The Role of AI in Designing and Delivering Net Zero

2024 CIBSE ANZ Seminar Series | The Need for Speed
SESSION 2 | AI tools to help us reach net zero

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Introduction: The Imperative of Digital Transformation

Overview:

- Achieving net zero demands an integrated approach using digital tools, frameworks, and rating systems.

Role of Artificial Intelligence:

- Integrated with rating systems and frameworks, AI becomes a powerful enabler of the net zero transition throughout the asset lifecycle.

Objective:

- Explore AI tools and approaches that drive the design and delivery of net zero buildings and infrastructure.

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Net Zero: A Strategic Imperative for Australia and New Zealand

Defining Net Zero:

- Net zero involves balancing greenhouse gas emissions with removal efforts, important for meeting Australia and New Zealand's climate commitments.

Strategic Relevance:

- Australia and New Zealand have set targets for net zero by 2050, driven by regulatory pressure and public demand for sustainability.

Lifecycle Integration:

- Applying net zero principles across the asset lifecycle ensures sustainable development and climate resilience in Australia and New Zealand.

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Cundall's Zero Carbon Design 2030 Commitment

"We will collaborate with our clients and industry to deliver energy and carbon solutions necessary to keep global heating below 1.5°C. After 2030, Cundall will only work on design projects that are net zero carbon".

Achieving net zero carbon design on 100% of our projects everywhere in the world by 2030 is a challenging target but we expect to achieve this goal earlier in some locations like UK and Australia.

We recognise that a lot of our clients are at different stages on the journey to net zero carbon.

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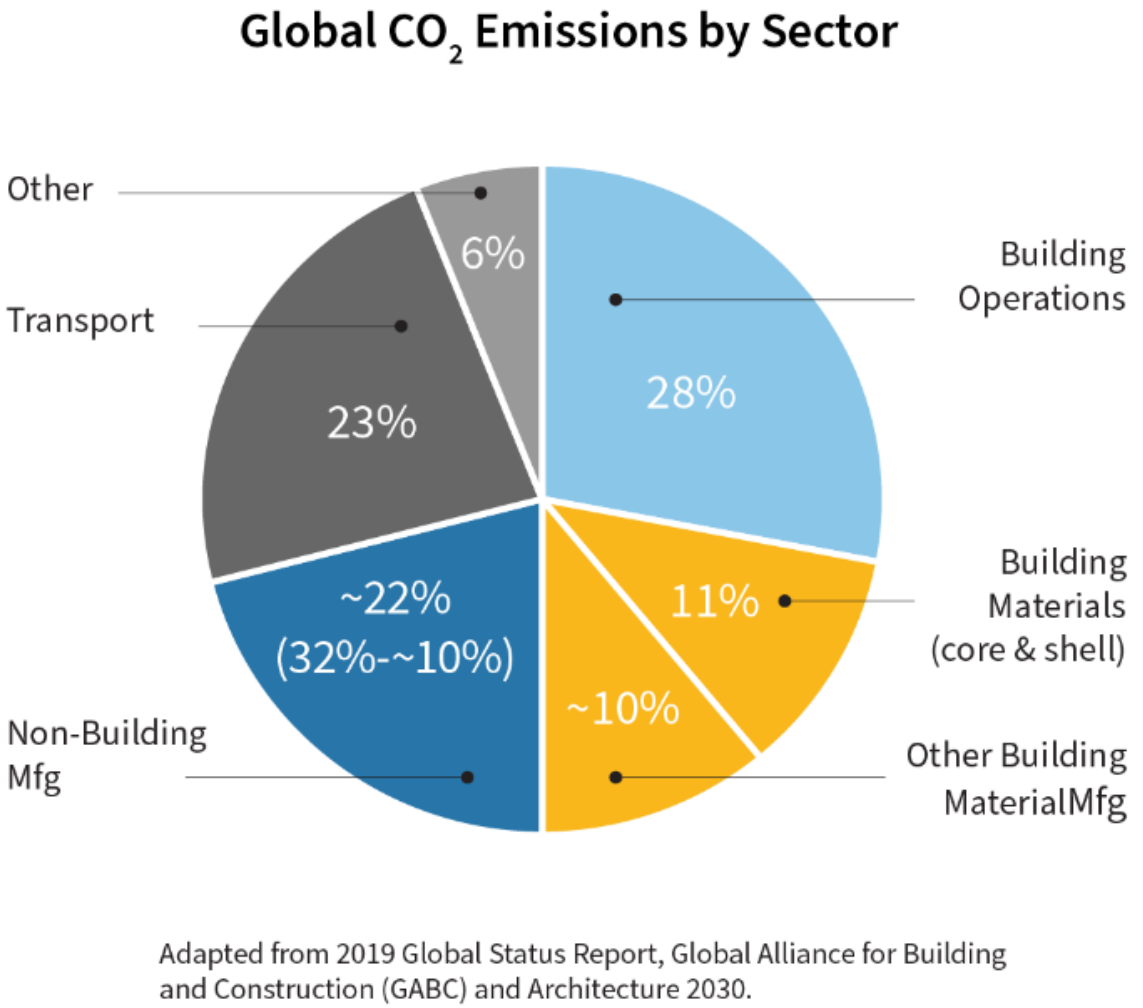
Challenges in Achieving Zero Carbon Design

The building sector is **one of the largest contributors to carbon emissions globally.**

Achieving Zero Carbon Design by 2030 requires significant reductions in energy consumption and the use of renewable energy sources.



Adapted from 2019 Global Status Report, Global Alliance for Building and Construction (GABC) and Architecture 2030.

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AI: A Game-Changer in the Net Zero Transition

Transformative Potential:

- AI is recognised for its ability to enhance efficiency, reduce waste, and improve decision-making across the infrastructure lifecycle.

AI-Driven Insights:

- Through predictive analytics, machine learning, and real-time data processing, AI provides valuable insights that support the net zero transition.

Focus Areas:

- We will explore AI applications in sustainable building design, energy management, smart cities, and project optimisation.

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Building energy use optimisation

Energy Modelling and Simulation:

- Energy performance simulation is an important step in designing sustainable buildings.
- AI can be used to create detailed models of building energy usage, simulating different scenarios to find the most efficient configurations.

Predictive Maintenance:

- AI tools can predict when building systems are likely to fail or need maintenance, allowing for proactive interventions that keep systems running efficiently and extend their lifespan.

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Carbon footprint reduction

Lifecycle Analysis:

- AI can analyse the entire lifecycle of materials and products used in construction and operation, identifying areas where carbon emissions can be reduced.

- This helps in selecting sustainable materials and construction methods.

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Building energy use optimisation – AI Toolkit!

AI for Energy Efficiency:

- AI reduces the burden of data management by automating the collection and cleaning process, significantly improving the accuracy of emissions calculations.

Granular Analysis:

- AI utilises knowledge graphs and natural language processing to define relationships between business activities and energy use, enabling a granular analysis that informs more effective energy optimisation strategies.

Strategic Implementation:

- AI-driven insights turn complex energy data into actionable strategies, prioritising interventions that maximise energy savings and carbon reductions.

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Building energy use optimisation – AI Toolkit! (Continued)

Reducing Embodied Emissions with AI:

- AI reduces the burden of data management by automating the collection and cleaning process, significantly improving the accuracy of emissions calculations.

Large Language Models (LLMs)

ASPEC

Predictive Maintenance:

- AI tools can anticipate when building systems might fail or require maintenance, enabling proactive measures that ensure systems operate efficiently and last longer.

IBM Watson IoT™

Efficient Building Operations:

- AI-powered smart technologies optimize energy efficiency and reduce operational emissions in buildings.

Hank
A JLL company

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The Role of AI-Powered Microgrids in Zero Carbon Design

Integration with Renewable Energy:

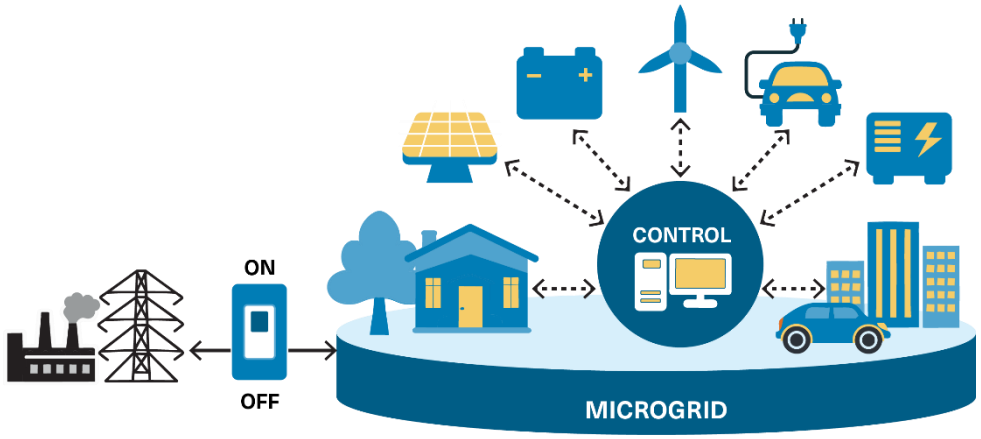
- Microgrids integrate renewable energy sources, such as solar and wind, to reduce reliance on grid-supplied electricity, enhancing energy efficiency and reducing carbon emissions.

Dynamic Energy Optimisation:

- AI-powered microgrids optimise energy use in real-time by analysing data from weather forecasts, energy consumption patterns, and grid status. This reduces energy waste and costs, ensuring efficient energy usage where and when it's needed most.

Enhanced Reliability and Resilience:

- AI predicts potential failures and automatically reconfigures the microgrid to maintain a stable energy supply.



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Smart City Infrastructure

Transportation Management:

AI can optimise public transportation routes, reduce traffic congestion, and promote the use of electric vehicles, all of which contribute to lower urban carbon emissions.

Urban Planning:

AI can assist in designing smart cities that maximise energy efficiency, incorporate green spaces, and support sustainable living practices.

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Project management and avoiding scope creep

AI can help project management by preventing scope changes and ensuring that projects are completed on time and within the cost.

For example:

a. Predictive Analytics
b. Resource Optimisation
c. Risk Management

To explain Predictive Analytics in more detail;
AI can enhance project management by using historical project data and current project parameters to predict possible problems and take preventive actions to reduce risks.

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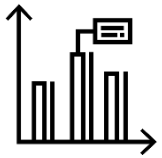
The process

Data Analysis:

AI algorithms use data from previous projects, such as timelines, budgets, resources, and results. They also consider the current project's parameters, such as scope, deliverables, and timelines.

Pattern Recognition:

AI can detect patterns and relationships among various factors. For example, it may notice that projects that have many change requests in the initial stages tend to have scope creep.



Risk Forecasting:

AI uses these patterns to predicts potential risks that could cause scope creep. It could point out areas where more scrutiny is needed or recommend changes to the project plan.

Preventive Actions:

Project managers get alerted in advance and can take preventive actions, such as reallocating resources, updating timelines, or managing stakeholder expectations to ensure the project's success.

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Conclusion: AI as a Cornerstone for Net Zero Success

Recap:

- AI plays a crucial role in supporting the net zero transition by enhancing efficiency, reducing waste, and optimising project outcomes.

Future Outlook:

- The integration of AI into net zero initiatives will continue to be a key factor in driving sustainable growth.

Call to Action:

- Embrace AI as a strategic tool to achieve sustainability goals and drive innovation in your projects.

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Questions?

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