Encouraging the Construction of Net Zero Energy Buildings

Building To Zero Conference

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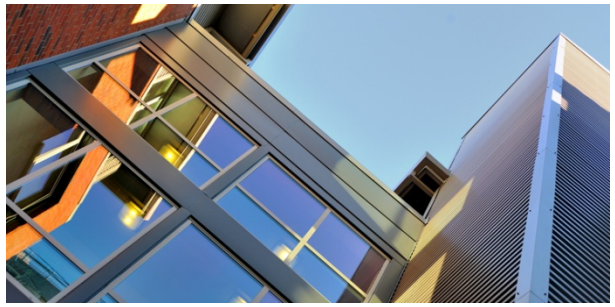
What Are Net Zero Energy Buildings?

- Buildings that produce as much energy from onsite renewable resources as they consume on an annual basis
- Global trend
- All new buildings
  UK 2016, EU 2020,RAIC 2030

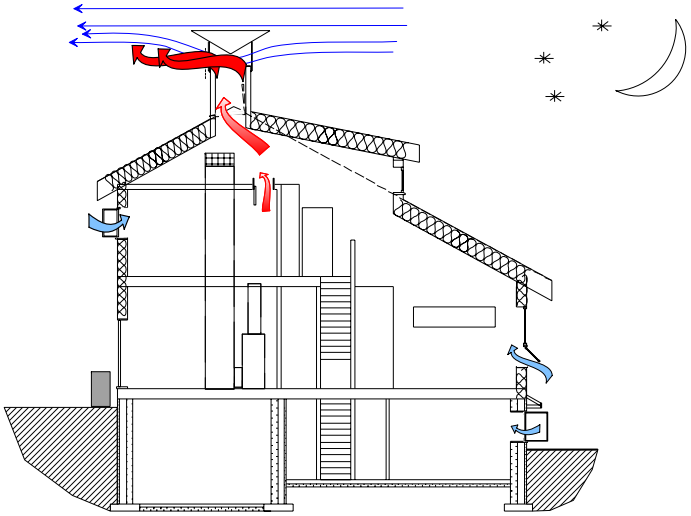
How is Net Zero Energy Achieved ?

- Stage 1
- Minimize Energy Consumption For:
  - Space Heating
  - Space Cooling
  - Ventilation
  - Domestic Water Heating
  - Lighting
  - HVAC equipment
  - Appliances
- Initially it is much cheaper to save energy than generate energy
- Building envelope measures reduce heating and cooling energy by 50 to 80%
- Electrical energy consumption reduced 30 to 60%



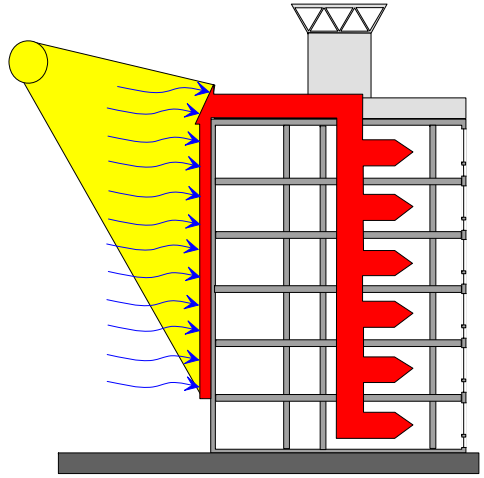
How is Net Zero Energy Achieved ?

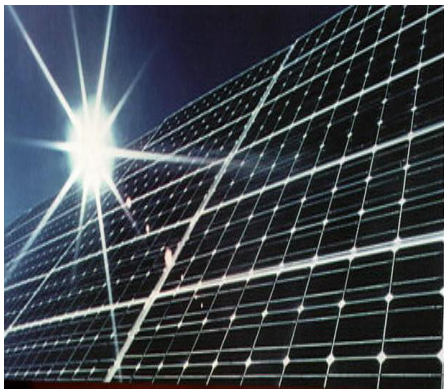
- Stage 2
- Utilize Passive Energy Systems
  - Daylighting
  - Passive solar heating
  - Air flow cooling
  - These are typically the least expensive ways of using renewable energy to supply the energy needs of the building



How is Net Zero Energy Achieved ?

- Stage 3
- Utilize Active Solar Energy Systems
  - Solar Thermal Systems (heating air or water)
  - Solar Electric (Photovoltaic) Systems which are typically grid connected





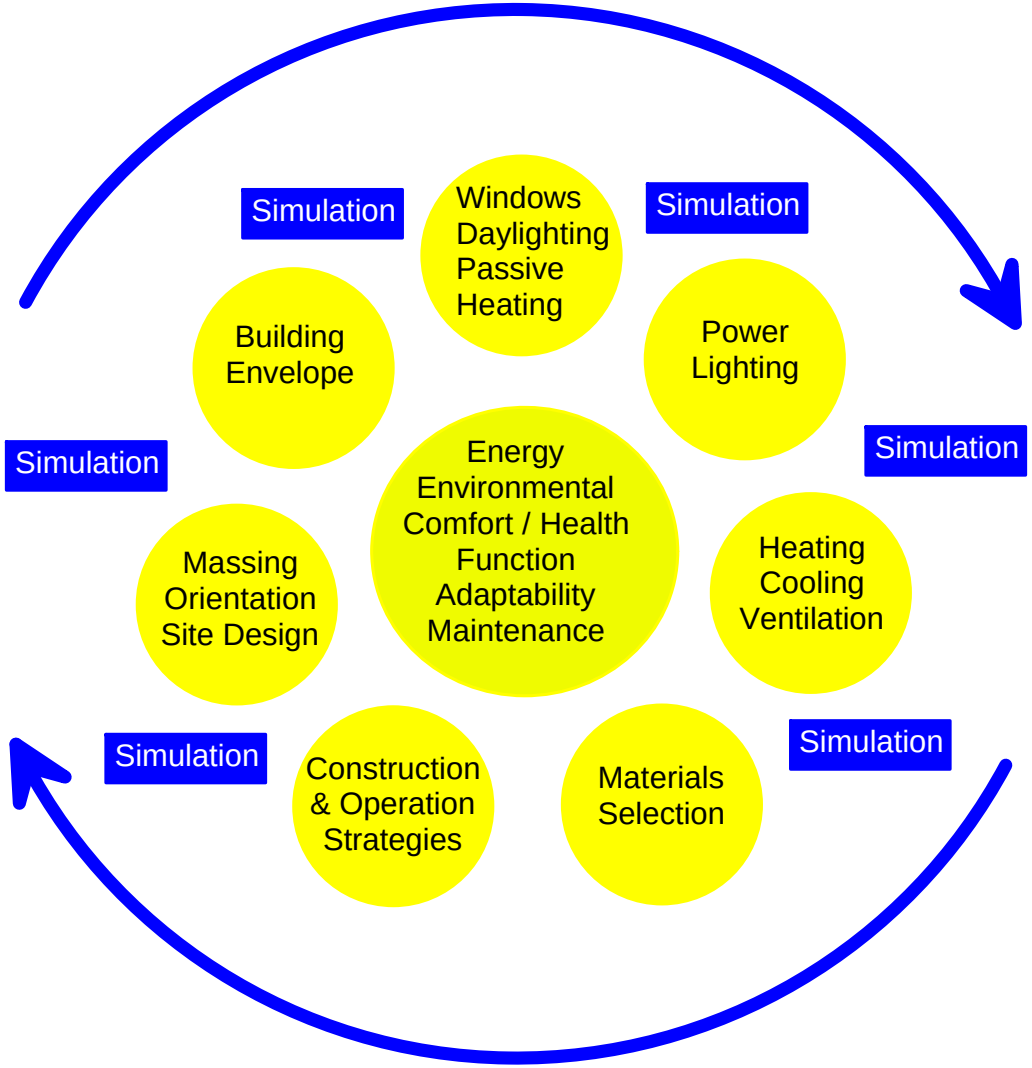
Net Zero Ready

- Stages 1&2 and preparation for Stage 3
- Highly efficient building envelope
- Design that utilizes daylighting, passive heating and natural ventilation
- Orient and slope roof areas for future solar water / air heating and PV systems
- Pre-plumb and pre-wire
- Allocate space for solar storage tanks and for inverters
- All measures are far cheaper to include during construction than to retrofit later
- Can result in up to 80% of the energy savings that will be achieved with a full net zero energy building

Designing for Net Zero and Net Zero Ready
The Integrated Design Process

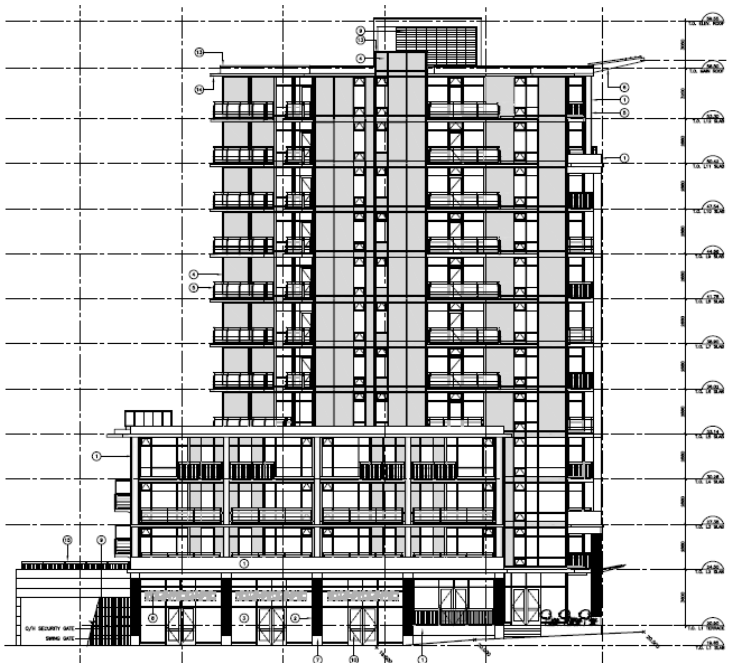
- All parties to the project involved at the earliest stage of the design process
  - Design professionals
  - Owners
  - Utilities
  - Sponsoring agencies
- Process
  - Performance goals
  - Brainstorming
  - Iterative process
- Results
  - Team building
  - Team buy-in
  - Cost effective solutions

Integrated Design Process



Integrated Design Process Example

- High Rise Residential Building in Victoria
- 12 stories
- 120 residential units
- Ground floor commercial
- Composite wall RSI 0.85 (R4.8)
- Annual energy consumption 1,513,189 kW/hrs
- Annual energy costs $125,282

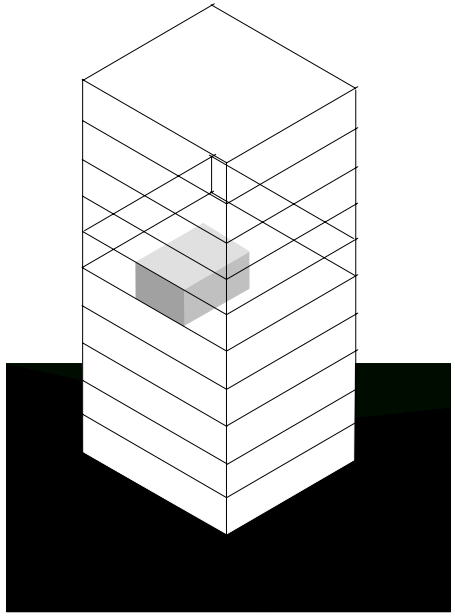


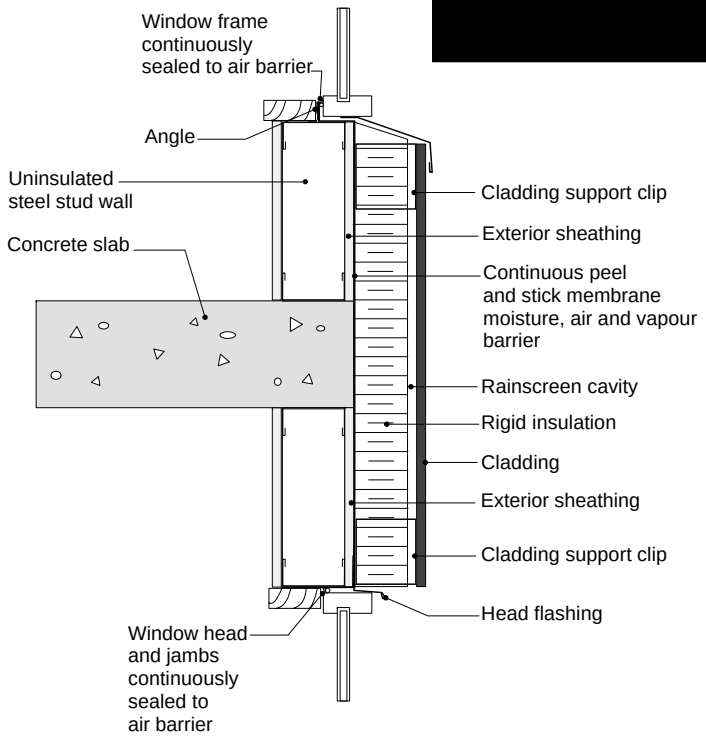
Integrated Design Process

- Two day design charrette
- Developer, builder, design team, energy simulator, utilities, BCMEMPR, CMHC
- Net Capital Cost of All Energy Efficiency Measures (EEMs) $138,000
  - Annual Energy Savings of 42% (635,540 KWhr/yr) ($35,100 / yr)
  - 380 tonnes per year of CO_2 avoided
  - 4.1 year discounted payback
  - Cost to own and operate over 30 years $600,000 less than original design
  - Eligible for Power Smart New Construction Program and 50% subsidy for EEMs

Integrated Design Process

- Results
  - Greater affordability
  - Lower GHG emissions
  - Greater thermal comfort
  - Improved indoor air quality
  - Greater life safety
  - Reduced noise transmission
  - Enhanced building envelope durability





How to Encourage Construction of Net Zero Energy and Net Zero Ready Buildings

- Set progressive targets for future energy performance of buildings with the ultimate goal of net zero energy
- Ensure future solar access is guaranteed
- Provide incentives for early adopters
  - Increased FSR
  - Public recognition
- Encourage the integrated design process as an method for reducing energy consumption, optimizing design, increasing quality and reducing cost
- Partner with Power Smart New Construction Program
- Trust but Verify: mandate quality assurance procedures to ensure buildings perform as predicted
  - Airtightness testing
  - HVAC system commissioning
  - Performance monitoring

Thank You