

Architecture & design in achieving energy efficiency & net zero

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CIBSE EPG Power Hour

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Introduction

Southgate & Sarabia Architects Ltd. Founder & Director

- We work in all sectors, Education, Industrial, Heritage, Conservation, Urban Design, Masterplanning, Commercial, Extracare, Housing, residential & community.
- We are passionate about design, sustainability, social value and the communities we work in.
- We work nationally and internationally.
- We are award winning.
- Founder & Director of Constructive Futures CIC We work with charities, fund raising and volunteering.



The importance of Energy Efficiency & Net Zero

What is Energy Efficiency? Optimal use of energy to perform a task.

What is Net Zero? Balancing the amount of emitted greenhouse gases with the equivalent offset or reduction.

The 2050 target: The Climate Change Act commits the UK government by law to reducing greenhouse gas emissions by at least 100% of 1990 levels (net zero) by 2050.

Delivering a net zero NHS: Two targets have been set:

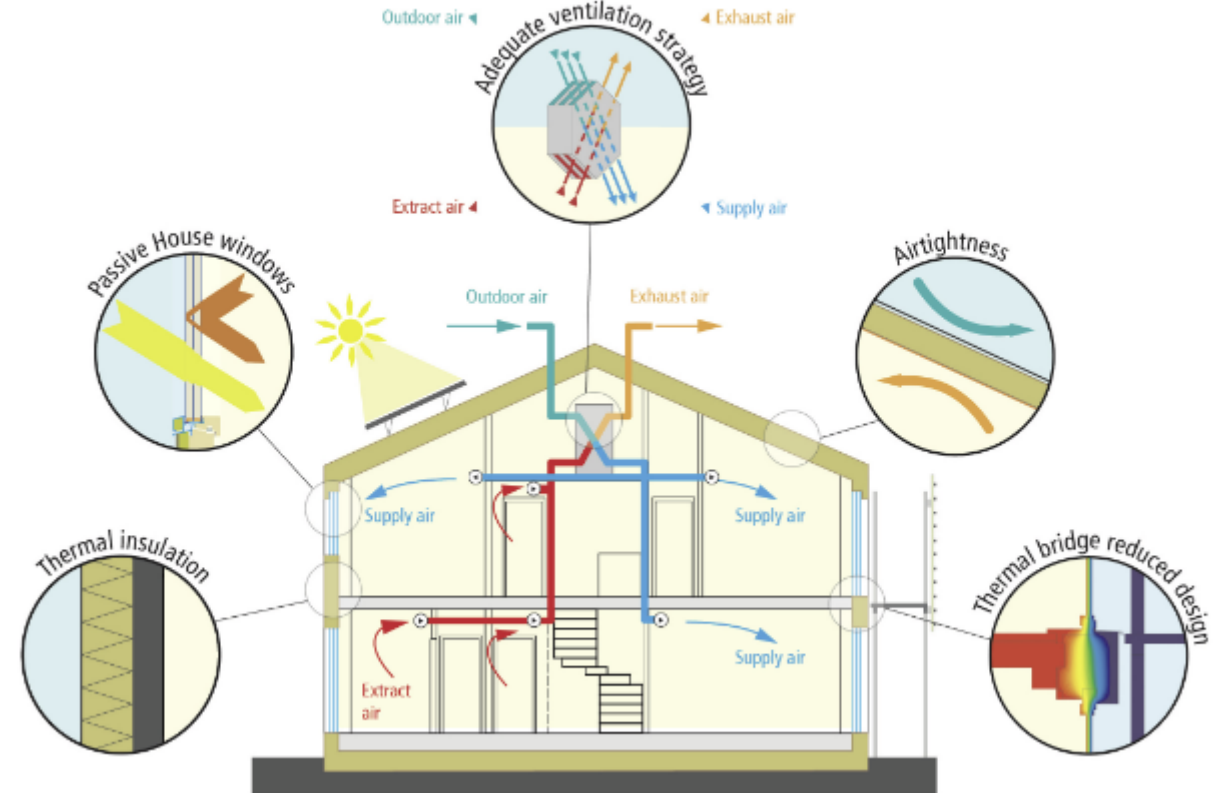
- For the emissions they control directly (the NHS Carbon Footprint), they will reach net zero by 2040, with an ambition to reach an 80% reduction by 2028 to 2032;
- For the emissions they can influence (our NHS Carbon Footprint Plus), they will reach net zero by 2045, with an ambition to reach an 80% reduction by 2036 to 2039.



The Role of Architecture in Energy Efficiency

There are several key elements that impact architecture;

- Passive Design Principles
- Active Design Strategies
- Sustainable Materials and Construction Methods
- Retrofitting Existing Buildings
- Innovative Technologies



The Role of Architecture in Energy Efficiency

Passive Design Principles:

Orientation: Maximizing natural light and heat.

Building Envelope: Insulation, air tightness, and thermal mass.

Natural Ventilation: Use of windows, vents, and courtyards.

‘Eden’ – Britain’s most sustainable office building

- A landmark project in Salford, Greater Manchester.
- Completed in January 2024.
- Exceeding the UK Green Building Council’s 2030-2035 operational energy targets,
- It’s Britain’s most sustainable office buildings with a projected annual energy consumption of 41kWh/m².
- The construction followed Passivhaus principles,



Photo credits: Simon Buckley

Make Architects
Muse, Legal & General and Homes England

Active Design Strategies

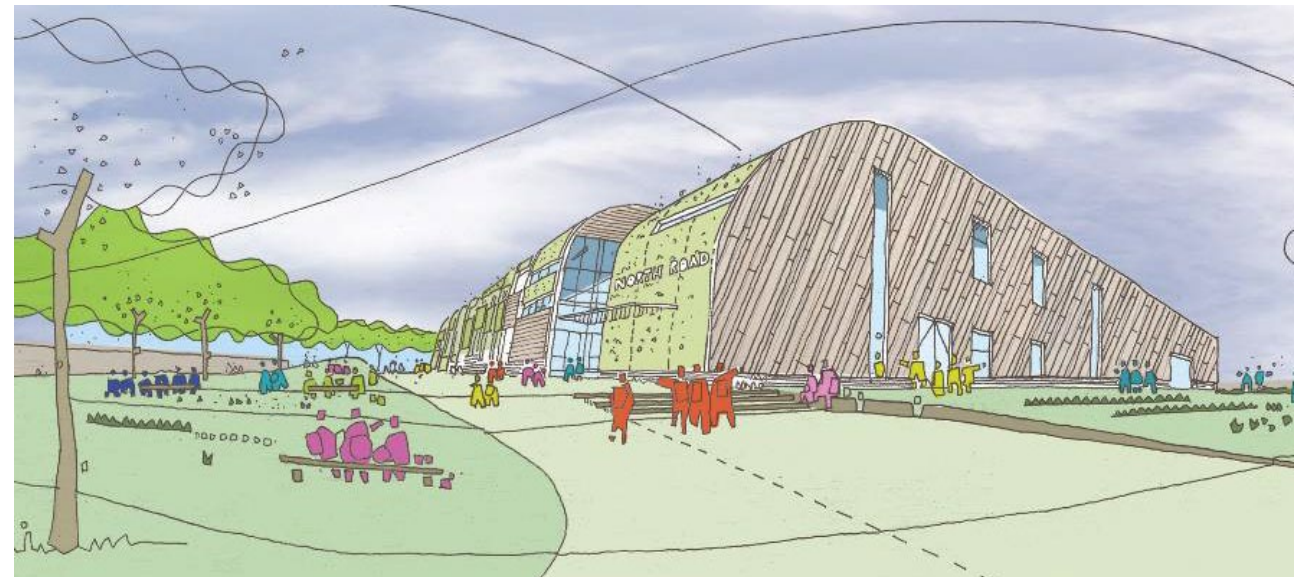
Renewable Energy Integration: Solar panels, wind turbines, geothermal systems.

Energy Management Systems: Smart grids, building management systems.

Water Efficiency: Rainwater harvesting, greywater recycling.

Northwood Primary School Darlington - 2011

- Award winning exemplar sustainable school
- Innovative design
- Use of timber frame & timber cladding, sustainable materials, living wall and roofs, rainwater harvesting, BMS natural ventilation, community engagement, ecology and BNG.



Materials and Construction Methods

- **Sustainable Materials:** Use of low-carbon, recycled, and locally sourced materials.
- **Construction Techniques:** Prefabrication, modular construction, and 3D printing.
- **Lifecycle Assessment:** Consideration of the environmental impact of materials over their lifecycle.

Wigan Pier Modular houses 2020

Fully built off site, steel frame, brick slip aluminium windows.

Part of larger masterplan for the regeneration of Wigan Pier.

Air source heat pumps, whole house ventilation & airtight.



Retrofitting Existing Buildings

Importance of Retrofitting: Majority of future buildings already exist, which is important for redevelopment & regeneration of an area.

- **Strategies:**

Improving Insulation: Adding internal/external insulation.

Upgrading Systems: Replacing old HVAC systems with efficient ones.

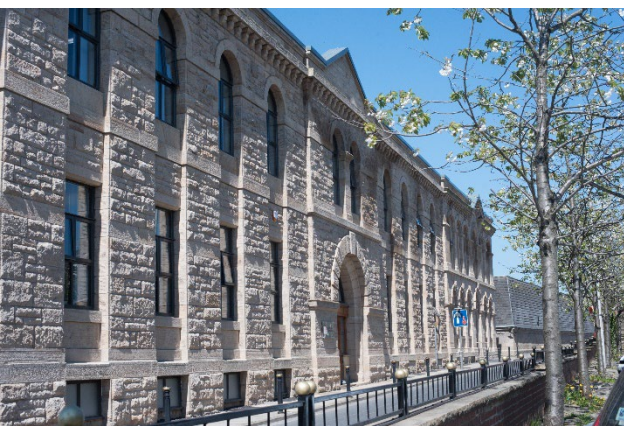
Renewable Energy Integration: Adding solar panels to existing roofs.

Redevelopment of Brierfield Mills, Nelson 2015-2023

£35m regeneration of 500,000sqft of grade 2 listed building, with £13m funding. Burnley football club in the community – Leisure Box, InSitu artist's studio, Lancashire Adult Learning College, Private residential apartments, Managed office space, landscaped canal side plaza & parking.



Regeneration, redevelopment and Retrofit



Regeneration, redevelopment and Retrofit



Innovative Technologies in Design

Building Information Modeling (BIM): Enhancing efficiency through detailed design, co-ordination & planning.

Internet of Things (IoT): Smart sensors and controls for energy management.

Green Roofs and Walls: Benefits for insulation, biodiversity, and aesthetics.

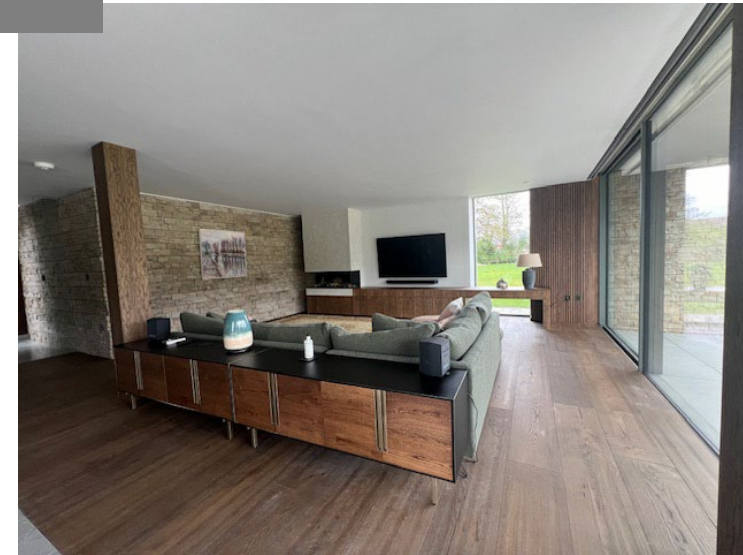
High Trees Barn, Boston Spa, Leeds 2024

How do we balance sustainable principles when a clients wants a 4 bed “eco house” in the green belt, but it’s 10,225sqft or 950m2 and there's lots of South facing glass and they don’t want to compromise on the design.

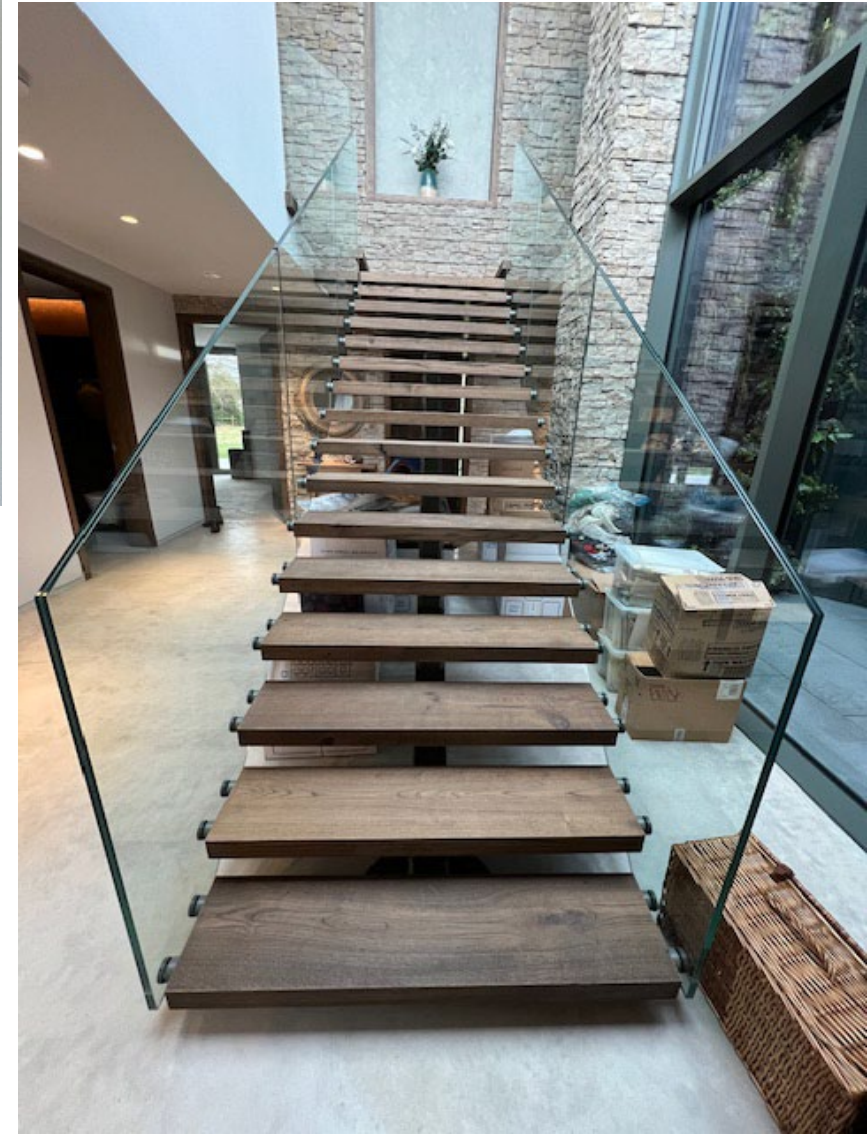
Solar PV, air source heat pumps, whole house vent, rainwater harvesting, triple glazing, fully programable.



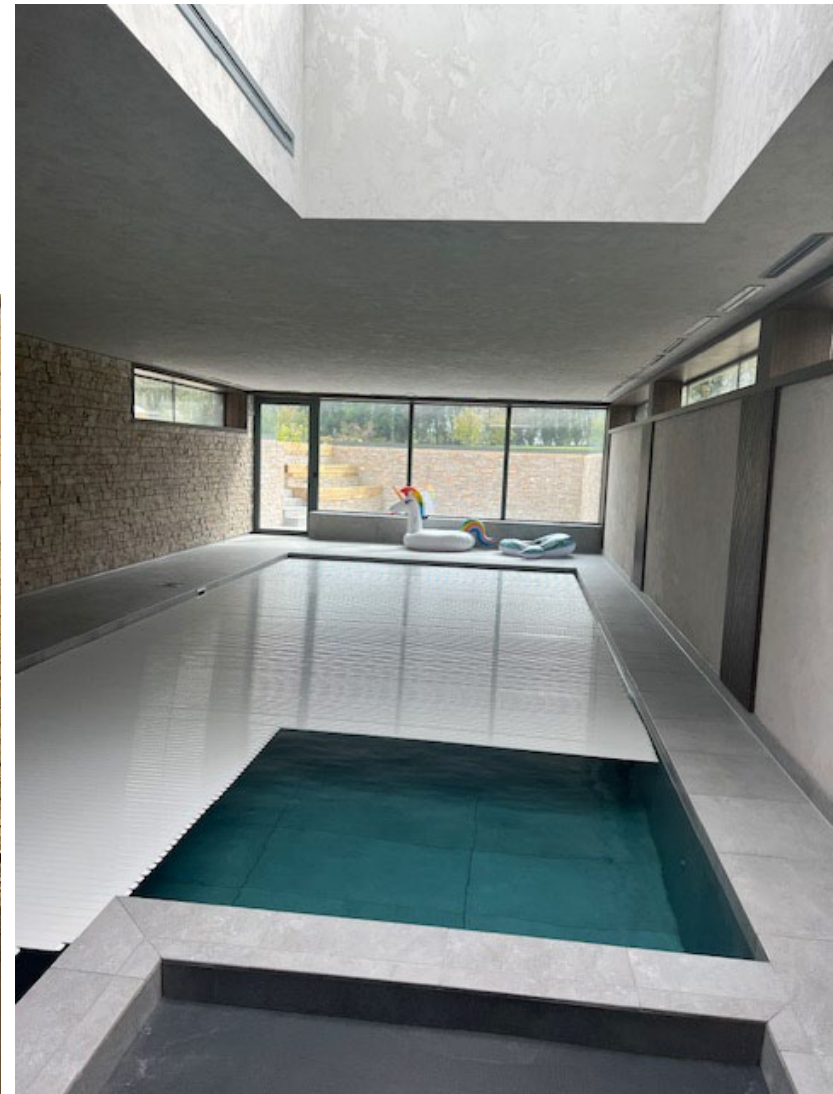
Innovative Technologies in Design



Innovative Technologies in Design



Innovative Technologies in Design



Challenges and Solutions

Challenges:

Cost: Initial investment vs. long-term savings.

Regulations: Navigating building codes and standards.

Stakeholder Engagement: Collaboration among architects, engineers, and clients.

Solutions:

- **Incentives:** Government grants, tax rebates.
- **Education and Advocacy:** Promoting awareness and training.
- **Integrated Design Approach:** Early collaboration in the design process.



Future Trends in Sustainable Architecture

Emerging Trends:

- **Carbon-Neutral Buildings:** Publicly procured buildings, planning policy, need to promote this as a starting point for all projects.
- **Adaptive Reuse:** Transforming old structures for new purposes.
- **Regenerative Design:** Going beyond sustainability to restore natural environments.
- **Predictions:** The future landscape of architecture in achieving net zero, but we need to do this as a collective.

Summary: There are net zero and carbon neutral buildings, but they come at a cost. It needs to be addressed from the start of the project with a shared vision & a collaborative approach. **Reuse, Reuse Reuse!**



Contact details

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CONSTRUCTIVE FUTURES



LinkedIn VIDEO content

UKREiiFDay 1

<https://www.linkedin.com/feed/update/urn:li:activity:7199311085638746112>

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https://www.linkedin.com/posts/constructivefutures_day-two-highlights-super-impressed-with-activity-7199351376370384897-SE8w?utm_source=share&utm_medium=member_desktop

UKREiiFDay 3

<https://www.linkedin.com/feed/update/urn:li:activity:7214585851022819328>

5-minute mentors

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