Global Trends in the Thermal Insulation Market

PRESENTED BY
Lucintel

DATE
July, 2021
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Executive Summary

- In global thermal insulation market is valued at $50 Billion in 2020 and is expected to reach $65.3 Billion by 2025 with a CAGR of 5.5%
  - Building and construction segment accounts for ~54% of the total thermal insulation market, valued at $27 B in 2020 and is expected to reach $37.5 B by 2025

- Emerging economies provide high growth potential for thermal insulation materials
  - Asia Pacific market is driven by rapid growth in construction and industrial sectors

- During 2020 global shutdown and lockdown halted many construction work creating supply chain bottleneck for key resources of materials and equipment

- Plastic foam holds largest share and is expected to maintain it in the near future
  - Plastic foam insulation materials provide better performance benefits over other options

- To drive further growth in the thermal insulation market, industry needs to work in below areas:
  - Increase awareness of thermal insulation among residential and commercial builders in emerging economies to accelerate adoption
  - Reduce cost of insulation materials and installation
  - Develop energy efficient, fire resistant thermal insulation, and recyclable / sustainable solutions
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Building and Construction Segment of Thermal Insulation Market is Expected to Grow at a CAGR of 6.8% during the Forecast Period

<table>
<thead>
<tr>
<th>Thermal Insulation Market</th>
<th>Market Size ($B) - 2020</th>
<th>CAGR % (2020-2025)</th>
<th>Future Outlook</th>
<th>Major Thermal Insulation Material Suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building and Construction</td>
<td>~$27</td>
<td>6.8%</td>
<td>• Growing construction activities and increasing urbanization in emerging economies are creating healthy demand for energy efficient buildings hence thermal insulation materials</td>
<td>SAINT-GOBAIN, Dow, DuPont, BASF, Asahi KASEI, Covestro</td>
</tr>
<tr>
<td>Industrial</td>
<td>~$6</td>
<td>5.3%</td>
<td>• Demand for thermal insulation materials will be favored by growth in industrialization and increasing regulations for safety and emission norms.</td>
<td></td>
</tr>
<tr>
<td>Others (Includes oil and gas, marine, automotive, clothing, etc.)</td>
<td>~$17</td>
<td>3.3%</td>
<td>• Thermal insulation market would be favored by growing deep water operations, increasing demand in marine, automotive, &amp; clothing industry</td>
<td></td>
</tr>
</tbody>
</table>
Thermal Insulations are Used in a Variety of Applications in Various Industries. For Example in Construction, it is Used in Roof, Wall, and Floor

<table>
<thead>
<tr>
<th>Construction</th>
<th>Industrial</th>
<th>Oil and Gas</th>
<th>Aerospace</th>
<th>Transportation</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Roof</td>
<td>• Industrial</td>
<td>• Storage Tank Insulation</td>
<td>• Thrust Reversal System</td>
<td>• Sensors</td>
<td>• Clothing</td>
</tr>
<tr>
<td>• Wall</td>
<td>• Pipes</td>
<td>• Pipes</td>
<td>• Ducting and Tubing</td>
<td>• Batteries</td>
<td>• Mechanical Insulations</td>
</tr>
<tr>
<td>• Floor</td>
<td>• HVAC</td>
<td>• Joints</td>
<td>• Flight Recorders</td>
<td>• Engine</td>
<td>• Others</td>
</tr>
<tr>
<td></td>
<td>• Insulation in Industrial</td>
<td>• Jumpers</td>
<td>• Battery</td>
<td>• Compartment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Refrigerators</td>
<td>• Risers</td>
<td>Insulation</td>
<td>• Insulation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Storage Tanks</td>
<td>• Spools</td>
<td>• Electrical</td>
<td>• Roof</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Etc.</td>
<td>• Manifolds</td>
<td>Insulation</td>
<td>• Floor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Sidewalls</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Underbody</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Customers in Each Application Have Several Choices such as In-Organic, Organic and Combined Materials to Meet Their Needs

- **Insulation Materials**
  - **In-Organic Materials**
    - Stone Wool, Glass Wool, Foam Glass
  - **Organic Materials**
    - Expanded Polystyrene, Extruded Polystyrene, PU Foam, Cork, Melamine Foam, Sheep Wool, Cellulose, Others
  - **Combined Materials**
    - Calcium Silicate, Gypsum Foam, Wood Wool
Future of Thermal Insulation Market Looks Promising with Opportunities in Industrial and Building and Construction Segment

Global Thermal Insulation Market Forecast in $B

<table>
<thead>
<tr>
<th>Year</th>
<th>Building and Construction</th>
<th>Industrial</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>2019</td>
<td>54.8</td>
<td>29.4</td>
<td>6.8</td>
</tr>
<tr>
<td>2020</td>
<td>50.0</td>
<td>27.0</td>
<td>5.9</td>
</tr>
<tr>
<td>2025</td>
<td>65.3</td>
<td>37.5</td>
<td>7.6</td>
</tr>
</tbody>
</table>

CAGR (2020-25)

- Building and Construction: 6.8%
- Industrial: 5.3%
- Others: 3.3%

Note:
- Other segment here includes oil and gas, marine, automotive, clothing, and others

Key Insights

- Development of infrastructure in emerging economies driven by rapid industrialization and urbanization is driving demand for thermal insulation materials
- Increasing demand for sustainable technologies, energy efficient buildings are key propelling factors for growth of industry
- Regulatory pressure from government for energy efficiency and sustainability will drive the demand for energy efficient thermal insulation materials
Performance Advantage of Plastic Foam Such as Higher Thermal Conductivity Makes it the Preferred/Dominant Material for Thermal Insulation

<table>
<thead>
<tr>
<th>Key Insulation Materials</th>
<th>Dominance in Global Thermal Insulation Market</th>
<th>Base Materials</th>
<th>Thermal Conductivity ($\lambda$) [W/m·K]</th>
<th>Density [kg/m³]</th>
<th>Fire Class NEN-EN13501</th>
<th>Price [€/m²]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass Wool</td>
<td><img src="https://example.com/diagram.png" alt="Diagram" /></td>
<td>Cullet, quartz sand, dolomite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stone Wool</td>
<td><img src="https://example.com/diagram.png" alt="Diagram" /></td>
<td>Diabase, basalt</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plastic Foam</td>
<td><img src="https://example.com/diagram.png" alt="Diagram" /></td>
<td>Benzene, ethylene, Pentane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Expanded polystyrene (EPS)</td>
<td></td>
<td>Benzene, ethylene, Pentane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Extruded polystyrene (XPS)</td>
<td></td>
<td>Benzene, ethylene, pentane</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polysisocyanurate (PIR)</td>
<td></td>
<td>Isocyanate, (polyether)polyol</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Polyurethane (PUR)</td>
<td></td>
<td>Polyester polyol, MDI</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Others (Cellulose, Hemp, etc.)</td>
<td></td>
<td>Cellulose, Hemp</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Relative Performance**
- High
- Moderate
- Low

**Dominance**
- High
- Low
Plastic Foam and Glass Wool are Attractive in Terms of Market Size and Growth Rate Respectively

**Key Insights**

- Building and Construction is the largest application segment. Increased industrialization and urbanization are the driving factors.
- Plastic foam is mostly utilized followed by glass wool in Building and Construction application.
- Glass wool is the fastest growing material in building and construction application such as masonry cavity walls, timber frame walls, etc.
- High performance benefit of plastic foam over other materials has increased its demand.

Source: Lucintel
Voice of Market: Plastic Foam is the Largest Material Segment in the Global Thermal Insulation Market and is Expected to Maintain its Share in Near Future

“Plastic foam is the largest material segment in the global thermal insulation market. Emergence of green building technology and high fire resistance properties will also drive the demand of glass and stone wool in future. Glass and stone wool insulation is gradually replacing other kinds of insulation, both in multi-storey and private construction considering its high fire resistance properties. Insulation market is highly correlated with construction industry, and building application represents more than 50% in insulation market. Insulation demand varies according to geographical specific areas.”

Business Analyst, Major Thermal Insulation Manufacturer

“Building is the largest end use industry for thermal insulation. The growth is more than the growth of construction industry. After the fire incidents happened in many high rise buildings including London Grenfell Tower, contractors and builders have decided to prefer glass and stone wool insulation due to its non combustible nature for better fire resistance, smoke resistance, and zero flame properties. The fire resistance properties of PU is low compare to mineral wool. The growing concern for fire safety is leading towards the changing interest of builders towards the mineral wool insulation in near future”

Sales Head, Major Manufacturer of Mineral Wool
Building and Construction Accounts for 54% of the Global Thermal Insulation Materials, Plastic Foam and Glass Wool Materials will Grow at High Pace

The thermal insulation market is anticipated to grow at 5.5% CAGR during the forecast period.

- Government initiatives for increasing energy-efficient buildings will benefit the demand for insulation materials.
- Major drivers of plastic foam insulation materials are performance benefits over other traditional options like glass wool, stone wool, natural insulation materials.
- Demand for glass wool is growing at higher pace driven by its high fire resistance and low cost compared to other materials.

Future Outlook: Thermal Insulation Market by End Use

- Building and Construction: 54%
- Industrial: 34%
- Others: 12%

Future Outlook: Thermal Insulation Market by Material

- Plastic Foam
- Stone Wool
- Glass Wool
- Others

Note: Position of arrow denotes the future growth potential.
Increasing Pressure to Control Green House Gas Emission from Government is the Major Driver of Thermal Insulation

**Key Drivers**

- **Growing construction spending**, **increasing urbanization in emerging economies** has led to strong demand of **energy efficient buildings** with rising consciousness of consumers to control energy consumption across the globe.

- **Pressure from government to increase energy efficiency** of buildings to reduce greenhouse gas emissions and address the energy efficiency targets.

- **Increased adoption of sustainable technologies** in growing end use industries like aerospace and transportation in order to control GHG emissions.

**Key Challenges**

- **Low awareness about benefits** of thermal insulation in emerging economies.

- **High capital cost of installing thermal insulation** in buildings restricts its reach in every house.

- **Volatile price of raw materials** like styrene is one of the major challenge faced by players of the industry, which affects there cost of manufacturing and profitability.
Growing Construction Spending and Increasing Urbanization in Asian Countries Will Drive Construction of Sustainable Buildings

**Key Insights**

- **APAC has >50% of the global construction industry. Urban population in China is expected to reach 66% by 2025**

- China construction industry has started to recover after the downfall for 6 months during the COVID outbreak, the industry is expected to grow at 1.5% during 2020

- **Improving infrastructure development, urbanization & economic development in developing Asian countries are likely to increase demand of energy efficient and sustainable homes, will drive increased usage in the construction industry**

Source: Export Govt. (China), World Bank and Lucintel
Increasing Industrialization in Growing Economies has Propelled Consumption of Thermal Insulation

**Key Insights**

- **Contribution of the Industrial Sector for the total GDP of China** has increased at CAGR of 12% in the past 20 years.

- **Rapid industrialization in China** positively contributed to the GDP but has led to an increase in Green House Emissions.

- **Increasing rate of industrialization, Increasing GHG emissions** and mandatory regulations will drive future demand of thermal insulation. Global CO2 emission reduction was in 2020 was the result of lockdown in several countries due to Corona virus outbreak.

Source: Global Carbon Project, World Bank and Lucintel
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Most of the Key Players Have Presence in Multiple Thermal Insulation Materials

<table>
<thead>
<tr>
<th>S.No</th>
<th>Company Name</th>
<th>Key Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Glass Wool</td>
</tr>
<tr>
<td>1</td>
<td>Saint Gobain</td>
<td>✓</td>
</tr>
<tr>
<td>2</td>
<td>BASF</td>
<td>✓</td>
</tr>
<tr>
<td>3</td>
<td>Dow Chemicals</td>
<td>✓</td>
</tr>
<tr>
<td>4</td>
<td>Asahi Kasei Corp.</td>
<td>✓</td>
</tr>
<tr>
<td>5</td>
<td>Covestro AG</td>
<td>x</td>
</tr>
<tr>
<td>6</td>
<td>Owens Corning</td>
<td>✓</td>
</tr>
<tr>
<td>7</td>
<td>Kingspan Group</td>
<td>✓</td>
</tr>
<tr>
<td>8</td>
<td>Rockwool</td>
<td>x</td>
</tr>
<tr>
<td>9</td>
<td>John’s Manville</td>
<td>✓</td>
</tr>
<tr>
<td>10</td>
<td>Armacell</td>
<td>✓</td>
</tr>
</tbody>
</table>
Polyisocyanurate (PIR) and Polyurethane (PUR) Insulation Materials Outperform Others with Low Thermal Conductivity but at High Price

Price Comparison of Various Thermal Insulation Materials

<table>
<thead>
<tr>
<th>Material</th>
<th>Price Range (€/m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass Wool</td>
<td>9-15</td>
</tr>
<tr>
<td>Stone Wool</td>
<td>12-20</td>
</tr>
<tr>
<td>EPS</td>
<td>8-18</td>
</tr>
<tr>
<td>XPS</td>
<td>18-24</td>
</tr>
<tr>
<td>PIR</td>
<td>24-26</td>
</tr>
<tr>
<td>PUR</td>
<td>20-24</td>
</tr>
</tbody>
</table>

Thermal Conductivity Comparison of Various Thermal Insulation Materials

<table>
<thead>
<tr>
<th>Material</th>
<th>Thermal Conductivity (λ) [W/m·K]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glass Wool</td>
<td>0.030-0.040</td>
</tr>
<tr>
<td>Stone Wool</td>
<td>0.030-0.040</td>
</tr>
<tr>
<td>EPS</td>
<td>0.032-0.045</td>
</tr>
<tr>
<td>XPS</td>
<td>0.025-0.040</td>
</tr>
<tr>
<td>PIR</td>
<td>0.022-0.035</td>
</tr>
<tr>
<td>PUR</td>
<td>0.020-0.035</td>
</tr>
</tbody>
</table>

Source: Lucintel
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### High Performance and Fire Resistance are the Key Innovation Areas for Thermal Insulation Materials

<table>
<thead>
<tr>
<th>Impacts on Growth of Thermal Insulation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Increased usage</strong> of thermal insulation in building, aerospace, automotive and oil and gas industry</td>
</tr>
<tr>
<td><strong>Huge growth opportunity</strong> for residential and commercial buildings</td>
</tr>
<tr>
<td><strong>Tremendous opportunity</strong> to use eco-friendly and sustainable thermal insulation across various industries</td>
</tr>
<tr>
<td><strong>Huge growth opportunity</strong> in building and construction sector</td>
</tr>
<tr>
<td><strong>Increased usage</strong> in aircraft, spacecraft, railcars, marine vessels and other applications</td>
</tr>
</tbody>
</table>

#### A. High Performance
- Improvement in thermal resistance and reduction in thermal conductivity to improve energy efficiency of buildings

#### B. Fire Resistance
- Increased demand of thermal insulation materials which offer high R-Values and **superior fire resistance properties** to meet building code

#### C. Recycling / Sustainability
- Ongoing development of new technology and new materials
- Recycling of scrap heat shields
- Usage of waste materials as insulation

#### D. Cost Reduction
- Development of durable, robust, cost-effective insulation materials and panels which are more energy efficient than current available solutions

#### E. Lightweight
- Continuous innovation and development of high performance insulation foam with **lightweight, thermal and acoustic properties**
## Recent Innovation: Development of High Performance, and Sustainable Glass Wool Insulation Materials

<table>
<thead>
<tr>
<th>Lightweight Fiberglass</th>
<th>Bio-Sourced Glass Wool</th>
<th>Recycled Fiberglass</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Supplier:</strong> Evonik</td>
<td><strong>Supplier:</strong> Saint Gobain</td>
<td><strong>Supplier:</strong> Owens Corning</td>
</tr>
<tr>
<td><strong>Innovative Product:</strong> CALOSTAT</td>
<td><strong>Innovative Product:</strong> ISOVER</td>
<td><strong>Innovative Product:</strong> EcoTouch PINK FIBERGLAS</td>
</tr>
<tr>
<td>&quot;The material posses extremely low thermal conductivity of $\lambda = 0.019$ W/mK and is 50% thin&quot;</td>
<td>&quot;Glass wool which has 100% bio-sourced binder, two in one solution of acoustic as well as thermal insulation&quot;</td>
<td>&quot;Formaldehyde fiberglass insulation material with minimum 73% recycled content&quot;</td>
</tr>
</tbody>
</table>

### Value Proposition

**Lightweight Fiberglass**
- Lightweight as its 50% thin compared to available options
- Very low thermal conductivity

**Bio-Sourced Glass Wool**
- 100% bio-sourced binder
- Sustainable and green

**Recycled Fiberglass**
- Sustainable and green
- 73% recycled content

Source: Lucintel
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Recommendation and Industry Support

- Demand for thermal insulation materials is expected to continue to grow based upon Building and Construction growth in emerging economies and due to innovations in materials, technologies and applications in combination with continued cost reductions.

- To succeed in the thermal insulation market, the Industry needs to focus on:
  - Development of transformative technologies for cost effective installation of insulation materials.
  - Increase awareness and develop eco-friendly and sustainable insulation solutions.
  - Development of durable, cost-effective insulation materials and panels which are more energy efficient than current solutions.

- Lucintel’s Market Reports and Consulting Services can help the Thermal Insulation Industry in China define and implement a strategy designed to grow your business, more specifically to:
  - **Identify and evaluate attractive opportunities:** Develop dynamic understanding of the relevant market segments where you should compete, broken down by segment, application, technology and region. What gaps exist to realize full potential?
  - **M & A for Growth:** Help you identify partner or finance to implement your strategy.
Lucintel - At a Glance

- Premier management consulting and market research firm. Founded in 1998.
- Deep global insights into major industries. Team of over 120 analysts / consultants across globe
- Management comprised of PhDs, MBAs, and subject matter experts. Head quarter in Dallas, USA.

Conducted 500+ consulting projects across industries for 3M, Audi, Dupont, Carlyle, GE, etc.

<table>
<thead>
<tr>
<th>Consulting Services</th>
<th>Why Lucintel</th>
<th>Industries Served</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunity screening</td>
<td><strong>Trusted insights:</strong> Reliable insights. Widely cited in Wall Street Journal, Financial Times, Forbes, etc.</td>
<td></td>
</tr>
<tr>
<td>Market entry strategy</td>
<td><strong>Clients we serve:</strong> Over 1000 clients from 70 countries – Fortune 500 companies</td>
<td></td>
</tr>
<tr>
<td>Supply chain analysis</td>
<td><strong>Strategic advice:</strong> Over 20 years of proven global strategic management consulting experience</td>
<td></td>
</tr>
</tbody>
</table>
1000+ Clients in 70 Countries Value Our Service
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