

### Methods for Modeling Lighting

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**Question:** Here's a topic that came up based on a recent project, and the NC Guidelines Addendum 1 / section 5.2.3 Inspections reminded me of this issue. The inspection section asks for a spreadsheet that details the "spaces of the building, quantity of fixtures, and proposed LPD (etc)."

We believe that based on ASHRAE 90.1-2007 Appendix G Table G3.1 / Section 6 "proposed item b" and "baseline" language would allow the "building area method" to be used for the proposed ERP model.

We have seen projects where there are minimal savings (around 5%) to the lighting system, and believe that generally the building area method would be of acceptable accuracy for these cases, especially if there are not daylighting sensors reducing the lighting power of perimeter spaces.

Is it acceptable for the Proposed and the Actual ERP to use a building-area method for the lighting power – for NC projects with limited lighting savings? (While the ASHRAE standard requires a thermal-block level lighting calculation for instances where the lighting system "exists," we believe this applies mainly to additions / renovations, not as-built models of new construction.)

If so, we would anticipate this new lighting spreadsheet would indicate the fixtures and LPD at a building-wide level, not on a space-by-space level. Does that make sense? (I could see you wanting more detail for a post-installation inspection, but in an NC project, we have a lighting plan that indicates fixture type designations, which provides a pretty good guideline of where to look for lighting fixtures.)

**Answer:** Per Section 4.4 of the NC Program Guidelines, it is acceptable to model the **baseline** using either the space by space method or the building area method.

*Lighting for the baseline must be modeled using either the building or space by space methods described in ASHRAE Standard 90.1-2007 sections 9.5 and 9.6. Lighting for the proposed design should include all task, ambient, and exterior lighting. Lighting energy savings credit may be claimed only for hardwired lighting fixtures, unless otherwise specified in Appendix B Minimum Performance Standards.*

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Per ASHRAE 90.1 User Manual, thermal block lighting calculations are required for design and in instances where lighting exists, regardless if credit is claimed. Therefore, Appendix G does not allow Building Area Method in the proposed design. The following approach must be used to calculate proposed lighting power:

*“If construction documents are complete, the proposed building lighting system power is modeled as shown on the design documents. The lighting power for the proposed design is taken from the design documents for the building. The lighting power specified in the models must correspond to the spaces within each thermal block.”*

Section 4.7 of the Program Guidelines requires the following:

*“For any lighting measures, descriptions must include a schedule of the proposed lighting including fixture types by space, as shown on lighting plans for the project”.*

The addendum to the Program Guidelines (Section 5.2.3) clarifies this requirement:

*“To facilitate As-built inspections, a supplemental lighting spreadsheet that details the spaces of the building, fixture type, model number, manufacturer, fixture wattage, quantity of fixtures, details of lamps/ballasts, and proposed LPD must be submitted.”*

Per ASHRAE 90.1 User Manual, in cases where lighting is not specified on drawings, the Building Area Method may be used in the baseline and proposed model.

*“In the special case where no lighting system or design exists, as in a shell building where the lighting will be installed by a future tenant, then a default lighting power must be assumed, based on the Building Area Method appropriate for the space type.”*

Similarly, in cases where savings associated with lighting are small or lighting does not meet Minimum Performance Standard requirements, the baseline and proposed buildings may be modeled using the Building Area Method, and no performance credit may be claimed. However, we strongly recommend working with the design team to consider lighting fixtures that meet Program requirements and contribute to a more efficient lighting design.