



DEVELOPERS GUIDE

Insulated Concrete Forms by Nudura

Developers Guide

As the demand for energy-efficient and environmentally conscious construction grows, developers seek innovative solutions to meet these challenges. This whitepaper explores the multifaceted advantages of building with Nudura Solid Insulated Wall system in the context of large-scale, multi-residential developments. Through interviews with industry experts and developers, we uncover the intangible benefits experienced throughout the build journey, shedding light on Nudura's exceptional performance at scale.

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I. Introduction of Nudura

Nudura is a brand of Tremco and a world's leading manufacturer of solid insulated wall system or also called, insulated concrete formwork (ICF). Sold around the world, Nudura's innovative systems offer a revolutionary approach to construction that prioritises energy efficiency, sustainability, safety and resilience.

Our ambition is for ICF to become a recognised and preferred alternative to traditional construction methods. We are aligned with UK's government goal in providing all building owners with energy efficient, comfortable and safe indoor environments all year round.



Through a real project example at Chwilog with Beech Development and expert interviews, we aim to provide valuable insights into the transformative impact of Nudura ICF.

We encourage you to learn more about Nudura and the value of building sustainable and cost-effective structures with ICF.

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2. Energy Efficiency & Cost Savings

2.1 Reduced Energy Costs

The UK government has set in Law a target to reduce greenhouse emissions to net zero by 2050. To support this objective recent changes to the building regulations have been implemented which include the mandatory reduction in carbon emissions by 30% for all new homes.

Nudura ICF not only provides energy efficiency but also results in substantial cost savings. Developers can expect up to a 70% reduction in annual utility costs, a critical consideration for multi-residential projects aiming for long-term sustainability.

The monolithic concrete is layered between two continuous layers of Expanded Polystyrene (EPS) insulation, which isolates the concrete and significantly reduces the heat loss through a wall. With its ability to store and release heat in combination with its low thermal conductivity – structures built with Nudura provide the most useful level of thermal mass. This simply means, less energy consumption required in heating and cooling dwellings, resulting in greater cost savings throughout the life of the building.

A Nudura structure can provide U-Values as low as 0.11 W/m²K, compared to 0.18 W/m²K which is typically set as the benchmark for meeting current Building Regulations. The U-Value represents the rate at which heat flows through the wall element, with lower U-values indicating better insulation properties. For building owners this represents savings of over 70% in annual energy costs.

In the context of the Chwilog project, the achievement of a U-value of 0.16 W/m²K is noteworthy. This value signifies an exceptional level of thermal insulation, demonstrating the project's commitment to energy efficiency. This accomplishment not only contributes to reducing energy consumption but also enhances the overall sustainability of the Chwilog project.

In summary, building with Nudura reduces a building's operational energy demands, and as a result, the structure's carbon footprint on the environment.



Did you know: Nudura is 100% recyclable?

Whilst building with Nudura does require a different approach in design, our team of experts located across the UK, are on hand to help.

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2.2 Environmental Impact

Nudura building solutions are sustainable buildings, that offer a potential Net Zero energy build. Allowing architects, engineers, developers and builders to create buildings which are more energy efficient, sustainable and create less waste during the construction process.

Nudura's commitment to sustainability extends to its environmental impact. Nudura's forms consist of two panels of Expanded Polystyrene (EPS) insulation that are connected with our patented web system - made from 100% recycled polypropylene.

2.3 Superior Insulation & Indoor Air Quality

Nudura offers superior performance when it comes to thermal bridging, resulting in even temperatures throughout the structure with reduced draughts and cold spots, or any unwanted heat loss through air infiltration, ensuring occupants are comfortable no matter what the temperature is outside. Nudura offers 17 different thermally modelled junctions for each of our 5 different u-values based on British Regulations and Passivhaus Planning Package (PHPP).

The energy performance that comes from a Nudura form is the combination of thermal mass and airtightness tested as low as 0.35 m³/hr.m² and 0.2 air changes per hours (ACH) . As per the Approved Document L of the Building Regulations, the minimum standard for airtightness is 8.0 m³/hm² @ 50 Pa.

A Nudura house can easily achieve an airtightness < 3 m³/hm² or lower, especially when installed with illbruck air and water tight sealing solutions around the window and doors..

Nudura solid insulated wall systems are ideal for residential construction projects, since its forms act as an effective sound barrier by dampening sound vibrations from unwanted outside noise. With Nudura homeowners get an SRI (Sound Reduction Index) ratings of SRI 51* and higher.

In general, its superior insulation offers homes built with Nudura, reduced energy requirement for heating and cooling.



Reduce energy expenses



Superior indoor air quality



Net zero potential build

3. Sustainable Development with Nudura ICF

Sustainable construction requires a balance between development and environmental benefits and should promote inter-generational fairness i.e. a better quality of life for present and future generations. When building with Nudura Solid Wall Insulated systems, structures will do just that.





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3.1. Reduction of Waste and Emissions

Building with Nudura not only minimises waste and lowers the carbon footprint of the construction process but also ensures that the waste generated is 100% recyclable.

Recently introduced at the Chwilog development, Nudura Pre-cut system offers further reductions in waste on-site. This system follows a plan of a house type, which is then entered into computer software which generates a detailed plan of the exact number of Nudura blocks needed considering the most optimum way of cutting the blocks to minimise waste. After that, the Nudura team pre-cuts all the openings for the developers in our factory and deliver all block uniquely marked up and ready to be assembled on-site. Metaphorically speaking, this is Nudura's lego system.

Nudura pre-cut system brings enormous advantages when it comes to waste and recycling. As claimed by John Gardiner, Technical Director for Beech Developments Ltd, *“Not only we have seen a major reduction in waste on-site but since we now require less skips, we are also experiencing a tangible cost saving per week.”*

From a manufacturer perspective, Matthew Fidler, Nudura & Dryvit Sales Director added, *“By cutting the Nudura blocks in-house, at our factory, means that any waste will be 100% recycled. As manufacturers this offers us a full circular economy benefit and contribution towards sustainability.”*

3.2. Safe and Resilient Structures

The strength of Nudura comes from the solid concrete core. Nudura walls are built with steel reinforced concrete and a non-toxic, fire retardant grade of expanded polystyrene insulation. Nudura also provides greater impact resistance and will withstand winds of up to 250 mph ensuring that the occupants of the building or home are safe and secure in almost any situation. Nudura also provides structural stability and resistance to seismic actions as per Eurocode 2: Design of concrete structures and Eurocode 8: Design of structures for earthquake resistance. Nudura walls as part of a construction are flood resistant thus providing another dimension of safety and security.

In summary, Nudura ICF offers durability and resilience in adverse conditions, including protection against fire, earthquakes, storms, and flooding.

Developers and homeowners can trust Nudura to offer structures that are built to last and retain its value longer, contributing to the creation of safer buildings and safer communities.



Faster build time



Simplified assembly



Sustainable solution



Continuous insulation helps to reduce energy loss inside

4. Achieving Passivhaus Standards

4.1 Overview of Passivhaus Standards

The Passivhaus standard, originating from Germany, represents a benchmark in energy-efficient construction and design. It sets out rigorous criteria for building performance, focusing on minimising energy consumption while maximising occupant comfort. Developers embracing Passivhaus standards commit to creating structures that are not only environmentally friendly but also economically sustainable.

Core Principles of Passivhaus:

- **Energy Efficiency:** Passivhaus buildings prioritise reducing energy demand through meticulous design, high-quality insulation, and airtight construction. This results in homes that require minimal heating or cooling, drastically cutting down on energy consumption.
- **Thermal Comfort:** A fundamental tenet of Passivhaus is providing consistent thermal comfort. Through advanced insulation and ventilation strategies, Passivhaus structures maintain a stable and comfortable indoor temperature throughout the year, regardless of external conditions.

- **Airtightness:** Passivhaus constructions emphasise airtightness to prevent unintended heat loss. This is achieved through careful detailing and the use of high-quality materials, ensuring that the building envelope is virtually impermeable to air infiltration.
- **Ventilation with Heat Recovery:** While maintaining airtightness, Passivhaus buildings incorporate mechanical ventilation systems with heat recovery. This ensures a continuous supply of fresh air while recovering and reusing the heat from exhaust air, contributing to both energy efficiency and indoor air quality.
- **Renewable Energy Integration:** Although achieving ultra-low energy consumption is the primary goal, Passivhaus projects often integrate renewable energy sources, further reducing the environmental impact of the building.

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4.2. Nudura's Contribution to High-Performance Green Homes

Nudura combined with concrete provides a robust building which allows our structures to meet the performance requirements for UK Building Regulations, Future Home Standards, as well as Passivhaus requirements. Our ICF systems align seamlessly with Passivhaus standards, providing a robust and efficient building envelope.

Developers choosing Nudura ICFs for Passivhaus projects benefit from a streamlined construction process, airtight structures, and the assurance of meeting the highest standards in energy efficiency. The combination of Nudura's innovative ICF technology and the principles of Passivhaus results in buildings that not only meet the immediate needs of occupants but also set a benchmark for sustainable and high-performance construction.

Benefits of Passivhaus Nudura ICF Houses:

- **Reduced Energy Bills:** Nudura ICF houses typically exhibit significantly lower energy consumption, resulting in substantial cost savings for homeowners in terms of reduced energy bills.
- **Lower Environmental Impact:** By consuming less energy, Nudura houses contribute to a smaller carbon footprint. This aligns with global efforts to combat climate change and promotes environmentally responsible building practices.
- **Enhanced Comfort:** Occupants of Nudura houses enjoy consistent and superior thermal comfort throughout the year, with minimal temperature fluctuations.
- **Healthier Indoor Environment:** The emphasis on controlled ventilation ensures a continuous supply of fresh air, contributing to a healthier indoor environment by minimising the presence of pollutants and allergens.
- **Long-Term Value:** While upfront construction costs may be marginally similar, the long-term value of Nudura houses is evident through lower operational costs, increased durability, and enhanced resale value.



4.3. Developer's Testimonial - Beech Developments

In an interview about Nudura and the experience in building with our Insulated Concrete Forms, John Gardiner - Technical Director for Beech Developments said: *"In our quest for construction solutions that grant us ultimate control on-site, high energy performance, and adherence to evolving building regulations in Wales, we found Nudura to be a game-changer. The system and team not only addressed the challenge of bridging the gap between specifications and on-site delivery but also ensured that installations are precise from day one, eliminating the need for constant checks as it would be expected during a traditional build. The simplicity and efficiency brought by Nudura significantly streamlines the entire construction process. Beyond the standard considerations of thermal performance and durability, cost played a pivotal role in our decision to shift from a timber frame system. With timber costs skyrocketing, Nudura Systems proved to be not only cost-effective but also offered unexpected benefits such as increased build speed, improved quality, and better interfacing with joinery work. The trades have wholeheartedly embraced the change, with training provided by the Nudura team resulting in a skilled and adaptable workforce. Our joinery company's involvement in the process has notably reduced errors and enhanced accuracy throughout the construction, giving us confidence in the precision of our buildings. The collaborative approach has proven successful, making the transition from groundwork contractors to joinery seamless and effective. The accountability of joiners from above-ground work to finishing touches has eliminated excuses and significantly reduced mistakes, contributing to the overall success of our projects. Credits to Nudura and the trades for embracing innovation and transforming our construction processes for the better."*

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5. Nudura vs. Conventional Houses

5.1. Speed Of Construction

Building with Nudura cuts down the overall construction time due to the speed of wall assembly. Whilst substructure and fit out time frame remains the same – for a standard dwelling a Nudura superstructure can be built in approximately 10-14 days (including the 1st floor construction).

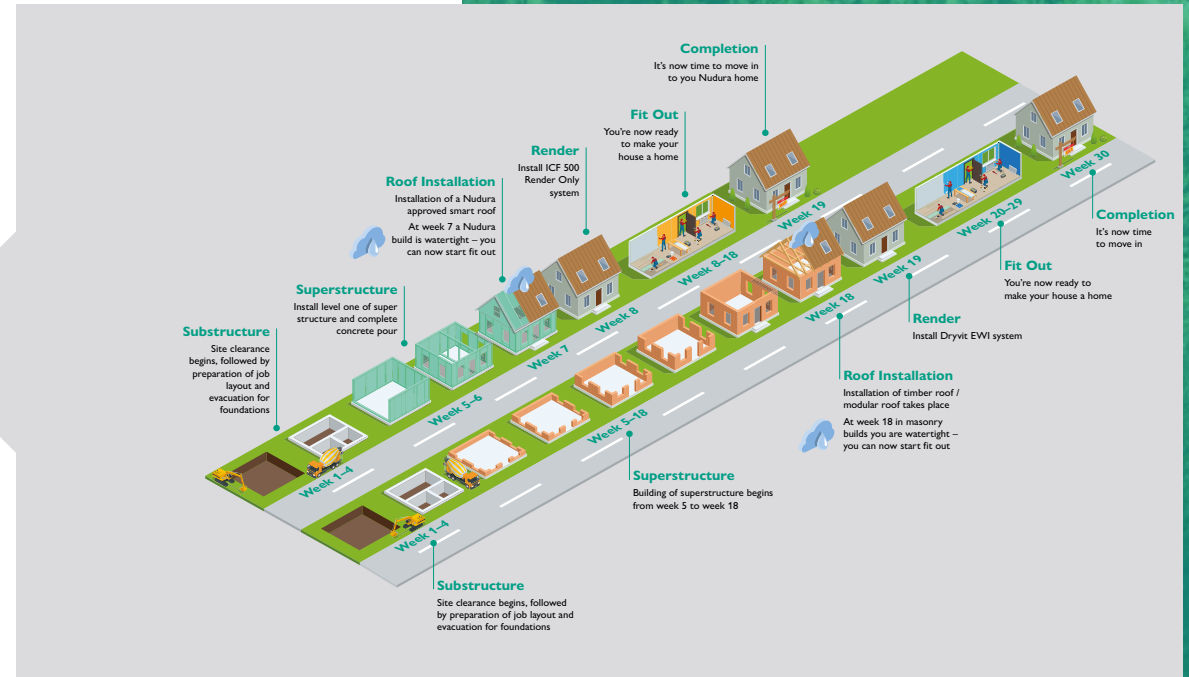
But we can go even faster with our Nudura's pre-cut system. This system has been introduced in one of the eighteen houses of the Chwilog project on a trial basis. From his experience on-site, Ian Coles commented *“The pre-cut system means speed. It literally took us 4 men and 3 hours to build one floor of a house.”*

Following works, John Gardiner said, *“I must say, the pre-cut system is brilliant. It significantly reduces wastage and speeds up the construction process. For subcontractors and installers on-site, this means they don't need to stop to measure and cut – they're far quicker, which may represent a saving in labour cost and reallocation of their time to other tasks and efficiently.”*

John added, *“Initially, we started with the traditional method to get a hands-on understanding of the product, and it provided valuable insights into its assembly. Transitioning to the pre-cut system afterward was seamless, thanks to the foundational understanding gained through the traditional approach.”*

“The traditional build with Nudura creates a sense of responsibility among the trades. They consider every aspect as they construct, aiming for efficiency on-site, minimising waste, and maintaining a cleaner workspace. Yet, the advantages of the pre-cut approach undoubtedly outweigh these considerations. The speed and efficiency it brings to the project are undeniable.”

John's final words about Nudura pre-cut were: *“For us the Nudura pre-cut system brings a vast list of advantages, namely efficiency, speed, reduction in waste and cost effectiveness. With that said, we are considering this system to go forward for our next site.”*



Did you know:

Homeowners as well as developers and builders can save up to 45% in construction time!

5.2 Net Cost Comparison

It is often a common misconception that ICF builds have a higher cost when compared to traditional construction methods. With the material shortages driving costs of materials up in the past years, and the industry seeing cost rises, now more than ever before developers are being pushed to look for alternative methods of construction.

There is a multitude of factors that should be considered when looking at the cost of building, not just merely the cost of materials. Delays on site, transportation and labour costs should also be considered.

With Nudura Solid Insulated Wall technology (ICF), developers can now achieve significant savings of up to 29% when compared to alternative, traditional construction.

John Gardiner, said *“While upfront construction costs may be marginally higher due to, for example the amount of concrete needed, the long-term value of Nudura houses is evident through lower operational costs, increased durability, and enhanced resale value. Furthermore, in contrast to timber frame, and modular kits, the expenses associated with Nudura have been distributed more evenly throughout the construction timeline.”*

John added, *“We haven’t incurred any unexpected or additional costs, which was surprisingly pleasant. The cost expenditure and timing are just different to what we were used to and have done previously with traditional building construction.”*

THE COST OF NUDURA VS.

Build Type	Cost per M2*
Nudura	£195 m2
Brick & Block Cavity	£250 m2
Rendered Block Cavity	£196 m2
Insulated Block (Rendered)	£190 m2
Brick Taced Timber Frame	£236 m2
Clad Timber Frame	£263 m2

5.3 Limitless Finishing Touches

When designing with Nudura, building finish options are virtually limitless. Nudura forms can have a variety of wall finishes applied to them to match any desired look and style.

Interior finishes are no different. Plasterboard or trowel-applied plaster materials can be easily attached directly to the Nudura Wall System using our fastening strips that are embedded within the EPS foam at 203 mm centres.

In the context of the Chwilog project, the building engineer and architect decided to go with the ICF 500 Render System, from our sister brand Dryvit. This system specialist render finish specifically designed for use with Nudura, offering both durability and thermal efficiency.

As per John Gardiner’s words, *“As the only system with full BBA approval, the Dryvit ICF 500 Render System was the obvious choice to meet our commitment towards our sustainability targets. It maintains the continuity of thermal insulation at junctions, while enabling both airtightness and weather tightness.”*





6. Tremco Construction Products Group (CPG) Synergies

6.1. Excellence in Technical Support and Training

As a brand of Tremco CPG UK, at Nudura we work closely with our sister brands, like Dryvit for its rendering system and using illbruck's range of air and water tight membranes and seals. We are the best placed manufacturer to offer an array of construction products for all stages of the construction projects.

This gives architects, specifiers, main contractors and self-builders an unparalleled advantage when using Nudura. With access to a range of building products at the touch of a button - but all through a single point of contact.

With an experienced technical and sales team, we are positioned to aid with specification, application-specific product development, problem solving and assistance on-site. Working with us means working with a single company, developing a single supplier relationship for all your construction products needs under one warranty, which only reduces the risk for all the developers and homeowners.

As part of the Tremco CPG UK training academy, at Tremco CPG we provide a range of online and in-person training sessions which are aimed to simplify the journey through the complex world of construction.

From CPD seminars for architects to product application tutorials for developers, contractors and installers - the Nudura team will be at your side to help at any stage.

The One-Day training course available across the UK, is a programme that teaches participants the basics of Nudura ICF installation skills. This is led by a certified Nudura installation specialist and experienced ICF installers, we'll break down the installation process, work through common building scenarios that arise in the field, and explain how our unique line of accessory products from Tremco CPG UK can help speed up the installation process.

But the technical support goes beyond the trainings, our Technical Manager for the Sealant, Bonding & Insulation division, Kathy Millward provided meticulous work on background information including U-value calculations and bespoke detailed drawings as requested by the architect and the structural engineering team for this project.

According to John Gardiner, *“Both the training and the ongoing on-site support from the Nudura team have been fantastic and incredibly helpful. Our Area Sales Manager is always on the other hand of the phone as well as the technical team, including Ian Coles with his site visits and continuous training on-site.”*

“We cannot thank the Nudura team enough for the continuous involvement and training provided, in particular as we progress with the building construction and have new trades coming on-site. This has been offering us piece of mind – which is invaluable.”

In Ian Coles, Field Service Manager for Nudura & Dryvit, words, *“I’ve been actively involved in weekly on-site support, particularly during the critical foundation construction phase. The progress has been impressive, with render already underway within just a few months since the project’s inception in November, which speaks volumes about its efficiency.”*

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7. About the Chwilog Project

The Chwilog project is situated in the picturesque village of Chwilog, on the stunning Llyn Peninsula and owned by Beech Developments. The development consists of a mixture of homes for sale and affordable homes through North Wales Housing Association. This is the very first Nudura project between both companies, that came to fruition 18 months ago.

After initial discussions with Beech, the original proposal was for three sustainable and passive houses, showcasing the efficiency of our construction methods. This initial collaboration paved the way for a more ambitious undertaking—the Chwilog site, comprising a staggering 18 houses, in which 1 is built with Nudura precut system.

The Chwilog project commenced in November 2023. This journey from a proposal for a handful of passive houses to a substantial 18-house development exemplifies the successful fusion of our innovative building methods with the broader landscape of mainstream house building.

The realisation of the Chwilog project stands as a testament to our commitment to revolutionising the construction industry and making sustainable, efficient housing solutions accessible to a wider audience.



To speak to a member of the Nudura team please contact **01942 251 400** or visit us online at **[nudura-europe.com](https://www.nudura-europe.com)**



Tremco CPG UK Ltd
Coupland Road, Hindley Green
Wigan
WN2 4HT UK

+44 (0) 1942 251400
hello@tremcocpg.com
www.tremcocpg.eu