# Title 24 2013 Compliance Software: CBECC-Com

"California Building Energy Code Compliance for Commercial Buildings"

Creating Model Geometry using the Detailed Geometry Approach

### Detailed Geometry Approach: Required Software and Plugins

#### 1. SketchUp 8.0\* + OpenStudio Plugin (v1.4.0)

CBECC-Com uses SketchUp in combination with OpenStudio SketchUp Plugin to create and building geometry for input into CBECC-Com for simulation and compliance analysis. Please use the links below to download these supporting tools:

Download SketchUp: http://www.sketchup.com/download/all

Download OpenStudio Sketchup Plugin: http://openstudio.nrel.gov/downloads

Note: In order to download OpenStudio Plugin, you are required to setup a user account.

#### 2. DXF Plugin for SketchUp 8.0

(Google Search Keywords: Free SketchUp DXF Plugin https://www.google.com/?gws\_rd=ssl#q=free+dxf+plugin+sketchup)

#### 3. CBECC-Com v3

http://bees.archenergy.com/software.html

\* Note:

- SketchUp 8.0 is currently available free of cost but with limited capability for importing drawing files Alternatively you can also use the SketchUp 2013/2014 Pro versions
- Make sure to download the compatible version of OpenStudio when using SketchUp 2014

## Objective: Create Spaces from DXF File

- 1. Review of useful SketchUp/OpenStudio Tools
- 2. Import DXF Floor Plan (exported from AutoCAD)
- 3. Assign to a Separate Layer
- 4. Create Single Line Floor Plan
- 5. Create OpenStudio Spaces

#### Training Module 1: Setting Toolbars in SketchUp



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Training Module 1: Useful SketchUp Tools



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### Training Module 1: Useful OpenStudio Tools



Reference: <u>https://openstudio.nrel.gov/files/openstudio\_interface\_workflow-090\_verA.pdf</u>

### Training Module 1: Useful OpenStudio Tools



### Training Module 1: Import DXF Floor Plan (using FreeDXF plugin)

#### Click on Plugins and from the drop down click on FreeDXF v0.57

Note: SketchUp Professional (Pro) version allows you to import DXF/DWG and other drawing formats and you would not need additional plugins



#### Locate DXF file location and click Open

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Plugin: <u>https://sites.google.com/site/jimfoltz/my-sketchup-plugins/freedxf</u>

#### Training Module 1: Import DXF Floor Plan (using FreeDXF plugin)

- Set options as shown below
- From the SketchUp menu bar click on

**Camera > Standard Views > Top to view the file in 2D Plan view** 



#### Training Module 1: Assign to Separate Layer

#### **\*** From the SketchUp menu bar click on Window then Layers to display the Layer window

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#### Training Module 1: Assign to Separate Layer

**Create a New Layer "Spaces" by clicking on the + and then select that layer to draw the spaces** 



Drawing on a new layer makes it easy to hide the other dxf layer that are not required. This can be done by unchecking the box in front of the respective layer names

#### Training Module 1: Create Single Line Floor Plan

#### Use the Line Tool to trace the floor plan



**Note:** To prevent creating replicas of walls in spaces that share walls, do not trace the shared wall twice while tracing adjacent spaces.

#### Training Module 1: Create OpenStudio Spaces

- Change View using Menu bar: Camera > Standard Views > Iso
- Select all traced spaces in the floor plan using the Select Tool



#### Training Module 1: Create OpenStudio Spaces

- Click on the "Create Spaces from Diagram" tool in the toolbar as shown
- Fill in the Floor Height (12ft) for the spaces in the dialog box that opens



#### Training Module 1: Create OpenStudio Spaces

#### 3-D View showing OpenStudio Spaces



#### **Training Module 2**

## Objective: Prepare OpenStudio Model for CBECC-Com

- 1. Surface Matching
- 2. Name Spaces
- 3. Add Fenestration
- 4. Add Shading
- 5. Export SDD XML file

#### **Training Module 2: Surface Matching**

- Click on the "Surface Matching" tool in the toolbar as shown
- After the dialog box opens click on "Match in Entire Model"

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#### **Training Module 2: Name Spaces**

- Click on the "Inspector" tool in the toolbar as shown to open the OpenStudio Inspector
- To name spaces select individual spaces by double-clicking on them, then rename them in the Inspector dialog box

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- **W** Use the Tape Measure tool to draw reference lines for the fenestration (window/door/skylight)
- To draw the fenestration) double-click on the surface on which it occurs. Then using the pencil tool draw the window/door/skylight.





### Training Module 2: Window Schedule

Space Name	Window	Sill Height	Dimensions	Туре
Open Office South	W1	3'	44' x 4'	Fixed Window
	W2	3′	19' x 4'	Fixed Window
Lobby	W3	1'	11' x 8'	Lobby Window
	W4	1'	16' x 8'	Lobby Window
			4' x 8'	Exterior Door
Open Office North	W5	3'	26' x 4'	Fixed Window
	W6	3'	50' x 4'	Fixed Window
Private Office	W7	3'	11' x 4'	Fixed Window
Conference	W8	3'	4' x 4'	Fixed Window
	W9	3'	4' x 4'	Fixed Window
	W10	3'	4' x 4'	Fixed Window









#### **Training Module 2: Add Shading**

- Use the Tape Measure tool to draw reference lines for the shading
- To draw a shade click on the "New Shading Surface Group" tool. Then click on the model close to where the shade is to be drawn



#### **Training Module 2: Add Shading**

- Double-click on the Shading Group box everything else turns transparent
- Using the line tool draw the shade in an anti-clockwise direction



#### **Training Module 2: Add Shading**

View showing the completed Shade with the rest of the building model



#### Training Module 2: Export SDD XML File

To export the model to SDD XML file in the menu bar go to:

Plugins > OpenStudio > Export > Export SDD model

✤ A dialog box will open where you can specify the location and name of the XML file



#### **Training Module 3**

## Objective: Import XML and Provide High Level Inputs

- 1. Open CBECC-Com and Load XML File
- 2. Organization of Envelope Tab
- 3. Enter Location
- 4. Enter Stories
- 5. Enter other Simulation Parameters

#### Training Module 3: Open CBECC-Com and Load XML File

- Open CBECC-Com and a dialog opens asking to either to "Open Recent Project" or "Select an Existing Project to Open". Select the latter option.
- Next in the Open dialog box browse to the directory where the SDD XML file is saved
- Then click on the file type drop down next to the Filename and select "SDD XML Project Files (\*.xml)" from the drop down.
- Select and open the project XML file you had saved.



### Training Module 3: Organization of Envelope Tab



### Training Module 3: Organization of Envelope Tab (contd.)



#### **Training Module 3: Enter Location**

**\*** Double-click on Project to open the "Building Model Data" dialog box

Enter the location of the project using the required inputs

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#### **Training Module 3: Enter Stories**

- Double-click on Building (Medium Office) to open the "Building Model Data" dialog box
- Enter the number of Stories as required





#### **Training Module 3: Enter other Simulation Parameters**

- **\*** Double-click on Project to open the "Building Model Data" dialog box
- Enter the Simulation Parameters as required on the various tabs Design Team, Exceptional Conditions etc.

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