## Exterior Lighting Control

### Description

This energy efficiency measure (EEM) reduces all exterior lighting to 30% of its peak power between midnight or within 1 hour of business closing, whichever is later, and until 6 am or business opening, whichever is earlier, and during any period activity is not detected for a time longer than 15 minutes.

### Modeler Description

This measure first loops through all occupancy schedules in the model, determines the earliest and latest occupied, compares these times to a fixed 0000-0600 schedule, and creates a new fractional schedule for exterior lights with the shortest interval. The new schedule reduces the exterior lighting power to from 1.0 to 0.7 (30% reduction) during this interval. The measure then loops through all exterior lights objects in the model, changes the control option to ScheduleNameOnly if necessary, and sets the schedule to the new exterior lights schedule.

### Use Case Types

This measure applies to the following OpenStudio use cases types:

* Retrofit EE
* New Construction EE

### Arguments

No arguments per DOE.

### Initial Condition Message

Number of exterior lights objects in model = #{ext\_ltg\_count}

### Final Condition Message

Number of exterior lights objects changed = #{ext\_ltg\_changed}

### Info Messages

Adding new schedule to model: #{ext\_lights\_sch\_name}

Applying exterior lighting controls to: #{el.name}

=> control option set to: AstronomicalClock

=> setting control option to: ScheduleNameOnly

=> setting schedule to: #{ext\_lights\_sch.name}

### Not Applicable Messages

No exterior lights objects found in model.

### Warning Messages

NA

### Error Messages

NA

### Code Outline

1. Loop through occupancy schedules in the model and find max and min times
2. Create new schedule for exterior lights based on building open and close times or 12-6am
3. Set schedule for all exterior lights objects to new schedules and set Control Option to ScheduleNameOnly

### Tests

This measure applies to all DOE Prototype Building types.

The following tests should be verified:

* A new Schedule Ruleset is created for exterior lights
* Exterior Lights Schedule is set to 0.7 from 0000 – 0600
* All Exterior Lights objects in the model are changed to:
  + Schedule = Exterior Lights Schedule
  + Control Option = ScheduleNameOnly