

Minimizing Capital and Energy Costs through Envelope Design

by Mark Blamey, Cobalt Engineering

Synopsis

This presentation will touch on the most significant features of building envelope design that affect the design of mechanical systems for a variety of buildings, both in the southwestern BC market, and beyond our local region. The evolution of building codes, energy bylaws, and the like will also be presented in the context of how building envelope design requirements are changing.

Photovoltaic generation Rooftop planting

Improving insulation

Automated ventilation control

Lighting control using natural light

Lighting control using motion detection sensors

High-efficiency light fixtures

Rainwater utilization systems

High-efficiency heating equipment

Restriction of sunlight

Conceptual Drawing of Green Building

Effective Building Envelope Design

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Summary

- Drivers of Effective Building Design
- Integrated Design Process
- Passive Design Strategies
- Related Codes & Standards
- Case Studies

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GO GREEN

- Climate Change
- Fuel Supply
- Energy Distribution

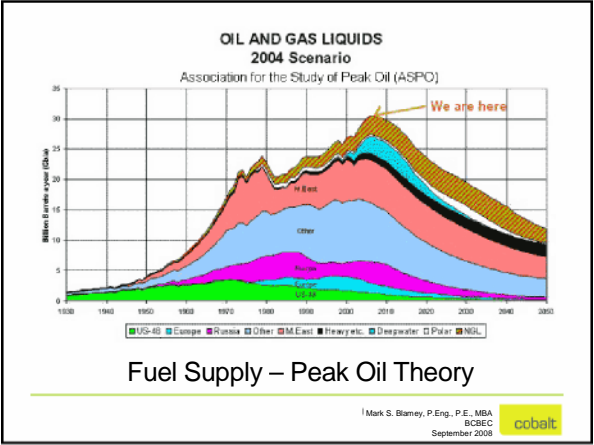
Why is This Important?

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The diagram illustrates the Earth's climate system. At the top left, 'Solar Radiation' is shown as a sun. 'CLIMATE VARIABILITY AND CHANGE' is indicated by clouds. 'ATMOSPHERIC COMPOSITION' includes 'H₂O, CO₂, CH₄, N₂O, O₃, etc.' and 'Aerosols'. A volcano is shown emitting smoke. The 'WATER CYCLE' includes 'Evaporation', 'Condensation', 'Precipitation', 'Runoff', and 'Infiltration'. 'LAND USE, LAND COVER CHANGE' shows 'Agriculture', 'Forests', and 'Land Surface'. 'ECOSYSTEMS' and 'CARBON CYCLE' are also depicted. A central box says 'HUMAN CONTRIBUTIONS AND RESPONSES' with arrows pointing to various parts of the system.

Climate Change

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- Power
- Fossil Fuels
- Alternatives


Distribution of Energy

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- Site Specifics
- Programming & Form
- Preliminary Bldg Concepts
- Frame Building Envelope
- Lighting & Power Systems
- Mechanical Systems




Examine Functional Requirements

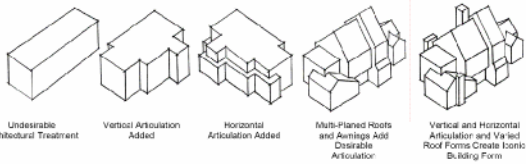
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
Determine Site Issues

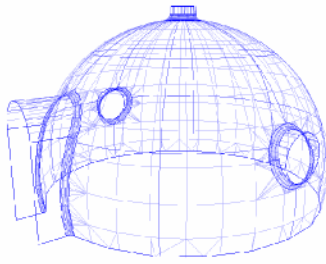
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Building Form Figure



Develop Programming & Building Form

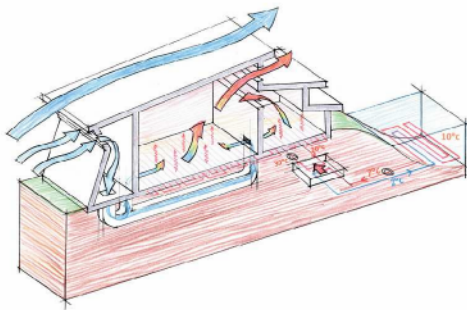
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Preliminary Building Concept

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Frame Building Envelope

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Lighting & Power Systems

- Daylighting Analysis
- Renewables
- Alternative Energy



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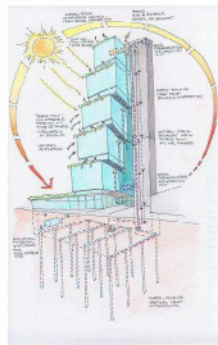




Structural Design Parameters

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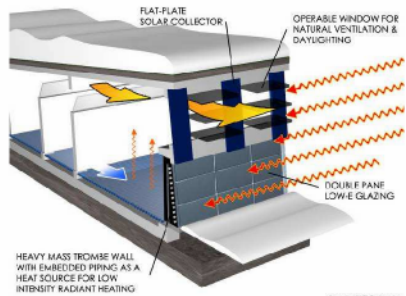




Mechanical Systems

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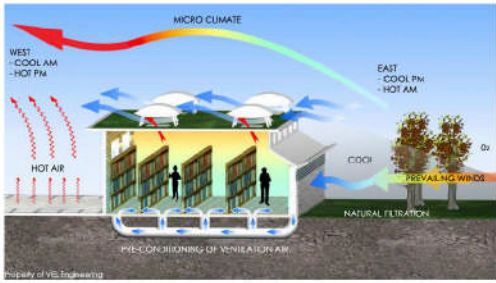




Passive Design Strategies

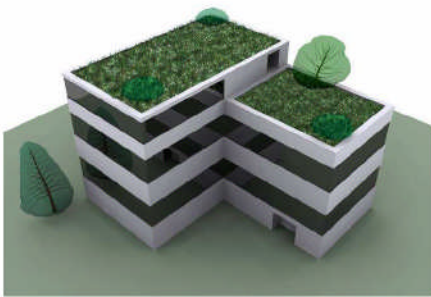
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Microclimate Analysis

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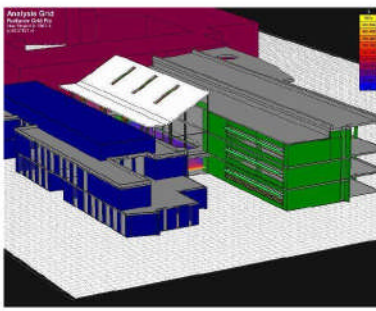
Building Shape and Massing

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Programming

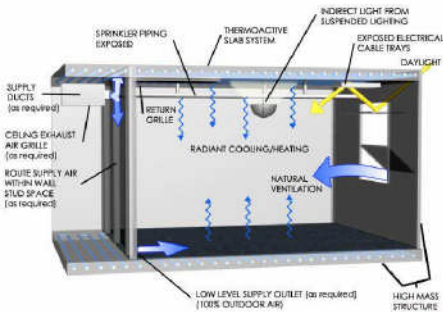
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Glazing to Wall Area Ratio Analysis

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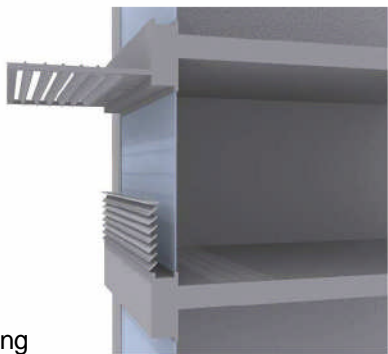




Thermal Mass

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Solar Shading

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Glazing Assembly Parameters

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Thermal Insulation

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Acoustic Barriers

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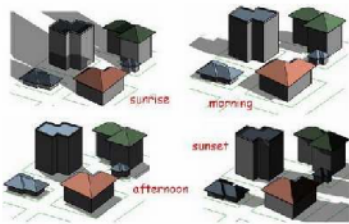




Roof Design for Solar Collection

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Site Shadow Study



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
Codes and Standards Moving Forward


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A.S.H.R.A.E.


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Leadership in Energy
And
Environmental Design


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British Columbia - Green Building Code

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City of Vancouver
Building By-law
2007 Volume 1

Vancouver Building By-law 2007 and Beyond

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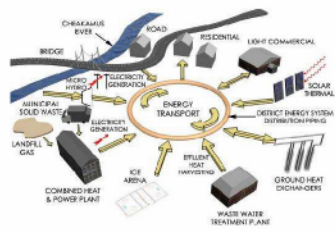


Trends in Codes & Standards




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Funding Options

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A Word About Thermal Comfort

ASHRAE Comfort Zone
in Newsworld Centre

Cold Moderate Hot

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Case Study – Nk'Mip Desert & Heritage Centre

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South East False Creek – Parcel 2a

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Montenay Office Building

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Hesquiaht School

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Regent College
Library Addition

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Kwantlen University College

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Cottonwood Lodge

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Thank You

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