



How sustainable are SIPs?

Rebecca Foster looks at whether this modern construction method could be the best fit for your eco-friendly home building project

Above: Erected by the team at JML Contracts, this house on the Isle of Skye features the traditional Scottish long house design. SIPs were chosen thanks to their excellent thermal insulation, which keeps the property warm throughout the chilly winters

Taking a green approach to development is something many self builders prioritise when getting started on their scheme. But the term sustainability covers an array of factors: and it often starts with what goes into the core of your home. Specifying a structural system that utilises low-carbon materials and minimises waste may be high on the agenda for some people, for instance, while others might prioritise performance and emissions in use. So how do structural insulated panels (SIPs) stack up in the eco stakes?

Capable of delivering excellent thermal performance and ultra-fast build speeds, SIPs are a major contender for those looking for a straightforward route to energy efficiency. "This system offers many advantages for self builders, both during the design and erection phases and in terms of delivering lifetime energy savings," says John Langley, director of JML Contracts.

Fabric first approach

For many people, sustainable building is all about going back to basics and creating a well-insulated and airtight shell, rather than bolting on thousands of pounds' worth of eco goodies. With their high-quality thermal core and factory-accurate airtightness detailing, structural insulated panels certainly deliver on this side of the equation.

"Heat flow through any given combination of materials, air layers or spaces in the building fabric is measured as the U-value," says Martin Cook, MD of Eco SIPs Homes. "The lower the figure, the more slowly the transfer of heat in and out of a building and the better the insulating quality. SIPs ranges between 0.21W/m²K and 0.1W/m²K."

That puts it on a par with other modern systems. But crucially the high degree of precision involved in the manufacturing process takes responsibility for achieving the as-designed energy efficiency away from the site operatives – so you'll know what you're getting and there's less risk of the dreaded performance gap. "You can do room by room heat loss calculations," says Mike Fleming, director of Glosford SIPs. "The fact that you can better determine the heating and cooling requirements means it's easier to plan a suitable renewable heating setup, too."

When you factor in airtightness levels that can easily reach Passivhaus standard, a finished SIPs structure can require substantially less energy to maintain than other conventionally-constructed houses. This results in a greater reduction in CO₂ over the whole lifetime of the dwelling, further boosting this method's sustainability.

Smart design strategies

One way to increase your project's sustainability is to use fewer construction materials. SIPs scores highly on this front, as the computer-controlled construction line helps to cut down on waste. "Offsite manufacture means there are less discarded by-products on site, as it is contained in factories where it can be recycled," says Martin from Eco

SIPs Homes. "Wood waste from off-cuts can be used as biomass fuel to heat production facilities. Insulation materials can be salvaged, too. We ensure that all of our polystyrene (EPS) waste, for instance, is 100% recycled."

Once transported to site, the interlocking panels are erected quickly – most structural shells can be put up within about a week. Insulation is, of course, pre-fitted in the middle layer of the panel and all window and door openings will have been pre-cut in the factory. "This means there is a decrease in vehicular transportation of goods (and labour) from workshop to your plot. Quicker build times from start to finish can therefore be factored into the overall reduction of CO₂," says Mike from Glosford SIPs.

The lightweight nature of the factory-engineered components can also minimise foundation loadings. "A 150mm panel weighs approximately 20kg per m²," says John from JML. "This can allow for a reduced foundation specification, meaning the project requires smaller quantities of high-energy materials such as concrete."

Material sourcing & embodied energy

If sustainability is a key priority for you, then it's vital to check out the supply chain of the materials and products you're using. If you're building with SIPs, the first step is to ensure that the timber used to form your panels' OSB boards is sourced from responsibly-managed forests.

"This material should be made from young, fast-growing trees grown in plantations accredited by the Forest Stewardship Council (FSC) or equivalent," says John from JML. "Young trees produce oxygen and remove more carbon dioxide from our atmosphere than mature ones. OSB can be renewable, recyclable, biodegradable and non-toxic." So, don't hesitate to ask your manufacturer for documentation that proves your timber-based panels have arrived via a responsibly-managed supply chain.



Featuring a curved roof profile and timber cladding, this modern home was constructed by Glosford SIPs

While offsite manufacturing and the use of wood boosts SIPs score in terms of sustainability, bear in mind that the rigid insulation material at the core of the panels is made from thermosetting plastic. Typically, this will be either polystyrene (EPS), polyisocyanurate (PIR) or polyurethane (PUR) – although some alternatives are available. All of these insulation products are derived from petrochemicals and therefore have a relatively high embodied energy (this term refers to the amount of carbon produced in the extraction of raw materials, processing, manufacture and transportation of building components).

"PIR is plastic, so by definition is made from a finite resource," says Bryan Stuart, managing director of Model D Homes. "However, it's highly efficient, cost-effective and easily handled. In terms of balancing resource reduction against energy savings, its use certainly appears justified."

Nevertheless, to get a full picture of sustainability it's important to weigh up the sum of the embodied energy in your new building versus that which will be used by the occupants when it's completed.

There's no doubt that natural insulation products such as sheep's wool and cellulose have the edge in terms of pre-occupancy carbon emissions. But this has to be factored against the built-in efficiency that's provided by the rigid core of SIPs boards, and the improved thermal performance this will allow a building to achieve over its



Above: Built by Eco SIPs Homes, this dwelling's asymmetric form and crisp rendered finish give it a striking look

CREATING A HEALTHY HOME

If sustainability is at the heart of your scheme, then occupant health is likely to be near the top of your agenda, too. Over recent decades, manufacturers have cut down on the amount of toxic substances that are used in building components. Volatile Organic Compounds (VOCs) can be found in a range of elements, including wood products, paints, glues and air fresheners. While not all VOCs are harmful, some new dwellings contain undesirable levels of toxins like formaldehyde. "It's worth noting that insulation materials such as EPS and PUR do not contain any CFCs, HCFCs or formaldehyde and do not release any VOCs," says Martin from Eco SIPs Homes. "A number of OSB manufacturers, including us, also use formaldehyde-free adhesives."

For more information on healthy homes, see page 92

lifetime. Plus, the low level of carbon produced in the sourcing and processing of OSB boards (most of the wood for which is grown in the UK) helps to offset this.

"Overall, embodied energy for this construction system is relatively low in materials content, fabrication and erection," says Bryan. "Panels can be swiftly assembled by hand, are readily transportable and can be constructed without the use of heavy plant on site."



Left: Horizontally and vertically laid cladding was paired with a stone to complete this house, which was built by JML Contracts



Above: A barn-style SIPs house by Model D Homes. Large swathes of glazing and horizontally-laid cladding give the building a modern look

SIPs are composite panels used to form the structural load bearing elements of a building. Insulation is injected between two wood-based racking sheets, usually made from oriented strandboard (OSB). The middle layer forms a rigid core that bonds to the two outer panels, delivering a strong and highly airtight arrangement. Made in a factory, the units can be used to form walls, floors and ceilings, slotting together quickly and neatly on site.

CONTACTS

Caber House 01369 701988 www.caberhouse.co.uk **Eco SIPs Homes** 07577 791936 www.ecosipshomes.co.uk **Glosford SIPs** 01432 842999 www.glosfordsips.co.uk **Heb Homes** 0141 550 7360 www.hebrideanhomes.com **SIPCO** 01514 245346 www.thesipcompany.com **JML Contracts** 01764 663271 www.jmlcontracts.co.uk **Model D Homes** 01464 851208 www.modeldhomes.com