GETTING STARTED WITH THE SOLAR RADIATION TECHNOLOGY PREVIEW FOR REVIT ARCHITECTURE AND REVIT MEP

OVERVIEW

Use the Solar Radiation Technology Preview for Revit Architecture and Revit MEP to analyze the effects of solar radiation on various surfaces of your conceptual building model. Using the Solar Radiation Analysis add-in during the conceptual design stage of your project can help you make fundamental design decisions about building shape, orientation, and surfaces early on, when changes are least costly. The add-in uses conceptual massing elements from Revit models and the Autodesk Ecotect insolation analysis engine to calculate the amount of solar radiation hitting the surfaces of the massing shapes. This add-in works with Revit Architecture 2010 and Revit MEP 2010.

This technology preview is a limited term release to seek customer feedback on its performance and expires on January 13th 2010.

GETTING READY TO USE THE ADD-IN

Before you launch the add-in, do the following:

1. Verify that your model contains conceptual massing elements.
2. Verify that Show Mass is enabled. (Show Mass is located in the Conceptual Mass panel, which is on the Massing & Site tab in Revit Architecture and on the Architect tab in Revit MEP).
3. Verify that all massing elements that need to be analyzed are contained within the view range. Massing elements outside of the view range will not be imported for analysis.

STARTING THE ADD-IN

After you install the add-in, the Add-Ins tab in the Analysis panel will contain the Solar Radiation button.

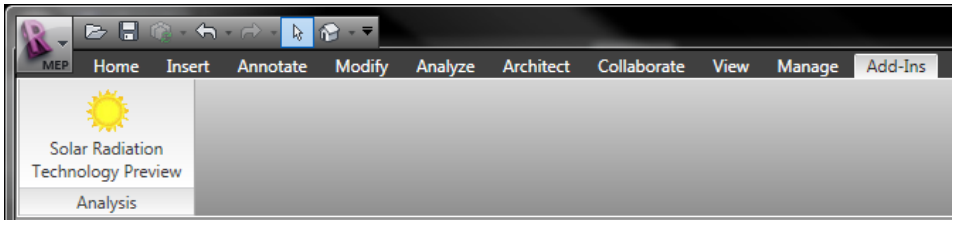

FIGURE 1 –THE SOLAR RADIATION BUTTON

Click the Solar Radiation button to display the Solar Radiation Analysis window, as shown in Figure 2.

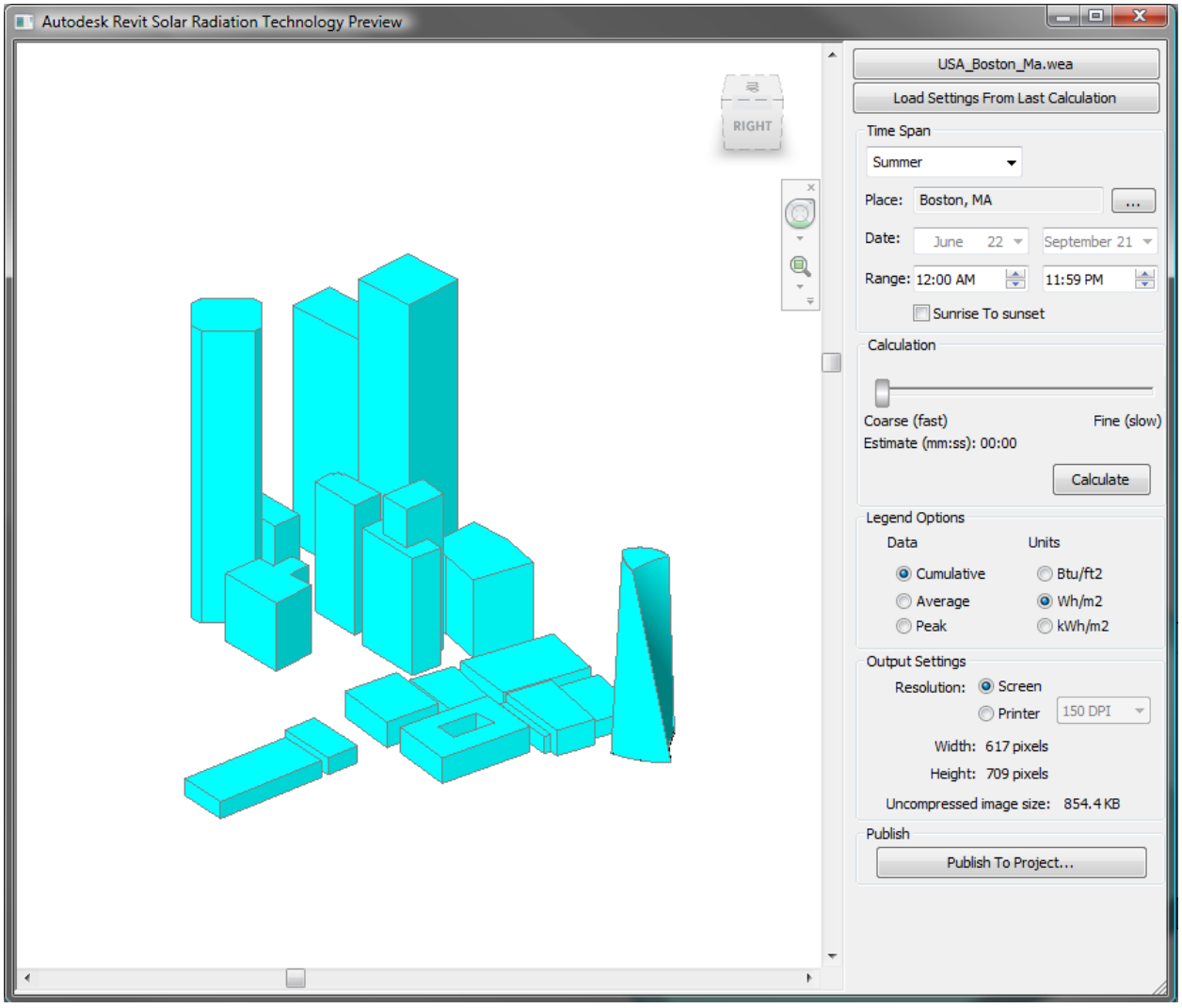

FIGURE 2 – SOLAR RADIATION ANALYSIS WINDOW

The Solar Radiation Analysis window includes a dialog box where you specify the settings that will be used to perform the analysis, as described in the following section.

Specifying Settings for the Solar Radiation Analysis

Weather Data Options

Begin by selecting the weather data file that will be used to calculate the solar radiation for your project location. To load a weather data file, click Set Weather Data at the top of the dialog. The add-in accepts both Ecotect weather files (.wea) and Energy Plus weather files (.epw). Some pre-loaded weather files have been provided.

If the weather file you select is more than 20km (12.43 mi.) from your project location, a warning dialog displays. The add-in will not prevent you from using a weather file; however, it provides instructions for either creating a local weather file or finding a weather file that is nearer your project location.

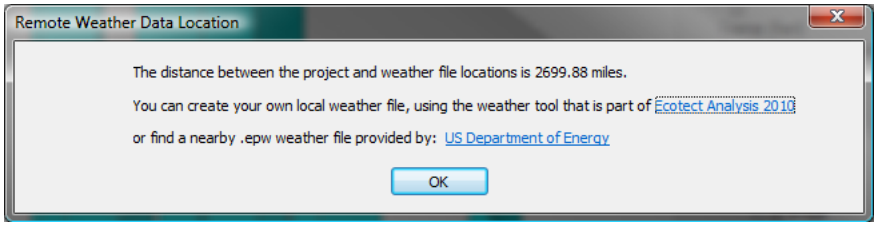

FIGURE 3 – WEATHER DATA WARNING

After you specify a weather file, the Set Weather Data button changes to display the name of the selected weather file, as shown in this example:

FIGURE 4 – WEATHER DATA BUTTON

To use a different weather file, click the weather data button, and select a new file.

After you select a weather file, specify the remaining settings for the solar radiation analysis. These settings define the model surfaces to be analyzed, the time span for the analysis, the precision of the calculations, and the legend data.

SURFACE ANALYSIS OPTIONS

By default, all surfaces of all massing elements are set to be analyzed. Right-click a surface to display a contextual menu, where you can change how that surface will be analyzed, as shown:

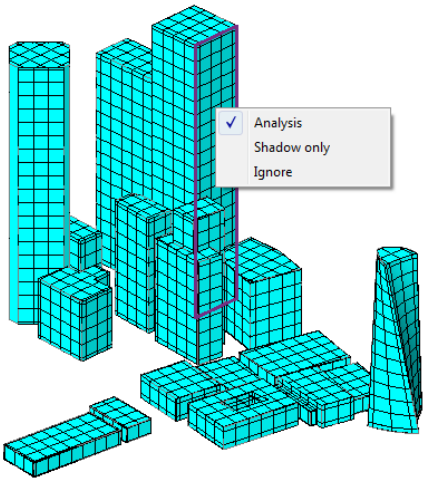

FIGURE 1 – SURFACE ANALYSIS OPTIONS CONTEXTUAL MENU

- **Analysis.** This is the default setting. Select this option to include the surface in the analysis and to overlay solar radiation data on the surface.
- **Shadow only**. Select this option to use the surface only to determine whether it shades any other surfaces in the model. Surfaces set to "Shadow only" are not overlaid with solar radiation data, and they are colored gray on the model.
- **Ignore**. Select this option to exclude the surface from the analysis. Excluded surfaces are colored transparently on the model.

NOTE: You can change the settings for surfaces at any time; however, if you change the settings after you have run an analysis, you must re-run the analysis to take the new settings into account. You can also set an entire mass to be Shadow only before running the add-in by going to the Instance Properties dialog of the mass and typing in "shade" (without quotation marks) in the Comment field of the dialog. This is helpful for making a number of masses Shadow only, if you only want to analyze one of the masses amongst multiple masses.

The Time Span settings specify the period of time covered by the solar radiation analysis. To set the time span, (shown as Summer in Figure 6, below) use the top drop-down to choose either a preset value from the list or a user-customizable time span. The top three values in the list (Multi-day, Single-day, and Still) are customizable:

- **Multi-day.** Use this option to enter a date range for the analysis.
- **Single-day.** Use this option to constrain the analysis to one day and enter a time range.
- **Still.** Use this option to constrain the analysis to a single moment in time on one day.

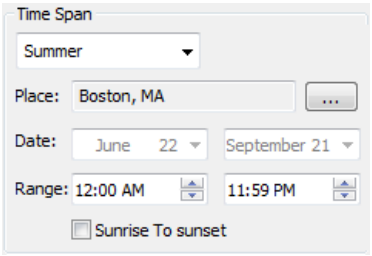

FIGURE 2 – TIME SPAN CONTROLS

Preset time spans (such as solstices, equinoxes, seasons, and months of the year) make it easy to pick meaningful calendar events for solar radiation analysis. All preset time spans are set for the dates appropriate to the northern hemisphere. For project locations in the southern hemisphere, set solstice, equinox, and seasonal dates manually by using either the Multi-day, Single-day, or Still option. When using a preset time span, the date range controls are disabled; however, time ranges can still be set. Additionally, you can select the "Sunrise to sunset" option to constrain the time range from sunrise to sunset.

The value displayed in the Place field cannot be changed within the add-in. This value is set in the project on the Manage tab from the "Location" in the "Project Location" panel. The "…" button next to the project location opens an informational dialog that gives additional details about the project location.

CALCULATION OPTIONS

The Calculation control specifies the precision of the solar energy analysis. This is done by moving the slider left and right. When you move the slider to the right, the tiles used to measure solar radiation on the massing surfaces get smaller, which results in a more precise, but slower solar energy analysis. When you move the slider to the left, the size of the tiles increases, which results in a faster calculation but rougher, less precise solar energy analysis. The blue progress meter inside the slider shows the progress of pre-calculations that are being performed in the background. When the blue bar of the meter is all the way to the right, the add-in has finished all necessary pre-calculations.

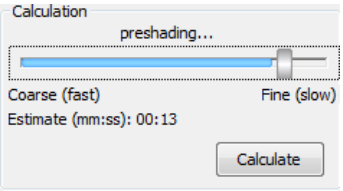

FIGURE 3 – CALCULATION CONTROLS

To run a calculation:

Press the Calculate button to start the analysis of the model. The time it takes to complete the calculation will vary depending on the position of the slider control, the size and complexity of the surfaces in the model, and the amount of pre-calculations that have been completed.

If a solar energy analysis has already been run and some of the settings from the Time Span, Calculation, or Legend Options have been changed, you can use the Load Settings From Last Calculation button to revert all the controls in those areas to the state they were in when the last calculation was run.

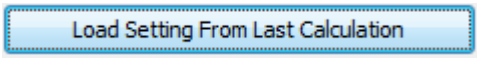

FIGURE 4 – LOAD SETTINGS FROM LAST CALCULATION BUTTON

LEGEND OPTIONS

The Legend Options controls specify how the analysis results are shown on the model. You can change these settings after the calculation has been run, and the model will automatically update to reflect the new settings.

The Data option you select controls whether cumulative, average, or peak values are shown on the model. The Units option you select controls the units of measure that correspond to the values in the legend that are overlaid on the model. The units of measure can be set to either British Thermal Units per foot squared (Btu/ft^2, Imperial), Watts per meter squared (Wh/m^2, Metric), or Kilowatts per meter squared (KWh/m^2, metric).

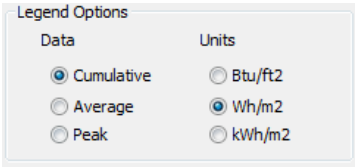

FIGURE 5 – LEGEND OPTIONS CONTROLS

MOVING AROUND THE MODEL

You can orbit, pan, and zoom your 3D model. The View Cube (Figure 10) and the Navigation Bar (Figure 11) are visible by default in the model area of the add-in. The Steering Wheel (Figure 12) can be turned on from the top control in the Navigation Bar. If the Navigation Bar is turned off, it can be re-enabled by right clicking on the view cube and selecting the option in the list entitled "Show Navigation Bar". The View Cube controls orbiting of the model. The model can be orbited by left clicking on the view cube and while continuing to hold the mouse button down, moving the mouse. This makes the cube and the model rotate simultaneously. You can also single click on several areas on the cube (shown in blue on Figure 10) and the model will smoothly rotate to the corresponding perspective that was chosen by clicking on the View Cube. The Steering Wheel, when enabled follows the cursor and contains several tools to control orbiting, panning, zooming, and rewinding of the different model orientations that have been manipulated. The Navigation Bar launches the view cube and contains several zooming controls. To see more of the zooming controls, left click on the arrow beneath the magnifying glass in the control.

FIGURE 6 – VIEW CUBE

FIGURE 7 – NAVIGATION BAR

FIGURE 8 – STEERING WHEEL

The mouse and keyboard can also be used to control orbiting, panning, and zooming. To pan the model with the mouse, press and hold the middle mouse button (sometimes enabled by pressing the scroll wheel of the mouse) and move the mouse around. The model will pan in the direction the mouse is moving while holding the middle mouse button. To orbit the model with the mouse and keyboard, press and hold the SHIFT key on the keyboard and press and hold the middle mouse button while moving the mouse over the model. The place in the model where the middle mouse button is depressed will become the point in which the model orbits around. To zoom the model using the mouse and keyboard, press and hold the CTRL key on the keyboard and press and hold the middle mouse button. Moving the mouse up while holding down the buttons zooms out, while moving the mouse down zooms in on the model.

OUTPUT FROM THE ADD-IN

The Solar Radiation Analysis add-in generates images that are saved in the Revit project that contains the massing elements. After these images are added to the project, you can place them on sheets and print them. You can also export the images from Revit for use in presentations or for editing in external software applications.

To create images of the solar radiation analysis, specify image resolution and size in the Output Settings area of the Solar Radiation Analysis window. Images can be captured at a number of resolutions. The default is "Screen" resolution which will generate an image exactly how it is displayed on the computer screen. The "Printer" option and the DPI settings dropdown will generate higher resolution images that can be used when cropping or editing the images outside of Revit. The width, height, and uncompressed size of the image to be generated is also shown in the Output Settings area. Higher DPI values using the printer option increase the image dimensions (width and height) and size of image file in the project. Depending on the size of the model, very high resolution images can be very large and can take up lots of disk space.

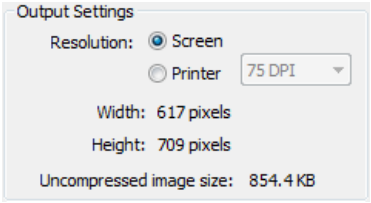

FIGURE 9 – OUTPUT SETTINGS CONTROLS

After configuring the controls in the Output Settings area pressing the "Publish to Project…" button in the Publish area, will generate an image that is saved to the Rendering section in the Project browser. After pressing the "Publish to Project…" button a dialog will appear (Figure 14) to specify the name of the image that is being generated. The name of the image will appear as a node in the project browser. The images will be stored up until the add-in is closed. After closing the add-in dialog window, the images will appear in the project browser, which can be opened by double clicking on the image name in the tree. Different images can be created of the same model using different output settings and perspectives of the model by adjusting the view of the model or the Output Settings and pressing the "Publish to Project…" button again and naming the image(s).

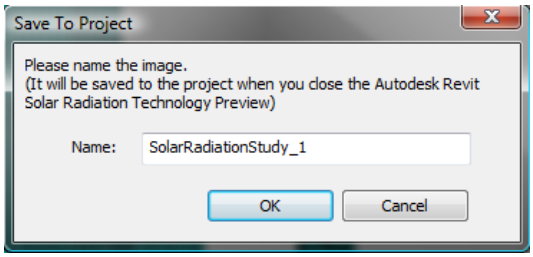

FIGURE 10 – SAVE IMAGE TO PROJECT DIALOG