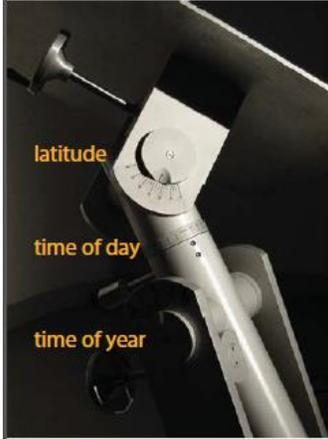


# Heliodon Studies

## Energy Training Centers Technical Fact Sheet



The heliodon can tilt and rotate to simulate any latitude, hour or month.

### The Heliodon: A Architectural Resource

The heliodon is a tool that makes it easy to assess shading and solar radiation patterns to foster energy-efficient, comfortable, climate-responsive design. It can be used by design teams and building owners based in, or working on projects within, the PGE territory. The heliodon can help identify opportunities for energy savings, glare control, and increased occupant comfort through solar-responsive architecture.

### What is a Heliodon?

The heliodon consists of a table-top that can be tilted and rotated about different axes. The table is used in conjunction with an electric light source that represents the sun. Adjusting the table for latitude, time of year, and time of day allows representation of sun and shade for any location and season.

An architectural model is placed on the heliodon to evaluate site planning, building form, location of windows and shading devices, location of landscape elements, and potential for solar electric generation or solar water heating. Assessment of interior sun path patterns is also possible. In a small amount of time, a design can be tested, modified, and re-tested early in the design process to allow for modification of the building form, envelope, and shading.

### Types of Studies

Heliodon **Shading Analysis Studies** can reveal when building surfaces are in sun or shade for a particular time of day during the year. For this type of shading analysis, the model can range from a portion of an urban landscape to study building massing to a single window for examination of a shading device.

A **Solar Radiation Study** determines the performance of a shading device by measuring the percent shading on a window at different times of day and year. For this type of study, a façade model of a representative location including window openings is built and tested with a grid where the window opening would be located. The number of squares in shadow is used to calculate the percent of shading.



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### Scheduling and testing with the heliodon

A session usually lasts around two hours, depending on the number of views, level of discussion, and documentation method(s). Be sure to bring information regarding latitude and exact orientation of the project to north or south. To schedule a heliodon session please email us at [PECArchitecture@pge.com](mailto:PECArchitecture@pge.com).



Model undergoing heliodon testing.

Both studies typically examine three distinct days of the year:

- June and December solstices (highest and lowest sun conditions)
- March or September equinox (a mid-point in the sky sun condition).

While the heliodon is an excellent tool for shading, solar radiation, and glare studies, it does not represent illumination levels from daylight. Daylighting concerns the light qualities and light levels in a space rather than simply what is in direct sun and what is in shade. To assess light levels and light quality issues other than glare, the Energy Center provides other tools and methods.

### Building the Model

- It should weigh less than 25 pounds and be no larger than 2.5' x 3.5' in plan.
- If using only the heliodon, you can build it from standard materials such as foam core, matte board, or cardboard. If you are interested in also testing the model in the Overcast Sky Simulator, there are different modeling requirements (see Daylighting Studies fact sheet).
- Construct it with reasonable care and strength. It should be able to withstand tilts of up to 90°.
- Label true north directly on it or bring orientation information.
- Build it to accurately represent the geometry of the building and building site with correctly scaled windows, mullions, window reveals, overhangs, neighboring buildings, trees, etc.
- Build a base model that allows alternative design options to be 'plugged' into place. This allows for quick modifications for comparison of things like different building or window or shading strategies.
- Allow a 2" border for attaching it to the table-top.

### Documentation

The results of the heliodon session can be recorded as a still or digital video images through a 'point-of-view' camera. The camera, about the size of a lipstick tube (5/8" in diameter), is usually small enough to fit through windows and doors in the model for interior views of shading patterns.

Bring a digital storage device to take recorded images with you at the end of the session.

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