

Built Environment Research Ireland

Construct Innovate IndEx-Seed Funding Feedback

Image Credit: Bruno Biancardi





DRES PROPERTIES - COMPANY TIMELINE

D/RES







COMPLETED UNITS

 2021**
 2022
 2023
 2024
 2025 Exp

 206
 369
 168
 460
 320



D/RES

Making life remarkable





* Excluding sales from Cherrywood. ** D/RES sites were closed from December 2020 to April 2021 due to COVID-19

DRES INNOVATION JOURNEY





Insulated Concrete Formwork (ICF)



External Wall Insulation (EWI)



Hybrid Panelised TF Wall Systems

Wall Types	A1-A3 Manufacture	A1-A3 Sequestered	A4 Transport to Site	A5 Constuct	B1, B2, B3	B4, B5	C1 Demolition	C2 Transport	C3/C4 (Recycled)	C3/C4 (Incinerated)	C3/C4 (Landfill)	Total A-C
5: Timber frame (I-beam, cellulose & renderboard)	3.5	-5.4	0.5	Omitted	0.0	0.0	Omitted	0.1	0.0	5.4	0.1	4.1
7: Timber frame (mineral wool + PIR, renderboard)	4.2	-4.0	0.6	Omitted	0.0	0.1	Omitted	0.1	0.0	4.0	0.0	5.0
9: Timber frame (PIR, renderboard)	4.4	-4.0	0.6	Omitted	0.0	0.0	Omitted	0.0	0.0	4.1	0.0	5.2
6: Timber frame (PIR, renderboard)	4.2	-3.3	1.1	Omitted	-0.5	1.0	Omitted	0.3	0.2	3.3	0.0	6.4
8: Timber frame (PIR, block outer)	4.6	-3.3	1.1	Omitted	-0.5	0.9	Omitted	0.3	0.2	3.3	0.0	6.6
3: Block on flat (rendered EWI)	6.2	0.0	1.6	Omitted	-1.0	0.4	Omitted	0.4	0.5	0.0	0.1	8.2
1: Cavity wall (rendered)	6.6	0.0	1.5	Omitted	-0.9	0.9	Omitted	0.4	0.5	0.0	0.1	8.9
2: Cavity wall (brick clad)	8.0	0.0	1.3	Omitted	-0.5	0.0	Omitted	0.4	0.4	0.0	0.0	9.8
11: ICF (20/25 RC, 70% GGBS, 0.4% rebar)	6.2	0.0	1.8	Omitted	-0.2	0.0	Omitted	0.5	0.5	0.9	0.1	9.9
4: Block on flat (brick slip EWI)	7.9	0.0	1.7	Omitted	-1.0	0.4	Omitted	0.5	0.5	0.0	0.1	10.0
10: ICF (28/35 RC, CEM I, 1% rebar)	11.4	0.0	1.9	Omitted	-0.4	0.0	Omitted	0.5	0.6	0.9	0.1	15.0

Whole Lifecycle Carbon Analysis – Wall Buildups

MMC: 2-D MODULAR PANELISED TIMBER FRAME





Off-site Pre-Manufactured Components

TIMBER FRAME – 3 BED SEMI-DETACHED EMBODIED CARBON



RIAI 2030 Climate Challenge



*New build domestic includes a lower target of 450 kg CO_2e/m^2 for dwellings over 133m²

RIAI 2030 Climate Challenge – housing target of 450kgCO2e/m²



TF Construction – achieved embodied carbon of 231kgCO2e/m²





Mass Engineered Timber



D/RES

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Cross Laminated Timber (CLT)

 CLT is an engineered wood product consisting of layers of kiln-dried dimension lumber (usually three, five, seven or nine) oriented at right angles to one another and then glued to form structural panels.

Glue Laminated Timber (Glulam)

 Glulam (glued laminated timber) comprises a number of wood laminates glued together. The fibres in the laminates run parallel to the length of the piece then glued to form structural panels.







✤ Sustainability

- Renewable resource via afforestation
- Sequestration of carbon within timber
- Lowest Global Warming Potential (GWP)

Operational Effectiveness

- Lower heating consumption
- Air tightness achieved is almost Passivhaus
- Thermal comfort throughout the year
- Superior acoustic insulation & sound dampening
- Indoor quality similar to the WELL Concept

✤ Construction

- Design for Manufacture & Assembly (DfMA)
- Shorter programme duration
- Greater precision & construction quality
- Fire safety

User Comfort & Wellness

- Biophilia response to proximity of timber
- Improved health & wellbeing
- Enhanced productivity and learning outcomes

Carbon footprint

Tonnes of CO2 emitted per tonne produced

Aluminium



NEWTOWNMOUNTKENNEDY - CRECHE & COMMUNITY CENTRE **D/RES**

- A. CRECHE: 600m²
- B. COMMUNITY CENTRE: 400m²

Sub-structure

- Reinforced concrete strip foundation
- Reinforced concrete rising walls

Superstructure

- CLT floors/walls/roof
- Glulam columns/beams/rafters

External Envelope

Naturheld Wood Fibre Insulation

Roof Structure

- Solid CLT roof panel clad with::
 - Sedum green roof
 - Greencoat roof sheeting



CONSTRUCT INNOVATE - SEED FUNDING TOPICS

D/RES











 $\frac{OLLSCOIL NAGAILLIMHE}{UNIVERSITY OF GALWAY}$

CONSTRUCT INNOVATE SEED FUNDING awarded for:

1. Mass Timber Demonstration Building Project Project summary:

Use of the Creche & Community Centre as baseline CLT buildings which can demonstrate the use of typical CLT floor cassettes, walls & roofs as well as standard mass timber structural connections, membranes & tapes that can be used across other building typologies.

2. Mass Timber Living Lab Project

Project summary:

A pioneering effort to assess the creation of a mass timber demonstrator building in order to establish criteria for measuring and monitoring the post-occupancy satisfaction of users and the overall success of the mass timber buildings.

Supervision by:

- Dr Patrick McGetrick (University of Galway)
- Brett Chrystal (DRES Properties)

CONSTRUCT INNOVATE - SEED FUNDING OBJECTIVES

D/RES









 $\frac{Ollscoil NAGAILLIMHE}{UNIVERSITY OF GALWAY}$

OBJECTIVES

- Life Cycle Assessment (LCA)
- Supply Chain Analysis
- Off-site DfMA Manufacture
- Standardised Detailing
- Promote 3-D Computational Design
- Collaboration

INNOVATION

- Whole Building Life Cycle Assessment
- Design for Manufacture & Assembly (DfMA)
- Guideline Reference Document:

BUILDING PERFORMANCE ANALYSIS

D/RES



✤ 3-D Volumetric Modelling



3-D Analysis of Envelope



Building Energy Modelling



Thermal Modelling



Isolation of CLT Components for DfMA



Whole Lifecycle Carbon Assessment

CONSTRUCT INNOVATE – GUIDELINE REFERENCE DOCUMENTS







 $\frac{Ollscoil NAGAILLIMHE}{UNIVERSITY OF GALWAY}$







CRECHE LAYOUTS





1:100

CRECHE SECTIONS





COMMUNITY CENTRE LAYOUTS

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COMMUNITY CENTRE SECTIONS





Community Centre Section B
 1:50

EMBODIED CARBON ASPIRATIONS

D/RES



✤ TARGET – NET ZERO CARBON

A 'Net Zero Whole Life Carbon' building does not exceed local targets for operational energy use or embodied carbon; such that the sum total Global Warming Potential for all cradle to grave life cycle stages are less than or equal to zero, where residual carbon is compensated for via renewable energy sources, or as a last resort carbon offsetting.



IRISH GREEN BUILDING COUNCIL





















SPECIALIST TIMBER ENGINEERING EXPERTISE











ENGINEERED STRUCTURAL ANALYSIS - 1



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Horizontal Wind Load



TT_05: slab-wall connection



ENGINEERED TIMBER STRUCTURAL ANALYSIS - 2



D/RES

the art of timber engineering

Internal code: 23013

ERGODOMUS - STRUCTURAL TIMBER REPORT(233 pages)

ENGINEERED TIMBER CONNECTIONS & TAPES

D/RES



WHT

WHT HOLD DOWN ANGLE BRACKET: VERSATILITY AND STRENGTH

The WHT **hold-down angle bracket** from Rothoblaas is on the market in an optimised version of the classic angle bracket for tensile loads. The new variant offers a more efficient fastening without compromising the performance of an already outstanding product.

Available in 5 sizes, the WHT **hold-down angle bracket** is suitable for every static or seismic requirement, providing freedom of fastening with nails, screws or partial nailing.









HBS

3 THORNS TIP

Thanks to the 3 THORNS tip, minimum installation distances are reduced. More screws can be used in less space and larger screws in smaller elements. Costs and time for project implementation are reduced.

FAST With the 3 THORNS tip, screw grip becomes more reliable and faster, while maintaining the usual mechanical performance. More speed, less effort.

JOINTS WITH SOUNDPROOFING PROFILES The screw has been tested and characterised in applications with soundproofing layers (XYLGFON) interposed on the shear plane. The impact of acoustic profiles on the mechanical performance of the HBS screw is described on page 74.

NEW-GENERATION WOODS Tested and certified for use on a wide variety of engineered timbers such as CLT, GL, UL, OSB and Beech IVL. Externely versatile, the HDS screw guarantees the use of new-generation woods for the creation of increasingly innovative and sustainable structures.



UNIVERSAL SINGLE-SIDED TAPE WITH SEPARABLE LINER

SPECIAL LINER

The product has a unique separating film which, thanks to a special treatment, can be divided at any point without pre-cutting, thus adapting to any installation requirement.

FLASHING TAPE

It meets all the requirements to be classified as a tape for sealing external doors or windows, ensuring maximum safety even in case of stagnating water.







MOISTURE MANAGEMENT PRINCIPLES

The Mass Timber Insurance Playbook:

A guide to insuring mass timber buildings



Co-authored by Philip Callow and Jim Glockling, Funded by Bullt by Nature, Marsh, and Zurich Resilience Solutions.



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FIRE PROTECTION PRINCIPLES

D/RES

A. Fire Performance as per TGB – Part B (Fire Safety)







The charring rate for CLT walls constitutes 0.65 mm/min where only the outermost layer is charred and 0.8 mm/min where charring progresses past the first layer

ENCAPSULATION TO CLT STRUCTURAL MEMBERS TO ACHIEVE: FIRE CLASS B-s1,d0 (EN 13501)

B. Surface Spread of Flame





RETARDENT TO CLT STRUCTURAL MEMBERS TO ACHIEVE: FIRE CLASS B-s3,d2 OR Class 0 (National Class)