

To: Dockets Office, California Energy Commission

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RE: 2013 Nonresidential ACM Reference Manual

Docket number 12-BSTD-06



Note: Comments below are a revised version of the NACM portion of my '13 Standards comments originally submitted to the CEC on April 12,2010. Unfortunately, I do not have the ability to fully determine whether some of the following issues have already been addressed in the current draft NACM Reference Manual. Please ignore any comments listed below which are no longer applicable.

■ **ACM PROGRAM CHANGE NOTIFICATIONS:**

Issue: ACM program users, and compliance verification officers, often are not aware when a mandatory program upgrade is/was available.

Proposal: All ACM program vendors should be required to send notices to each licensed user within a short, defined time period, whenever a mandatory upgrade to the ACM program has been made. Furthermore, the cover page of the Title 24 compliance report should indicate the specific version number of the program (e.g. "6.032")

An automatic software update feature could suffice for the notification requirement, but only if the ACM publisher can know which users have enabled the auto update feature.

■ **ACM PROGRAM TERMINOLOGY:**

Issue: It is essential that compliance programs use clear terms which are consistent with the Standards, both at the user interface and on the compliance forms. For instance, in early versions of EnergyPro5 for the '08 Standards, the term "Occupancy Sensor" was used at both the user interface and on the compliance forms to denote "Multi-Level Occupancy Sensor". This unclear use of terminology can lead to much confusion on the part of the ACM program users, plan checkers and field inspectors.

Proposal: Require all nonresidential ACM programs to use accurate terms – at both the user interface, and on the compliance forms - when describing efficiency measures for which credit is taken.

■ **ACM PROGRAM LIGHTING CONTROL CREDIT CAPABILITIES:**

Issue: The complexity of modeling automatic daylight controls has increased in the '08 Standards (i.e. both Primary and Secondary zones, different EA's for each). However, modeling of this credit is an option for ACM programs. This has led to confusion, and to EnergyPro users "inventing" solutions which may, or may not, be consistent with the code.

Proposal: Require all nonresidential ACM programs to be able to fully model, and clearly document, all PAF lighting control credits.

- **ACM PROGRAM COMPLIANCE FORMS AND EDITING:**

Issue: Many (perhaps all) ACM programs can publish forms in PDF format. These forms can be easily edited, making the production of false results relatively easy.

Proposal: Research whether it is possible for ACM programs to incorporate the following requirements (or similar requirements that would address the issue of editing compliance results):

1. Publish PDF format forms that contain certain fields that can be edited (such as explanatory notes), but that do not allow editing of vital compliance information. Either the program could allow explanatory notes to be added before publishing the report, or explanatory notes could be added to the PDF file if the PDF pages can be created in such a manner that edits can only be made in certain fields where explanatory notes are allowed to be added.
2. Should it not be technically feasible, or practical, for compliance programs to create compliance forms that are not editable except for explanatory notes, then the compliance programs should be required to produce reports that are not editable in any way. In this case, report authors would still have the option of attaching an addendum to the compliance report which contains explanatory notes.
3. Prevent the creation of any electronic format report that can be converted into a PDF format report that does not include editing restrictions.

- **ACM PROGRAM MODELING AND INCORRECT ENERGY CREDIT:**

Issue: There have been past instances where NACM compliance programs have provided energy credit for mandatory measures, such as daylight lighting controls.

Proposal: a) Require ACM program vendors to certify that their programs do not provide energy credit for mandatory measures; b) The CEC should test ACM programs to confirm that they meet this requirement.

- **ELIMINATE CREDIT FOR LOW LIGHTING POWER IN RETAIL SALES AREAS:**

Issue: Retail sales spaces change often, and all lighting changes are allowed to meet the *prescriptive* allowance (regardless of the original space's LPD). For complete building energy compliance under the *performance* approach (i.e. envelope and lighting, or envelope, lighting and mechanical), allowing credit for low lighting power is a very temporary energy savings trade-off in many retail situations.

Proposed Solution: Under the *performance* compliance approach, retail sales areas should not receive credit for proposed lighting power that is less than the *prescriptive* lighting power allowance. For the purpose of this restriction, the *prescriptive* lighting power allowance shall be the lighting power allowance as calculated for the subject building energy compliance.

- **ACM PROGRAM INPUT AND OUTPUT REQUIREMENTS:** Compliance programs should be clear to both the energy analyst and to the enforcement agency as to how complex HVAC systems are modeled, especially with regard to modeling both designed HVAC systems and modeling “default” systems. The following ACM rules will help much in this regard:
 - ◆ Program input fields must identify each field that can be defaulted by not inserting any value.
 - ◆ Program must be capable of modeling the correct “default” HVAC system by leaving the input field(s) for this system blank.
 - ◆ Program output must identify all inputs that are default inputs.
 - ◆ Performance compliance forms must describe what equipment is allowed when output says "default" equipment modeled. For example, if the secondary pumps are defaulted (assuming they can be defaulted), note whether there is a limit on the number of pumps and horsepower of the pumps.
 - ◆ Program output must identify all input fields where no value was input, but that are not default capable, by printing the word "None". For example, if no primary CHW loop pump system is modeled, and this is not a default-capable input, the output would say "None" under primary CHW loop.

- **DESIGN VAV FAN POWER FOR "WARM SHELL" PROJECTS:**

Issue: For this type of project, the conditioned air distribution system is installed under a future building permit. Therefore, the mechanical engineer can only guess what the supply fan brake horsepower(s) will be. While the nominal fan horsepower can be used, this could be an unfair penalty to impose on a building simply because the air distribution system is unknown.

Proposed Solution: Consider requiring that, for “warm shell” buildings, the modeled supply fan HP be the nameplate HP (per the manufacturer). If practical, the NACM program could contain factors, based on zone size and geometry, to convert the input fan HP to BHP.

- **FANS & PUMPS:**
 - ◆ **ALLOW FOR MULTIPLE FAN & PUMP SIZES.** ACM compliance software is currently limited to one pump size and one fan size per system. When a system employs multiple size fans and/or multiple size pumps, the input must use an average size, which does not accurately account for the differing efficiencies between small and large fans and pumps. If the modeling engine supports this, require that each system can be modeled with two different size pumps and fans.
 - ◆ **ALLOW FOR MULTIPLE FAN CONTROL TYPES PER SYSTEM.** ACM compliance software is currently limited to one type of fan control per system. I am currently working on a project with package single-zone AC systems, where the supply fan has constant volume control, but the economizer system power exhaust fan has variable air volume control. This cannot be modeled with current NACM compliance

programs. If the modeling engine supports this, require that each system can be modeled with two different types of fan control.

- ◆ **DHW & CONDENSER WATER PUMP MODELING:** Tall buildings tend to suffer a large energy penalty when pump HP and GPM are modeled. Look into whether the ACM provides a realistic pump energy budget for efficient pumps in tall buildings.
- ◆ **HYDRONIC HEAT PUMPS:** The current ACM program significantly inflates the heating energy assumed when a 4-pipe fan coil unit is changed to a water-source heat pump, where the same water heat source is used in both models. Explore whether the ACM fixed assumptions and algorithms for hydronic heat pump systems are appropriate.
- **RESPONSE TO STANDARDS CHANGES AFTER INITIAL EFFECTIVE DATE:**
Issue: In the 2008 Standards, whose effective date was January 1, 2010, a major change to AC fan requirements took effect on January 1, 2012 [§144(l)]. I am not aware of any requirement that NACM compliance programs be updated to incorporate this requirement. NACM compliance programs still offer energy efficiency credit for this required feature.
Proposed Solution: Require that NACM programs be updated as necessary to incorporate any Standards updates that would affect the energy budget. A time frame for meeting this requirement should be established.