



## **Structural Insulated Panels (SIPs)**

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### Abstract:

Aside from a few exceptions, building methods have remained relatively constant over the past decades, especially for single-family and small multi-family homes. **Structural insulated panels** or **SIPs** have the opportunity to change that, as they offer many features that make them a better choice than traditional building methods. However, they currently hold a very small share of the market, and are not a well-known or used technology. If the obstacles facing them can be overcome and their market share grows, structural insulated panels stand a good chance of becoming a dominant building technology in the coming years.

### About 360Chestnut:

360Chestnut is an online resource dedicated to energy efficiency. Our goal is to be a one-stop information resource tool for the consumers to determine the most cost-effective energy efficiency improvement projects for their homes, discover available rebates and incentives, and connect with a local certified service contractor who will perform the work. Here at 360Chestnut, we help you to Save Energy, Save Money, and Live Better.

Check out our blog for most up-to-date information on home energy efficiency at <http://www.360chestnut.com/blog>. If you have any questions about home energy efficiency, ask one of our experts by emailing [info@360chestnut.com](mailto:info@360chestnut.com). We love to hear from you.

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## SIP Technology

A significant efficiency problem in traditional green building is thermal bridging, which is a term used to describe the wooden frame of a building conducting heat. This phenomenon occurs regardless of insulation levels, as the studs of a frame act as bridges between the two outer surfaces of a wall, hence the term bridging. One solution that has been developed for this problem is SIPs (structural insulated panels), which are comprised of two layers of insulated sheathing surrounding a layer of dense insulation. These panels serve as structural components themselves, and do not require framing, thus eliminating the issue of thermal bridging. They can be used for the entire building envelope, including floors and roofing.

SIPs are considered a green building technology for two main reasons: they allow for energy-efficient construction and they use materials more efficiently than stick-built homes. SIPs allow for such energy-efficient construction because they are very well insulated and allow for more airtight construction than traditional building methods because they are assembled as large panels in an off-site facility rather than being built on-site. It might seem counterintuitive that SIPs use less material than traditional framing. They save building materials by being made to order (at least some of them) and are built in a factory, so that materials can be used with little waste, whereas many board ends are thrown out in traditional framing. This information is supported by a growing body of literature around the use of SIPs to achieve LEED and other building certifications for green construction. In addition to providing energy efficiency, SIPs allow for an efficient construction process that is much faster than that of a conventional stick-built home.

## The Market

Though they offer several benefits over conventional building materials, SIPs have yet to capture a significant portion of the market. According to a yearly survey by SIPA (Structural Insulated

Panels Association), there are 55 firms that produce SIPs in the US and Canada whose total sales in 2012 were \$116.2 million. The SIP market has been volatile since SIPA began performing its annual survey in 2003, but their share of the single-family housing market has stayed relatively steady at about 1% for several years, but overall sales in recent years have declined. Only statistics for the single-family housing market are available, as 94% of SIPs used in residential construction are used in single-family homes. About 67% of SIPs sold in both 2011 and 2012 were used in residential construction, with 32% going to non-residential construction and 1% going to non-building uses. Its important to note that the above figures from SIPA do not include figures for metal skin manufacturers. In the introduction to their 2012 survey, SIPA explains:

The two key reasons [for not including data on metal skin manufacturers] are: 1) the metal skin manufacturers have been very uncooperative in providing data, forcing estimates which are, or may have been, far from what was actually produced, and 2) it is difficult to determine if these metal-skin insulated panels are truly structural. Most are attached to a sub-frame of some sort, implying they may not be strong enough to be classified as structural.

In 2007, the FAS (Federation of American Scientists) described several barriers to the further development of the SIP industry. The first of these is lack of knowledge about SIPs from property owners, builders, architects, engineers, and the general public. These are the groups that make choices of building materials, and if they are unaware of SIPs it will be very difficult for SIPs to gain market share. Additionally, they note that the SIP industry's size and lack of development does not allow it to respond to market conditions, in addition to limiting its production capacity. The other issues noted in their report are specific to CSIPs, and it is unclear whether or not SIPs face the same problems.

It is difficult to predict what the next few years hold for the SIP market, given the uneven housing recovery, trends over recent years, and the barriers that manufacturers are facing. If SIP sales do not increase in the coming years, it will not likely be due to any deficiencies in the technology, but likely due to lack of consumer knowledge and the building methods that are already ingrained in the industry. Developers and architects often use products and technologies that they are comfortable with, so the key to market expansion is spreading knowledge about SIPs to those that have the opportunity to

choose to use the product. At first glance, the market does not have any glaring peculiarities.

Production is fairly widely distributed, and many manufacturers are able to ship their product across the country and to Canada.

### SWOT Analysis

SIP producers have several strengths, perhaps most important of which is the superior building technology that they are creating and marketing. Their product is efficient in terms of building time, resource consumption, and ROI. The product can be shipped fairly easily, and production is widely distributed across the US and Canada. In general, the current market has several weaknesses. As discussed before, there is a lack of knowledge about SIPs, which includes how they should be installed and where their best applications are. Additionally, the market is still very small and made up of many even smaller producers, which limits flexibility and ability to respond to market conditions. Given the distribution of producers, it seems that the market is likely localized, at least to a certain extent. SIPs cannot be shipped using standard methods, so it makes more financial sense for consumers to buy from regional producers.

However, the size of the market could be seen as an opportunity. SIPs are a very marketable product based on their efficiency advantages over traditional building methods, and with sales being relatively low there is room for expansion. Taking advantages of this opportunity would require increased publicity for the product, which would be gained most easily through targeted marketing campaigns. Single family new housing starts are forecasted to increase significantly over the coming years, and if the SIP industry can maintain or increase its market share, it will certainly put it in a more secure position from which it can further expand. The largest threat to SIP producers is probably lack of demand, which is a product of lack of knowledge in the marketplace. The market is already very small, and further reduction in demand could be disastrous for producers. Additionally, advancements in other types of building technology that provide the same benefits as SIPs, like modular construction

techniques, would negatively impact the market for SIPs.

While SIPs provide many efficiency benefits during the construction process and throughout the life of a building, their share of the market remains small. Production of panels is widely distributed geographically amongst many small firms, which might have something to do with seemingly ineffective marketing and small market share of the product. Even so, the opportunity to overcome the challenges SIPs face certainly exists, and as knowledge about the product spreads the use of this product should increase based on its advantages over conventional construction materials and methods.

## References

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