Outline

Environmental Impacts of Buildings

Total Carbon Metric

41X Case Study

The Next Step
Environmental Impacts of Buildings
Environmental Impacts of Buildings

Embodied
Environmental Impacts of Buildings

Embodied + Energy
Environmental Impacts of Buildings

Embodied + Energy + Transport
Environmental Impacts of Buildings

Embodied + Energy + Transport + Waste

Carbon Centred Approach to Sustainable Design
Common environmental impact:
Carbon emissions
What are the issues around carbon?

- Carbon forms a large component of Greenhouse Gases (6 Kyoto GHG’s)
  - CO2 (carbon dioxide)
  - CH4 (methane)
  - CHF3 (hydrofluorocarbons)
  - C3F8 (perfluorocarbons)
  - N2O (nitrous oxide)
  - SF6 (sulphur hexaflouride)

- Combined to be referred to as:
  - CO2-e (carbon equivalents)
How do these issues relate to the built environment?
Carbon and the Built Environment

Setting sustainability targets
Carbon and the Built Environment

**Building Energy Rating**
- **Zero Energy** Building: operational energy = on-site energy production
- **Zero Carbon** Building: operational carbon emissions = use of renewable energy either on site or directly connected to the site to offset operational carbon emissions
- **Carbon Neutral** Building: life cycle carbon emissions = use of renewable energy either on site or directly connected to the site to offset both operational and embodied carbon emissions

**Building Rating Tools**
- Green Star – Australia/NZ/S.Africa
- LEED – U.S and Canada
- BREEAM – United Kingdom

**Level of Commitment from Building Owner**
- **Minimum Building Regulation (BCA) Compliance**
- **Sustainable Measures**
- **Zero Energy**
- **Zero Carbon**
- **Carbon Neutral**
Carbon and the Built Environment
Carbon and the Built Environment

Lifecycle of a building
Demolition
Carbon provides a common language for assessing environmental impacts that links directly to climate change.
Total Carbon Metric
Carbon Centred Approach to Sustainable Design

Building Life Cycle

- End of Life
- Embodied
- Operational
Carbon Centred Approach to Sustainable Design

Embodied

Operational

Total Carbon Metric
Total Carbon Metric

Embodied

Operational
Total Carbon Metric

- Embodied
- Operational
- Construction
Total Carbon Metric

- Embodied
  - Construction
  - Materials
- Operational
Total Carbon Metric

- Embodied
  - Construction
  - Materials
- Operational
  - Energy
Total Carbon Metric

- Embodied
  - Construction
  - Materials

- Operational
  - Energy
  - Transport
Total Carbon Metric

Embodied
- Construction
- Materials

Operational
- Energy
- Transport
- Waste
Fast comparative analysis of carbon reduction scenarios

To inform building designers & stakeholders

To quantify a building's total carbon footprint

Total Carbon Metric

Embodied

Operational

Construct Materials Energy Transport Waste

Carbon Centred Approach to Sustainable Design
Assess a range of environmental attributes against a single metric
Carbon Centred Approach to Sustainable Design
Project Vision

An exemplar case study in sustainable building design
Carbon Centred Approach to Sustainable Design

Construction
Materials
Energy
Transport
Waste

BAU - 22%
BAU - 25%
BAU - 26%
BAU - 27%

Tonnes CO2-e / annum
Carbon Centred Approach to Sustainable Design

- Construction
- Materials
- Energy
- Transport
- Waste

[Bar Chart]

- BAU Energy Efficiency Plan
- Green Materials Plan

- BAU - 22%
- BAU - 25%

Tonnes CO2-e / annum

0 500 1000 1500 2000 2500 3000

BAU  Energy Efficiency Plan  Green Materials Plan
Carbon Centred Approach to Sustainable Design

Construction
Materials
Energy
Transport
Waste

Tonnes CO2-e / annum

BAU - 22%
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BAU
Energy Efficiency Plan
Green Materials Plan
Green Transport Plan
Carbon Centred Approach to Sustainable Design

BAU
Energy Efficiency Plan
Green Materials Plan
Green Transport Plan
Green Waste Plan

Tonnes CO2-e / annum

BAU - 22%
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Carbon Centred Approach to Sustainable Design

Remaining emissions will be offset through Sustainability Charter

27% Reduction
Commitment by 41X owners and tenants to offset carbon emissions over 30 years.
The Next Step
The Next Step

Look beyond existing rating tools

Follow through to construction and operation

Continued engagement with building users
Collaborate through all project phases to move towards a Low Carbon Future.
Thank You

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