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Dr. Barry McCarron

Head of Business and Industry Support at South West College

7th December *2023 – Belfast City Council Climate & City Resilience Committee*


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HUMBER

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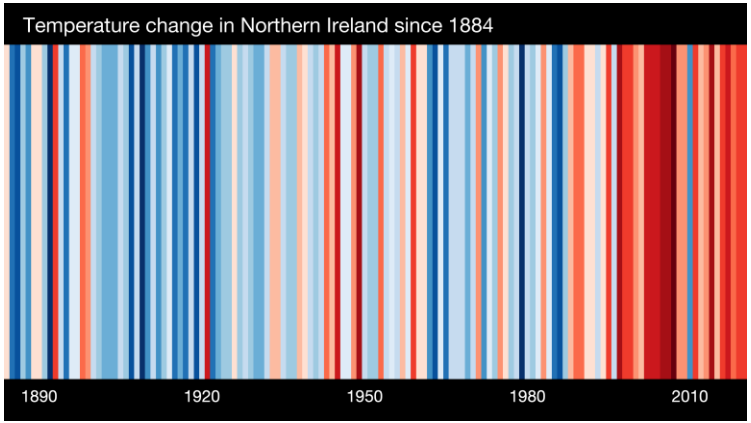
United Nations
Framework Convention on
Climate Change

Climate Change

- Buildings Account for ~40% of emission's
- Passive House mentioned since 2007 by UN
- 4th Assessment Report
- Emissions Gap Report
- nZEB is PH
- FE has a pathway to Zero Carbon



Passive House and the UN SDGs

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Passive House Institute

Press Release 8 July 2021

Passive House meets social goals

#EfficiencyFirst: Highly energy efficient buildings support aims of United Nations

Darmstadt, Germany. **The United Nations set 17 Sustainable Development Goals to be reached by 2030. Envisioned as a "blueprint to achieve a better and a more sustainable future for all", the goals cover a wide array of fields and topics. With a new article and accompanying infographic, the International Passive House Association illustrates how highly energy efficient buildings built to the Passive House standard play a direct role in achieving these global aims.**

The article **"Passive House and the Sustainable Development Goals (SDGs): Connecting an international building standard with global aims"** comes at a time when policymakers and the private sector are making decisions about the direction their building guidelines and business development will take. The article details the performance-based Passive House standard with its transparent quality-assurance processes and application for both new-builds and retrofits across all climate zones.

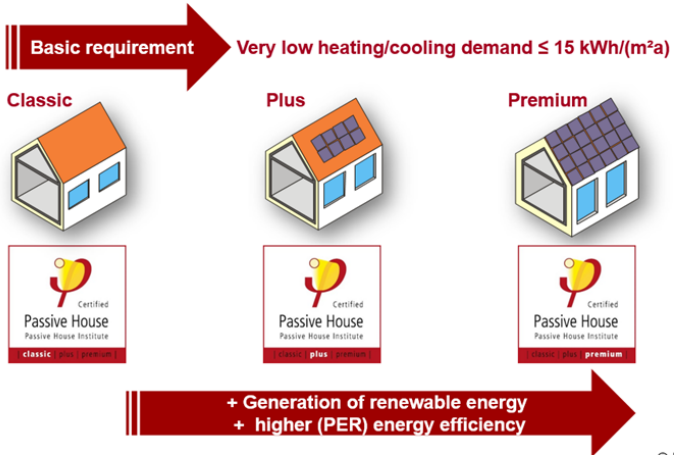
Why Passive House

- Fastest Growing Building Standard in the World
- Best Energy Efficiency Standard in the World
- International Standard provides opportunities for SWC
- Not a Brand “Open-Source Standard” Free to all.

“A rigorous, voluntary building energy standard focusing on highest energy efficiency and quality of life at low operating cost.”

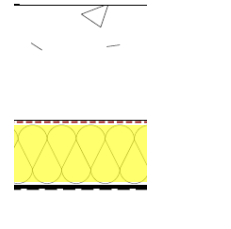
Future Building Standards

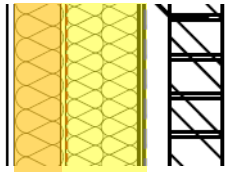
- Five Classifications can be Awarded:
- PH Low Energy Building
- PH EnerPHit
- PH Classic
- PH Plus
- PH Premium

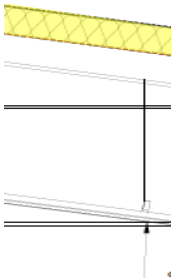


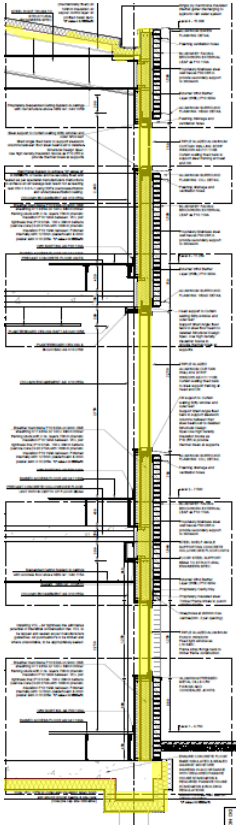
Erne Campus – Thermal Envelope

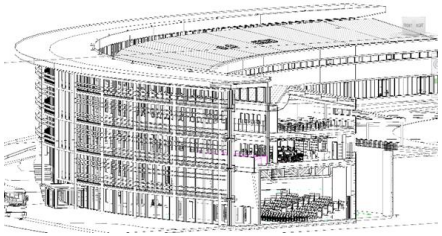
- Floor U-Value 0.25 W/m^{2}K
  90mm Insulation
  27.8%
- Wall U-Value 0.13 W/m^{2}K
  240mm Insulation
  17.6%
- Roof U Value 0.15 W/m^{2}K
  140mm Insulation
  27.8%

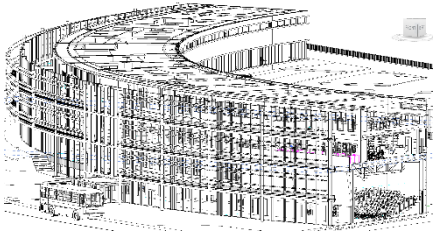






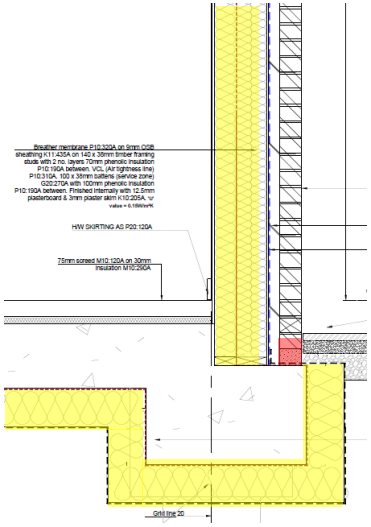


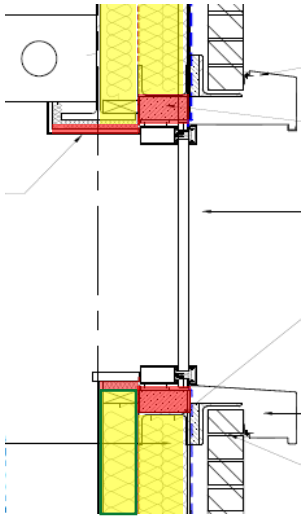


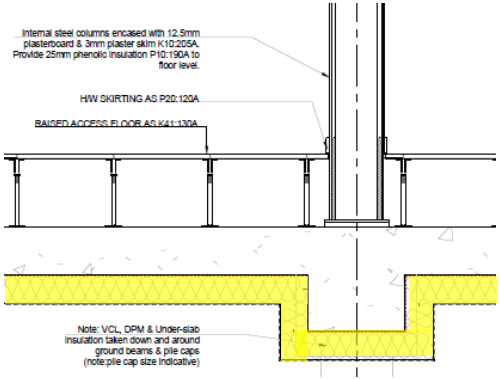


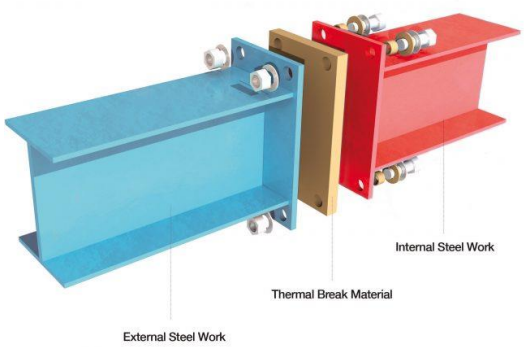
Erne Campus – Thermal Bridging

- All details have been Thermal Bridge mitigated



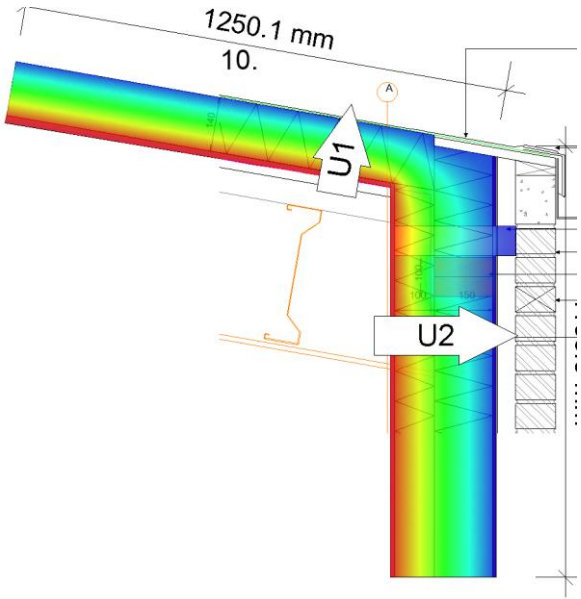


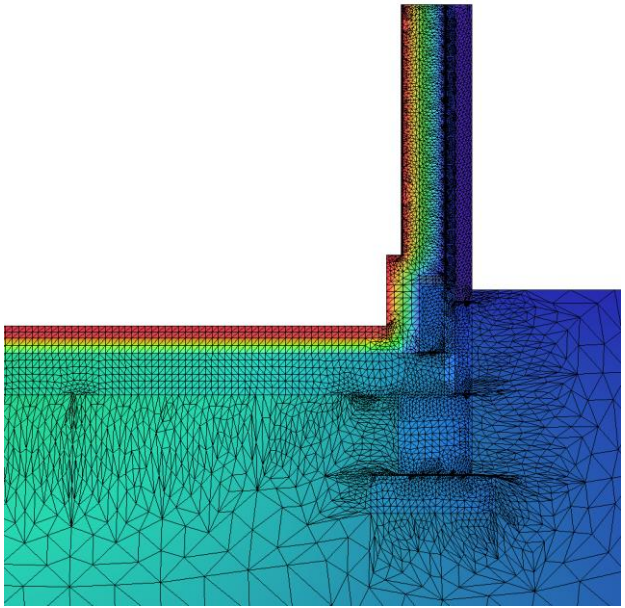


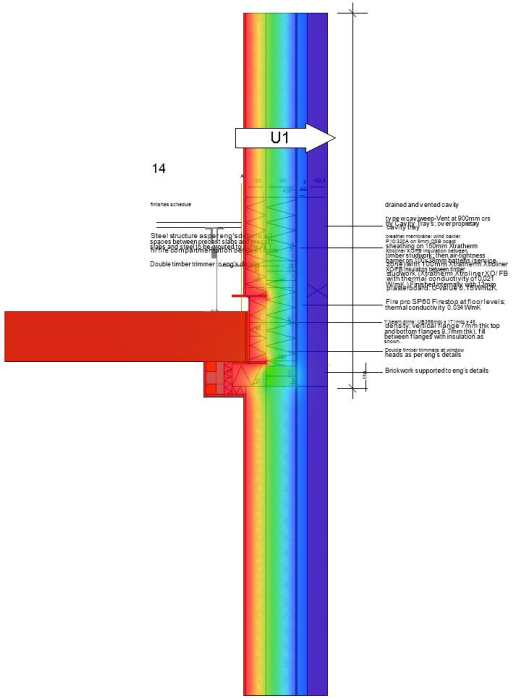


Erne Campus – Thermal Bridging

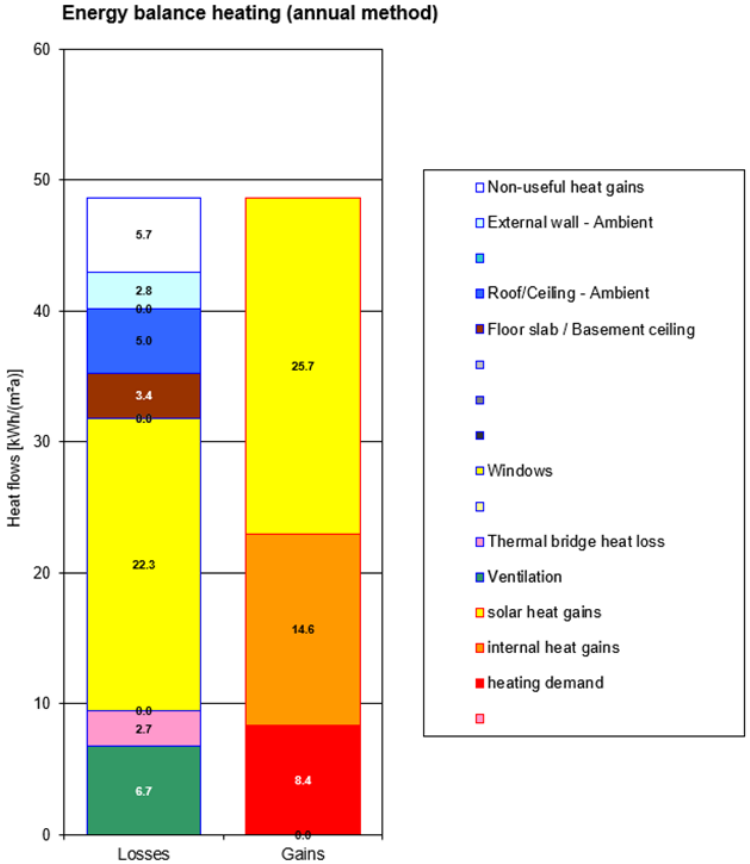
- There is just less than 4.5 km of Thermal Bridge accounted for in PHPP
- All have a better Psi Value that 0.07 W/mK



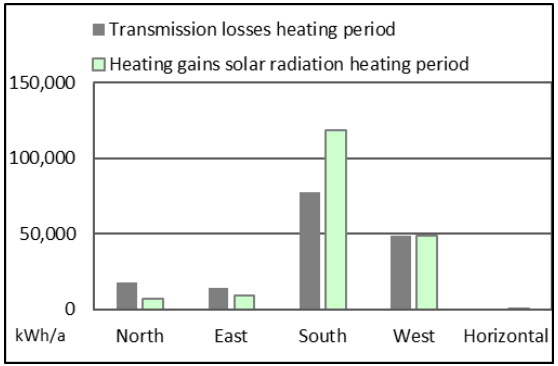


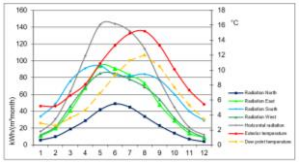


Erne Campus – Window Glazing



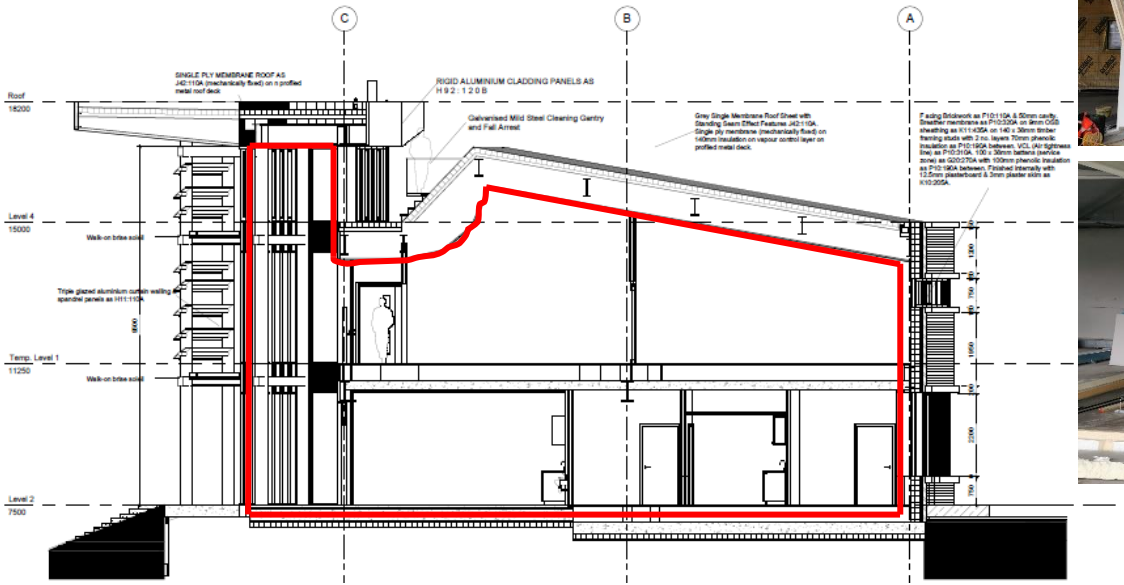
- g Value 0.41
- U Value Glazing 0.53 W/m²K
- U Value Frame 0.96 W/m²K
- U Value Installed 0.74 W/m²K
- Belfast Aldergrove Climate Data





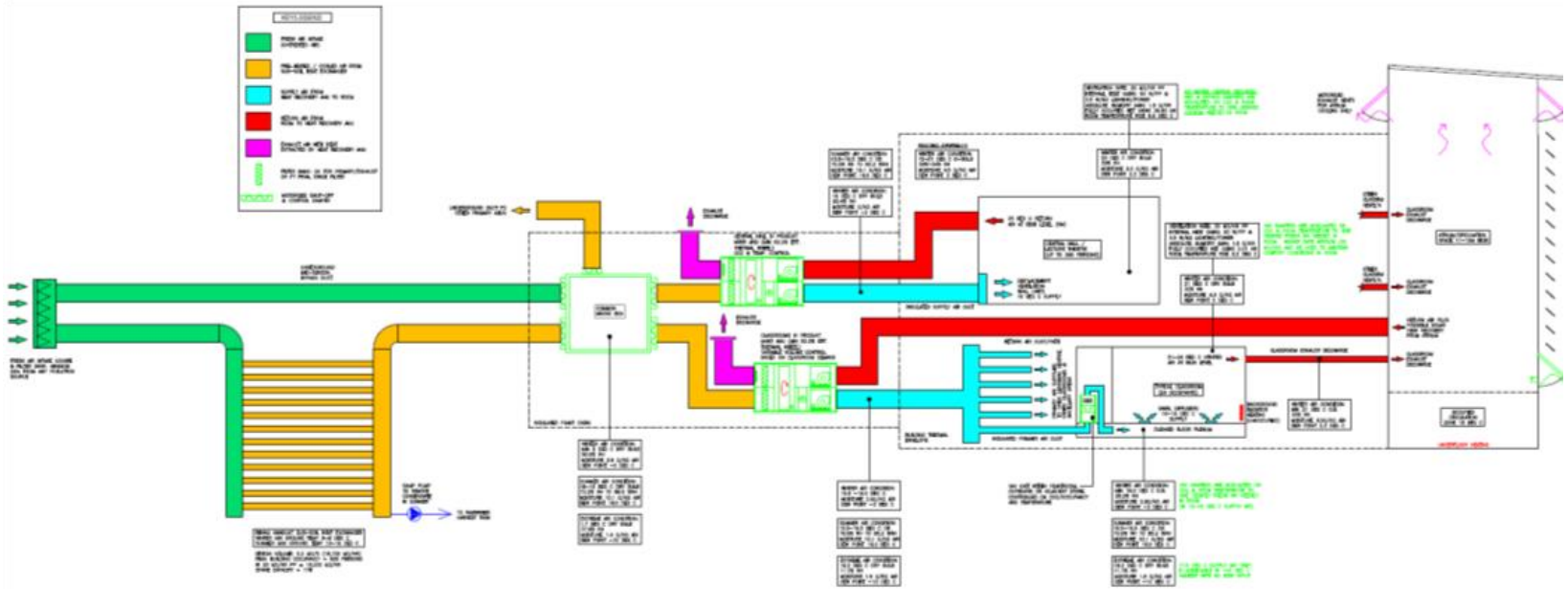
Erne Campus – Airtightness

- Airtightness Target of 0.36 ACH @ 50 PA



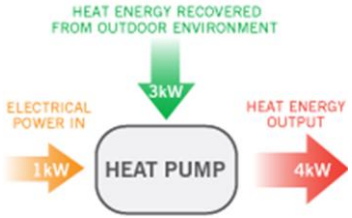
Erne Campus – MVHR

- The ventilation strategy is mixed mode, employing both mechanical and natural ventilation systems.



Erne Campus – Heating

- The heating system is a combination of a bio-oil micro-CHP unit producing 80% of the space heating demand as well as 100% of the DHW Demand and finally an air to water heat pump technology providing the remaining 20% of the space heating demand. Both these systems will use a mix of underfloor heating sections and responsive low water content radiators as the heat emitters.

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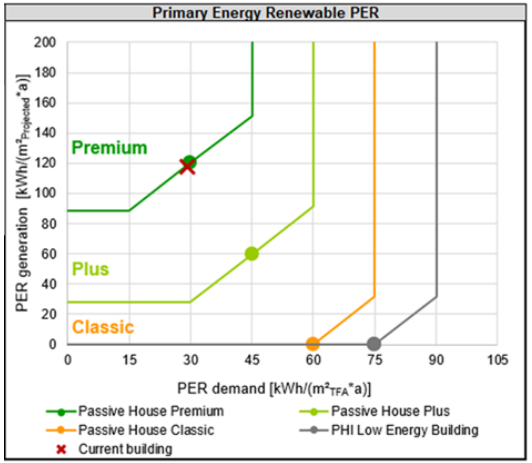
Erne Campus – Renewable Energy

- On site generation and consumption at the Erne campus was significantly increased for the high demand of power consumption in the campus. The roof has significant capacity 3400m2 to allow a solar photovoltaic system (520kwp) which will provide a renewable energy generation figure of 120 Kwh/m2/year.
- 2668m2 of PV equivalent of nearly 14 tennis Courts

Erne Campus – Energy Storage

- There is 460Kwh of battery storage in the design that will allow for reasonable amount of short-term storage.
- There is 460kWHr/180kWpk of Lithium battery storage in the design that will allow for a reasonable amount of short-term storage.



ACTUAL PERFORMANCE

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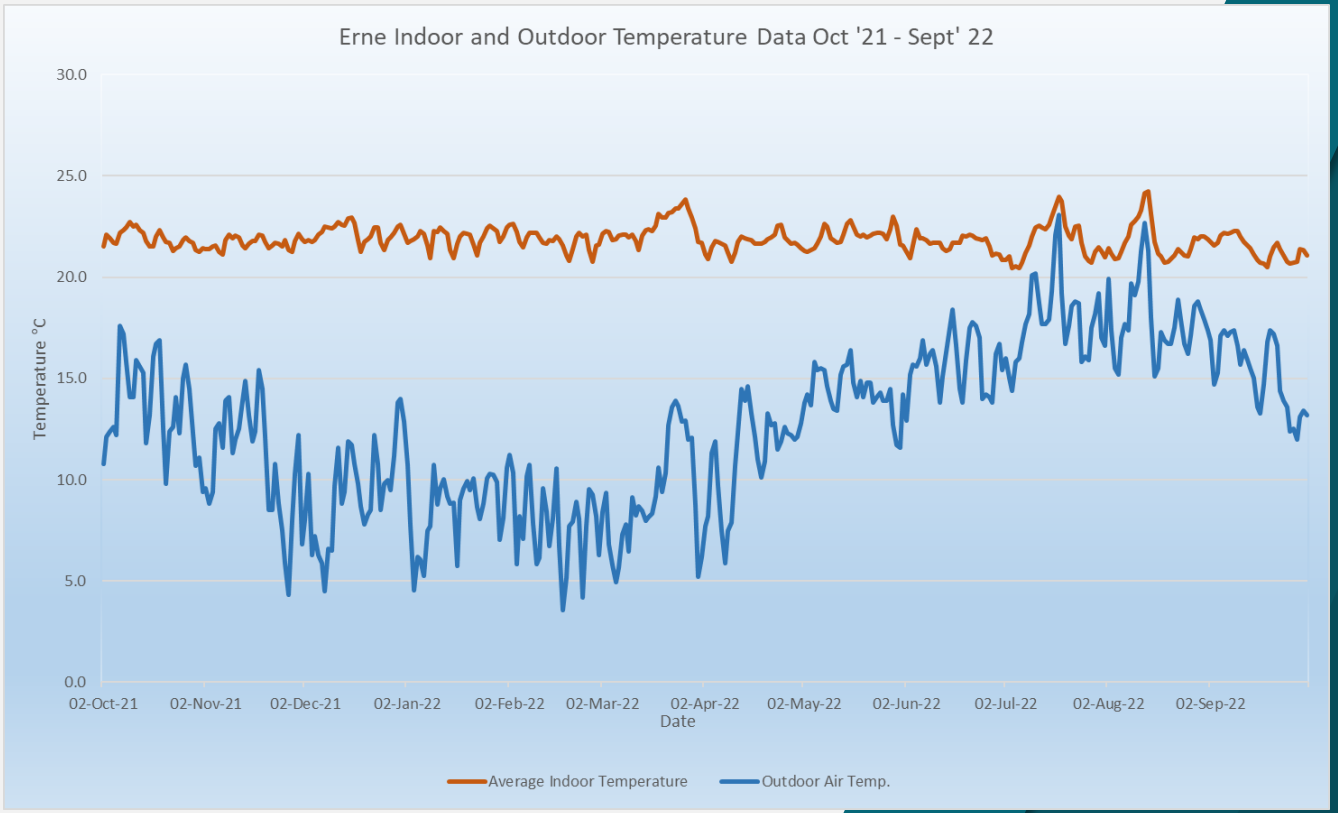

Erne Data – Oct '21 – September '22

Temperature °C	
Oct 21	21.9°C
Nov 21	21.7°C
Dec 21	22.2°C
Jan 22	21.9°C
Feb 22	21.8°C
Mar 22	22.6°C
April 22	21.7°C
May 22	22.1°C
June 22	21.7°C
July 22	21.8°C
Aug 22	21.8°C
Sept 22	21.4°C

Average Temperature over the year = 21.88°C

ACTUAL PERFORMANCE

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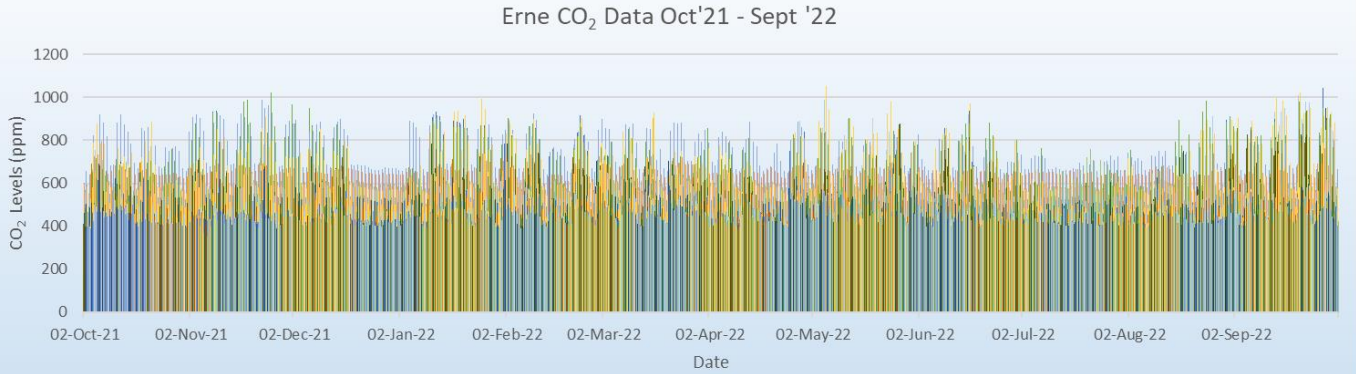


EF01-RoomCO2(ppm) EF02-RoomCO2(ppm) ES01-RoomCO2(ppm) ES02-RoomCO2(ppm)
ES03-RoomCO2(ppm) ES06-RoomCO2(ppm) ES07-RoomCO2(ppm) ES08-RoomCO2(ppm)
ES09-RoomCO2(ppm) ET01-RoomCO2(ppm) ET02-RoomCO2(ppm) ET03-RoomCO2(ppm)
ET04-RoomCO2(ppm) ET05-RoomCO2(ppm) ?ET06-RoomCO2(ppm) ET07-RoomCO2(ppm)
?ET08-RoomCO2(ppm) ET09-RoomCO2(ppm) ET10-RoomCO2(ppm) ET11-RoomCO2(ppm)
ET12-RoomCO2(ppm) ET13-RoomCO2(ppm) ET14-RoomCO2(ppm) ?ET15-RoomCO2(ppm)
ET16-RoomCO2(ppm) ET17-RoomCO2(ppm) ET18-RoomCO2(ppm) ET19-RoomCO2(ppm)
ET20-RoomCO2(ppm) ET21-RoomCO2(ppm) ET22-RoomCO2(ppm) ET23-RoomCO2(ppm)
ET24-RoomCO2(ppm) 1 To 1 Teaching ES50 Co2(ppm) Audio Room ES85 Co2(ppm) Beauty Rm1 ES39 Co2(ppm)
Beauty Room 2 ES40 Co2(ppm) Caretaker ES59 Co2(ppm) Child Care EF19 Co2(ppm) ClassRm Catering EG22 Co2(ppm)
ClassRm Numeracy EG18 Co2(ppm) ClassRm Prince Trust EG21 Co2(ppm) ClassRm Tourism EG19 Co2(ppm) Collab Learning ES42 Co2(ppm)
Dispensary Room ES32 Co2(ppm) Essential Skills ES74 Co2(ppm) Essential Skills IT ES72 Co2(ppm) Estate Room ES57 Co2(ppm)
Exam Room ES48 Co2(ppm) First Aid EF39 Co2(ppm) Fitness Suite ES15 Co2(ppm) General ClassRm EF05 Co2(ppm)
General Classroom EF13 Co2(ppm) General Classroom EF18 Co2(ppm) Hair 1 Room ES25 Co2(ppm) Hair 2 Room ES28 Co2(ppm)
Healthcare EF02 Co2(ppm) HLS Room ES55 Co2(ppm) HR Interview Rm ES44 Co2(ppm) HR Office ES45 Co2(ppm)
IRL Room ES77 Co2(ppm) IT Classroom EF41 Co2(ppm) Lab ClassRm EF21 Co2(ppm) Lecture Theatre Space Co2(ppm)
Life Skills EF15 Co2(ppm) Managers Room ES51 Co2(ppm) Meeting Room EF36 Co2(ppm) Meeting Room ET05 Co2(ppm)
Multi Function Room 2 ET11 Co2(ppm) Multi Function Room 5 ET14 Co2(ppm) Nail Bar ES30 Co2(ppm) Network Lab ET39 Co2(ppm)
Office Area ES86 Co2(ppm) Office Area ET01 Co2(ppm) Office EF38 Co2(ppm) Open Learning ES81 Co2(ppm)
Open Plan Office EF37 Co2(ppm) OpenPlanOfficeES41Co2(ppm) Prep Room EF22 Co2(ppm) Private Dining ET61 Co2(ppm)
Project Base Learning EF03 Co2(ppm) Project Learn ES29 Space Co2(ppm) Reception ES61 Co2(ppm) Reprographics ES60 Co2(ppm)
Science Lab 1 EF20 Co2(ppm) Science Lab 2 EF26 Co2(ppm) Staff Social Area EF43 Co2(ppm) Student Social ES56 Co2(ppm)
Student Support EF34 Co2(ppm) Student Support ES54 Co2(ppm) Study Room ES78 Co2(ppm) Study Room ES79 Co2(ppm)
Study Room ES80 Co2(ppm) Technology ES53 Co2(ppm) Union Office EF25 Co2(ppm) Workshop EG02 Co2(ppm)

CO_2 (ppm)

Oct 21	476 ppm
Nov 21	487 ppm
Dec 21	463 ppm
Jan 22	485 ppm
Feb 22	496 ppm
Mar 22	503 ppm
April 22	472 ppm
May 22	491 ppm
June 22	471 ppm
July 22	450 ppm
Aug 22	465 ppm
Sept 22	501 ppm

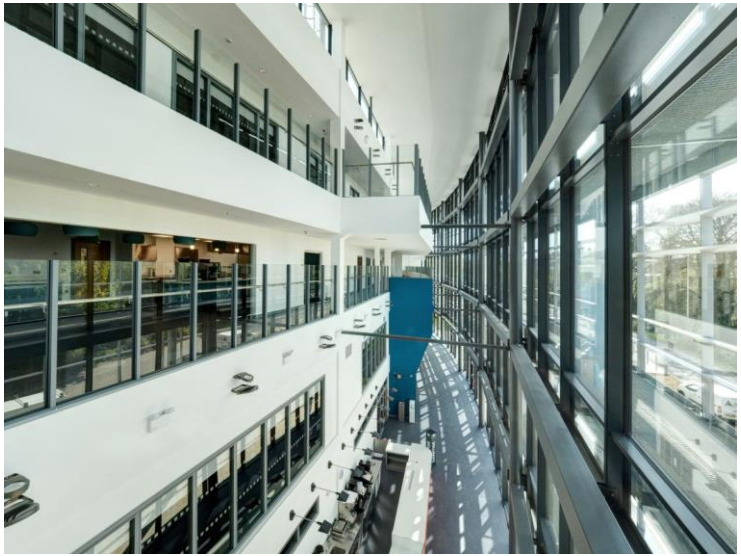
Average over the year = 480ppm

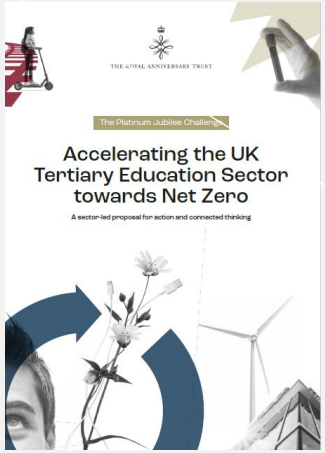
Minimum CO_2 Daily Average Oct '21-Sept '22 – 354ppm

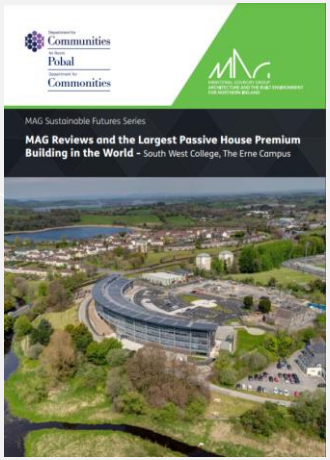
Maximum CO_2 Daily Average Oct '21-Sept '22 – 1055ppm

Erne Campus – Project Costs

- The total construction budget for the Erne campus is ~£29,128,000.00 which is the equivalent to £3,552 per m^2 of floor area







CULTURAL SHIFT & FUTURE

- COP 26 and COP 27 Participation
- iPHA Boot Camp Sept 2022
- International Passive House Open Days
- SRMA Guest Invite to Provide Case Study on Erne Campus
- Queens Jubilee Sustainability Challenge Publication
- FODC, Belfast City Council, DAERA Passive House Project Influence


Thank You
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