren rgy as energy ca e of secondary n	Att of 1 m² of i a thickness t (packaging i Construction - Installation A5 1.15E-03 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 3.24E-06 ewable primary en mietrial; RSF = RE	C1 0.00E+00	s ThermalSta average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 5.14E-01 0.00E+00 3.54E-31 5.65E-30 6.18E-05 utilization; PERT mary energy as m	Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 6.09E-05 Total renewabl aterial utilization;	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -2.62E-06 e primary energy PENRT = Total
Parameter PERE PERM PERT PENRE PENRE PENRT SM RSF RSF FW	Neopor® PI m ² *K/W (5.6	US Graphite 8 ft ² *hr.*F/B 1 Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.43E+01 3.43E+01 6.47E+01 0.47E+01 0.47E+01 0.48E+20 1.16E-18 6.41E-03 PERE = Renew resources, PEI non-renewable	AP A2 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 4.88E+30 0.00E+00 4.85E-31 7.71E-30 1.50E-04 able primary energy re	A3 2.45E+00 0.00E+00 2.45E+00 0.00E+00 2.45E+00 1.24E+01 2.04E-01 0.00E+00 3.43E+12 4.04E+11 3.33E+03 rgy as energy carr asengy carr rgy as energy carr asengy carr	A4 4.27E-02 0.00E+00 4.27E-02 0.00E+00 4.27E-02 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.90E-29 2.08E-04 ier; PERM = Ren rgy as energy ca e of secondary n FW =	Att of 1 m² of i a thickness t (packaging i Construction – Installation A5 1.15E-03 0.00E+00 1.15E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 3.24E-06 ewable primary er undernist, RSF = RE Use of net fresh	C1 0.00E+00	s ThermalSta average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 3.54E-31 5.55E-30 6.18E-05 utilization; PERT mary energy as m ary fuels; NRSF =	Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 6.09E-05 = Total renewable > Non-renewable	Benefits and Loads beyond ystem boundary D 8.53E-04 0.00E+00 8.53E-04 0.00E+00 -1.12E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 -2.62E-06 e primary energy PENRT = Total secondary fuels;
Parameter PERE PERM PERT PENRE PENRE PENRM PENRT SM RSF RSF NRSF FW	Neopor® PI m ² *K/W (5.6	us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.43E+01 3.43E+01 3.43E+01 0.00E+00 9.85E-20 1.16E-18 6.47E+01 0.00E+00 9.85E-20 1.16E-18 6.41E-03 PERE = Renew resources: PEI non-renewable	GPS) Type I vith a buildir Transport A2 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 4.85E-31 7.71E-30 1.50E-04 Able primary energy reprimary energy reprima (reprimary energy)	A3 A3 2.45E+00 0.00E+00 2.45E+00 0.00E+00 2.45E+01 2.04E-01 1.26E+01 0.00E+00 3.43E+12 4.04E-11 4.04E+11 3.33E-03 rgy as energy carr availe primary energy carr sources, SM = US US	A4 4.27E-02 0.00E+00 4.27E-02 0.00E+00 4.27E-02 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+01 0.00E+00 1.19E-30 1.90E-29 2.08E-04 icr; PERM = Ren icr; PERM	Alt of 1 m ² of i a thickness t (packaging i Construction – Installation A5 1.15E-03 0.00E+00 1.15E-03 0.00E+00 1.175E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 9.24E-06 errier, PENRM = Nc naterial; RSF = Re; Use on effest for Fr ell insulation	Installed Atla hat gives an ncluded). Demolition C1 0.00E+00 0.00E+00	s ThermalSt average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 3.54E-31 5.65E-30 6.18E-05 Utilization; PERT mary fuels; NRSF = it of 1 m ² of i th a thickness	Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 = Total renewable = Total renewable aterial utilization; Non-renewable estalled Atla as that gives	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -2.62E-06 e primary energy PENRT = Total secondary fuels; san average
Parameter PERE PERM PERT PENRE PENRE PENRT SM RSF RSF FW	Neopor® PI m ² *K/W (5.6	us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.43E+01 3.43E+01 3.43E+01 0.00E+00 9.85E-20 1.16E-18 6.47E+01 0.00E+00 9.85E-20 1.16E-18 6.41E-03 PERE = Renew resources: PEI non-renewable	GPS) Type I vith a buildir Transport A2 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 4.85E-31 7.71E-30 1.50E-04 Able primary energy reprimary energy reprima (reprimary energy)	CE USE for F I insulation m ing service life Manufacturing A3 2.45E+00 0.00E+00 2.45E+01 2.04E-01 1.26E+01 0.00E+00 3.43E-12 4.04E-11 3.33E-03 grg as energy carry as energy carry as upprimary energy carry as the Use FLOWS & WAR	A4 4.27E-02 0.00E+00 4.27E-02 0.00E+00 4.27E-02 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+01 0.00E+00 1.19E-30 1.90E-29 2.08E-04 icr; PERM = Ren icr; PERM	Alt of 1 m ² of i a thickness t (packaging i Construction – Installation A5 1.15E-03 0.00E+00 1.15E-03 0.00E+00 1.175E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 9.24E-06 errier, PENRM = Nc naterial; RSF = Re; Use on effest for Fr ell insulation	Installed Atla hat gives an ncluded). Demolition C1 0.00E+00 0.00E+00	s ThermalSt average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 3.54E-31 5.65E-30 6.18E-05 Utilization; PERT mary fuels; NRSF = it of 1 m ² of i th a thickness	Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 = Total renewable = Total renewable aterial utilization; Non-renewable estalled Atla as that gives	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -2.62E-06 e primary nengry PENRT = Total secondary fuels; san average). Benefits and Loads beyond system
Parameter PERE PERM PERT PENRE PENRT SM RSF NRSF FW Caption	Neopor® PI m ² *K/W (5.6	us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.43E+01 0.00E+00 9.85E-20 1.16E-18 6.47E+01 0.00E+00 9.85E-20 1.16E-18 6.41E-03 PERE = Renew resources; PEI non-renewable ers from LCA ing Neopor® of 1 m ²⁺ K/W Raw material supply	GPS) Type I vith a buildir Transport A2 4.31E-02 0.00E+00 4.31E-02 0.00E+00 1.88E+00 0.00E+00 1.88E+00 0.00E+00 1.88E+01 0.00E+00 1.88E+01 0.00E+00 4.85E-31 7.71E-30 1.50E-04 able primary energy reprimary energy reprimary energy reprimary energy for the start of the start	CE USE for F Insulation m ng service life Manufacturing A3 2.45E+00 0.00E+00 2.45E+01 0.00E+00 3.43E+12 4.04E+01 3.33E+03 gy as energy carr wable primary energy carr sources; SM = Us FLOWS & WAP te Polystyrer //BTU per inc Manufacturing	A4 4.27E-02 0.00E+00 4.27E-02 0.00E+00 4.27E-02 0.00E+00 1.72E+00 0.00E+00 1.72E+01 0.00E+00 1.72E+02 0.00E+00 1.72E+01 0.00E+00 1.90E-29 2.08E-04 ler, PERM = Ren rgy as energy ca set of secondary r FW = STE CATECO ee (GPS) Type th) with a bu Transport	it of 1 m² of i a thickness t (packaging i Installation A5 1.15E-03 0.00E+00 1.15E-02 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 3.24E-06 ewable primary er ewable primary er ORIES for F1 CORIES for F1 el linsulation ilding servict Construction – Installation	nstalled Atla hat gives an ncluded). Demolition C1 0.00E+00 0.00E+00	s ThermalSta average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 5.14E-01 0.00E+00 3.54E-31 5.65E-30 6.18E-05 utilization, PERT utilization, PERT utilizat	Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 6.09E-05 = Total renewable nstalled Atla sthat gives ing included Disposal	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -2.62E-06 e primary energy PENRT = Total secondary fuels; san average). Benefits and Loads beyond system boundary
Parameter PERE PERM PERT PENRE PENRT SM RSF RSF NRSF FW Caption Parameter	Neopor® PI m ² *K/W (5.6	us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.05E+01 6.47E+01 0.00E+00 9.85E-20 1.16E-18 6.41E-03 PERE = Renew resources, PEI non-renewable ers from LCA ing Neopor® of 1 m ²⁺ K/W Raw material supply A1	GPS) Type I vith a buildir Transport A2 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 1.88E+00 0.00E+00 4.85E-31 7.71E-30 1.50E-04 able primary energy reprimary energy refersion of the start of	CE USE for F Insulation m ng service life Manufacturing A3 2.45E+00 0.00E+00 2.45E+00 1.24E+01 2.04E-01 1.26E+01 0.00E+00 3.43E-12 4.04E-11 3.33E-03 rgy as energy carr vasbe primary energy carr usabe primary energy carr <td>A4 4.27E-02 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+01 0.00E+00 1.72E+01 0.00E+00 1.72E+01 0.00E+00 1.19E-30 1.90E-29 2.08E-04 Ier, FERM = Ren regv argv as energv as energv argv argv as energv argv argv as energv argv argv as energv argv argv argv argv argv argv argv a</td> <td>it of 1 m² of i a thickness t (packaging i Construction – Installation A5 1.15E-03 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 3.24E-06 wwable primary er eventre, PENRM = Nc on et insulation iding service Construction – Installation A5</td> <td>Installed Atla hat gives an ncluded). Demolition C1 0.00E+00 nctional Un m taterial wite e life of 75 yet Demolition</td> <td>s ThermalSta average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 5.14E-01 0.00E+00 3.54E-31 5.65E-30 6.18E-05 utilization; PERT utilization; PERT it of 1 m² of i th a thickness ars (packagi Transport C2</td> <td>Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 6.09E-05 = Total renewable nstalled Atla ss that gives ing included Disposal C3/C4</td> <td>Description Benefits and Loads beyond Loads beyond asystem boundary D 8.53E-04 0.00E+00 8.53E-04 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -2.62E-06 e primary energy PENRT = Total secondary fuels; san average . Benefits and Loads beyond system boundary D</td>	A4 4.27E-02 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+01 0.00E+00 1.72E+01 0.00E+00 1.72E+01 0.00E+00 1.19E-30 1.90E-29 2.08E-04 Ier, FERM = Ren regv argv as energv as energv argv argv as energv argv argv as energv argv argv as energv argv argv argv argv argv argv argv a	it of 1 m² of i a thickness t (packaging i Construction – Installation A5 1.15E-03 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 3.24E-06 wwable primary er eventre, PENRM = Nc on et insulation iding service Construction – Installation A5	Installed Atla hat gives an ncluded). Demolition C1 0.00E+00 nctional Un m taterial wite e life of 75 yet Demolition	s ThermalSta average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 5.14E-01 0.00E+00 3.54E-31 5.65E-30 6.18E-05 utilization; PERT utilization; PERT it of 1 m ² of i th a thickness ars (packagi Transport C2	Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 6.09E-05 = Total renewable nstalled Atla ss that gives ing included Disposal C3/C4	Description Benefits and Loads beyond Loads beyond asystem boundary D 8.53E-04 0.00E+00 8.53E-04 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -2.62E-06 e primary energy PENRT = Total secondary fuels; san average . Benefits and Loads beyond system boundary D
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Parameter PERE PERM PERT PENRE PENRM PENRT SM RSF SM Caption Caption Parameter HWD NHWD	Neopor® PI m ² *K/W (5.6	us Graphite 8 ft ² *hr.*F/B 1 Unit (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ)	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.43E+01 3.05E+01 6.47E+01 0.00E+00 9.85E-20 1.16E-18 6.41E-03 PERE = Renew resources, PEI non-renewable ers from LCA ing Neopor® of 1 m ²⁺ K/W Raw material supply A1 1.30E-08 1.31E-01	GPS) Type I vith a buildir Transport A2 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 1.88E+00 0.00E+00 4.85E-31 7.71E-30 1.50E-04 able primary energy re OUTPUT I Plus Graphi (5.68 ft ²⁺ n.*) Transport A2 5.67E-09 9.39E-05	CE USE for F Insulation m ng service life Manufacturing A3 2.45E+00 0.00E+00 2.45E+00 1.24E+01 2.04E+01 1.26E+01 0.00E+00 3.43E+12 4.04E+11 3.33E-03 rgv ase perimary energy carr sources; SM = US FLOWS & WA te Polystyrer //BTU per income Manufacturing A3 5.76E-09 5.07E-02	A4 4.27E-02 0.00E+00 4.27E-02 0.00E+00 4.27E-02 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.19E-30 1.90E-29 2.08E-04 ier, FERM = Rem erg as energy as energy as energy as energy as energy as energy as the of secondary nor FW = STE CATECO ister (GPS) Type their (GPS) type their (SPE, STE CATECO ister (SPS) type their (SPE, STE CATECO ister (SPS) type their (SPS) type	it of 1 m² of i a thickness t (packaging i Construction – Installation A5 1.15E-03 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 3.24E-06 ewable primary er eventer PENRM = Nc neterial; RSF = Re Use of net fresh Construction – Installation A5 6.97E-11 1.95E-02	Installed Atla hat gives an ncluded). Demolition 0.00E+00	s ThermalSta average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 3.54E-31 5.65E-30 6.18E-05 utilization; PERT mary fuels; NRSF = it of 1 m ² of i th a thickness ars (packagi Transport C2 3.99E-09 1.93E-05	Tesistar Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 6.09E-05 = Total renewable nstalled Atla sthat gives ing included Disposal C3/C4 1.72E-09 7.10E-01	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -2.62E-06 e primary energy PENRT = Total secondary fuels; Benefits and Loads beyond system boundary D -4.91E-12 -2.69E-06
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Parameter PERE PERM PENRE PENRT SM RSF SM Caption Caption Parameter HWD NHWD RWD CRU	Neopor® PI m ² *K/W (5.6	us Graphite 8 ft ² *hr.*F/B 1 [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.43E+01 3.05E+01 6.47E+01 0.00E+00 9.85E-20 1.16E-18 6.41E-03 9.85E-20 1.16E-18 6.41E-03 PERE = Renew resources: PEI non-renewable ers from LCA ing Neopor® of 1 m ²⁺ K/W Raw material supply A1 1.30E-08 1.31E-01 1.87E-04	GPS) Type I vith a buildir Transport A2 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 1.88E+00 0.00E+00 4.85E-31 7.71E-30 1.50E-04 able primary energy re OUTPUT I Plus Graphi (5.68 ft ²⁺ nr.*) Transport A2 5.67E-09 9.39E-05 1.93E-05	CE USE for F Insulation m insulation m g service life Manufacturing A3 2.45E+00 0.00E+00 2.45E+01 2.04E-01 1.26E+01 0.00E+00 3.43E-12 4.04E-11 3.33E-03 grg as energy carr vaburces; SM = Us FLOWS & WA te Polystyrer FBTU per inc Manufacturing A3 5.76E-09 5.07E-02 3.41E-04	A4 4.27E-02 0.00E+00 4.27E-02 0.00E+00 4.27E-02 0.00E+00 4.27E-02 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.9E-30 1.9E-30 1.9E-29 2.08E-04 ier, FERM = Ren rgy as energy ca se of secondary m STE CATECO ier (GPS) Typp th) with a bu Transport A4 1.34E-08 6.49E-05 3.80E-06	it of 1 m² of i a thickness t (packaging i Installation A5 1.15E-03 0.00E+00 1.15E-03 0.00E+00 1.15E-03 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 3.24E-06 ewable primary enrine, PENRM = Nonaterial; RSF = Re construction - Installation iding service Construction - Installation A5 6.97E-11 1.95E-02 1.64E-07	Installed Atla hat gives an ncluded). Demolition C1 0.00E+00 nor-enewable privenewable privenewable second naterial with a life of 75 yet Demolition C1 0.00E+00 0.00E+00	s ThermalSt average their Transport C2 1.27E-02 0.00E-00 1.27E-02 5.14E-01 0.00E+00 5.14E-01 0.00E+00 3.54E-31 5.65E-30 6.18E-05 utilization; PERT mary energy as m ary fuels; NRSF = it of 1 m ² of i th a thickness ars (packagi Transport C2 3.99E-09 1.93E-05 1.13E-06	Tesistar Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 6.09E-05 = Total renewable nstalled Atla sthat gives ng included Disposal C3/C4 1.72E-09 7.10E-01 5.15E-06	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -2.62E-06 e primary energy PENRT = Total secondary fuels; Benefits and Loads beyond system boundary D -4.91E-12 -2.69E-06 -6.97E-07
Parameter PERE PERM PENRE PENRM PENRT SM RSF FW Caption Caption Parameter HWD NHWD RWD	Neopor® PI m ² *K/W (5.6	us Graphite 8 ft ²⁺ hr.*F/B 1 (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ)	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.43E+01 3.05E+01 6.47E+01 0.00E+00 9.85E-20 1.16E-18 6.47E+01 0.00E+00 9.85E-20 1.16E-18 6.47E-01 9.85E-20 1.16E-18 6.47E-01 9.85E-20 1.16E-18 6.47E-01 9.85E-20 1.16E-18 0.00E+00 1.31E-01 1.87E-04 0.00E+00	GPS) Type I vith a buildir Transport A2 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 4.85E-31 7.71E-30 0.77E-30 Aable primary energy re - OUTPUT I Plus Graphi (5.68 ft ² hr.*I Transport A2 5.67E-09 9.39E-05 1.93E-05 0.00E+00	CE USE for F Insulation m insulation m g service life Manufacturing A3 2.45E+00 0.00E+00 2.45E+01 0.00E+00 2.45E+01 0.00E+00 3.43E+12 4.04E-11 3.33E-03 gras a energy carr vable primary energy carr vable primary energy carr FLOWS & WA te Polystyrer F/BTU per inc Manufacturing A3 5.76E-09 5.07E-02 3.41E-04 0.00E+00	A4 4.27E-02 0.00E+00 4.27E-02 0.00E+00 4.27E-02 0.00E+00 4.27E-02 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.9E-30 1.90E-29 2.08E-04 ier, FERM = Ren rgy as energy	it of 1 m² of i a thickness t (packaging i Installation A5 1.15E-03 0.00E+00 1.15E-03 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 3.24E-06 ewable primary entrier, PENRM = Nematerial; RSF = Re use of netfresh CORIE S for Fibe II insulation iding service Construction - Installation A5 6.97E-11 1.95E-02 1.64E-07 0.00E+00	Installed Atla hat gives an ncluded). Demolition C1 0.00E+00 naterial with the life of 75 yet Demolition C1 0.00E+00 0.00E+00 0.00E+00 0.00E+00	s ThermalStaverage their average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 5.14E-01 0.00E+00 3.54E-31 5.65E-30 6.18E-05 utilization; PERT ars (packagi Transport C2 3.99E-09 1.93E-05 1.13E-06 0.00E+00	Tesistar Disposal 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 6.09E-05 = Total renewable Installed Atla st that gives ing included Disposal C3/C4 1.72E-09 7.10E-01 5.15E-06 0.00E+00	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -2.62E-06 e primary energy PENRT = Total secondary fuels; B Benefits and Loads beyond system boundary D -4.91E-12 -2.69E-06 -6.97E-07 0.00E+00
Parameter PERE PERM PERT PENRE PENRT SM RSF RSF Caption Caption Caption Parameter HWD NHWD RWD CRU	Neopor® PI m ² *K/W (5.6	us Graphite 8 ft ² *hr.*F/B1 Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.43E+01 3.43E+01 0.00E+00 9.85E-20 1.16E-18 6.47E+01 0.00E+00 9.85E-20 1.16E-18 6.47E+01 9.85E-20 1.16E-18 6.47E+01 9.85E-20 1.16E-18 6.47E+01 9.85E-20 1.16E-18 9.85E-20 1.16E-18 9.85E-20 9.85E-20 1.16E-18 9.85E-20 9.85E-20 1.16E-18 9.85E-20 9.85E-20 1.16E-18 9.85E-20 9.85E-20 1.16E-18 9.85E-20 9.85E-20 1.16E-18 9.85E-20 9.85E-	GPS) Type I vith a buildir Transport A2 4.31E-02 0.00E+00 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 4.85E-31 7.71E-30 1.50E-04 able primary energy re POUTPUT I Plus Graphi (5.68 ft ² *hr.*I Transport A2 5.67E-09 9.39E-05 1.93E-05 0.00E+00	CE USE for F Insulation m insulation m g service life Manufacturing A3 2.45E+00 0.00E+00 2.45E+01 2.04E+01 2.04E+01 1.26E+01 0.00E+00 3.43E+12 4.04E+11 3.33E-03 gy as energy car wable primary energy car wable primary energy car wable primary energy car wable primary energy car Manufacturing A3 5.76E-09 5.07E-02 3.41E-04 0.00E+00 0.00E+00	A4 4.27E-02 0.00E+00 4.27E-02 0.00E+00 4.27E-02 1.72E+00 0.00E+00 1.90E-29 e.org seenergy care of secondary more for a seenergy care of secondary more for a seenergy care of secondary more for a seenergy care of SETE CATECC CATEC	it of 1 m² of i a thickness t (packaging i a thickness t (packaging i Installation A5 1.15E-03 0.00E+00 1.15E-03 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 wable primary en waterial; RSF = R& valerial; RSF = R& construction - installation iding service Construction - installation A5 6.97E-11 1.95E-02 1.64E-07 0.00E+00	Installed Atla hat gives an ncluded). Demolition C1 0.00E+00 non-renewable primerwable second water unctional Units naterial wits elife of 75 yet Demolition C1 0.00E+00	s ThermalStaverage their average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 5.14E-01 0.00E+00 3.54E-31 5.65E-30 6.18E-05 utilization, PERT mary energy as m ary fuels, NRSF = it of 1 m² of i th a thickness ars (packagi Transport C2 3.99E-09 1.93E-05 1.13E-06 0.00E+00 0.00E+00	Total resistar Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 6.09E-05 = Total renewable Installed Atla st that gives ing included Disposal C3/C4 1.72E-09 7.10E-01 5.15E-06 0.00E+00 0.00E+00	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -2.62E-06 -2.62E-06 -2.62E-06 -2.69E-06 -2.69E-06 -6.97E-07 0.00E+00
Parameter PERE PERM PENRE PENRM PENRT SM RSF RSF Caption Caption Caption RSF HW Caption RSF Caption Caption Caption RSF Caption Caption RSF Caption Caption RSF Caption Caption RSF CAPT RSF Caption RSF CAPT R	Neopor® PI m ² *K/W (5.6	us Graphite 8 ft ² *hr.*F/B1 (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ) (MJ)	Polystyrene (U per inch) v Raw material supply A1 7.74E-01 0.00E+00 7.74E-01 3.43E+01 3.43E+01 3.05E+01 6.47E+01 0.00E+00 9.85E-20 1.16E-18 6.47E+01 0.00E+00 9.85E-20 1.16E-18 6.47E+01 9.85E-20 1.16E-18 6.47E+01 PERE = Renew resources; PEI non-renewable of 1 m ²⁺ K/W Raw material supply A1 1.30E-08 1.31E-01 1.87E-04 0.00E+00 0.00E+00 0.00E+00	GPS) Type I vith a buildir Transport A2 4.31E-02 0.00E+00 4.31E-02 1.88E+00 0.00E+00 4.85E-31 7.71E-30 1.50E-04 able primary energy re PUS Graphi (5.68 ft ²⁺ hr.*1 Transport A2 5.67E-09 9.39E-05 1.93E-05 0.00E+00 0.00E+00	CE USE for F Insulation m g service life Manufacturing A3 2.45E+00 0.00E+00 2.45E+01 2.04E+01 1.26E+01 0.00E+00 3.43E+12 4.04E+11 3.33E-03 grg as energy carr grg as energy carr vable primary energy carr vable primary energy carr vable primary energy carr S.07E+02 3.41E-04 0.00E+00 5.07E+02 3.41E-04 0.00E+00 0.00E+00	A4 4.27E-02 0.00E+00 4.27E-02 0.00E+00 4.27E-02 1.72E+00 0.00E+00 1.72E+00 0.00E+00 1.72E+01 0.00E+00 1.72E+02 1.72E+03 0.00E+00 1.90E-29 2.08E-04 Exp Secondary nor FW = STE CATEC Ca (GPS) Type Ch (GPS)	it of 1 m² of i a thickness t (packaging i a thickness t (packaging i Installation A5 1.15E-03 0.00E+00 1.15E-03 0.00E+00 1.75E-02 0.00E+00 1.75E-02 0.00E+00 4.28E-25 5.02E-24 wable primary en aterial; RSF = Ret Use of netTres Construction – Installation A5 6.97E-11 1.95E-02 1.64E-07 0.00E+00 0.00E+00	Installed Atla hat gives an ncluded). Demolition C1 0.00E+00 naterial with alife of 75 yee Demolition C1 0.00E+00	s ThermalSt average their Transport C2 1.27E-02 0.00E+00 1.27E-02 5.14E-01 0.00E+00 3.54E-31 5.55E-30 6.18E-05 10127E-02 5.14E-01 0.00E+00 3.54E-31 5.55E-30 6.18E-05 1.354E-35 1.33E-05 1.35E-05 1.35E-05 1.35E-05 1.35E-05 1.35E-05 1.35E-05 1.35E-05 1.	Tesistar Disposal C3/C4 3.54E-02 0.00E+00 3.54E-02 5.02E-01 0.00E+00 5.02E-01 0.00E+00 5.02E-01 0.00E+00 1.37E-23 1.61E-22 6.09E-05 = Total renewable sthat gives ing included Disposal C3/C4 1.72E-09 7.10E-01 5.15E-06 0.00E+00 0.00E+00 0.00E+00	Benefits and Loads beyond system boundary D 8.53E-04 0.00E+00 8.53E-04 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -1.12E-02 0.00E+00 -2.62E-06 e primary energy PENRT = Total secondary fuels; Benefits and Loads beyond system boundary D -4.91E-12 -2.69E-06 -6.97E-07 0.00E+00





LCA results for Type IX insulation board:

		OF THE LCA	ulation bo	ENTAL IMPA							
			ne (GPS) Typ ich) with a bu				-	_	thermal resis	stance (RSI)	of 1 m ^{**} K/W
TRACI 2	2.1		Raw material supply	Transport	Manufacturing	Transport	Construction – Installation	Demolition	Transport	Disposal	Benefits and Loads beyond system
Parameter		Unit	A1	A2	A3	A4	A5	C1	C2	C3/C4	boundary D
GWP		[kg CO ₂ -eq.]	2.30E+00	1.77E-01	9.82E-01	1.51E-01	1.25E-02	0.00E+00	4.50E-02	3.90E-02	-8.76E-04
AP		[kg SO2-eq.]	5.18E-03	3.44E-03	2.30E-03	8.04E-04	7.40E-05	0.00E+00	2.40E-04	6.16E-04	-1.98E-06
EP		[kg N-eq.]	3.24E-04	1.29E-04	1.61E-04	6.36E-05	2.68E-05	0.00E+00 0.00E+00	1.89E-05	2.36E-04	-1.02E-07 -5.06E-14
ODP POCP		[kg CFC11-eq.] [kg O ₃ -eq.]	2.56E-10 8.22E-02	2.64E-14 6.74E-02	7.64E-10 9.44E-02	5.18E-15 2.68E-02	2.28E-16 8.10E-03	0.00E+00 0.00E+00	1.54E-15 7.98E-03	7.18E-15 5.16E-03	-5.06E-14 -2.38E-05
		[MJ, LHV]	1.11E+01	3.00E-01	1.79E+00	2.86E-01	2.74E-03	0.00E+00	8.52E-02	7.80E-02	-1.12E-03
Caption			GWP = Global w	arming potential;	ODP = Ozone de ne photochemical		AP = Acidification	potential; EP = E		I ential; POCP = Fo	ormation potential
			- ENVIRONM								
			ne (GPS) Typ ich) with a bu				-	-	thermal resis	stance (RSI)	of 1 m ⁻ K/W
CML 200	01 (2016)		Raw material supply	Transport	Manufacturing	Transport	Construction – Installation	Demoliton	Transport	Disposal	Benefits and Loads beyond system boundary
Parameter		Unit	A1	A2	A3	A4	A5	C1	C2	C3/C4	D
GWP		[kg CO ₂ -eq.]	2.32E+00	1.78E-01	9.88E-01	1.51E-01	1.35E-02	0.00E+00	4.50E-02	3.92E-02	-8.82E-04
ODP		[kg CFC11-eq.]	2.08E-10	2.64E-14	6.20E-10	5.18E-15	2.28E-16	0.00E+00	1.54E-15	7.18E-15	-4.76E-14
AP		[kg SO2-eq.]	5.10E-03	3.20E-03	2.20E-03	5.96E-04	2.94E-05	0.00E+00	1.77E-04	5.36E-04	-2.00E-06
EP POCP		[kg PO ₄ ³⁺ -eq.] [kg ethene-eq.]	5.26E-04 1.17E-03	3.62E-04 1.83E-04	2.82E-04 1.78E-02	1.59E-04 5.86E-05	3.26E-05 2.38E-03	0.00E+00 0.00E+00	4.74E-05 1.75E-05	2.40E-04 2.46E-04	-1.56E-07 -1.32E-07
ADPE		[kg Sb-eq.]	5.62E-07	1.68E-08	3.40E-02	2.76E-08	5.54E-10	0.00E+00	8.22E-09	2.40E-04	-1.32E-07 -2.48E-10
ADPF		[MJ]	7.96E+01	2.26E+00	1.45E+01	2.14E+00	2.12E-02	0.00E+00	6.34E-01	6.08E-01	-1.17E-02
					ential; ODP = Dep						
Caption			Eutrophication	n potential; POCF	= Formation pote resour		eric ozone photoc otic depletion pote			depletion potentia	al for non-fossil
	1 m ² *K/W (5	68 ff ² *hr *F/F	TII per inch	section in the section							
			Raw material supply	Transport	Manufacturing	i fe of 75 year Transport	s (packaging Construction – Installation	Demolition	Transport	Disposal	Benefits and Loads beyond system
Parameter		Unit	Raw material				Construction -		Transport C2	Disposal C3/C4	Loads beyond
PERE		Unit [MJ]	Raw material supply A1 9.62E-01	Transport A2 5.36E-02	Manufacturing A3 3.04E+00	Transport A4 5.30E-02	Construction – Installation A5 1.43E-03	Demolition C1 0.00E+00	C2 1.58E-02	C3/C4 4.40E-02	Loads beyond system boundary D 1.06E-03
PERE PERM		Unit [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00	Transport A2 5.36E-02 0.00E+00	Manufacturing A3 3.04E+00 0.00E+00	Transport A4 5.30E-02 0.00E+00	Construction – Installation A5 1.43E-03 0.00E+00	C1 0.00E+00 0.00E+00	C2 1.58E-02 0.00E+00	C3/C4 4.40E-02 0.00E+00	Loads beyond system boundary D 1.06E-03 0.00E+00
PERE PERM PERT		Unit [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01	Transport A2 5.36E-02 0.00E+00 5.36E-02	Manufacturing A3 3.04E+00 0.00E+00 3.04E+00	Transport A4 5.30E-02 0.00E+00 5.30E-02	Construction – Installation 45 1.43E-03 0.00E+00 1.43E-03	C1 0.00E+00 0.00E+00 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02	C3/C4 4.40E-02 0.00E+00 4.40E-02	Loads beyond system boundary D 1.06E-03 0.00E+00 1.06E-03
PERE PERM PERT PENRE		Unit [MJ] [MJ] [MJ] [MJ]	A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01	A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00	Manufacturing A3 3.04E+00 0.00E+00	A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-03 2.18E-02	Demolition C1 0.00E+00 0.00E+00 0.00E+00 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01	Loads beyond system boundary D 1.06E-03 0.00E+00 1.06E-03 -1.39E-02
PERE PERM PERT PENRE PENRM		Unit [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01	Transport A2 5.36E-02 0.00E+00 5.36E-02	Manufacturing A3 3.04E+00 0.00E+00 3.04E+00 1.54E+01	Transport A4 5.30E-02 0.00E+00 5.30E-02	Construction – Installation 45 1.43E-03 0.00E+00 1.43E-03	C1 0.00E+00 0.00E+00 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02	C3/C4 4.40E-02 0.00E+00 4.40E-02	Loads beyond system boundary D 1.06E-03 0.00E+00 1.06E-03
PERE PERM PERT PENRE PENRM PENRT		Unit [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01	A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00	Manufacturing A3 3.04E+00 0.00E+00 3.04E+00 1.54E+01 2.54E-01	A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-03 2.18E-02 0.00E+00	C1 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00	Loads beyond system boundary D 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00
PERE PERM PERT PENRE PENRM PENRT SM RSF		Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [Kg] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19	A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+00 0.00E+00 5.36E-31	A3 3.04E+00 0.00E+00 3.04E+00 1.54E+01 2.54E-01 1.57E+01 0.00E+00 4.26E-12	A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 1.48E-30	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-03 2.18E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25	C1 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 6.38E-01 0.00E+00 4.40E-31	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23	Loads beyond system boundary 0 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 0.00E+00 0.00E+00
PENRM PENRT SM RSF NRSF		Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18	A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+01 0.00E+00 9.38E-31 9.58E-30	A3 3.04E+00 0.00E+00 3.04E+00 1.54E+01 2.54E-01 1.57E+01 0.00E+00 4.26E-12 5.02E-11	A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+02 0.00E+03	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-02 0.00E+00 2.18E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24	Demolition 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 6.38E-01 0.00E+00 4.40E-31 7.02E-30	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23 2.00E-22	Loads beyond system boundary 0 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 0.00E+00 0.00E+00
PERE PERM PERT PENRE PENRM PENRT		Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [Kg] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18 7.96E-03 PERE = Renew resources, PEI	Transport A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 6.02E-31 9.58E-30 1.87E-04 able primary ene WE = Non-rene'	A3 3.04E+00 0.00E+00 3.04E+00 1.54E+01 2.54E-01 1.57E+01 0.00E+00 4.26E-12	A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 1.48E-30 2.36E-29 2.58E-04 ier, PERM = Ren rgy as energy ca e of secondary r	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.02E-06 ewable primary en rrier, PENRM = NK	Demolition C1 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization; PERT mary energy as m	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23 2.00E+22 7.56E-05 = Total renewabl aterial utilization;	Loads beyond system boundary D 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 -3.26E-06 e primary energy PENRT = Total
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF FW		Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E+19 1.44E-18 7.96E-03 PERE = Renew resources, PEI non-renewable	A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 6.02E+31 9.58E-30 1.87E-04 able primary energy resprinted and	Manufacturing A3 3.04E+00 0.00E+00 3.04E+00 1.54E+01 1.57E+01 0.00E+00 4.26E+12 5.02E+11 4.14E-03 rgy as energy carr vable primary energy carr sources, SM = Us	A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 1.48E-30 2.36E-29 2.58E-04 ier, PERM = Ren rgy as energy ca se of secondary r FW =	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.02E-06 ewable primary et errier, PENRM = NK et SF = RE	Demolition C1 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization; PERT mary energy as m mary fuels; NRSF =	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23 2.00E-22 7.56E-05 = Total renewable	Loads beyond system boundary 0 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 0.00E+00 0.00E+00 -3.26E-06 te primary energy PENRT = Total secondary fuels;
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF FW	Environmer	Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18 7.96E-03 PERE = Renew resources, PEI	A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+00 0.00E+00 3.34E+00 0.00E+00 4.02E-31 9.58E-30 1.87E-04 able primary energy reprimary energy energy energy end/states end/sta	Manufacturing A3 3.04E+00 0.00E+00 3.04E+00 1.54E+01 2.54E-01 1.57E+01 0.00E+00 4.26E-12 5.02E-11 4.14E-03 rgy as energy carr aybe primary energy carr sources, SM = US ELOWS & WAP	Transport A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 1.48E-30 2.36E-29 2.56E-04 ier, PERM = Ren rgy as energy ca se of secondary r FW = STE CATEC te (GPS) Typ	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-03 2.18E-02 0.00E+00 2.18E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.002E-06 ewable primary et rriter, PENRM = Nk naterial; RSF = Re : Use of net fresh GORIE S for Fi e IX insulatio	Demolition C1 0.00E+00 unoregy as material unortional Un unctional Un	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization; PERT mary energy as m ary fuels; NRSF = it of 1 m ² of i ith a thickne	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23 2.00E-22 7.56E-05 = Total renewable nstalled Atla ss that gives	Loads beyond system boundary 0 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 -1.39E-02 0.00E+00E+00 0.00E+00 0.00E+00E+00E+00
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF FW	Environmer	Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18 7.96E+03 PERE = Renew resources, PEI non-renewable ers from LCA ing Neopor®	A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+00 0.00E+00 3.34E+00 0.00E+00 4.02E-31 9.58E-30 1.87E-04 able primary energy reprimary energy energy energy end/states end/sta	Manufacturing A3 3.04E+00 0.00E+00 3.04E+00 1.54E+01 2.54E-01 1.57E+01 0.00E+00 4.26E-12 5.02E-11 4.14E-03 rgy as energy carr aybe primary energy carr sources, SM = US ELOWS & WAP	Transport A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 1.48E-30 2.36E-29 2.56E-04 ier, PERM = Ren rgy as energy ca se of secondary r FW = STE CATEC te (GPS) Typ	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-03 2.18E-02 0.00E+00 2.18E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.002E-06 ewable primary et rriter, PENRM = Nk naterial; RSF = Re : Use of net fresh GORIE S for Fi e IX insulatio	Demolition C1 0.00E+00 unoregy as material unortional Un unctional Un	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization; PERT mary energy as m ary fuels; NRSF = it of 1 m ² of i ith a thickne	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23 2.00E-22 7.56E-05 = Total renewable nstalled Atla ss that gives	Loads beyond system boundary 0 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 -1.39E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 1.32EE-06 te primary energy PENRT = Total secondary fuels; S an average). Benefits and Loads beyond system
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF FW Caption	Environmer	Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18 7.96E-03 PERE = Renew resources: PEI non-renewable ers from LCA ing Neopor® of 1 m ² -K/W Raw material	A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 6.02E-31 9.58E-30 1.87E-04 able primary energy re POUTPUT F Plus Graphi (5.68 ft ² *hr.*F	Manufacturing A3 3.04E+00 0.00E+00 3.04E+01 2.54E+01 1.57E+01 0.00E+00 4.26E-12 5.02E+11 4.14E-03 97 as energy carr vable primary energy carr vable primary energy carr Sources: SM = US ELOWS & WA te Polystyrer F/BTU per incomposition	A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 1.48E-30 2.36E-29 2.58E-04 ier, FERM = Ren rgy as energy ca se of secondary r FW = ASTE CATECO ier (GPS) Typp ch) with a but	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.02E-06 evvable primary et miter, PENRM = Nr. alterial; RSF = Re Use of net fresh ORIES for Fi e IX insulation ilding service	Demolition C1 0.00E+00 0.	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization, PERT mary energy as m mary fuels; NRSF = it of 1 m ² of i ith a thickne ars (packagi	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23 2.00E-22 7.56E-05 = Total renewable nstalled Atla ss that gives ng included	Loads beyond system boundary 0 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 -1.39E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 -3.26E-06 le primary energy PENRT = Total secondary fuels; s an average). Benefits and Loads beyond
PERE PERM PERT PENRE PENRM PENRT SM RSF FW Caption Caption	Environmer	Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18 7.96E+03 PERE = Renew resources; PEI non-renewable ers from LCA ing Neopor® of 1 m ²⁺ K/W Raw material supply	Transport A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+01 0.00E+00 2.34E+01 0.00E+00 1.37E-04 able primary energy reprimary energy reprimary energy reprimary energy for the start of the start	Manufacturing A3 3.04E+00 0.00E+00 3.04E+01 2.54E+01 1.57E+01 0.00E+00 4.26E-12 5.02E+11 4.14E-03 rgy as energy carr asble primary energy carr sources; SM = Us FLOWS & WAP te Polystyrer //BTU per inc Manufacturing	Transport A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 1.48E-30 2.36E-29 2.58E-04 ier, PERM = Ren regy as energy ca se of secondary r FW = e (GPS) Type ch) with a bu Transport	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-03 2.18E-02 0.00E+00 2.18E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.02E-06 ewable primary err errer, PENRM = Nc aterial; RSF = Re Use of net fresh CORIES for Fr CORIES for Fr CORIES for Fr CORIES for Fr Construction – Installation	Demolition C1 0.00E+00 0.	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization; PERT utilization; PERT itt of 1 m ² of i itt a thickne ars (packagi Transport	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 1.70E-23 2.00E+22 7.56E-05 = Total renewable nstalled Atla ss that gives ng included Disposal	Loads beyond system boundary D 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF FW Caption Caption Parameter HWD NHWD	Environmer	Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18 7.96E-03 PERE = Renew resources; PEI non-renewable ers from LCA ing Neopor® of 1 m ²⁻ K/W Raw material supply A1 1.61E-08 1.63E-01	Transport A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+00 0.00E+00 1.87E-04 able primary energy reprimary energy reprimary energy reprimary energy for a start of the start of	Manufacturing A3 3.04E+00 0.00E+00 3.04E+01 1.54E+01 2.54E-01 1.57E+01 0.00E+00 4.26E-12 5.02E-11 4.14E-03 gy as energy carr vable primary energy carr vable primary energy carr vable primary energy carr sources; SM = US FLOWS & WAP te Polystyrer /BTU per inc Manufacturing A3 7.16E-09 6.30E-02	Transport A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+01 0.00E+00 2.14E+02 0.00E+03 2.36E-29 2.58E-04 1er, FERM = Renergy as energy as end as e	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-03 2.18E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.02E-06 wable primary er iner, PENRM = Nr naterial; RSF = Re Use of net fresh SORIES for FT installation A5 8.66E-11 2.42E-02	Demolition C1 0.00E+00 Demolition C1 0.00E+00 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization; PERT mary energy as m ary fuels; NRSF = it of 1 m ² of i ith a thickne ars (packagi Transport C2 4.96E-09 2.40E-05	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 1.70E-23 2.00E+22 7.56E-05 = Total renewable nstalled Atla ss that gives included Disposal C3/C4 2.14E-09 8.82E-01	Loads beyond system boundary D 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 Secondary fuels; S Benefits and Loads beyond system b Benefits and Loads beyond system b D C C C C C C C C C C C C C C C C C C
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF Caption Caption Parameter HWD NHWD RWD	Environmer	Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18 7.96E-03 PERE = Renew resources: PEI non-renewable ers from LCA ing Neopor® of 1 m ²⁺ K/W Raw material supply A1 1.61E-08 1.63E-01 2.32E-04	Transport A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 6.02E-31 9.58E-30 1.87E-04 Plus Graphi (5.68 ft ² *hr.*F Transport A2 7.04E-09 1.17E-04 2.40E-05	Manufacturing A3 3.04E+00 0.00E+00 3.04E+00 1.54E+01 2.54E-01 1.57E+01 0.00E+00 4.26E-12 5.02E-11 4.14E-03 gy as energy carr wable primary energy carr wable primary energy carr sources; SM = US FLOWS & WA te Polystyrer F/BTU per inc Manufacturing A3 7.16E-09 6.30E-02 4.24E-04	Transport A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+01 0.00E+00 2.14E+01 0.00E+00 1.48E-30 2.36E-29 2.58E-04 efer, FERM = Ren regy as energy ca ef GPS) Typp che (GPS) Typ ch) with a bu Transport A4 1.67E-08 8.06E-05 4.72E-06	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.02E-06 0.24E-24 4.02E-06 Use of net fresh corte from service ilding service Construction – Installation A5 8.66E-11 2.42E-02 2.04E-07	Demolition C1 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization; PERT mary energy as m ary fuels; NRSF = it of 1 m ² of i ith a thickne ars (packagi Transport C2 4.96E-09 2.40E-05 1.40E-06	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23 2.00E-22 7.56E-05 = Total renewable nstalled Atla ss that gives included Disposal C3/C4 2.14E-09 8.82E-01 6.40E-06	Loads beyond system boundary 0 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 secondary fuels; S an average). Benefits and Loads beyond system boundary D -6.10E-12 -3.34E-06 -8.66E-07
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF Caption Caption Parameter HWD NHWD RWD CRU	Environmer	Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18 7.96E-03 PERE = Renew resources: PEI non-renewable ers from LCA ing Neopor® of 1 m ²⁻ K/W Raw material supply A1 1.61E-08 1.63E-01 2.32E-04 0.00E+00	Transport A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+01 0.00E+00 6.02E-31 9.58E-30 1.87E-04 phmary energy removes the energy re	Manufacturing A3 3.04E+00 0.00E+00 3.04E+00 1.54E+01 2.54E-01 1.57E+01 0.00E+00 4.26E-12 5.02E-11 4.14E-03 gy as energy carr wable primary energy carr wable primary energy carr wable primary energy carr wable primary energy carr sources; SM = US ELOWS & WA te Polystyrer F/BTU per inc Manufacturing A3 7.16E-09 6.30E-02 4.24E-04 0.00E+00	Transport A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+01 0.00E+00 2.14E+01 0.00E+00 1.48E-30 2.36E-29 2.58E-04 regy as energy ca regy as energy ca STE CATEC Transport A4 1.67E-08 8.06E-05 4.72E-06 0.00E+00	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.02E-06 evable primary er inger, PENRM = Ni aderial; RSF = Re Use of net fresh SORIES for Fi ne IX insulation Idding service Construction – Installation A5 8.66E-11 2.42E-02 2.04E-07 0.00E+00	Demolition C1 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization; PERT mary energy as m ary fuels; NRSF = it of 1 m ² of i ith a thickne ars (packagi Transport C2 4.96E-09 2.40E-05 1.40E-06 0.00E+00	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23 2.00E-22 7.56E-05 = Total renewable aterial utilization, Non-renewable nstalled Atla ss that gives ing included Disposal C3/C4 2.14E-09 8.82E-01 6.40E-06 0.00E+00	Loads beyond system boundary 0 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 secondary fuels; Bana verage b Benefits and Loads beyond system boundary D -6.10E-12 -3.34E-06 -8.66E-07 0.00E+00
PERE PERM PERT PENRE PENRT SM RSF NRSF FW Caption Caption Parameter HWD NHWD RWD CRU	Environmer	Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18 7.96E-03 PERE = Renew resources: PEI non-renewable ers from LCA ing Neopor® of 1 m ²⁺ K/W Raw material supply A1 1.61E-08 1.63E-01 2.32E-04 0.00E+00	Transport A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 6.02E-31 9.58E-30 1.87E-04 able primary energy re POUTPUT F Plus Graphi (5.68 ft ²⁺ hr.*F Transport A2 7.04E-09 1.17E-04 2.40E-05 0.00E+00	Manufacturing A3 3.04E+00 0.00E+00 3.04E+01 2.54E-01 1.57E+01 0.00E+00 4.26E-12 5.02E-11 4.14E-03 3.04 primary energy carry vable primary energy carry vable primary energy carry vable primary energy carry as energy as end as end as energy as energy as energy	Transport A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 1.48E-30 2.36E-29 2.58E-04 ier, PERM = Ren rgy as energy ca es of secondary r FW = ASTE CATECO De (GPS) Typp ch) with a bu Transport A4 1.67E-08 8.06E-05 4.72E-06 0.00E+00	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-03 2.18E-02 0.00E+00 2.18E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.02E-06 evable primary en rriter, PENRM = Nr. alterial; RSF = Ré construction – Installation A5 8.66E-11 2.42E-02 2.04E-07 0.00E+00 0.00E+00	Demolition C1 0.00E+00 0.00E+01 0.00E+02 Demolition C1 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization; PERT mary energy as m ary fuels; NRSF = it of 1 m ² of i ith a thickne ars (packagi Transport C2 4.96E-09 2.40E-05 1.40E-06 0.00E+00 0.00E+00	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23 2.00E-22 7.56E-05 = Total renewable rotal renewable nstalled Atla ss that gives ing included Disposal C3/C4 2.14E-09 8.82E-01 6.40E-06 0.00E+00 0.00E+00	Loads beyond system boundary 0 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.326E-06 E primary energy PENRT = Total secondary fuels; S an average b Benefits and Loads beyond system boundary D -6.10E-12 -3.34E-06 -8.66E-07 0.00E+00 0.00E+00
PERE PERM PERT PENRE PENRM PENRT SM RSF NRSF Caption Caption Parameter HWD NHWD RWD CRU	Environmer	Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18 7.96E-03 PERE = Renew resources; PEI non-renewable ers from LCA ing Neopor® of 1 m ²⁺ K/W Raw material supply A1 1.61E-08 1.63E-01 2.32E-04 0.00E+00 0.00E+00	Transport A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 2.34E+00 0.00E+00 6.02E-31 9.58E-30 1.87E-04 Able primary energy re POUTPUT F Plus Graphi (5.68 ft ²⁺ hr.*F Transport A2 7.04E-09 1.17E-04 2.40E-05 0.00E+00 0.00E+00	Manufacturing A3 3.04E+00 0.00E+00 3.04E+01 2.54E-01 1.57E+01 0.00E+00 4.26E-12 5.02E-11 4.14E-03 97 as energy carr wable primary energy carr wable primary energy carr FLOWS & WAP te Polystyrer F/BTU per inco Manufacturing A3 7.16E-09 6.30E-02 4.24E-04 0.00E+00 0.00E+00	Transport A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 1.48E-30 2.36E-29 2.58E-04 167; FERM = Ren ergy as energy ca se of secondary r FW STE CATEC (GPS) Typ ch) with a bu Transport A4 1.67E-08 8.06E-05 4.72E-06 0.00E+00 0.00E+00 0.00E+00	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-03 2.18E-02 0.00E+00 2.18E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.02E-06 evable primary er micr, PENRM = Ni naterial, RSF = R& Use of net fresh Construction – Installation A5 8.66E-11 2.42E-02 2.04E-07 0.00E+00 0.00E+00	Demolition C1 0.00E+00 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization; PERT mary energy as m ary fuels; NRSF = it of 1 m ² of i ith a thickne ars (packagi Transport C2 4.96E-09 2.40E-05 1.40E-05 1.40E-06 0.00E+00 0.00E+00 0.00E+00	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23 2.00E-22 7.55E-05 = Total renewable stalled Atla ss that gives ng included Disposal C3/C4 2.14E-09 8.82E-01 6.40E-06 0.00E+00 0.00E+00 0.00E+00	Loads beyond system boundary 0 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 -1.39E-02 0.00E+00 0
PERE PERM PERT PENRE PENRM PENRT SM RSF FW Caption Caption Parameter HWD NHWD RWD CRU MFR	Environmer	Unit [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	Raw material supply A1 9.62E-01 0.00E+00 9.62E-01 4.26E+01 3.78E+01 8.04E+01 0.00E+00 1.22E-19 1.44E-18 7.96E-03 PERE = Renew resources: PEI non-renewable ers from LCA ing Neopor® of 1 m ²⁺ K/W Raw material supply A1 1.61E-08 1.63E-01 2.32E-04 0.00E+00	Transport A2 5.36E-02 0.00E+00 5.36E-02 2.34E+00 0.00E+00 2.34E+00 0.00E+00 6.02E-31 9.58E-30 1.87E-04 able primary energy re POUTPUT F Plus Graphi (5.68 ft ²⁺ hr.*F Transport A2 7.04E-09 1.17E-04 2.40E-05 0.00E+00	Manufacturing A3 3.04E+00 0.00E+00 3.04E+01 2.54E-01 1.57E+01 0.00E+00 4.26E-12 5.02E-11 4.14E-03 3.04 primary energy carry vable primary energy carry vable primary energy carry vable primary energy carry as energy as end as end as energy as energy as energy	Transport A4 5.30E-02 0.00E+00 5.30E-02 2.14E+00 0.00E+00 2.14E+00 0.00E+00 2.14E+00 0.00E+00 1.48E-30 2.36E-29 2.58E-04 ier, PERM = Ren rgy as energy ca es of secondary r FW = ASTE CATECO De (GPS) Typp ch) with a bu Transport A4 1.67E-08 8.06E-05 4.72E-06 0.00E+00	Construction – Installation A5 1.43E-03 0.00E+00 1.43E-03 2.18E-02 0.00E+00 2.18E-02 0.00E+00 2.18E-02 0.00E+00 5.32E-25 6.24E-24 4.02E-06 evable primary en rriter, PENRM = Nr. alterial; RSF = Ré construction – Installation A5 8.66E-11 2.42E-02 2.04E-07 0.00E+00 0.00E+00	Demolition C1 0.00E+00 0.00E+01 0.00E+02 Demolition C1 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00	C2 1.58E-02 0.00E+00 1.58E-02 6.38E-01 0.00E+00 6.38E-01 0.00E+00 4.40E-31 7.02E-30 7.68E-05 utilization; PERT mary energy as m ary fuels; NRSF = it of 1 m ² of i ith a thickne ars (packagi Transport C2 4.96E-09 2.40E-05 1.40E-06 0.00E+00 0.00E+00	C3/C4 4.40E-02 0.00E+00 4.40E-02 6.24E-01 0.00E+00 6.24E-01 0.00E+00 1.70E-23 2.00E-22 7.56E-05 = Total renewable rotal renewable nstalled Atla ss that gives ing included Disposal C3/C4 2.14E-09 8.82E-01 6.40E-06 0.00E+00 0.00E+00	Loads beyond system boundary 0 1.06E-03 0.00E+00 1.06E-03 -1.39E-02 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.00E+00 0.326E-06 E primary energy PENRT = Total secondary fuels; S an average b Benefits and Loads beyond system boundary D -6.10E-12 -3.34E-06 -8.66E-07 0.00E+00 0.00E+00





6.0 LCA: Interpretation

All environmental impact categories are significantly influenced by the provision of raw materials and the production process. The polystyrene used in the production process already contains a large part of the environmental burden. For the impact categories GWP, EP, AP, ADP (element & fossil) and POCP the granule production and transport is responsible for about 55% to 85% of the impact. Manufacturing of the insulation board (A3) also contributes significantly to GWP due to the energy requirements during production and POCP due to the pentane emissions during the product foaming and aging processes. The ozone depletion potential (ODP) is largely caused by the production of polystyrene granules and the production of the insulation board (> 95% of the impact). Transport of the Neopor® F5300 Plus GPS resin from BASF's Ludwigshafen, Germany plant to

6.1 VOC emissions

Like it is the case for all EPS products insulation boards, Atlas ThermalStar® GX featuring Neopor® Plus Graphite Polystyrene (GPS) can be used for indoor applications, however they typically are not directly exposed to the indoor air but covered by some kind of covering layer such as gypsum board.

To make it easier for architects and developers to find low-emission materials, the Greenguard label indicates products that meet the strict emissions limits for Volatile Organic Compounds (VOCs). There are limits for over 360 VOCs. All insulation boards with Neopor® PLUS GPS meet not only the demanding criteria of the Greenguard certificate, but also the requirements of the Californian Department of Public Health Services. As a result, the raw material has been given the Greenguard Gold label, which means it may also be used in schools and health facilities accommodating children or elderly people, in addition to commercial buildings.

Manufacturers producing Neopor® Plus GPS insulation boards can also benefit from the certification of the raw material; by applying for an extended license from UL (Underwriter Laboratories), they can have their product labeled as protective of health for indoor spaces.

6.2 Leaching performance

Leaching behavior is not relevant for Neopor® Plus GPS insulation board.

Atlas EPS's North American manufacturing locations contributes appreciably to the impact categories of AP, EP, GWP and POCP.

The effort (input of additional energy and material) for the end-of-life scenario (C3/C4) and the resulting credits in form of electricity and steam due to the capture and utilization of landfill gas are considered separately. Any benefits result in negative values in module D. Though no appreciable benefits are realized in this assessment.

Transports other than A2, (A4 and C2) have a minor influence on all impact categories compared to the contributions from the other areas.





GRAPHITE ENHANCED EXPANDED POLYSTYRENE





7.0 References

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NFPA 286

Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth

Neopor[®] Picture Front Page and Page 3 BASF Wohnen + Bauen GmbH

Neopor[®] Plus GPS Manufacturing process schematic (page 4)

Adapted form EPS IA EPS Insulation EPD Declaration No. 4787238561.101.1 8/10/2017

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ThermalStar® GX Insulation and Construction Photos

Atlas EPS BASF SE

