

ENVIRONMENTAL PRODUCT DECLARATION

M2 TECH TYPE X 5/8" GYPSUM BOARD

CERTAINTEED GYPSUM
CALGARY, AB



The M2Tech Moisture and Mold Resistant Advantage:

- Specially engineered to provide enhanced protection against mold growth
- Type X for enhances fire resistance
- Achieves the best possible score of 10 for mold resistance per ASTM D3273
- Achieves the best possible score of 0 for mold resistance per ASTM G21
- Achieves less than 5% water absorption by weight after 2-hour immersions, as per ASTM C473 test method
- GREENGUARD Gold Certification

CertainTeed
SAINT-GOBAIN

Architects, contractors and manufacturers continue to look for ways to reduce our industry's impacts on the environment while meeting customer demand for products that deliver beauty, comfort and performance. CertainTeed Gypsum, the leader in innovative drywall and performance wallboards, has the products to make you property healthier, quieter and more comfortable.

CertainTeed Gypsum operates its manufacturing facilities with a responsible and environmentally conscious ethic that includes reclamation, preservation of natural resources, recycling and waste management. CertainTeed, and Saint-Gobain, are committed to providing sustainable building products and to limiting our impacts on the environment while doing so. (See our CSR at <https://www.saint-gobain.com/en/commitments/saint-gobains-csr-commitments>.)

For more information visit:
www.CertainTeed.com



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M2 Tech Type X 5/8" Gypsum Board
Calgary, AB

According to ISO 14025/44/40 Series and ISO 21930:2017

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. **Exclusions:** EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. **Accuracy of Results:** EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. **Comparability:** EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.



| | | |
|---|--|--|
| PROGRAM OPERATOR | UL Environment | |
| DECLARATION HOLDER | CertainTeed Gypsum, Inc. • 20 Moores Road • Malvern, PA 19355 • USA | |
| DECLARATION NUMBER | 4789532059.101.1 | |
| DECLARED PRODUCT | M2 Tech Type X 5/8" Gypsum Board – Calgary, AB | |
| REFERENCE PCR | NSF International PCR for Gypsum Panel Products v.1e October 2019 | |
| REFERENCE PCR STANDARD | <input type="checkbox"/> EN 15804 (2012) <input type="checkbox"/> ISO 21930 (2007) <input checked="" type="checkbox"/> ISO 21930 (2017) | |
| DATE OF ISSUE | July 1, 2020 | |
| PERIOD OF VALIDITY | 5 Years | |
| CONTENTS OF THE DECLARATION | Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications | |
| The PCR review was conducted by: | NSF International PCR Peer Review Panel ncss@nsf.org | |
| This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL | Grant R. Martin, UL Environment | |
| This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by: | Thomas Gloria, Ph.D., Industrial Ecology Consultants | |

This EPD conforms with ISO 21930:2017



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Product Documentation

Product Description

M2Tech Type X Gypsum Board is a moisture and mold resistant gypsum board designed for use on interior walls and ceilings to provide enhanced moisture and mold resistance for fire-rated assemblies. It is comprised of a specially formulated moisture resistant core and encased in 100% recycled content moisture and mold resistant light violet colored face paper and bronze colored back paper. M2Tech Type X Gypsum board is used for new and renovation construction in residential commercial and institutional applications over wood and steel framing. M2Tech Type X Gypsum Boards may be finished, painted, textured or wallpapered following standard gypsum board techniques. M2Tech Type X Gypsum board is used for new and renovation construction in residential, commercial and institutional applications over wood and steel framing up to 24" o.c. (610 mm) in UL/cUL/ULC fire-rated designs.

The CertainTeed M2Tech Moisture and Mold Type X Advantage:

- Fire resistance ratings up to four hours
- M2Tech Technology provides additional zone of protection against moisture and mold
- Achieves best possible score of 10 (no mold growth) for mold resistance per ASTM D3273
- Less than 5% total water absorption by weight after 2-hour immersion per ASTM C473
- 100% recycled content moisture and mold resistant face and back paper
- GREENGUARD Gold Certified
- Consistently high quality
- Uniformly flat, attractive appearance; no shadows
- High edge hardness
- No wavy edges, warps, bows or deformities
- Uniform high-strength cores eliminate crumbling and cracking
- Edge tapers consistent to form perfect joints
- Excellent thermal barrier and sound attenuation qualities



Application

Gypsum board products provide multiple functions including wall covering, creating a barrier that controls noise, air, water and thermal transmission between the external environment and the interior space of a building, as well as other functions such as load carrying capacity, thermal mass and aesthetics.



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Technical Data

| Technical Data M2 Tech Type X 5/8" | |
|---|--|
| Thickness | 5/8" (15.9mm) |
| Width | 4' (1220 mm) |
| Length | 8', 10', 12' (2440mm, 3050mm, 3660 mm) |
| Weight | 2.2 lbs/ft ² (10.7 kg/m ²) |
| UNSPSC Code | 301615 |
| CSI Code | 092900 |
| Flame Spread Rating (ASTM E84, CAN/ULC-S102) | 5 |
| Smoke Developed Rating (ASTM E84, CAN/ULC-S102) | 5 |
| UL & ULC Fire Resistance (ASTM E119) | Yes |
| Mold Resistance score (ASTM D3273) | 10 |
| Mold Resistance score (ASTM G21) | 0 |
| Water absorption (ASTM C473) | 5% |
| Applicable Standards and References | |
| ASTM C1396 | Standard Specification for Gypsum Board: Type X Standard |
| CAN/CSA-A82.27 | Gypsum Board |
| ASTM C840 | Standard Specification for Application and Finishing of Gypsum Board |
| CAN/CSA-A82.31 | Gypsum Board Application |
| Gypsum Association GA-216 | Application and Finishing of Gypsum Panel Products |
| Gypsum Association GA-214 | Quick Reference Guide Levels of Finish |
| ICC International Building Code (IBC) | |
| ICC International Residential Code (IRC) | |
| National Building Code of Canada (NBCC) | |

Table 1: Technical Data and Applicable Standards for CertainTeed M2 Tech Type X 5/8" Gypsum Board



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Calgary, AB

According to ISO 14025/44/40 Series and ISO 21930

Description of Organization

This EPD is specific to the M2 Tech Type X Gypsum Board manufactured at the CertainTeed Gypsum facility in Calgary, AB.

- CertainTeed Gypsum
6715 Ogden Dale Road SE
Calgary, AB T2C 2A4

The Calgary, AB manufacturing facility operates integrated Environmental, Health, and Safety Management Systems that align with the ISO 14001 and ISO 45001 standards.

Flow Diagram

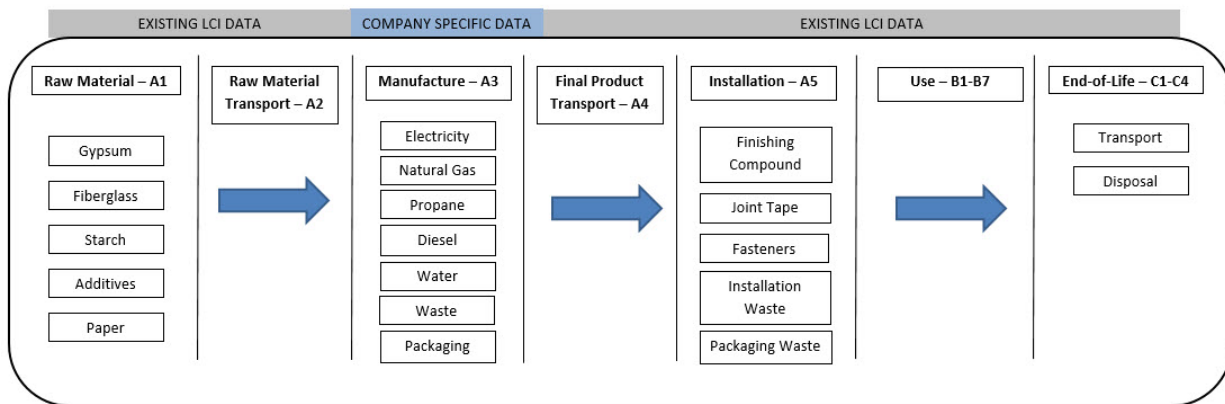


Figure 1: Life Cycle Boundary Flow Diagram

Material Content

| Component | M2 Tech Type X 5/8" |
|----------------------------|---------------------|
| Internally recycled Gypsum | 7.54% |
| Natural Gypsum | 86.73% |
| Fiberglass | 0.20% |
| Starch | 0.42% |
| Silicone | 0.53% |
| Additives | 0.31% |
| Paper facings | 4.28% |
| Total kg/FU: | 1034 |

Table 2: Material Content for CertainTeed M2 Tech Type X 5/8" Gypsum Board (Calgary, AB)



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Methodological Framework

Functional Unit

| Functional Unit = 92.9 m ² (1000 ft ²) | | |
|---|--------------|------------------|
| Product | Mass (kg/FU) | Thickness (cm) |
| M2 Tech Type X Gypsum Board | 1034 | 1.5875 cm (5/8") |

Table 3: Functional Unit

Reference Service Life

The Reference Service Life used in the study is 75 years, as specified in the PCR.

System Boundary

The life cycle analysis performed for this EPD is classified as a “cradle-to-grave” study. The system boundary includes raw material supply, manufacture, and transport; the M2 Tech Type X Gypsum Board manufacture in Calgary, AB, and packaging; product transportation to building site; installation; use phase, and product end-of-life.

| Description of the System Boundary (X=included in LCA; MND=module not declared) | | | | | | | | | | | | | | | | |
|---|-----------|---------------|-------------------------------------|--------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|------------------|----------|---|
| Product Stage | | | Construction Process Stage | | Use Stage | | | | | | | End of Life Stage | | | | Benefits & Loads Beyond System Boundaries |
| Raw Material Supply | Transport | Manufacturing | Transport from the gate to the site | Installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational Energy Use | Operational Water Use | De-construction demolition | Transport | Waste Processing | Disposal | Reuse-Recover-Recycling Potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | MND |

Table 4: System Boundary



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Allocation

There are several facilities in the United States and Canada that produce gypsum board product lines for CertainTeed. Each of the facilities produces multiple types of gypsum board. Allocation within each facility was conducted based on the machine hour run time production data provided by the facilities and the central CertainTeed Gypsum product team. This EPD is specific to the M2 Tech Type X Gypsum Board produced at the Calgary, AB facility.

Cut-Off Criteria

The cut-off criteria established for the study include materials, energy, and emissions data. For the purposes of this study, the criteria are as follows:

- Mass – Chemicals with a combined weight less than 1% of the mass of the modeled product may be excluded, providing its environmental relevance is not a concern.
- Hazardous substances as defined by the U.S. Resource Conservation and Recovery Act (RCRA), will be included if representing more than 0.1% of the product composition.
- Human activity factors were not included in the scope of this study.
- Capital equipment factors were not included in the scope of this study.

Data Sources

GaBi version 9.2 software system was used for modeling the life cycle of the CertainTeed M2 Tech Type X Gypsum Board products. Each background dataset was taken from the GaBi Thinkstep US Ecoinvent, USLCI databases, and Ecoinvent v3.

Data Quality

Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty. The data sources used are complete and representative of North America and Europe (depending on the material source) in terms of the geographic and technological coverage and are less than 10 years old. Any deviations from these initial data quality requirements for secondary data are documented in the report. Overall, the primary data from the manufacturing location is of very high quality, being directly tracked and measured by facility personnel. Secondary data sets are of fair-to-good quality.

Period Under Review

Data for this LCA was collected for the 2019 calendar year.



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Estimates and Assumptions

Estimates and assumptions are required in life cycle analysis to constrain the project boundary or model when little or not data is available. In this study of CertainTeed M2 Tech Type X Gypsum Board, any estimates or assumptions made are appropriately documented in the background report.

Comparability

Comparison of the environmental performance of building and construction products using EPD information shall be based on the product's use and impacts at the building level. In general, EPDs may not be used for comparability purposes when not considered in a building context. As noted in the PCR, only EPDs generated from cradle-to-grave life cycle results and based on the same function, RSL, quantified by the same functional unit, and meeting all the conditions for comparability listed in ISO 14025:2006 and ISO 21930:2017 can be used to compare between products.

Technical Information and Scenarios

Manufacturing (A3)

The process begins with internally recycled gypsum material added to the natural gypsum raw material. Water is then added to produce a stucco slurry. Additional additives are mixed with the slurry as indicated by the specific product recipe. Large rolls of the facing and backing paper are loaded onto spools that feed the manufacturing line. The backing paper is fed through first, the slurry is applied to the backing paper, and then the facing paper is fed through the line and applied on top of the slurry. The wet board is fed through rollers to ensure proper thickness and allow the material set. The boards are then cut to length and aligned for processing through the ovens for the remainder of the drying process. After drying in the ovens, the boards are stacked by two, with end tape applied for shipping.

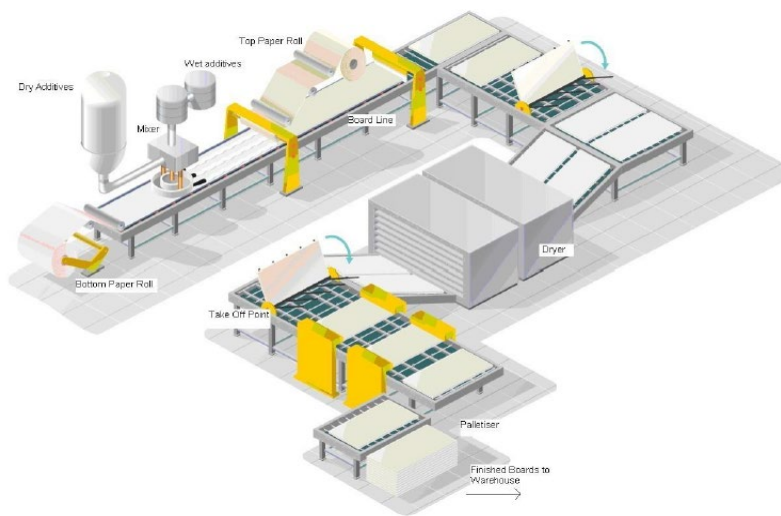


Figure 2: Gypsum Board Manufacturing Diagram



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Packaging (A3)

Packaging of the final product after production is included in the life cycle assessment. Packaging material includes the end tape applied at the end of the manufacturing process, as well as spacers used to stack the boards at varying heights for easier loading and unloading. The spacers used in the packaging are made at the manufacturing facility using rejected boards from the manufacturing process.

Transportation (A4)

Final products are transported via truck throughout North America. Distances and modes of transport for final product transportation are specified in the PCR.

| Information | Unit | Value |
|-------------------|---|-------------------|
| Type of transport | Product shipping to distribution center | |
| Type of vehicle | Commercial tractor-trailer truck | |
| Distance | km | 448 |
| Fuel type | Diesel | |
| Amount of fuel | liters | 1792 (4 L/km) |
| Information | Unit | Value |
| Type of transport | Product shipping to distribution center | |
| Type of vehicle | Rail | |
| Distance | km | 208 |
| Fuel type | Diesel | |
| Amount of fuel | liters | 1830.4 (8.8 L/km) |
| Information | Unit | Value |
| Type of transport | Product shipping to construction site | |
| Type of vehicle | Single unit truck | |
| Distance | km | 40 |
| Fuel type | Diesel | |
| Amount of fuel | liters | 160 (4 L/km) |

Table 5: Final Product Transportation (A4)



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Installation (A5)

The Gypsum Panel PCR specifies the default on-site installation waste scenario is 10% of the installed surface area. The PCR also specifies ancillary materials required for installation of gypsum panels as joint compound, joint tape, and fasteners. This study used the installation calculator located on the CertainTeed Gypsum website to calculate the amount of ancillary materials required for installation. In addition, disposal of the packaging material is included in the installation phase.

| Installation (A5) | Unit | M2 Tech Type X 5/8" |
|---|----------------|---------------------|
| Product loss | kg | 103.4 |
| Ancillary materials | kg | 60.573 |
| <i>Joint Compound</i> | kg | 56.70 |
| <i>Joint Tape</i> | kg | 0.873 |
| <i>Fasteners</i> | kg | 3.00 |
| Electricity consumption | kWh | 0 |
| Other energy consumption | kWh | 0 |
| Water consumption | m ³ | 0 |
| Direct emissions to ambient air, soil, and water | kg | 0 |
| Waste materials as output from installation process | kg | 103.4 |

Table 6: Installation (A5)

| Information | Unit | M2 Tech Type X 5/8" |
|---|---|---------------------|
| Mass of packaging waste | kg | 1.938 |
| Type of packaging waste | Non-hazardous co-mingled construction waste to landfill | |
| Biogenic carbon content of packaging (where relevant) | kg CO ₂ eq | 0.021 |

Table 7: Packaging Waste (A5)



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Use (B1-B7)

As specified in the PCR, gypsum panel products are assumed to have no material or energy inputs or emissions during the use (B1), maintenance (B2), repair (B3), replacement (B4), or refurbishment (B5) life cycle stages. The PCR also specifies that gypsum panel products are assumed to have no operational energy use (B6) and no operational water use (B7) during the use phase of the life cycle.

| Maintenance (B2) | Unit | M2 Tech Type X 5/8" |
|--|----------------|---------------------|
| Information on maintenance | - | None required |
| Maintenance cycle | Number/RSL | 0 |
| Water consumption | m ³ | 0 |
| Ancillary inputs for maintenance | kg | 0 |
| Other resources | kg | 0 |
| Electricity consumption | MJ | 0 |
| Other energy carriers | MJ | 0 |
| Waste materials resulting from maintenance | kg | 0 |

Table 8: Maintenance (B2)

| Repair (B3) | Unit | M2 Tech Type X 5/8" |
|---------------------------------------|----------------|---------------------|
| Information on repair process | - | None required |
| Repair cycle | Number/RSL | 0 |
| Water consumption | m ³ | 0 |
| Ancillary inputs for repair | kg | 0 |
| Other resources | kg | 0 |
| Electricity consumption | MJ | 0 |
| Other energy carriers | MJ | 0 |
| Waste materials resulting from repair | kg | 0 |

Table 9: Repair (B3)



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| Replacement (B4) | Unit | M2 Tech Type X 5/8" |
|--|------------|---------------------|
| Information on replacement process | - | None required |
| Replacement cycle | Number/RSL | 0 |
| Material inputs for replacement | kg | 0 |
| Electricity consumption | MJ | 0 |
| Waste materials resulting from replacement | kg | 0 |

Table 10: Replacement (B4)

| Refurbishment (B5) | Unit | M2 Tech Type X 5/8" |
|--|------------|---------------------|
| Information on refurbishment process | - | None required |
| Refurbishment cycle | Number/RSL | 0 |
| Material inputs for refurbishment | kg | 0 |
| Electricity consumption | MJ | 0 |
| Waste materials resulting from refurbishment | kg | 0 |

Table 11: Refurbishment (B5)

| Operational Energy Use (B6) | Unit | M2 Tech Type X 5/8" |
|-----------------------------|----------------|---------------------|
| Electricity consumption | MJ | 0 |
| Operational Water Use (B7) | Unit | M2 Tech Type X 5/8" |
| Water consumption | m ³ | 0 |

Table 12: Operational Energy and Water Use (B6-B7)



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End of Life (C1-C4)

The PCR supports the scenario for industry practices that all gypsum panel products shall be disposed in an appropriate construction and demolition landfill at the end of life. At this time, there are no known scenarios for the deconstruction of gypsum boards from the building at the end of life, although the PCR requires inclusion of the energy required for deconstruction and dust released in the air. The deconstruction module (C1) for this study is assumed to use 0.05 MJ of energy in order to be consistent with previous CertainTeed Gypsum Board studies. At this time, there is no known method for distinguishing gypsum board dust from the overall dust generated in the demolition of a building, so the deconstruction module assumed no dust generated. The PCR also specifies the assumption that no gypsum panel waste goes to a waste processing facility prior to disposal in a landfill, so the waste processing module (Module C3) is assumed to be burden free. The product's end-of-life disposition is assumed to be inert in a landfill per the PCR. Disposal in an appropriate construction and demolition landfill or in commercial incineration facilities is permissible and should be done in accordance with local, provincial, and federal regulations.

| Parameter | | Unit | Value |
|--------------------------------------|--|------|---|
| Assumptions for scenario development | | - | Disposal inert in landfill transported by truck |
| End of Life (C1-C4) | | | M2 Tech Type X 5/8" |
| Deconstruction | Energy use | MJ | 0.05 |
| Collection Process | Collected separately | kg | 0.00 |
| | Collected with mixed construction waste | kg | 930.7 |
| Recovery | Reuse | kg | 0.00 |
| | Recycling | kg | 0.00 |
| | Landfill | kg | 0.00 |
| | Incineration | kg | 0.00 |
| | Incinerations with energy recovery | kg | 0.00 |
| | Energy conversion efficiency rate | - | 0.00 |
| Disposal | Product or material for final deposition | kg | 930.7 |

Table 13: End-of-Life (C1-C4)



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According to ISO 14025/44/40 Series and ISO 21930

LCA Results

TRACI Impact Assessment Indicators (North America)

M2 Tech Type X Gypsum Board – TRACI Environmental Impacts – Calgary, AB

| | <i>Global Warming Potential, excl. biogenic</i> | <i>Global Warming Potential, incl. biogenic</i> | <i>Ozone Depletion Potential</i> | <i>Acidification Potential</i> | <i>Eutrophication Potential</i> | <i>Smog Creation Potential</i> | <i>Abiotic Depletion Potential (fossil)</i> |
|-------------------------------|---|---|----------------------------------|--------------------------------|---------------------------------|--------------------------------|---|
| | <i>kg CO₂ eq</i> | <i>kg CO₂ eq</i> | <i>kg CFC 11 eq</i> | <i>kg SO₂ eq</i> | <i>kg N eq</i> | <i>kg O₃ eq</i> | <i>MJ</i> |
| Raw Materials (A1) | 5.98E+01 | -2.45E+01 | 3.23E-05 | 2.82E-01 | 1.21E-01 | 4.73E+00 | 9.37E+01 |
| Raw Material Transport (A2) | 1.79E+01 | 1.79E+01 | 2.45E-15 | 6.36E-02 | 7.04E-03 | 1.44E+00 | 3.62E+01 |
| Manufacture (A3) | 1.89E+02 | 1.89E+02 | 4.81E-12 | 1.93E-01 | 1.14E-02 | 4.74E+00 | 4.61E+02 |
| Total A1-A3: | 2.67E+02 | 1.82E+02 | 3.23E-05 | 5.38E-01 | 1.40E-01 | 1.09E+01 | 5.91E+02 |
| Final Product Transport (A4) | 3.68E+01 | 3.69E+01 | 5.00E-15 | 2.14E-01 | 1.97E-02 | 5.52E+00 | 7.37E+01 |
| Installation (A5) | 5.97E+01 | 2.17E+01 | 4.26E-07 | 3.17E-01 | 5.33E-02 | 3.61E+00 | 1.57E+02 |
| Use (B1) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Maintenance (B2) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Repair (B3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Replacement (B4) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Refurbishment (B5) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Energy Use (B6) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Water Use (B7) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Deconstruction (C1) | 5.08E+00 | 5.08E+00 | 4.47E-16 | 1.13E-02 | 4.79E-04 | 2.21E-01 | 7.37E+00 |
| Waste Transport (C2) | 4.27E+00 | 4.27E+00 | 5.84E-16 | 1.37E-02 | 1.58E-03 | 3.07E-01 | 8.61E+00 |
| Waste Processing (C3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| End of Life Disposal (C4) | 3.78E+01 | 3.81E+01 | 1.31E-13 | 1.76E-01 | 9.94E-03 | 3.11E+00 | 7.90E+01 |
| Total Cradle-to-Grave: | 4.10E+02 | 2.89E+02 | 3.27E-05 | 1.27E+00 | 2.25E-01 | 2.37E+01 | 9.17E+02 |

Table 14: Cradle-to-Grave TRACI Environmental Impacts



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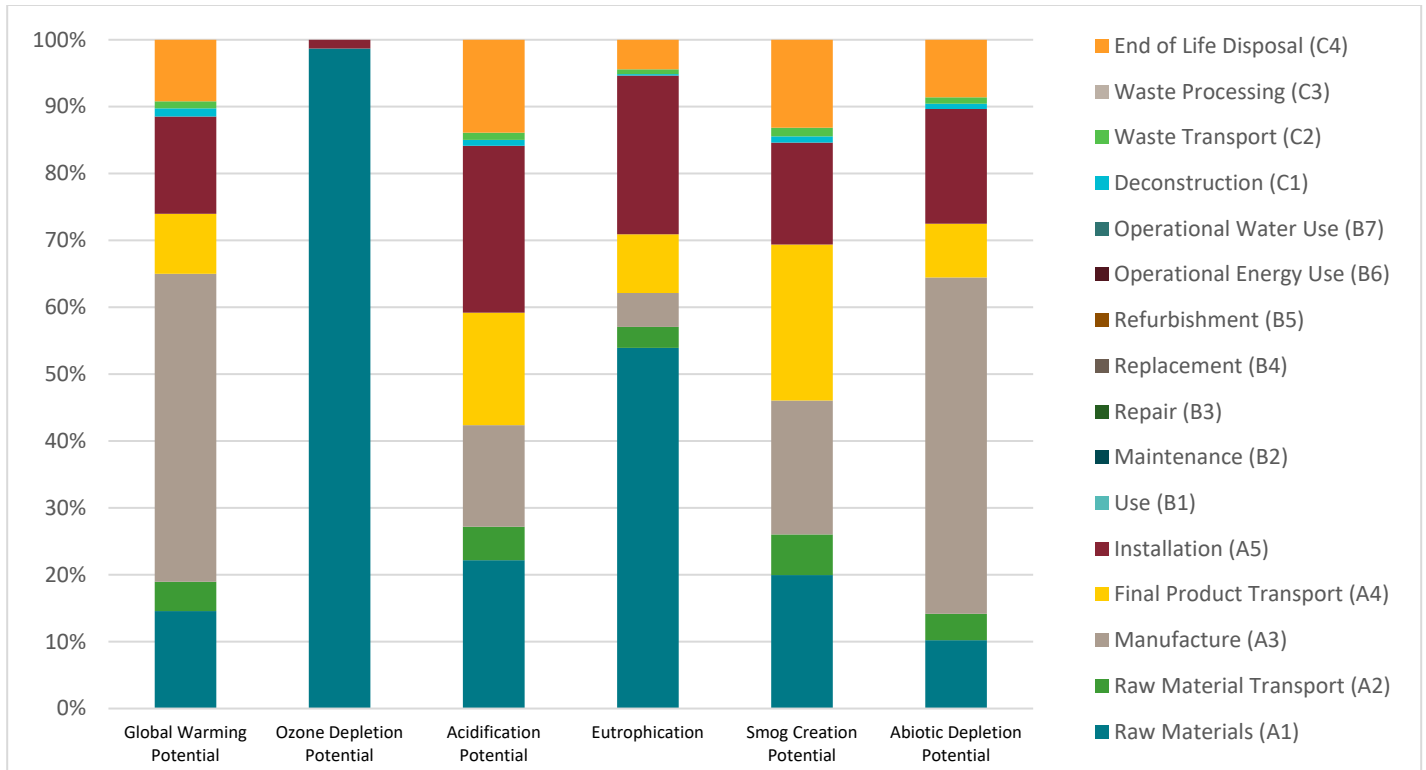


Figure 3: Cradle-to-Grave TRACI Environmental Impacts



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EN 15804 Impact Assessment Indicators (Europe)

| M2 Tech Type X Gypsum Board – EN 15804 Environmental Impacts – Calgary, AB | | | | | | |
|--|---|-------------------|-----------------------------|------------------------|---------------------|------------------|
| | <i>GWP (EN), TOTAL (incl. biogenic)</i> | <i>ODP (EN)</i> | <i>AP (EN)</i> | <i>EP (EN)</i> | <i>POCP (EN)</i> | <i>ADPF (EN)</i> |
| | <i>kg CO₂ eq</i> | <i>kg R 11 eq</i> | <i>kg SO₂ eq</i> | <i>kg phosphate eq</i> | <i>kg ethane eq</i> | <i>MJ</i> |
| Raw Materials (A1) | -2.45E+01 | 3.20E-05 | 2.62E-01 | 7.28E-02 | 2.59E-02 | 8.42E+02 |
| Raw Material Transport (A2) | 1.79E+01 | 2.45E-15 | 4.70E-02 | 1.25E-02 | -1.64E-02 | 2.70E+02 |
| Manufacture (A3) | 1.89E+02 | 4.80E-12 | 1.63E-01 | 2.62E-02 | 1.93E-02 | 3.15E+03 |
| Total A1-A3: | 1.82E+02 | 3.20E-05 | 4.72E-01 | 1.12E-01 | 2.88E-02 | 4.26E+03 |
| Final Product Transport (A4) | 3.69E+01 | 5.00E-15 | 1.56E-01 | 4.12E-02 | -4.03E-02 | 5.50E+02 |
| Installation (A5) | 2.17E+01 | 3.66E-07 | 3.19E-01 | 4.14E-02 | 1.99E-02 | 1.23E+03 |
| Use (B1) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Maintenance (B2) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Repair (B3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Replacement (B4) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Refurbishment (B5) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Energy Use (B6) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Water Use (B7) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Deconstruction (C1) | 5.08E+00 | 4.47E-16 | 1.05E-02 | 1.19E-03 | 8.99E-04 | 5.51E+01 |
| Waste Transport (C2) | 4.27E+00 | 5.84E-16 | 1.02E-02 | 2.71E-03 | -3.45E-03 | 6.44E+01 |
| Waste Processing (C3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| End of Life Disposal (C4) | 3.81E+01 | 1.31E-13 | 1.61E-01 | 2.01E-02 | 1.42E-03 | 6.09E+02 |
| Total Cradle-to-Grave: | 2.89E+02 | 3.23E-05 | 1.13E+00 | 2.18E-01 | 7.26E-03 | 6.77E+03 |

Table 15: Cradle-to-Grave EN 15804 Environmental Impacts



ENVIRONMENTAL PRODUCT DECLARATION



M2 Tech Type X 5/8" Gypsum Board
Calgary, AB

According to ISO 14025/44/40 Series and ISO 21930

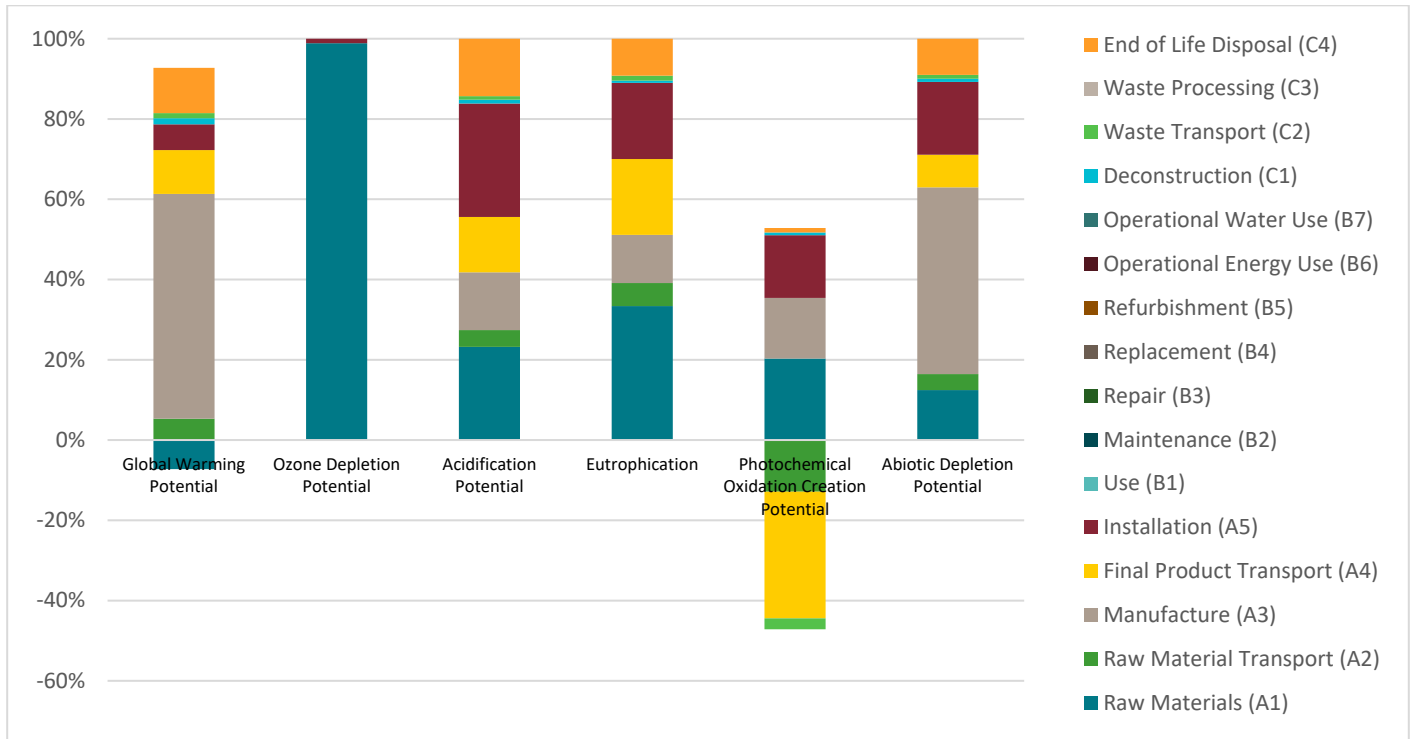


Figure 4: Cradle-to-Grave EN 15804 Environmental Impacts



ENVIRONMENTAL PRODUCT DECLARATION



M2 Tech Type X 5/8" Gypsum Board
Calgary, AB

According to ISO 14025/44/40 Series and ISO 21930

Use of Primary Resources

| Use of Primary Resources | | | | |
|-------------------------------|---|---|--|--|
| | RPR_E : Renewable primary energy used as energy carrier (fuel) | RPR_M : Renewable primary resources with energy content used as material | NRPR_E : Non-renewable primary resources used as an energy carrier (fuel) | NRPR_M : Non-renewable primary resources with energy content used as material |
| | MJ | MJ | MJ | MJ |
| Raw Materials (A1) | 1.56E+03 | 1.13E-04 | 9.32E+02 | 7.77E-02 |
| Raw Material Transport (A2) | 1.15E+01 | -2.12E-08 | 2.72E+02 | 8.94E-03 |
| Manufacture (A3) | 1.87E+02 | -9.26E-08 | 3.23E+03 | 6.47E-03 |
| Total A1-A3: | 1.76E+03 | 1.13E-04 | 4.44E+03 | 9.31E-02 |
| Final Product Transport (A4) | 2.34E+01 | -4.31E-08 | 5.54E+02 | 1.82E-02 |
| Installation (A5) | 9.39E+01 | 2.21E+02 | 1.28E+03 | 7.76E-02 |
| Use (B1) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Maintenance (B2) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Repair (B3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Replacement (B4) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Refurbishment (B5) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Energy Use (B6) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Water Use (B7) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Deconstruction (C1) | 2.72E-01 | -1.02E-09 | 5.54E+01 | 3.74E-05 |
| Waste Transport (C2) | 2.73E+00 | -5.05E-09 | 6.48E+01 | 2.13E-03 |
| Waste Processing (C3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| End of Life Disposal (C4) | 5.04E+01 | -2.99E-08 | 6.22E+02 | 1.48E-02 |
| Total Cradle-to-Grave: | 1.93E+03 | 2.21E+02 | 7.01E+03 | 2.06E-01 |

Table 16: Use of Primary Resources



ENVIRONMENTAL PRODUCT DECLARATION



M2 Tech Type X 5/8" Gypsum Board
Calgary, AB

According to ISO 14025/44/40 Series and ISO 21930

Use of Secondary Resources

| Use of Secondary Resources | | | | | |
|-------------------------------|--------------------------------|---------------------------------------|--|-----------------------------|---|
| | SM: Secondary materials | RSF: Renewable secondary fuels | NRSF: Non-renewable secondary fuels | RE: Recovered energy | FW: Use of net fresh water resources |
| | kg | MJ | MJ | MJ | m ³ |
| Raw Materials (A1) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.62E+00 |
| Raw Material Transport (A2) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 5.10E-02 |
| Manufacture (A3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.04E+00 |
| Total A1-A3: | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 2.70E+00 |
| Final Product Transport (A4) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.04E-01 |
| Installation (A5) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.68E+00 |
| Use (B1) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Maintenance (B2) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Repair (B3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Replacement (B4) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Refurbishment (B5) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Energy Use (B6) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Water Use (B7) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Deconstruction (C1) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 6.99E-04 |
| Waste Transport (C2) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 1.22E-02 |
| Waste Processing (C3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| End of Life Disposal (C4) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 8.84E-02 |
| Total Cradle-to-Grave: | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 4.59E+00 |

Table 17: Use of Secondary Resources



ENVIRONMENTAL PRODUCT DECLARATION



M2 Tech Type X 5/8" Gypsum Board
Calgary, AB

According to ISO 14025/44/40 Series and ISO 21930

Renewable and Non-Renewable Energy by Source

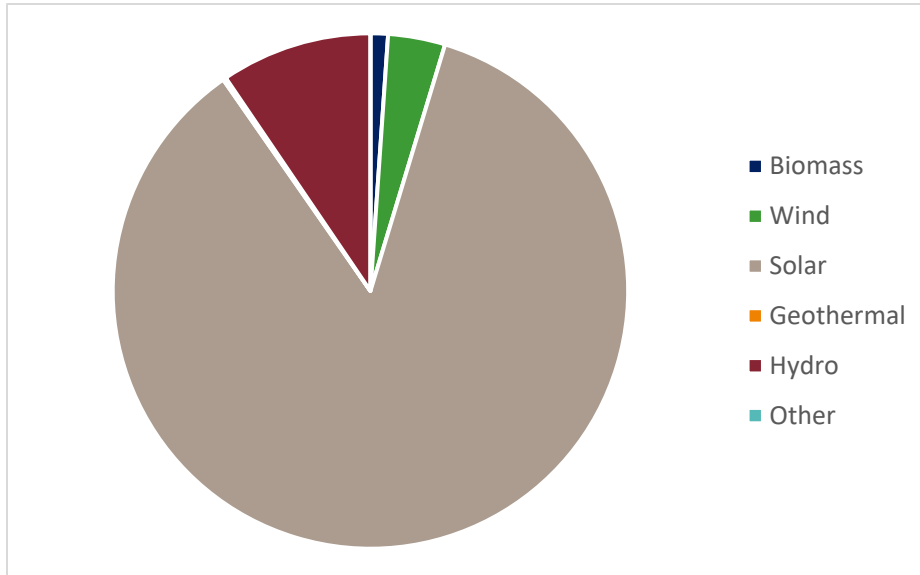


Figure 5: Renewable Energy by Source

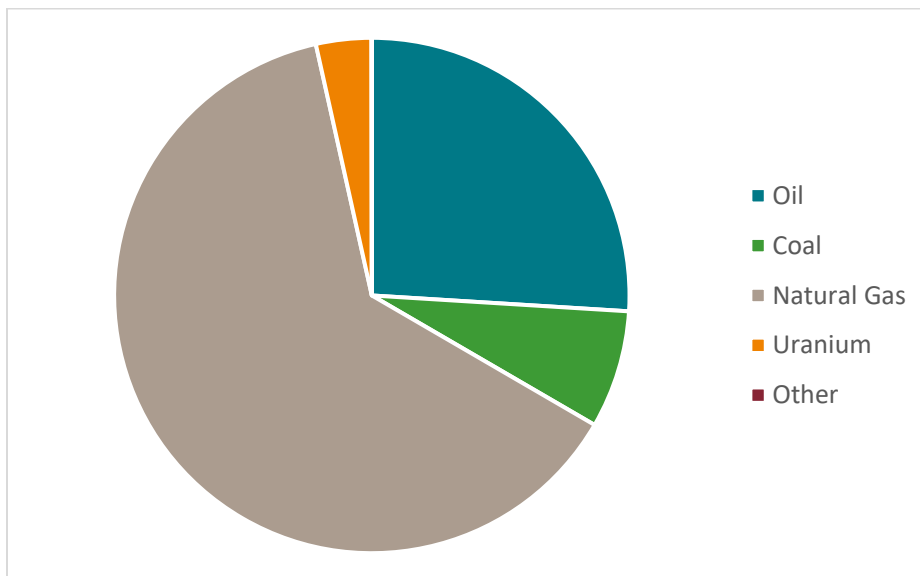


Figure 6: Non-Renewable Energy by Source



ENVIRONMENTAL PRODUCT DECLARATION



M2 Tech Type X 5/8" Gypsum Board
Calgary, AB

According to ISO 14025/44/40 Series and ISO 21930

Waste Flows

| Waste Flows | | | | |
|-------------------------------|---------------------------------|-------------------------------------|---|---|
| | <i>Hazardous waste disposed</i> | <i>Non-hazardous waste disposed</i> | <i>High level radioactive waste, conditioned, to final repository</i> | <i>Intermediate and low level radioactive waste, conditioned, to final repository</i> |
| | <i>kg</i> | <i>kg</i> | <i>kg</i> | <i>kg</i> |
| Raw Materials (A1) | 1.92E-05 | 1.56E+00 | 2.16E-05 | 6.81E-04 |
| Raw Material Transport (A2) | 4.65E-06 | 1.95E-02 | 7.39E-07 | 1.99E-05 |
| Manufacture (A3) | 1.16E-06 | 2.90E+00 | 4.18E-05 | 1.05E-03 |
| Total A1-A3: | 2.50E-05 | 4.47E+00 | 6.41E-05 | 1.75E-03 |
| Final Product Transport (A4) | 9.47E-06 | 3.97E-02 | 1.50E-06 | 4.05E-05 |
| Installation (A5) | 1.47E-06 | 1.07E+02 | 1.38E-05 | 3.83E-04 |
| Use (B1) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Maintenance (B2) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Repair (B3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Replacement (B4) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Refurbishment (B5) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Energy Use (B6) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Water Use (B7) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Deconstruction (C1) | 1.86E-08 | 9.14E-03 | 1.32E-07 | 3.60E-06 |
| Waste Transport (C2) | 1.11E-06 | 4.64E-03 | 1.76E-07 | 4.73E-06 |
| Waste Processing (C3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| End of Life Disposal (C4) | 4.16E-06 | 9.32E+02 | 6.14E-06 | 1.62E-04 |
| Total Cradle-to-Grave: | 4.13E-05 | 1.04E+03 | 8.58E-05 | 2.35E-03 |

Table 18: Waste Flows



ENVIRONMENTAL PRODUCT DECLARATION



M2 Tech Type X 5/8" Gypsum Board
Calgary, AB

According to ISO 14025/44/40 Series and ISO 21930

Output Material Flows

| Output Material Flows | | | | |
|-------------------------------|-----------------------------|--------------------------------|--------------------------------------|----------------------------------|
| | <i>Components for reuse</i> | <i>Materials for recycling</i> | <i>Materials for energy recovery</i> | <i>Recovered energy exported</i> |
| | <i>kg</i> | <i>kg</i> | <i>kg</i> | <i>kg</i> |
| Raw Materials (A1) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Raw Material Transport (A2) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Manufacture (A3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Total A1-A3: | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Final Product Transport (A4) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Installation (A5) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Use (B1) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Maintenance (B2) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Repair (B3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Replacement (B4) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Refurbishment (B5) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Energy Use (B6) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Operational Water Use (B7) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Deconstruction (C1) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Waste Transport (C2) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Waste Processing (C3) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| End of Life Disposal (C4) | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Total Cradle-to-Grave: | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

Table 19: Output Material Flows



ENVIRONMENTAL PRODUCT DECLARATION



M2 Tech Type X 5/8" Gypsum Board
Calgary, AB

According to ISO 14025/44/40 Series and ISO 21930

LCA Interpretation

Based on the results from the life cycle assessment model, the life cycle impacts are strongly driven by the manufacture. The impacts of the manufacture are primarily attributed to the natural gas usage needed for the ovens to dry the boards. The natural gas usage in the manufacture accounts for as much as 61% of the cradle-to-grave environmental impact potentials for CertainTeed M2 Tech Type X 5/8" Gypsum Boards at the Calgary, AB facility.

The manufacturing of gypsum board (A3) has the highest contribution to Global Warming Potential impacts. The use of internally recycled gypsum material helps to reduce the overall environmental impact potentials by reducing the amount of external raw materials needed for the process.

Another potentially significant contributor to the overall environmental impact results is seen in the results for the installation of the Gypsum Boards. The installation waste accounts for the majority of the impacts for installation. The PCR requires the use of a 10% installation waste scenario in the absence of actual data. As there is currently no actual installation data available, and because installation techniques may vary widely among installers, CertainTeed has little to no influence on the installation impacts.

Additional Environmental Information

Environment and Health During Manufacture

CertainTeed and Saint-Gobain have well-established Environmental, Health, and Safety (EHS) and product stewardship programs, which help to enforce proper evaluation and monitoring of chemicals and raw materials chosen to manufacture products. These programs ensure that all environmental and OSHA requirements are met or exceeded to ensure the health and safety of all employees and contractors.

The Calgary, AB CertainTeed Gypsum manufacturing facility operates integrated Environmental, Health, and Safety Management Systems that align with the ISO 14001 and ISO 45001 standards.

Further Information

<https://www.certainteed.com/drywall/>

LCA Development

This EPD and the corresponding LCA were prepared by Saint-Gobain Corporation North America in Malvern, PA.



ENVIRONMENTAL PRODUCT DECLARATION



M2 Tech Type X 5/8" Gypsum Board
Calgary, AB

According to ISO 14025/44/40 Series and ISO 21930

References

- Product Category Rules for Building-Related Product and Services: Part A – Life Cycle Assessment Calculation Rules and Report Requirements, Version 3.2 2018. UL Environment.
- Product Category Rule for Environmental Product Declarations: PCR for Gypsum Panel Products. April 23, 2020. NSF International.
- UL Program Instructions, Versions 2.5 March 2020. UL Environment.
- ISO 14040: 2006 Series – Environmental Management-Life Cycle Assessment
- EN 15804 – Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products
- ISO 21930:2017 – Sustainability in building construction – Environmental declaration of building products
- GaBi Ecoinvent Database. www.thinkstep.com
- US LCI Database. www.nrel.gov/lci
- Ecoinvent v3 Database. <http://ecoinvent.org/>
- Life Cycle Assessment: CertainTeed Gypsum, Gypsum Board EPD Generator LCA Methodology Report. 2020. CertainTeed Saint-Gobain North America EHS&S.
- CertainTeed Gypsum Website. <https://www.certainteed.com/drywall/>

