Wren Urban Nest
A Net Zero Carbon Case Study

Patrick Kavanagh – BDP

1st Runner Up in 2023 EFCA Future Leader Awards
Patrick Kavanagh

Engineering Director with **BDP.**
Chartered Engineer

12+ years of Sustainable Design Experience in Australia and Ireland

**Sustainability Accreditations:**
- BREEAM AP
- LEED GA
- WELL AP

- BER Assessor
- DEC Assessor
- SEAI Energy Auditor

TUD External Examiner & Guest Lecturer
Our Global Practice

Our professions
- Architecture
- Acoustics
- Building Services Engineering
- Civil and Structural Engineering
- Design Management
- Graphic Design
- Inclusive Design
- Interior Design
- Landscape Architecture
- Lighting
- Masterplanning
- Planning
- Principal Designer
- Sustainability
- Urban Design

19 Studios
12 Countries
6 Regions

North America
- New York
- Toronto

South America
- Lima

UK
- Birmingham
- Bristol
- Cardiff
- Edinburgh
- Glasgow

Europe
- Leeds
- Liverpool
- London
- Manchester
- Sheffield
- Dublin
- Rotterdam

MENA
- Abu Dhabi

Asia Pacific
- New Delhi
- Shanghai
- Singapore

25,000+ Projects / 2,000+ Design Awards
Introducing
Wren Urban Nest

Opened to guests in September 2021

137 Hotel rooms that come in three sizes;
  • Snug Nests (9.5sq.m)
  • Cosy Rooms (12sq.m)
  • Roomy Nests (18sq.m)

Lower Ground Floor Bar / Restaurant

Hotel Operator - Moran Hospitality

Team:

Architecture
Civil Structural
M&E Building Services
Acoustics
Disability Access Consultancy
Specialist Lighting

BDP.
Context / Location
St. Andrews Lane, Dublin 2, Ireland
**Site Challenges:**

- Very small site footprint (32m x 14m)
- Neighbours were listed buildings
- Difficult Site Access
- Strict FSC requirements
- Poor line of sight
Response / Building form & passive design

Site

Existing Building
The existing Andrew’s Lane Theatre building covered 100% of the site.

Desire Line
A pinch-point and blind spot exists on the north west corner of the site which creates an unwanted sense of enclosure. The diagram above indicates a notional desire line which will improve visibility and transparency.
**Response / Building form & passive design**

**Site**

**Porte Cochère**
A double height setback on the north west corner of the site creates a sense of arrival while also improving sight lines. The new space avails of afternoon sunlight from the west.

**Transparency**
The creation of a public space along St. Andrew’s Lane breaks down the perceived length of the lane.
Response / Building form & passive design

Overall Section Arrangement

Arrival Section
Response / Building form & passive design

Site

Typical guestroom floor
Pushing for maximum efficiency in the boutique luxury model
Response / Building form & passive design

Entrance
Response / Building form & passive design

Envelope – Passive Design

Façade Performance:
- External Walls – 0.15 W/m²k
- Roof – 0.15 W/m²k
- Ground Floor – 0.15 W/m²k
- Glazing – 1.2 W/m²k
- Air Permeability – 2.3 m³/m²/hr@50Pa
Response / Building form & passive design
Envelope – Façade Performance
Response / Building form & passive design
Envelope – Façade Performance

6pm in summer
3pm in summer
Response / Building form & passive design
Envelope – Façade Performance

Sun rises in the east and sets in the west.

In the afternoon we wanted to reduce the solar gain on the west façade but not compromise on daylight, views and Architectural design aspiration.

So we created different orientations with the curtain walling which reduced the peak cooling load on the west façade by 45%.

Nick.Caville@bdp.com
Bedrooms on the west façade in winter will still need to be cooled and there is always a hot water load in a hotel building.

So we designed the system in a way that it transfers the solar energy from the rooms on the west façade to the rooms in the shadow on the east façade or to hot water.
Response / Active Design
Sharing Energy

WINTER

Bedrooms on east façade in heating mode

Bedrooms on west façade in cooling mode

AIR SOURCE HEAT PUMP
HEAT TRANSFER

40°C
45°C

13°C
7°C
Response / Active Design
Sharing Energy

SUMMER

Bedrooms on east façade in cooling mode

Bedrooms on west façade in cooling mode

40°C ↔ 45°C

13°C ↔ 7°C
Response / Active Design
Sharing Energy

Leaving the fridge door open will actually heat the kitchen......

Two circuits with 5 different operating modes:

- Cooling Only
- Heating Only
- Heating = Cooling
- Heating > Cooling
- Heating < Cooling

COP > 8.0 (1 kW Electricity In = 8 kW Out)

Chilled Water @ 7°C

Heating Hot Water @ 45°C
Response / Active Design
So we captured all the waste heat and used it wherever we could!
Response / Active Design
Complex Design Coordination

Takes time and dedication but it's worth it to be innovative!
Response / Active Design
Acoustic and comfort decisions often overlooked

Traditional VRF System in Hotel

40°C supply air in heating
11°C supply air in cooling
Response / Active Design
Acoustic and comfort decisions often overlooked

Water Based System Used

40°C supply air in heating
11°C supply air in cooling

29°C supply air in heating
13°C supply air in cooling

Low refrigerant use = Lower embodied carbon
Response / Active Design
Kitchen Design – we designed out fossil fuels

A Single Energy Bill

Result = No Gas Connection, No Boiler Room, No Flues & Zero Pollution
Response / Passive Design
Use of Thermal Mass to reduce heating and cooling loads

Exposed slab absorbs solar gain during the day

Exposed slab releases heat at night
Response / Experience
Reducing Plastic Waste

We also developed a concept providing free chilled water to guests to remove the need for plastic bottles.

Providing free chilled water for guests on every floor…

Simple but clever valve arrangement allows mains water to be replaced by stored cold water in the event of an outage

…and fresh water from the wash hand basins
Response / Active Design
Water Conservation

Careful selection of sanitaryware i.e. rain showers 8 LPM vs 25 LPM (approx. 80% of hotels water use is for showers)

The Wren Hotel is tracking less than 160 Litres of water per day per room versus DCC guidance which recommends 1,050 Litres of storage per room.

- Reduced cold water storage requirements for hotel
- Reduced hot water generation bills by >60% (compared with typical hotel with baths)
- Monitored metering system to highlight inefficiencies / leaks
Response / Active Design
Room Controls

Advanced room controls system to reduce energy (VDA System)

- Turns off non-essential room loads
- Automatic control of blinds to reduce solar gain on West façade (added wake up function)
- Setback of room temperature during unoccupied hours and overnight
- Limits on user control can be adjusted
- Lighting scene selection and dimming to reduce lighting energy
- All adjustable set points
- System knows who’s in the room and for how long (management of house keeping)
- Room Preferences can be adjusted at Check-In (°C / F)
Response / Operation
A building design that encourages the operator to adopt their own sustainable operation

- Using local suppliers for ingredients, toiletries, soaps etc.
- Bio-diverse garden on the roof
- Too Good To Go app users buy surplus food from the hotel restaurant that would otherwise be going to waste
- No single use plastics

https://www.wrenhotel.ie/little-steps

Our Commitment
We believe in quality over quantity. We try to do our bit for the planet, quietly and efficiently. We don't do single use plastics. We use local organic produce and we are committed to recycling.
RECOGNISED FOR SETTING A NEW HOTEL PRECEDENT:

Construction Excellence Award 2022
– Leisure or Tourism over €10m Category

Building & Architect of the Year Award 2022
– Sustainability Award for a Single Building or Development

Mixology Awards 2022
– Positive Impact award

Sir George Grenfell Baines Award 2021

GGB Sustainability Award

SEAI Awards 2022
– Energy in Buildings’ Winner

Towards Net Zero Ireland 2022 (18th Nov)
- Commercial Building – Highly Commended

Summary:
• BER A rated (only a handful in Ireland)
• On Site Renewable Energy Ratio >40%
• Net Zero Carbon (WGBC definition)
• Low Water Use
• Low Embodied Carbon
• No Fossil Fuels
• No Local Pollution
• Sustainable Hotel Operation
• Provides a Low Carbon footprint alternative for Dublin’s visitors
• Wren Hotel “Luxury without the guilt”
For any questions, please contact patrick.kavanagh@bdp.com