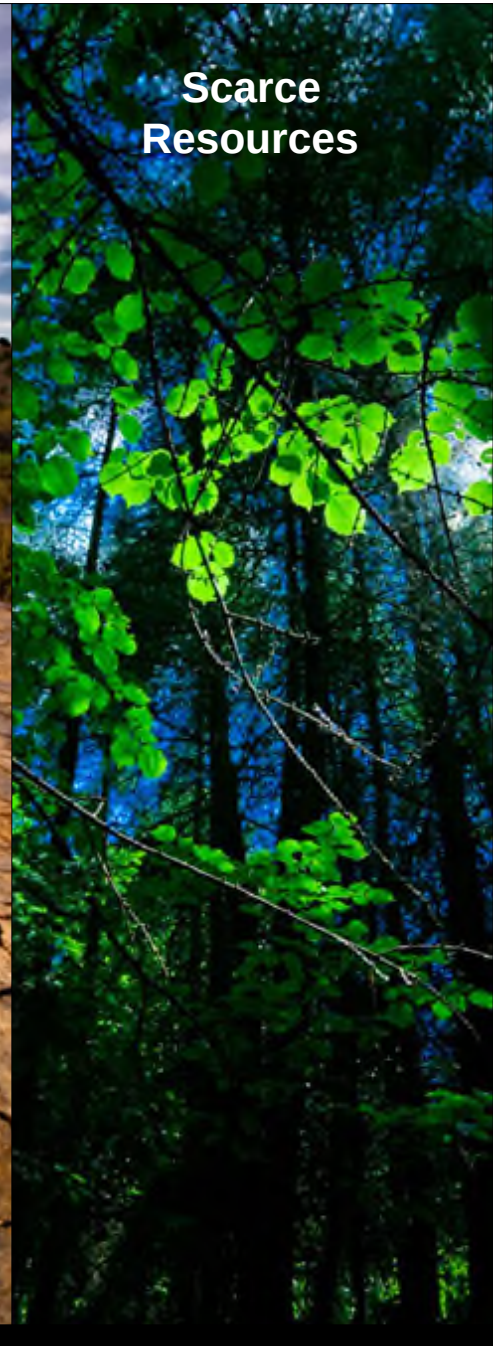
Sustainable Design is Now & Forever

John F. Kennedy
Sr. Manager, AEC Sustainable Design

© 2008 Autodesk

Autodesk



© 2008 Autodesk

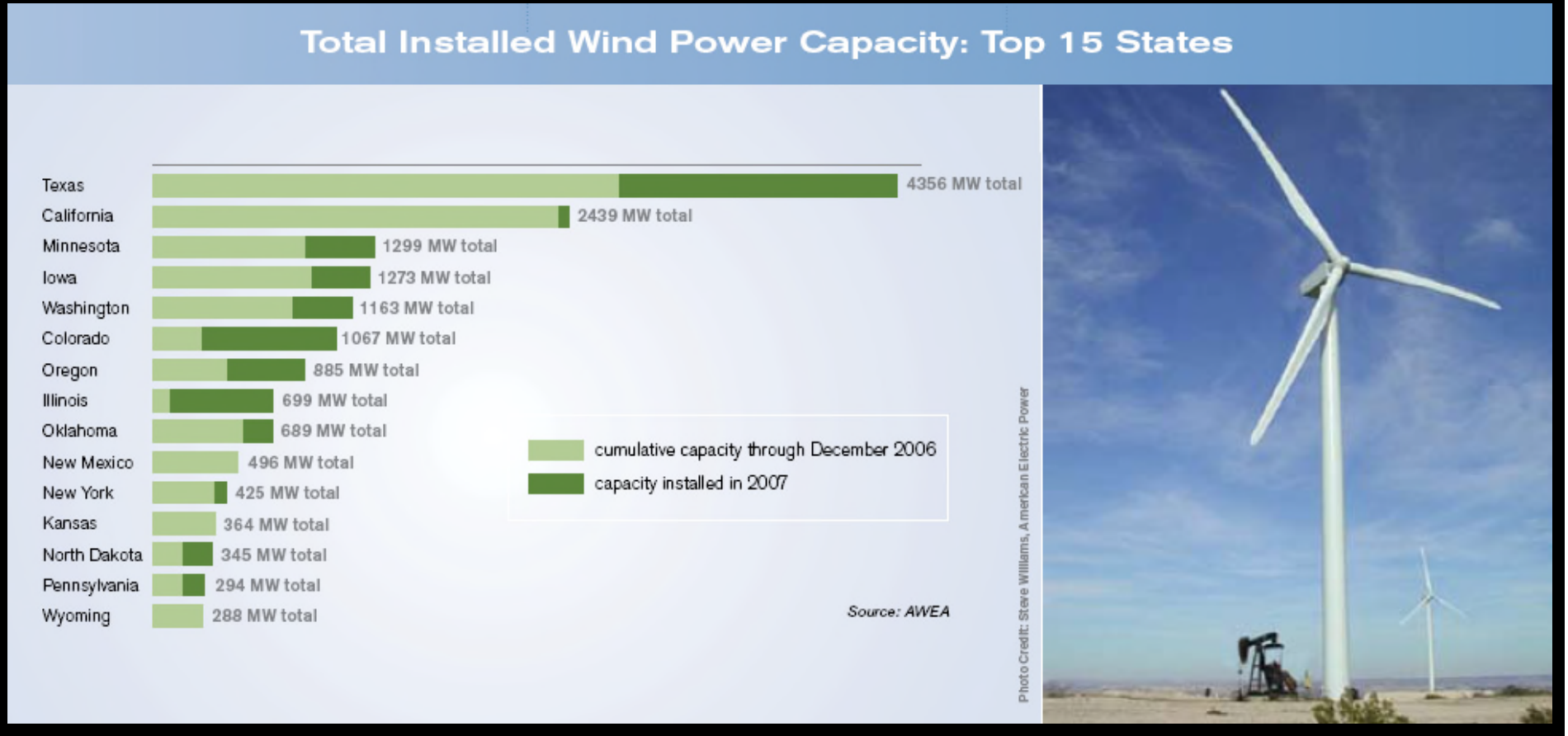
Autodesk

Radical BHAGs for Sustainability

© 2008 Autodesk

Autodesk

More Wind Power in last 2 years then the past 20

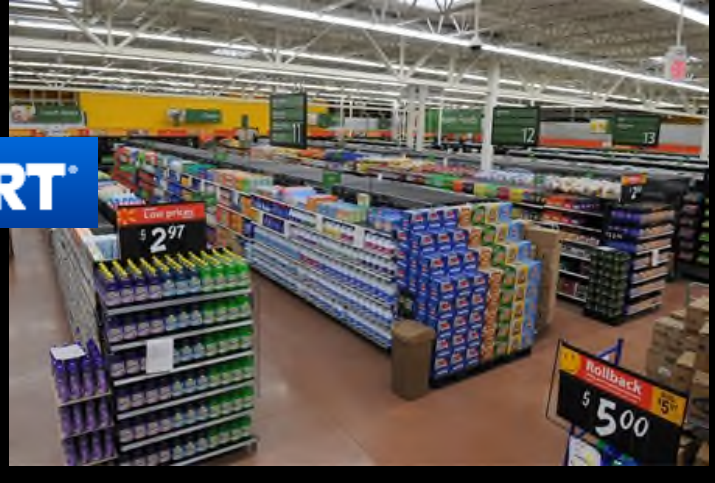


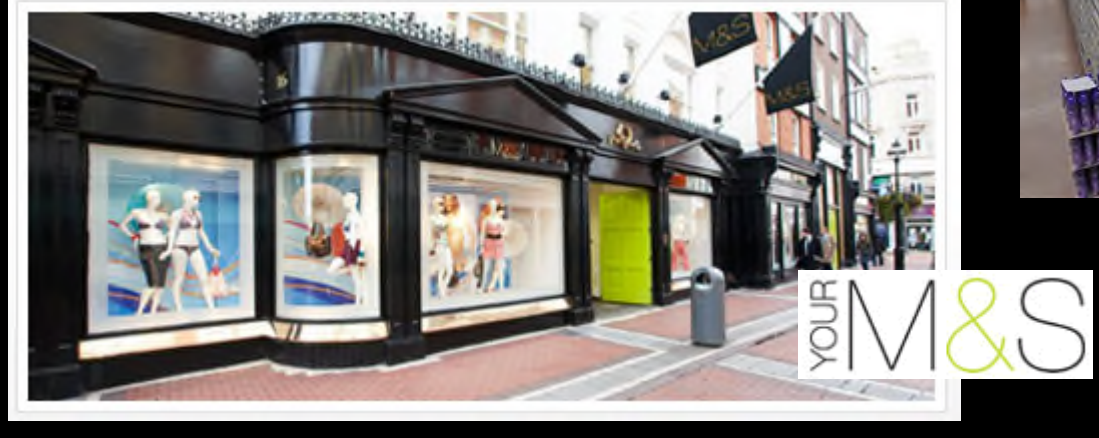
© 2008 Autodesk

Autodesk

Corporate Strategy is Sustainability

385 institutional investors with assets of $57 trillion.





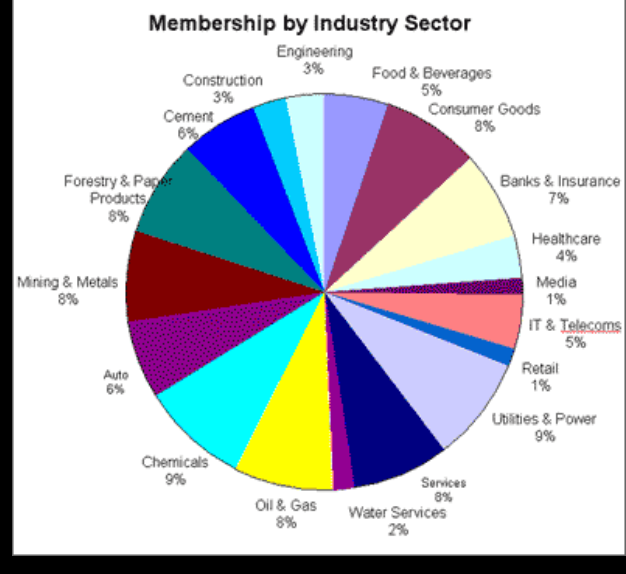
© 2008 Autodesk

Autodesk

World Business Council for Sustainable Development

- 200 CEOs from 35 countries
- Combined turnover of $5.5 trillion

- Top Priorities
  - Energy Efficient Buildings
  - Water



© 2008 Autodesk

Autodesk

Voluntary BHAGs → Regulatory Requirements

- Architecture 2030 Challenge
  - 55% fossil fuel reduction by 2010
  - Carbon neutral goal by 2030
  - AIA, US Conference of Mayors, USGBC

- US Federal Law
  - 55% fossil fuel reduction by 2010 all new federal buildings, carbon neutral by 2030

- UK Law
  - Carbon neutral by 2016 all new residential buildings
  - Carbon neutral by 2019 all new commercial buildings

- California Law
  - Net-zero energy 2020 all new residential buildings
  - Net-zero energy 2030 all new commercial buildings

© 2008 Autodesk

Autodesk

Sustainable Design

Meeting the needs of the present while *improving* the ability of future generations to meet their own needs.

© 2008 Autodesk

Autodesk

Sustainable Design Practice

Energy

Lighting and equipment

Heating, cooling & ventilation

Occupant processes

Water

Potable supply for occupants

Non potable supply for processes

Storm water run-off

Materials

Site work

Structure, envelope & finishes

Furnishings & equipment

Land

Natural Environment

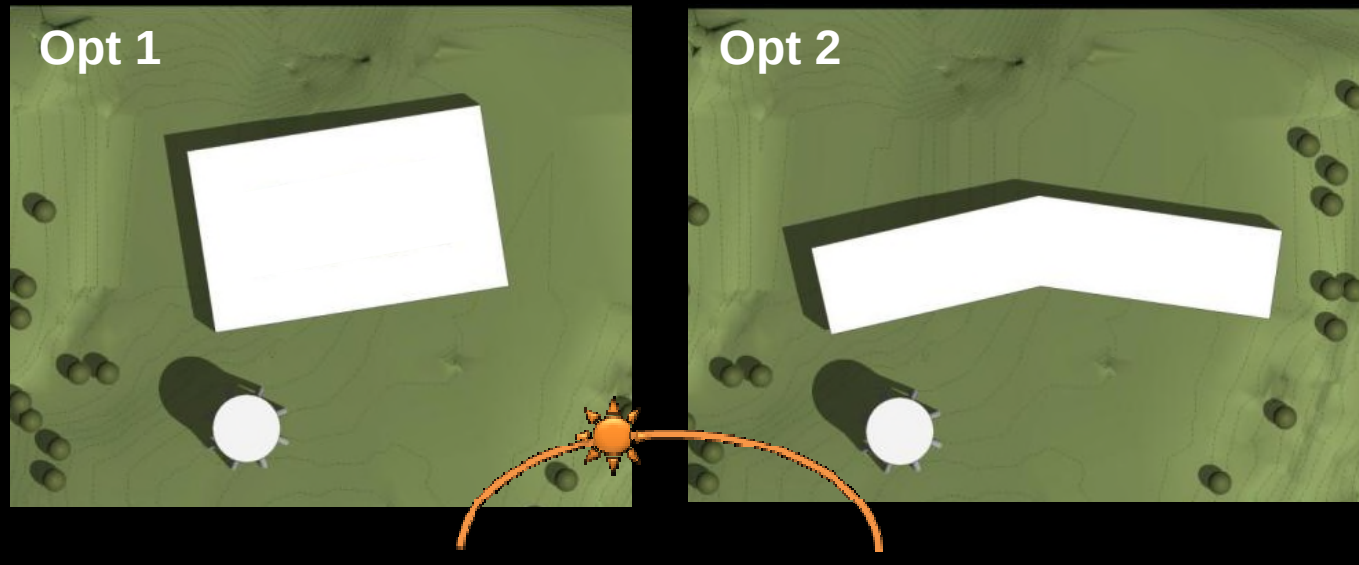
Transit Oriented Design

Cut and Fill

© 2008 Autodesk

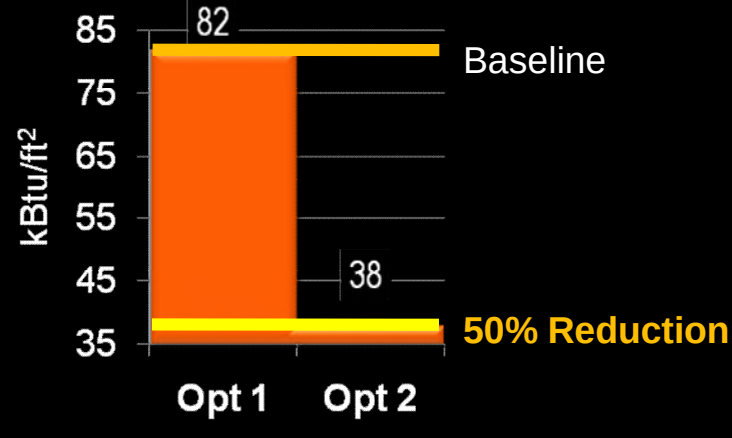
Autodesk

Energy Use



- Whole Building Energy Analysis
- Solar Analysis
- Daylight Analysis
- Thermal Analysis

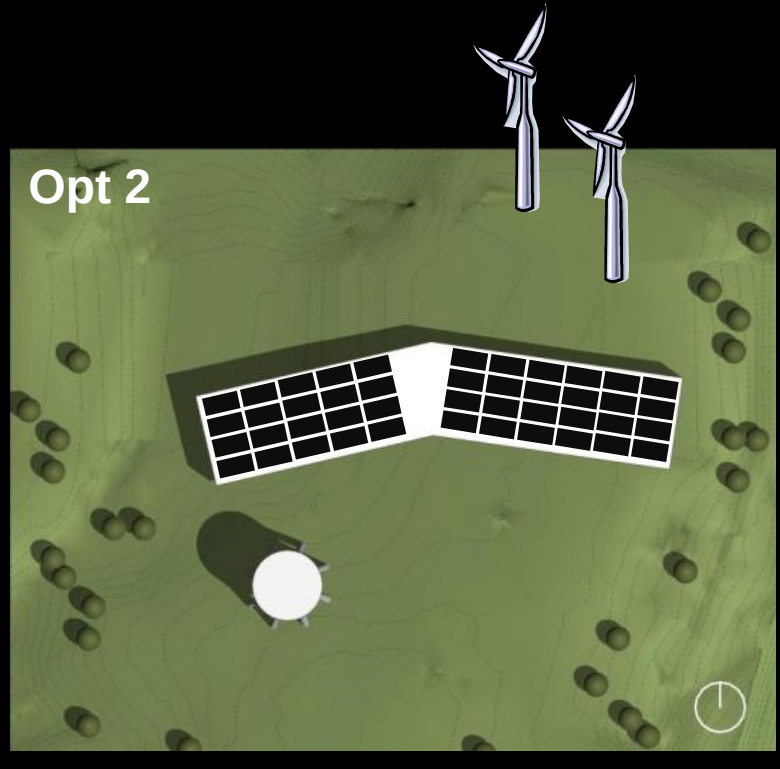
Schematic Energy:

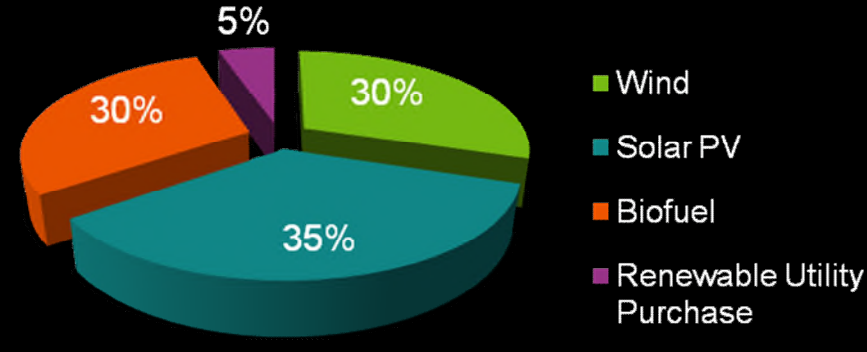


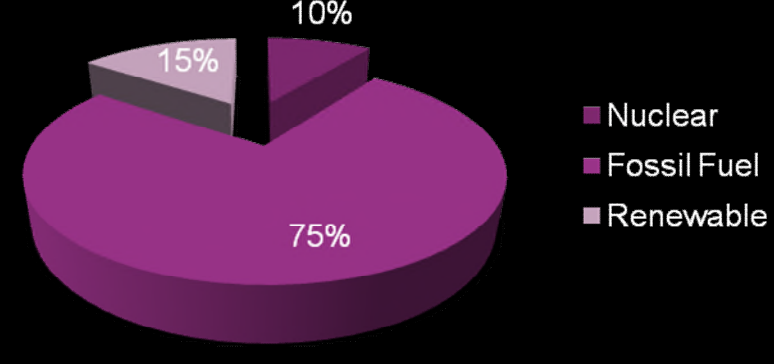
© 2008 Autodesk

Autodesk

On-site Renewable Energy





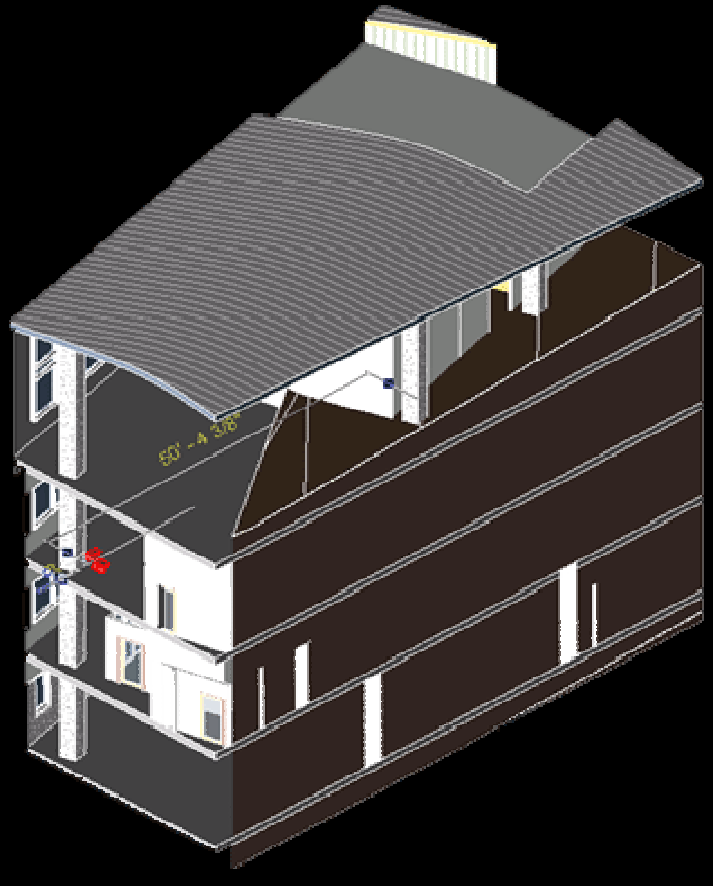


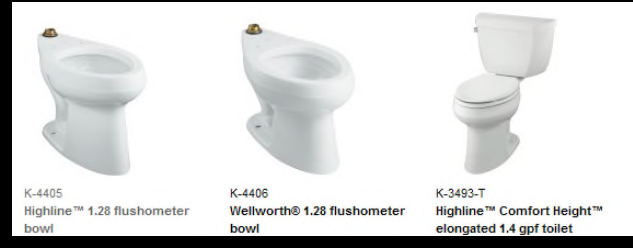
- Identify and size renewable energy resources

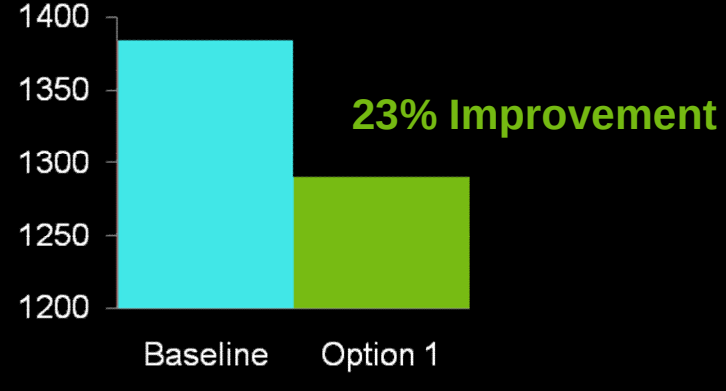
© 2008 Autodesk

Autodesk

Water Use





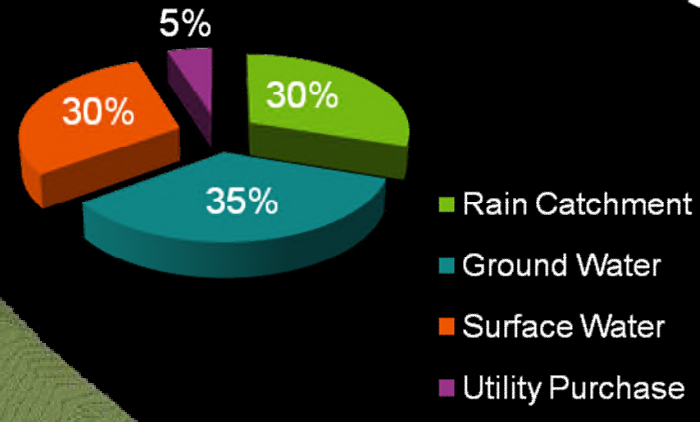


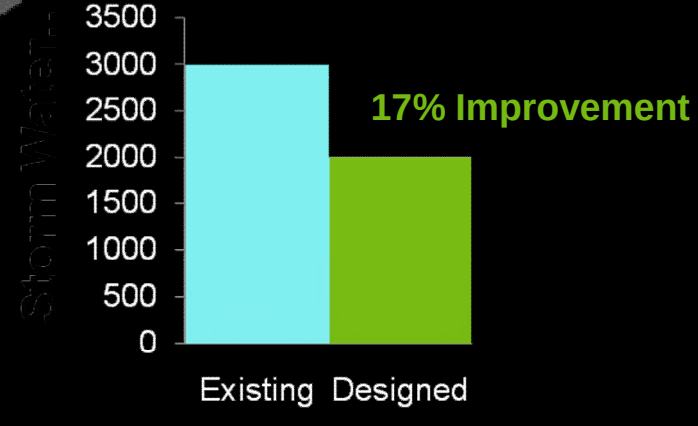
- Determine indoor and outdoor water use and opportunities for on-site water sources

© 2008 Autodesk

Autodesk

On-site Renewable Water



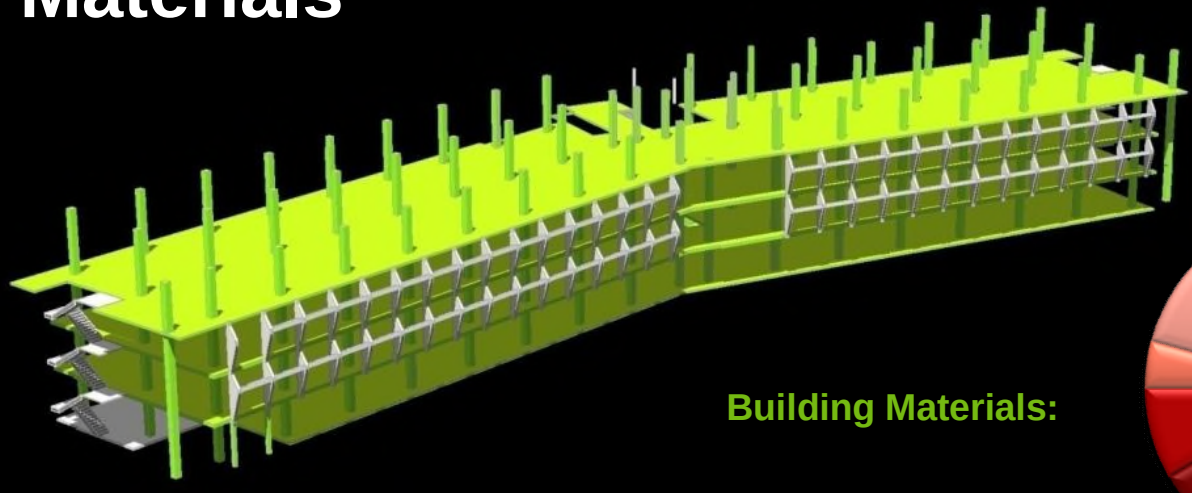


- Minimize total annual water use

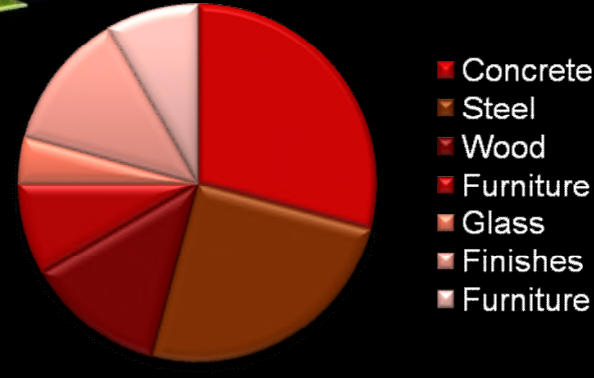
© 2008 Autodesk

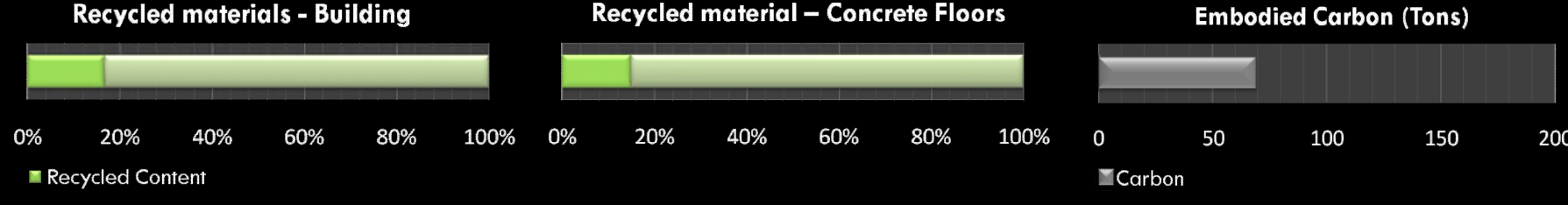
Autodesk

Materials



Building Materials:





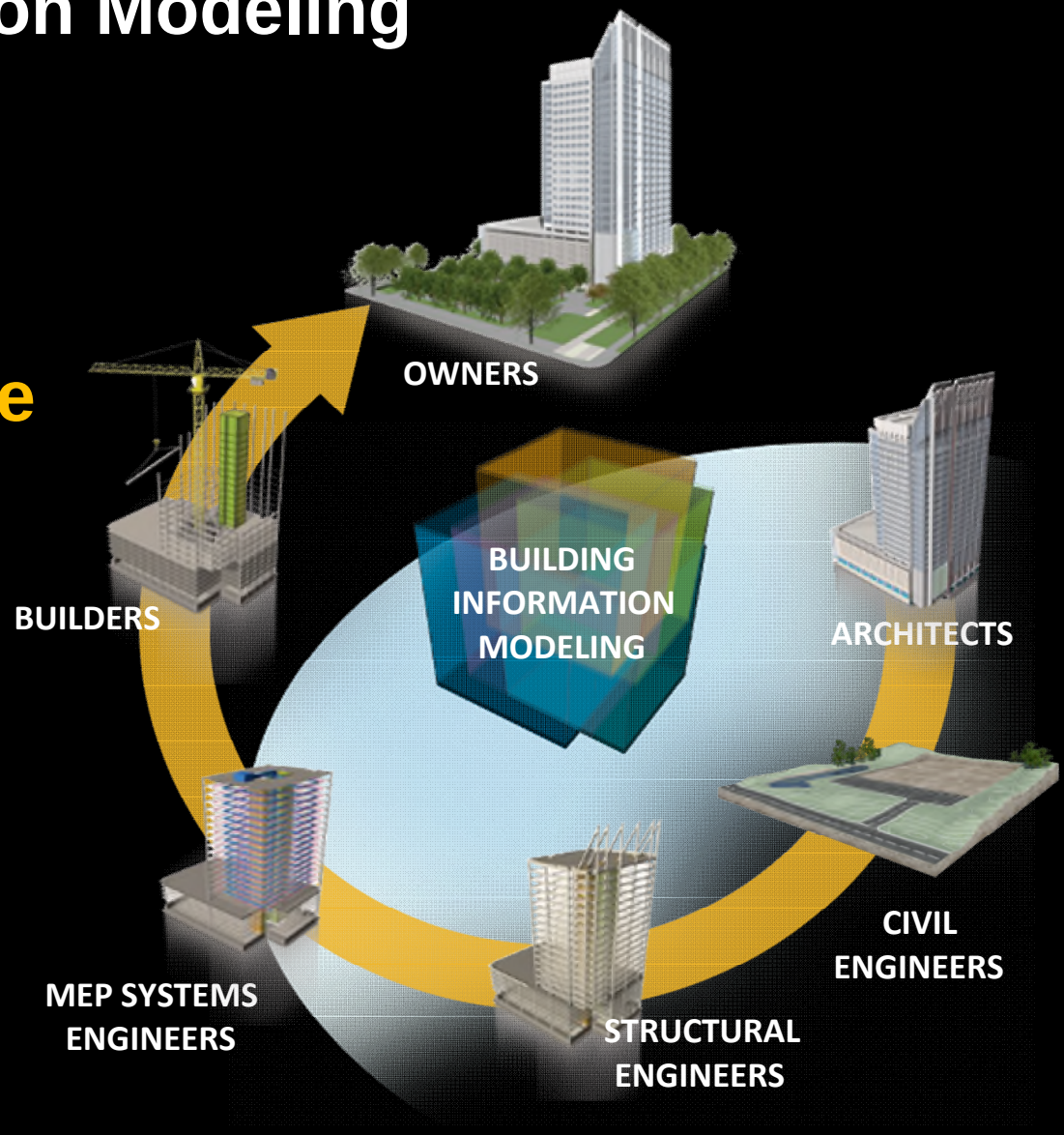
- Select materials and products that best meet sustainability performance requirements and economic constraints
- Employ digital fabrication practices to control material use and minimize waste

© 2008 Autodesk

Autodesk

Building Information Modeling

Create
Visualize
Simulate & Analyze
Deliver

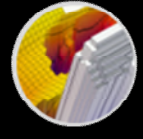


© 2008 Autodesk

Autodesk

New Analysis Tools for Sustainable Design

Autodesk Green Building Studio – Revit Architecture


Autodesk Ecotect

HVAC Load Calculation Extension – Revit MEP

Hydraflow Storm Sewers Extension – AutoCAD Civil 3D

Structural Analysis – Revit Structure

3DS Max Design

Autodesk Seek

© 2008 Autodesk

Autodesk

Analysis Tools for Sustainable Design

BIM Enabled Sustainable Design
Architecture

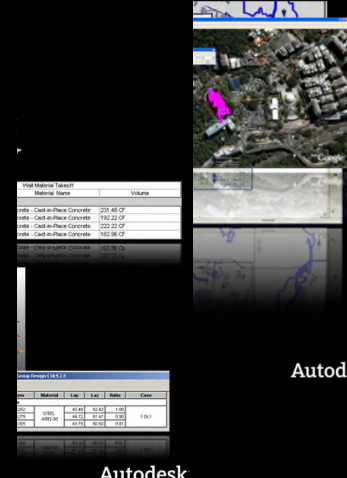
BIM Enabled Sustainable Design
Mechanical, Electrical & Plumbing Systems

BIM Enabled Sustainable Design
Civil Engineering

BIM Enabled Sustainable Design
Structural Engineering

BIM Enabled Sustainable Design
Construction

- Visualize design options to inform better decisions
- Evaluate project cost and environmental impact
- Minimize waste with QTO, clash detection, sequencing
- Accelerate project delivery and return higher owner value



Autodesk

© 2008 Autodesk

© 2008 Autodesk

Autodesk

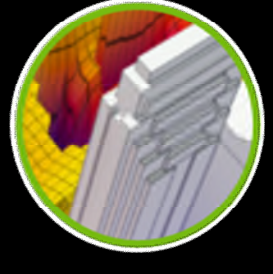
Sustainable Design Demonstration

Autodesk Green Building Studio

- Carbon Neutral in minutes

3DS Max Design

- Daylighting/Lighting Analysis



Autodesk Ecotect

- Solar/Shading Analysis

© 2008 Autodesk

Autodesk

Performance Data

- Glazing Example
- Actual Manufacturer data
- Analysis ready data

```
- <WindowType id="NPwindowType-210" DOELibIdRef="100001">
    <Name>PPG Double Pane SB70XL</Name>
    <Description>PPG Double Pane SB70XL</Description>
    <U-value unit="WPerSquareMeterK">1.625</U-value>
    <SolarHeatGainCoeff unit="Fraction">0.274</SolarHeatGainCoeff>
    <Transmittance type="Visible">0.643</Transmittance>
  - <Glaze id="Glaze-L1-NPwindowType-210">
      <Name>PPG SB70XL Starphire 6</Name>
      <Description>PPG SB70XL Starphire 6</Description>
      <Thickness unit="Feet">0.01857</Thickness>
      <Conductivity unit="WPerMeterK">1</Conductivity>
      <Transmittance type="Solar" unit="Fraction">0.28</Transmittance>
      <Transmittance type="Visible" unit="Fraction">0.722</Transmittance>
      <Transmittance type="IR" unit="Fraction">0</Transmittance>
      <Reflectance type="ExtSolar" unit="Fraction">0.499</Reflectance>
      <Reflectance type="IntSolar" unit="Fraction">0.559</Reflectance>
      <Reflectance type="ExtVisible" unit="Fraction">0.068</Reflectance>
      <Reflectance type="IntVisible" unit="Fraction">0.051</Reflectance>
      <Emittance type="ExtIR" unit="Fraction">0.841</Emittance>
      <Emittance type="IntIR" unit="Fraction">0.029</Emittance>
    </Glaze>
  - <Gap id="Gas-L2-NPwindowType-210">
      <Name>KRYPTON 3MM</Name>
      <Description>Krypton</Description>
      <Thickness unit="Feet">0.0105</Thickness>
      <Conductivity unit="WPerMeterK">0.1</Conductivity>
    </Gap>
  - <Glaze id="Glaze-L3-NPwindowType-210">
      <Name>PPG CLEAR 6</Name>
      <Description>PPG CLEAR 6</Description>
      <Thickness unit="Feet">0.01857</Thickness>
      <Conductivity unit="WPerMeterK">1</Conductivity>
      <Transmittance type="Solar" unit="Fraction">0.771</Transmittance>
      <Transmittance type="Visible" unit="Fraction">0.886</Transmittance>
      <Transmittance type="IR" unit="Fraction">0</Transmittance>
      <Reflectance type="ExtSolar" unit="Fraction">0.072</Reflectance>
      <Reflectance type="IntSolar" unit="Fraction">0.073</Reflectance>
      <Reflectance type="ExtVisible" unit="Fraction">0.085</Reflectance>
      <Reflectance type="IntVisible" unit="Fraction">0.085</Reflectance>
      <Emittance type="ExtIR" unit="Fraction">0.84</Emittance>
      <Emittance type="IntIR" unit="Fraction">0.84</Emittance>
    </Glaze>
  </WindowType>
```

© 2008 Autodesk

Sustainable Design

Meeting the needs of the present while *improving* the ability of future generations to meet their own needs.

www.autodesk.com

© 2008 Autodesk

Autodesk

Autodesk®