
FRAMESPACE

Construct Innovate IndEx:

Framespace Solutions in Collaboration with Construct Innovate

Paddy Mahon - Head of Design and Engineering

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About us

- Framespace Solutions were set up in 2016
- We are based in Longford, Ireland.
- We Design & Manufacture Light Gauge Steel building systems for the Residential & Commercial sectors in Ireland in 2D and 3D Solutions

Design & Engineering

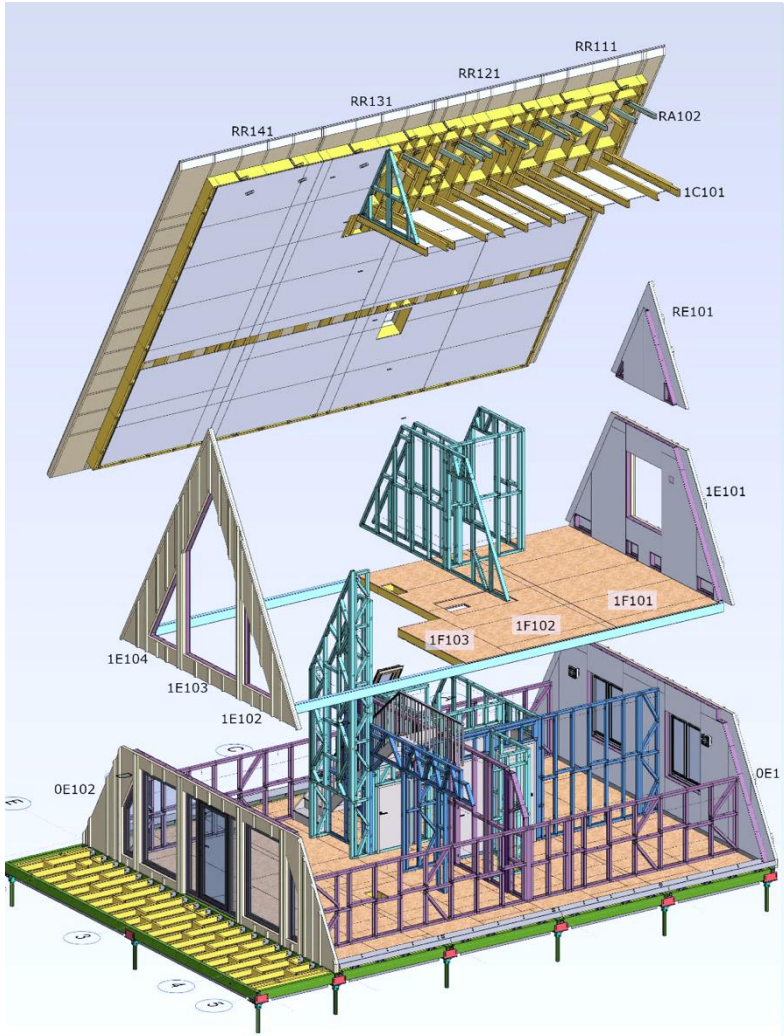
Precision Manufacturing

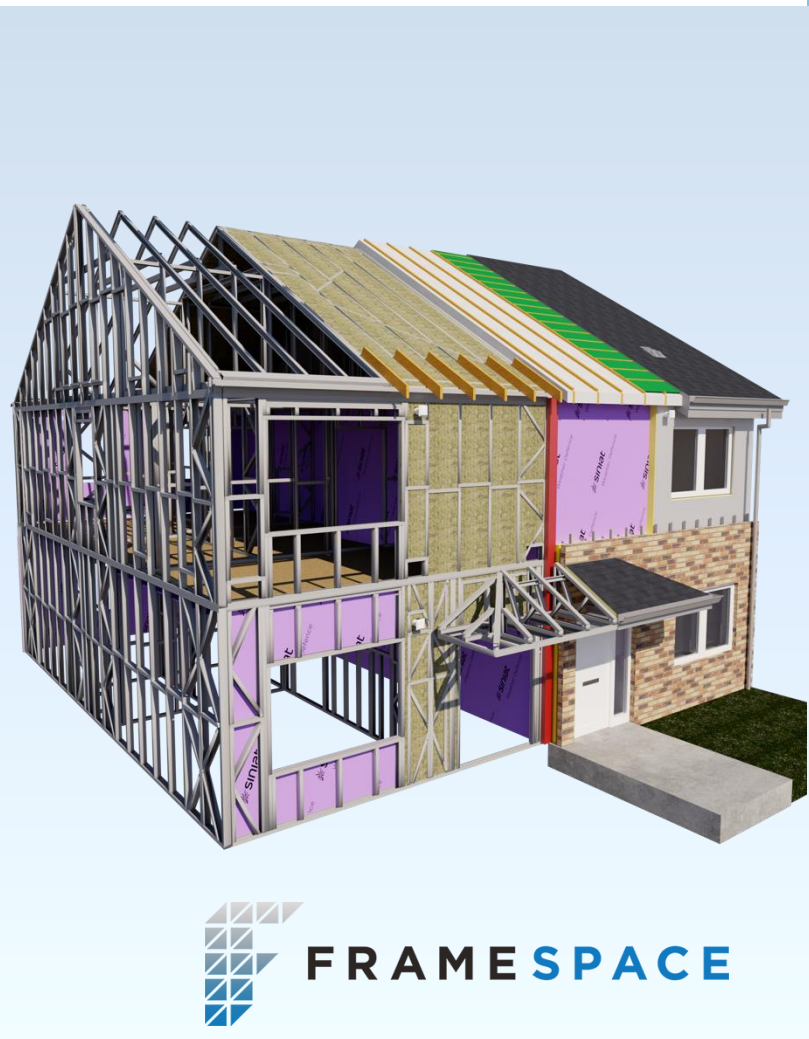
Installation & Assembly

Fit Out & Handover

What we do

- **2D Panelised System (Category 2)**: Closed Panel System assembled in the factory with an enclosed LGS structure, insulation and protective sheathing layers
- **3D Volumetric (Category 1):** Modules providing at a minimum a weather tight unit with or without external and internal finishes, internal fit out fully completed offsite.





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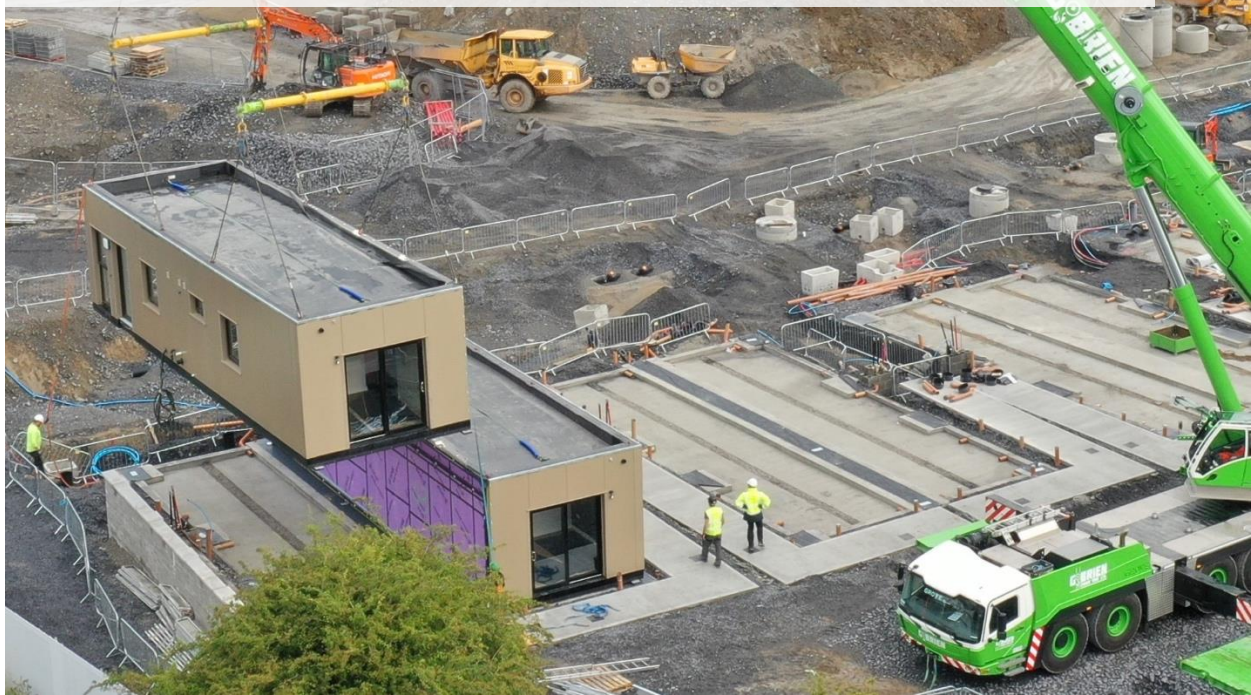
2D Closed Panel ⟷ 3D Volumetric

- PMV – 30-40%
- Fit out Completed Onsite
- Flexible Solution as it can be incorporated at later stage of design process
- Cost and Programme Certainty when it comes to Frame and Façade of buildings
- Fit out still to be completed as site activity.

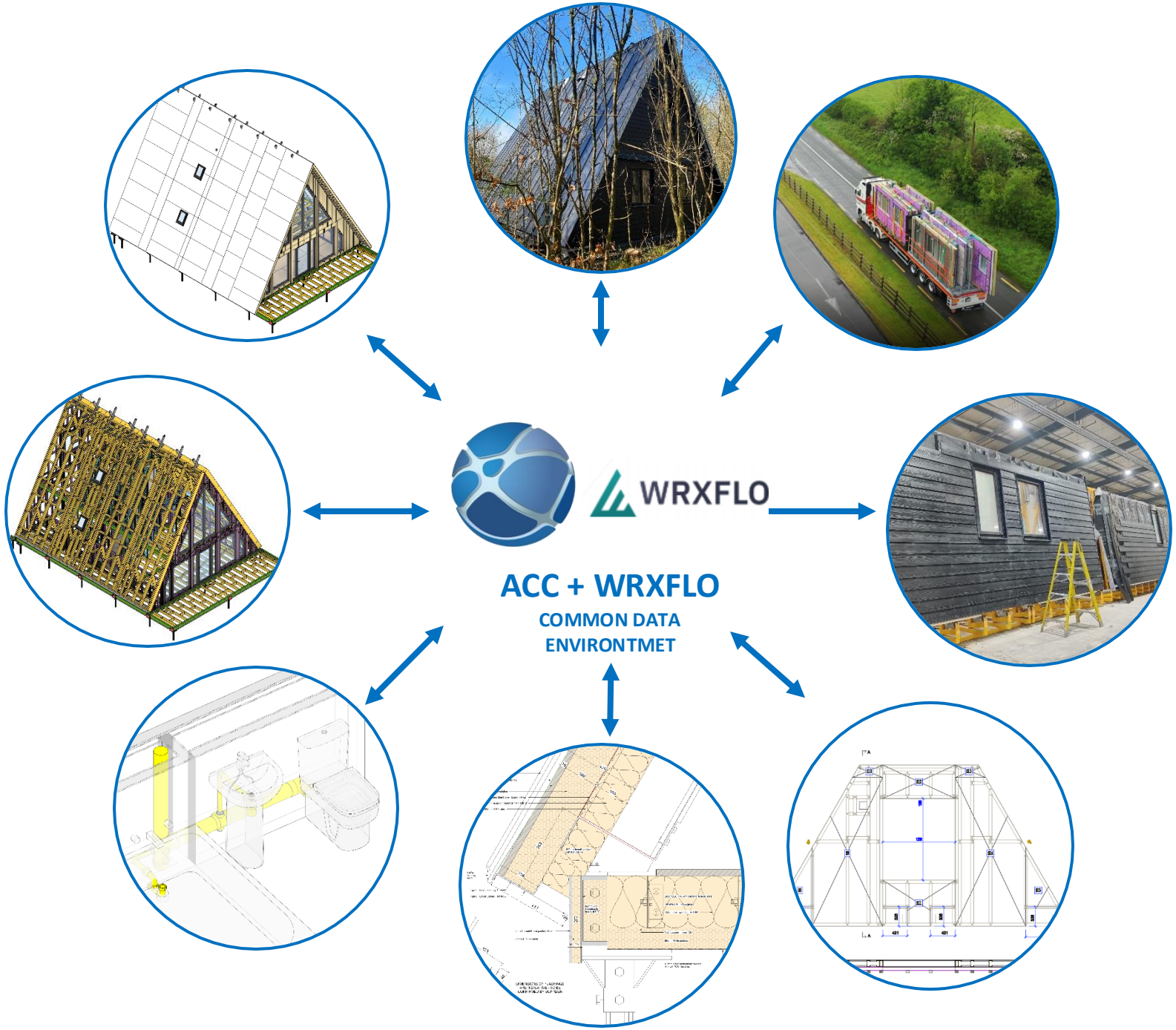
- PMV – +90%
- Fit out Completed Offsite
- Early Engagement/Consideration Important – Needs to be considered early as part of design.
- Cost and Programme Certainty – High level of cost and programme certainty. With civils and substructure, the only site activities.

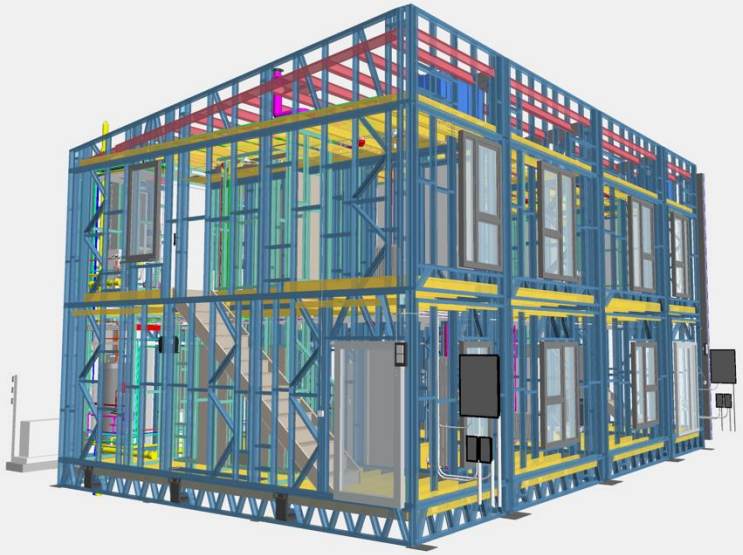


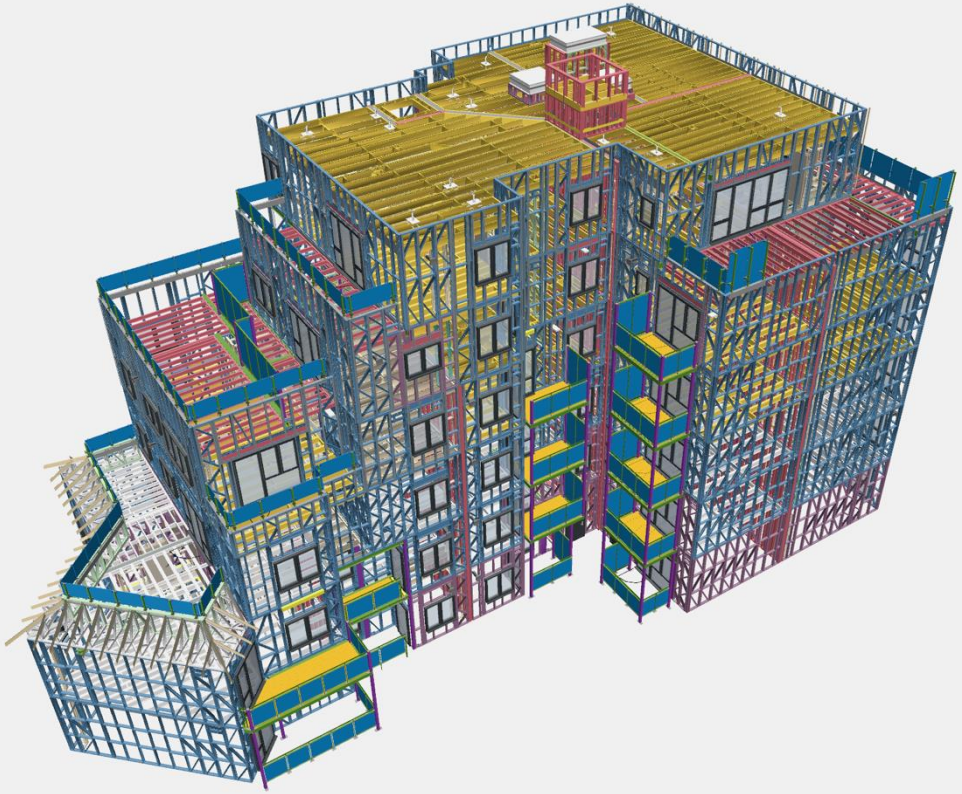
Design & Build Workflow

We operate with fully digital workflows from design to handover

- 100% traceability of every profile manufactured in our plant
- Deep analysis and control of all aspects of our manufacturing operations
- Industrial best practice built into all software







Testing and Analysis
Structure (Part A)

- All elements of the structure are designed for project specific conditions such as location, building height and elevation.
- Designed and Certified by a competent qualified structural engineer.
- All LGS and HRS elements are all modelled inhouse using 3D steel detailing software.

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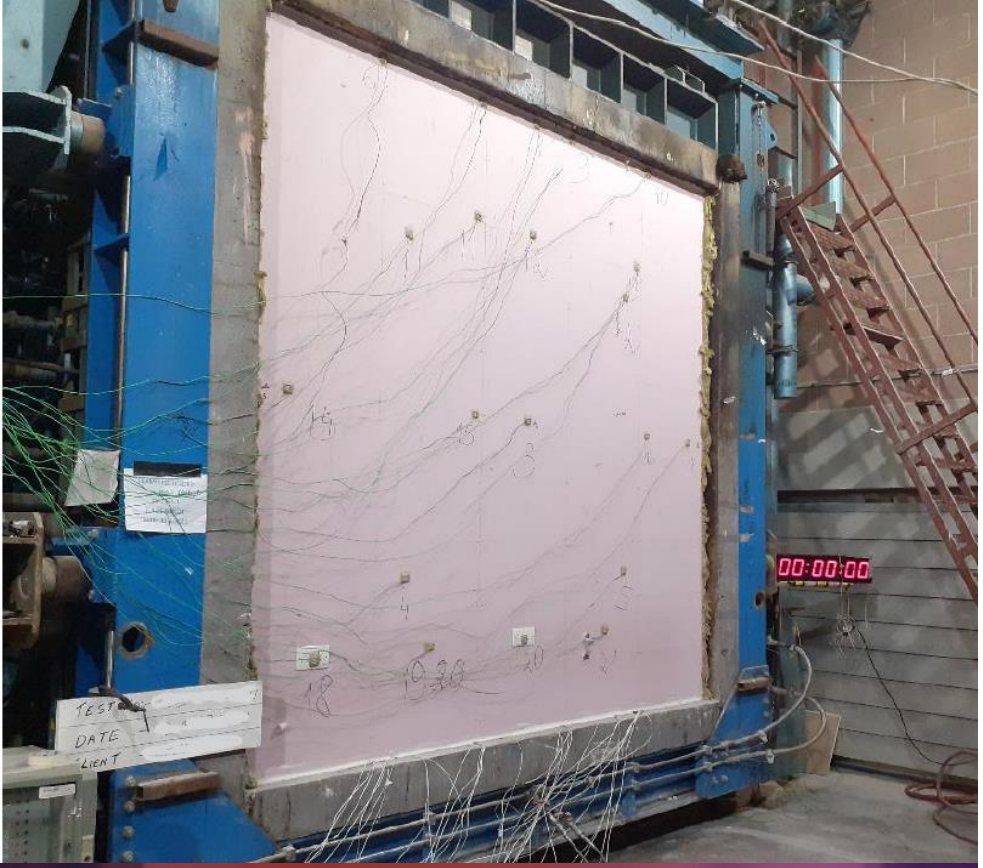

Testing and Analysis
Fire (Part B)

- We have carried out a full suite of Loaded Fire Testing on our System (External Wall, Compartment Wall, Compartment Floor, Load-Bearing Internal Walls).
- Covering 30min, 60min and 90min fire resisting requirements.
- We do not rely on any 3rd Party Assessment of our system.

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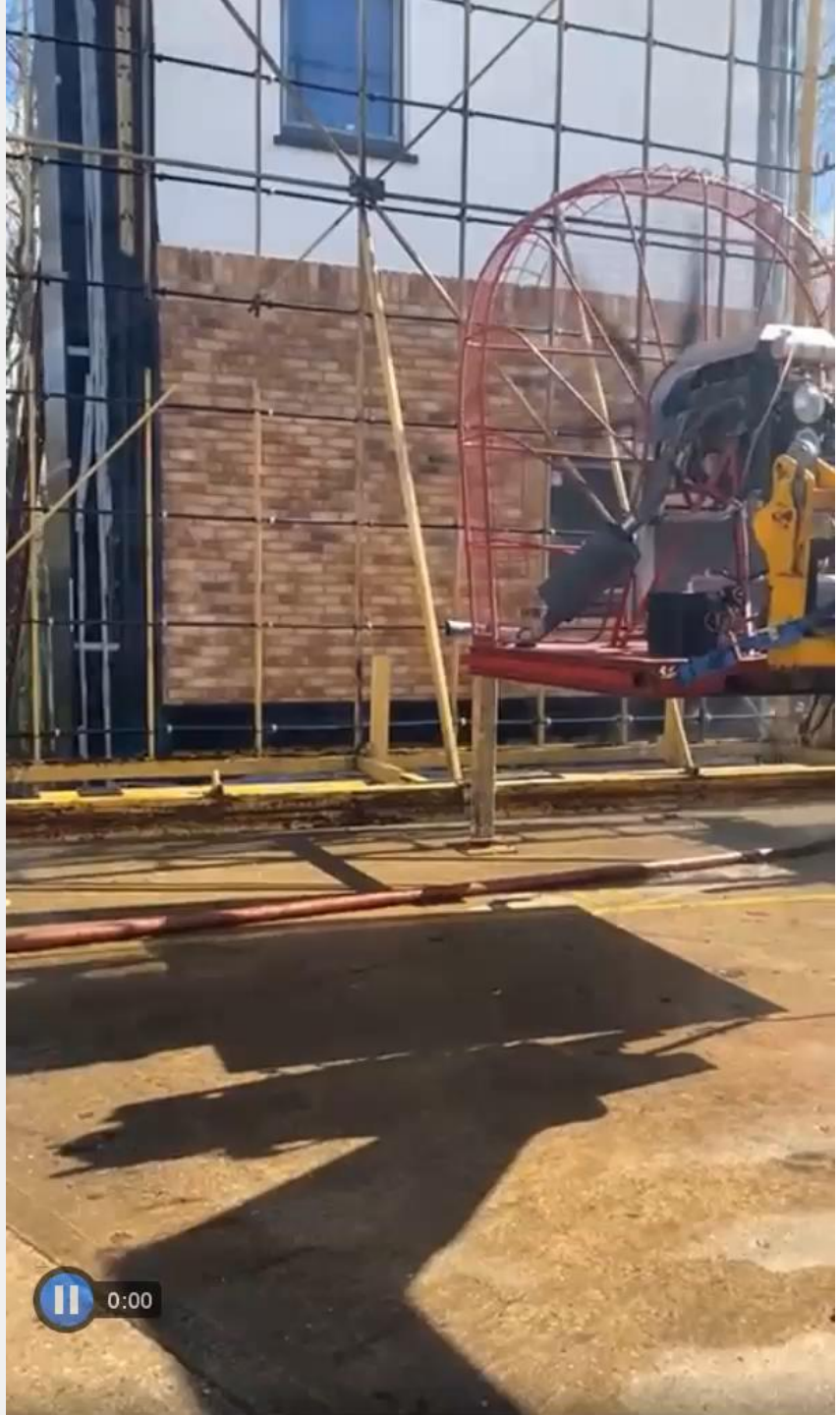

Testing and Analysis
CWCT Testing

- Full scale CWCT test carried out on external wall build-up.
- Testing for:
  - Air Permeability
  - Weather Resistance (Dynamic Water Resistance)
  - Wind Resistance
  - Hard and Soft Body Impact Testing

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Testing and Analysis
Hygrothermal Testing

- Testing involved :
  - Subjecting the sample to repeated heat/rain cycles followed by repeated heat/cold cycles at controlled humidity conditions designed to simulate naturally occurring condition
  - Post weathering cycles Bond Strength and Impact Testing was carried out on the panel finishes.

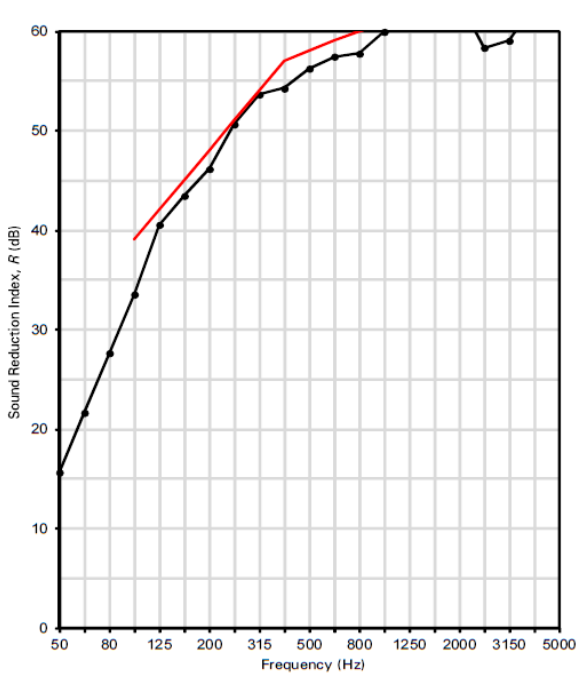
AIRO Report No. L/3506

Sound Reduction Index (R) according to BS EN ISO 10140-2:2010

Test No. L/3506/21 Date of Test:
Client: Framespace Solutions Ltd
Specimen: Wall Panel – Wall No. 10WD
Installed by: Framespace Solutions Ltd
Specimen area: 8.77 m² Mass per unit area: 47 kg/m²

Chamber Conditions	Volume	Air Temperature	Relative Humidity	Air Pressure
Source Chamber	102 m³	20°C	65%	1010 hPa
Receiving Chamber	205 m³	19°C	65%	1010 hPa

Frequency (Hz)	R One-third Octave (dB)	R Octave (dB)
50	15.6	
63	21.6	19.2
80	27.6	
100	33.5	
125	40.5	37.1
160	43.4	
200	46.1	
250	50.6	49.0
315	53.6	
400	54.2	
500	56.2	55.7
630	57.4	
800	57.7	
1000	59.9	59.4
1250	61.4	
1600	63.1	
2000	63.0	60.8
2500	58.3	
3150	59.0	
4000	62.7	61.8
5000	67.0	
6300		
8000		
10000		



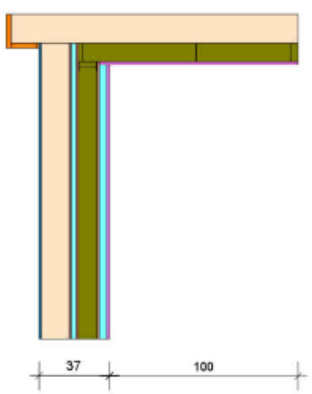
Rating according to BS EN ISO 717-1:2013

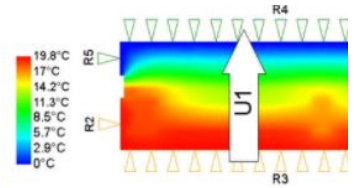
R_w (C;C_{tr}) = 58 (-2;-7) dB $C_{50\text{-}3150}$ = -7 dB $C_{50\text{-}5000}$ = -6 dB $C_{100\text{-}5000}$ = -1 dB
$C_{tr,50\text{-}3150}$ = -20 dB $C_{tr,50\text{-}5000}$ = -20 dB $C_{tr,100\text{-}5000}$ = -7 dB

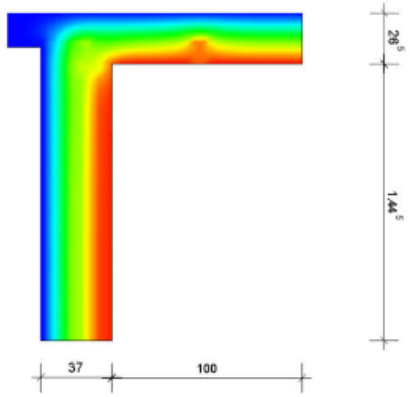
Evaluation based on laboratory measurement results obtained by an engineering method

Testing and Analysis **Acoustic (Part E)**

- Suite of Acoustic Lab Tests carried out during system development.
- Acoustic Testing carried out in line with Part E requirements for projects.
- Significant amount of site test data completed to date verifying the acoustic performance of the wall and floor build-ups.

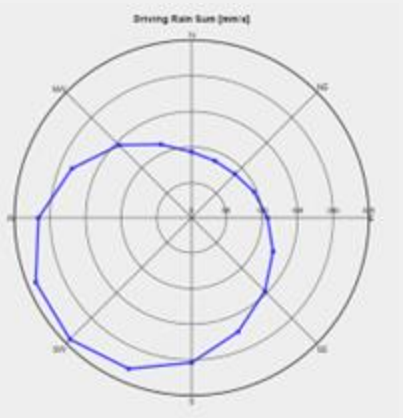


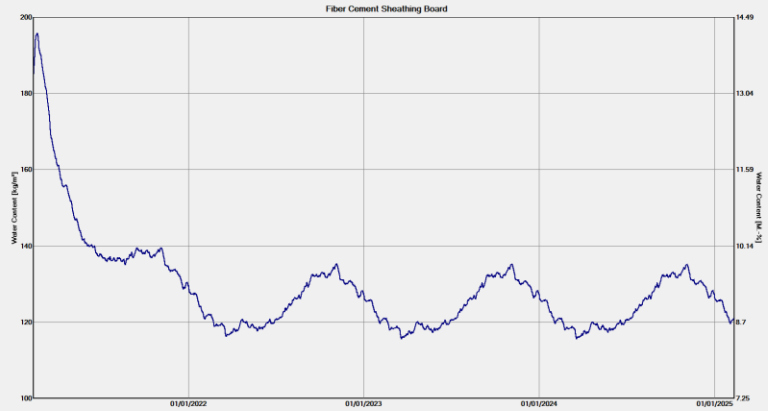




Testing and Analysis
Fabric Performance (Part L)

- Full suite of thermal models complete on 2D and 3D Junctions
- Hygrothermal Analysis has been carried out on the Floor, Wall and Roof Build-Ups.
- Achieve an average air tightness of 2m3/hr/m2.





Certification

- CE EN 1090 Certified
- NSAI Agrément Certified to construct buildings up to 20m to the top floor
- UL Certification for External Wall Build-Up.
- ISO 9001 Certified

Certificate for the UL Mark – Performance of Curtain and Cladding Support Systems

Section 1 – Certificate Details:

Customer Name:	Framespace Solutions Limited	Certification Body:	UL International (UK) Ltd
Customer Address:	Aghafad, Longford, Ireland, N39E337	Certification Body Address:	Halesfield 2 Telford Shropshire TF7 4QH
UL Scheme:	BSFO - Performance Cladding and Cladding Support Systems Issue 2	Certificate Number:	R40892-1
Date of Certification Commencement:	26th April 2023	Date of Certification Expiry:	25th April 2026
Certificate Compiled by:	Mark Swanborough Certification Leader	Certificate Approved by:	Michael Wass Engineering Manager
Signed:		Signed:	

Section 2 – Product covered by this Certificate:

System Name	System Type
External Insulation System with Non-Ventilated Residual Cavity	Drained and Non-Ventilated External Wall System with Render and Brickslip options

This Certification Covers

- A detailed overview of the certified product
- An assessment of the certified company's factory production control system.
- A review of the products documentation to help demonstrate compliance with the applicable requirements of the NHBC standard 2022 chapter 6.9
- A review of the certified products contribution to any key requirements of the building regulations.
- An overview of the certified company's product installation requirements and procedures.
- An overview of all supporting test documentation used for the product evaluation.
- Ongoing surveillance of the certified company's factory production control system and procedures.
- The conditions under which this product certification is valid.

NSAI

CERTIFICATE OF CONFORMITY OF THE FACTORY PRODUCTION CONTROL

0050 - CPR – 1055 System 2+

In compliance with the Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC, it has been stated that the construction product(s)

Structural Components for Steel Structures in accordance with the following:

Standard	I.S. EN 1090-1:2009 + A1:2011
Execution Class	EXC 2

Placed on the market by:
Framespace Solutions
Aghafad
Co. Longford
N39 E337

And produced in the factory:
Framespace Solutions
Aghafad
Co. Longford
N39 E337

is submitted by the manufacturer to the initial type-testing of the product and its factory production control and that the approved body – National Standards Authority of Ireland – has performed the initial inspection of the factory and of the factory production control and performs the continuous surveillance, assessment and approval of the factory production control.

This certificate attests that all provisions concerning the assessment and verification of constancy of performance and the performances described in Annex ZA of the standard(s) listed above under System 2+ were applied.

This certificate was first issued on 25/11/2020 and remains valid as long as the conditions laid down in the harmonised technical specification in reference or the manufacturing conditions in the factory or the FPC itself are not modified significantly.

Signed:

Seán Baffe – Director of Sustainability & the Built Environment

File no: 1.144.194
Approval Date: 25/11/2020
Last amended Date: 31/01/2023
Expiry Date: 24/11/2023
Issued By : NSAI, 1 Swift Square, Northwood Business Park, Santry, Dublin 9.

NSAI Agrément

IRISH AGRÉMENT BOARD
CERTIFICATE NO. 22/0429
Framespace Solutions Ltd
Aghafad,
Co. Longford,
N39 E337
T: +353 (0)43 3397991
W: www.framespace.ie

Framespace Solutions
LGS Building System

NSAI Agrément (Irish Agrément Board) is designated by Government to issue European Technical Approvals.
NSAI Agrément Certificates establish proof that the certified products are '**proper materials**' suitable for their intended use under Irish site conditions, and in accordance with the **Building Regulations 1997 and subsequent amendments**

SCOPE

This Certificate relates to the Framespace LGS Building System, for the manufacture and erection of structural cold-formed Light Gauge Steel (LGS) Frame Buildings. The Framespace Solutions LGS Building System is certified to be used in the following purpose groups: 1(a), 1(b), 1(c), 1(d), 2(a), 2(b), 3, 4(a) and 5 as defined in Technical Guidance Document B of the Irish Building Regulations 1997 and subsequent amendments.

The system is used for structural walls and floors in the above purpose groups where the height to the upper floor surface of the top floor is not more than 20m from ground level on the lowest side of the building, and where the full structure is designed, manufactured, supplied and erected by Framespace Solutions Limited.

The system may also be used to construct the upper storeys of a concrete or steel framed building where the height of the complete building to the upper floor surface of the top floor is not more than 20m in height. The system can accommodate a wide range of custom designs.

The Framespace Solutions LGS is also approved for use in non-loadbearing infill panels. The infill panels are used within reinforced concrete, steel frames and traditional construction that possess their own independent lateral stability systems.

Readers are advised to check that this Certificate has not been withdrawn or superseded by a later issue by contacting NSAI Agrément, NSAI, Sentry, Dublin 9 or online at http://www.nsai.ie

Construct Innovate Collaboration

- Awarded 2 Construct Innovate Seed Fund Projects in 2024 in collaboration with University of Galway
- Ongoing Research Projects:

Reducing Embodied Carbon in the Manufacture of LGS Modular Construction

Optimizing Slot and Stud Panel Connectors for Light Gauge Steel Framing Systems: Development and Testing

Construct Innovate
Built Environment Research Ireland

Ollscoil na Gaillimhe
University of Galway

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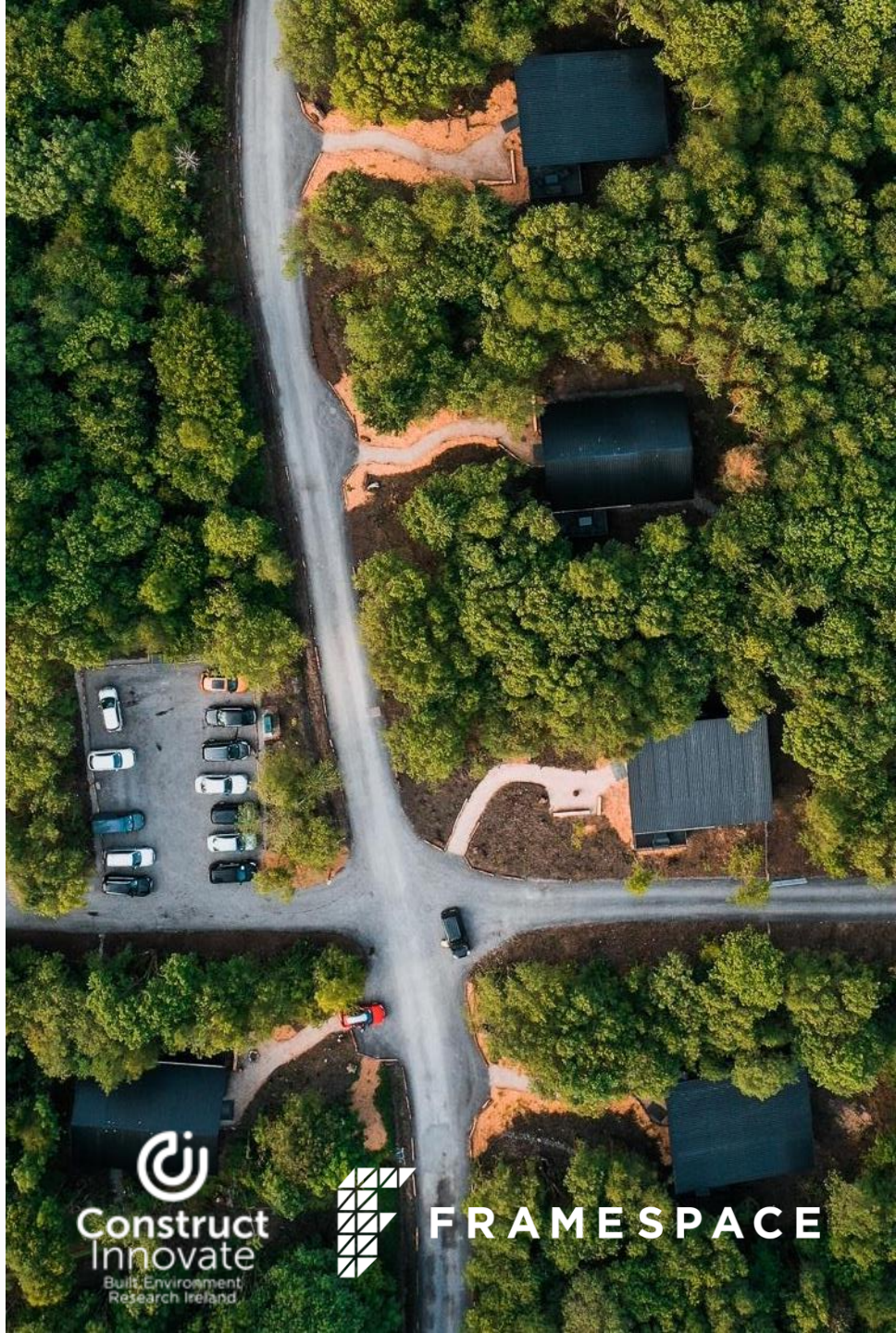
Reducing Embodied Carbon

- Assess the current embodied carbon of LGS modular construction and compare it with other construction methods.
- Develop strategies to minimize the embodied carbon of modular solutions.
- Identify the most impactful strategies and evaluate them for regulatory compliance and feasibility



Basis of Study: Embodied Carbon Study on 3D Modular Houses

Light Gauge Steel: GWP Results per LCA Stage:

	Building life-cycle stage	GWP, kgCO2e	GWP intensity, kgCO2e/m2	Stage contribution % for A1-C4 GWP
Product stage	A1-A3 Extraction of raw materials – Their transportation to manufacturing plant – Manufacturing and Fabrication	36132.8	368.7	69%
Construct. Process	A4 Transport to project site	1609.2	16.4	3%
	A5 Construction and Installation process	640.1	6.5	1%
Use stage	B1 Use (Refrigeration leakage was included)	Excluded	Excluded	Excluded
	B4-B5- Replacements & Refurbishment	6746.5	76.0	13%
	B6 Energy use	Excluded	Excluded	Excluded
	B7 Water use	Excluded	Excluded	Excluded
End of life stage	C1-C4 Deconstruction and Demolition	7304.1	74.5	14%
	Total A1-C4 (excluding B1, B6 & B7 stages)	52432.7	535	100%

Embodied carbon (Global Warming Potential) results - Breakdown per Life-Cycle Stage

Basis of Study:
GHG kgCO2 Comparison of Building Types

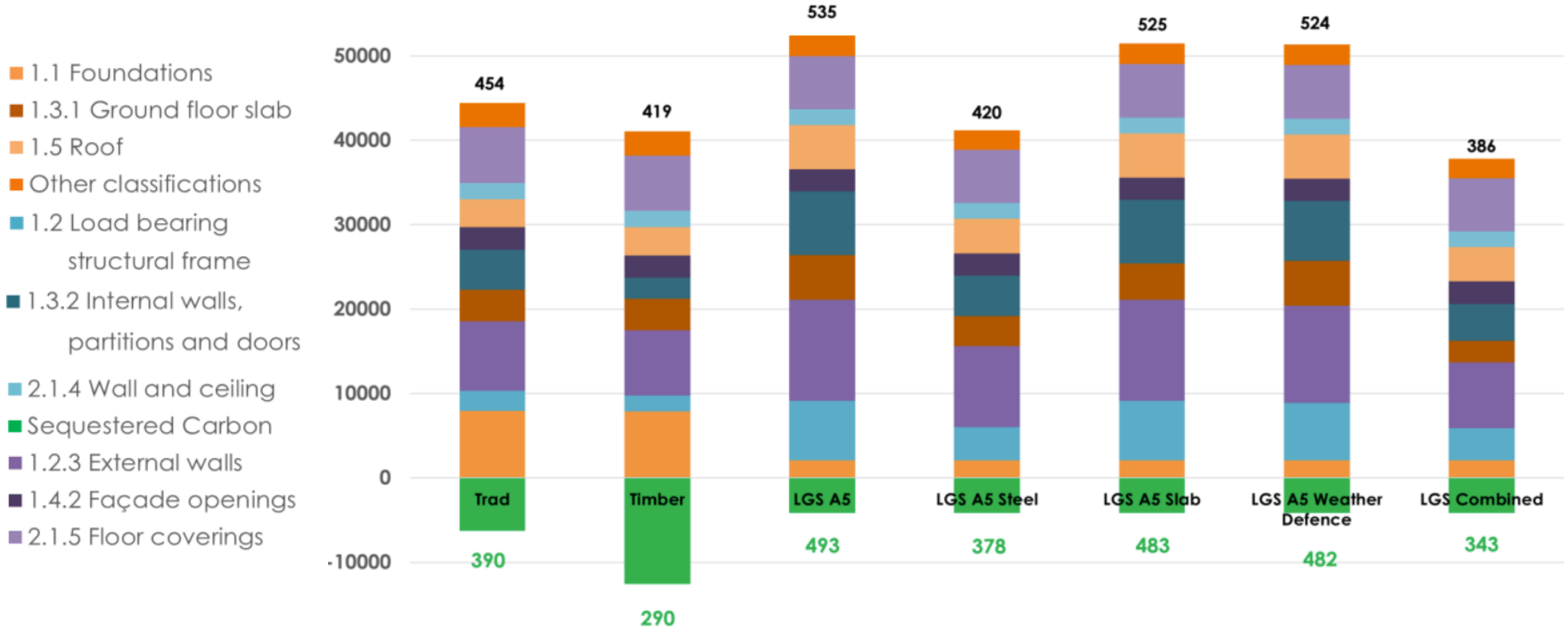


Figure – Embodied carbon (Global Warming Potential) A1-C4 Results Including Optimisations Comparisons

Current Study:
Pim Street Apartments

- **Project:** 30 Apartments on Infill in Dublin City
- **Results to Date:**
  - Total EC: **561,294kg CO2e**
  - Useful floor area: **1838m2**
  - EC/m2: **305**
- **Next Steps:** Complete comparison with data from 3D modular house. Look at Optimizations and their Impacts.

Further Study: Mount Lucas - MMC Demonstration Park

Project: 1 Bed and 3 Bed Houses ZEB modular units

- Key information:
- Designed as Zero Energy Buildings
- Will be constructed in 3D Modular (>90% PMV)

Objectives:

- Complete LCA's both Houses constructed in 3D Modular and in Traditional Forms of Construction
- Complete comparison of data for the different forms of construction.
- Look at Optimizations for 3D solution and their Impacts

Optimizing Slot and Stud Panel Connectors for Light Gauge Steel Systems

Problem Statement:

- Current panel connections are labour-intensive, time-consuming and relies heavily on installer expertise to ensure proper alignment and plumbing.

Objectives:

- Design new slot and stud connectors that are easy to install.
- Develop prototype and test these connectors both structurally and in the field.
- Optimize the design for cost-effectiveness.

Construct Innovate
Built Environment Research Ireland

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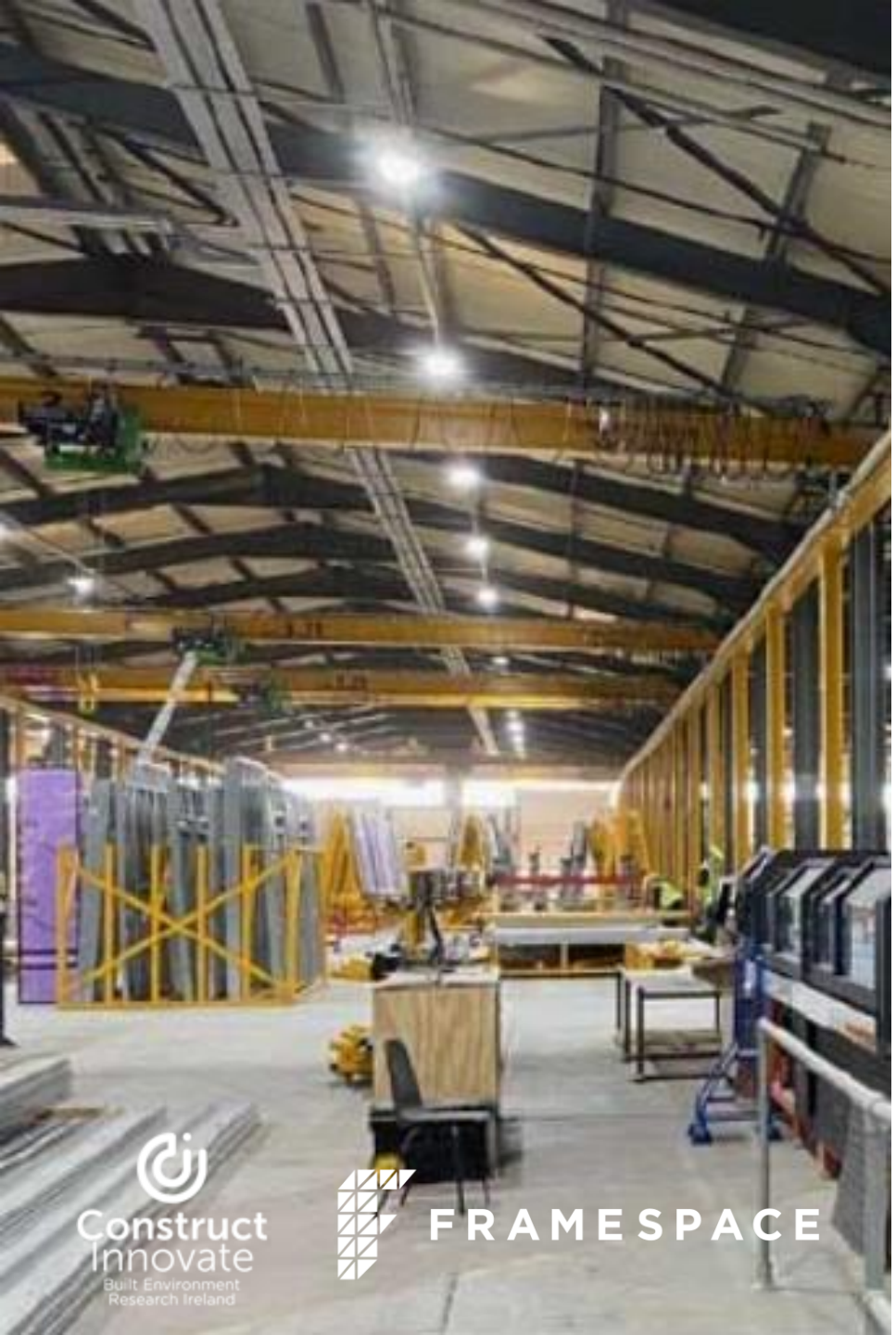


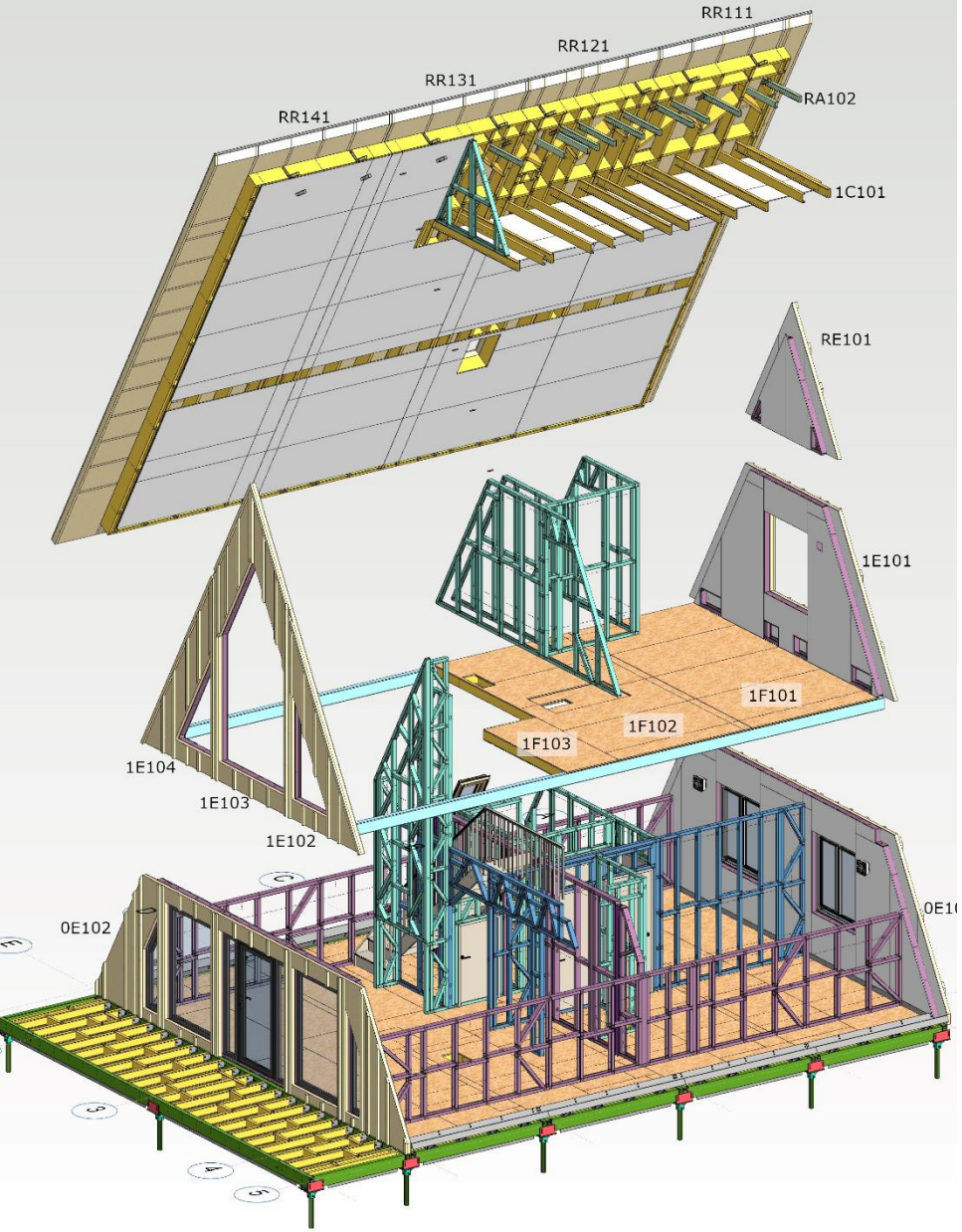
Optimizing Slot and Stud Panel Connectors

Expected Outcomes:

- High-performance connectors that have the required structural capacity and improve install efficiencies.
- Faster and more accurate installation, reducing construction time and labour costs.
- Cost-effective production of connection components.

Project Status:

- Researcher has accepted offer from University of Galway and is awaiting issue of visa and will begin project once they arrive.



Thank you!

Paddy Mahon

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Framespace LinkedIn

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Framespace Website

www.framespace.ie