Topics for This Session

- **OpenStudio Overview**
  - DOE’s open source EE analysis platform
  - Designed to address many utility program pain points

- **Applications**
  - Technology potential assessment
  - Low cost customer-specific opportunity identification
  - Energy Design Assistance cost reduction
OpenStudio – More than a Single Tool

- Three tier architecture
- $60+ Million invested
- DOE’s Goal: Invest to enable many developers rather than in individual tools
OpenStudio: For Individual Building Design...

- Envelope
- Constructions, loads schedules, etc.
- HVAC templates or custom systems
- Run, compare, report, QAQC, and parametric analysis

Best-of-Breed Simulation Engines

Building Modeling “Operating System”

Apps
...or Portfolio-Scale Analysis

Envelope

Constructions, loads schedules, etc.

HVAC templates or custom systems

Run, compare, report, QAQC, and parametric analysis

Custom Projects

Archetypal Analysis

Specific Analysis
OpenStudio Killer Feature: Measures

Measures: scripts that operate on model & results
• Transform model e.g., replace constructions, daylighting package, etc.
• Perform these actions repeatedly, consistently & quickly on any model
• An open way of extending functionality & transferring knowledge
Technology Potential Assessment

Prototype Model

Name
Create DOE Prototype Building

Description
Creates the DOE Reference Building Models as starting points for other analyses.

Modeler Description

Inputs
Select a Building Type.
MediumOffice
Select a Vintage.
90.1-2013
Select a Climate Zone.
ASHRAE 169-2006-58

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Technology Potential Assessment

Prototype Model

Energy Efficiency Measures

Name: Create DOE Prototype Building
Description: Creates the DOE Reference Building Models as starting points for other analyses.

Inputs:
- Select a Building Type
- Select a Vintage: 90.1-2013
- Select a Climate Zone: ASHRAE 169-2006-58

Name: MediumOffice
Description: 

Inputs:
- Select a Building Type
- Select a Vintage: 90.1-2013
- Select a Climate Zone: ASHRAE 169-2006-58

Name: Radiance

Name: AedgOffice
Description: 

Inputs:
- This space type should be part of a ceiling return air plenum.
- Total Cost for HVAC: 0
- Apply recommended schedules for:
  - Chilled Beam Type
  - Passive

Name: Chilled Beam with DOAS
Description: Measure replaces existing HVAC system (if any) with a chilled beam system with DOAS HVAC system zone (DOAS per floor). The chilled beam with DOAS system decentralized DOAS, with zone level air loops are dedicated to ventilation (DOAS) and have constant speed fan operation, gas furnace or hot water heating, single speed DX, two speed DX chilled water, or no cooling and optional energy inputs.

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Name: Office - WholeBuilding - Md Office space type to Chilled Beam system?

Name: Add 90.1-2013 - Office - WholeBuilding - Md Office space type to Chilled Beam system?
Technology Potential Assessment

Prototype Model

Energy Efficiency Measures

Reporting & Quality Checking

Name
Create DOE Prototype Building

Description
Creates the DOE Reference Building Models as starting points for other analyses.

Modeler Description

Inputs
Select a Building Type.
Medium Office
Select a Vintage.
90.1-2013
Select a Climate Zone.
ASHRAE 169-2006-58

Name
AedgOfficeHvacView

Description
Measures replaces a high efficiency (VAV) HVAC system with a chilled beam system with DOAS: HVAC system (VAV) with each zone.

Modeler Description

Inputs
This space type should be part of a ceiling return air plenum.

Total Cost for HVAC
0

Apply recommended schedules for:
Chilled Beam Type
Passive

Name
Chilled Beam with DOAS

Description
Measures replaces existing HVAC system if any with a chilled beam system with DOAS: HVAC system (VAV) with each zone.

Modeler Description

Airloops are dedicated to ventilation (DOAS) and have constant speed fan operation, gas furnace or hot water heating, single speed DX, two speed DX chilled water, or no cooling and optional energy.

Inputs
This space type should be part of a ceiling return air plenum.
Technology Potential Assessment
Customer Optimization For Furthering Energy Efficiency (COFFEE)

High level data from public and utility records

Automated Model Generation
High level data from public and utility records

Automated Model Generation

Automated Model Calibration
Customer Optimization For Furthering Energy Efficiency (COFFEE)

High level data from public and utility records  →  Automated Model Generation  →  Automated Model Calibration  →  Cost/Performance Comparison of Available Measures

Measures  ←  Outputs

1000+ Design Alternatives
Customer Optimization For Furthering Energy Efficiency (COFFEE)

- High level data from public and utility records
- Automated Model Generation
- Automated Model Calibration
- Cost/Performance Comparison of Available Measures

Cloud-Based Retrofit Recommendations For Each Customer
Incenting New Construction Efficiency

• **Energy Design Assistance (EDA)**
  - Programs are a primary tool to influence efficiency beyond code for new construction

• **Problems:**
  - Viability jeopardized as codes become more stringent
  - Must pass cost effectiveness test
  - Must maintain quality

• **Solution:**
  - **EDAPT** web service tracks projects, manages data and communications, and reports program-wide outcomes
  - OpenStudio provides automated quality and EDA protocol checking
  - EDAPT connects project data with model outcomes to streamline reporting
OpenStudio-EDAPT Integration

Analysis Results and QA/QC checks are uploaded to EDAPT

EDAPT automatically documents project data & OpenStudio output
EDAPT Creates a Utility-Scale Dashboard

Program managers can quickly visualize status of all projects in play

- Location, Building Type, Square Footage, etc.
- Completion Status
- Current Responsibility
EDAPT Provides Quick Access to Project Details

Drill down for project summary including:
- Automated QAQC
- Savings estimates

Huron St Residential

Preliminary Energy Analysis
Xcel Review (PM)
Stage
YRG
Energy Consultant
Darryl Presley
Account Manager

The intent of this step is to evaluate energy efficiency improvements, and assemble potential whole-building combinations for further analysis.

12-18-2013 14:58 - Project has been moved to the Intro Meeting stage by Steven.dilorenzo@xcelenergy.com. Emails sent to: EC, AM, MA, EC, PM.
EDAPT: Transforming Utility Incentive Programs

- **Xcel Energy Outcomes**
  - Saved $500k in program admin costs in 1st year of operation
  - Grew from 2 consultants to 10
  - Significant increase in number of projects processed annually

- **Now available to other utilities**
  - Austin Energy
  - Energy Trust of Oregon
  - Planned adoption in California
  - RFQ for Implementers in process

- **Improvements for further savings**
  - EE Measure content for consultants
  - 90.1 Baseline automation
  - Salesforce automation in process
For Further Information

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http://openstudio.net
http://eda-pt.org

Thank you!