EO 4: AUTOMATE TRACKING OF BUILDING ENERGY USE

Amendments to the New York City Building Code and to ANSI/ASHRAE/IESNA 90.1 (2007), as incorporated in Chapter 13 of the New York City Building Code
Proposal developed by the Energy & Ventilation Committee

Summary

Issue:
Many building managers and operators do not know how efficiently (or not) their buildings’ energy systems are performing. This can lead to poor performing systems and missed opportunities for energy savings.

Recommendation:
For all new buildings of 50,000 square feet and larger, require computerized building control systems that capture energy data and provide useful information to building managers and operators.

Proposed Legislation, Rule or Study

Amendments to ANSI/ASHRAE/IESNA 90.1 (2007), as incorporated in Chapter 13 of the New York City Building Code:

Add the following defined term to Section 3.2:

**building management system**: a computer-based control system installed in buildings that monitors and controls the building’s mechanical and electrical equipment such as ventilation, lighting, power systems, fire systems, and security systems.

Add a new Section 6.4.6 as follows:

6.4.6 Energy System Measurement and Monitoring

6.4.6.1 Measurement and Monitoring Systems – New Construction

All new construction buildings over 50,000 square feet **gross floor area** shall incorporate a **building management system** capable of capturing metered data from building wide energy, demand and water meters, including those supplied by utilities, and from sub-meters installed for any building system including heating, ventilating, air-conditioning, elevators, and transportation systems, expected to use more than 20% of the building’s annual electric energy, or 20% of the building’s annual peak electric demand, or 20% of the building’s annual fuel use or 10% of a building’s water use, and from sub-meters installed in the **spaces** of individual tenants.

6.4.6.2 Measurement and Monitoring Systems – Existing Buildings

a. Existing buildings undergoing renovations or repair of any building system including heating, ventilating, air-conditioning, elevators, and transportation systems expected to use more than 20% of the building’s annual electric energy, or 20% of the building’s annual peak electric demand, or 20% of the building’s annual fuel use or 10% of the building’s water use, shall install meters capable of capturing electric energy and demand and fuel and water use data and transmitting it to a **building management system**.

b. Existing buildings undergoing renovations or repairs of any building system including heating, ventilating, air-conditioning, elevators, and transportation systems expected to incur a total cost more than $1.00 per square foot of gross floor area shall add a **building management system** capable of capturing metered data from building level energy and water meters, including those supplied by utilities, and from sub-meters installed for any building system including heating, ventilating, air-conditioning, elevators, and transportation systems expected to use more than 20% of the building’s annual electric energy, or 20% of the building’s annual peak electric demand, or 20% of the building’s annual fuel use, or 10% of a building’s water use, and from sub-meters installed in the **spaces** of individual tenants. Any sub-meters not yet installed under para. (a) of this subsection shall also be installed at this time. Installations shall be required for existing buildings per the following schedule: over 100ksf by July 1, 2013, and over 50ksf by July 1, 2016.
Amendment to Title 28 of the Administrative Code, Chapter 3, Maintenance of Buildings:

1. Add a new Article 308 PERIODIC REPORTING OF BUILDING ENERGY AND WATER USE as follows:

28-308.1 General. Every building having a building management system with energy and water use data recording capability shall report this data in accordance with this article.

28-308.2 Information to be reported shall include data on whole-building energy, demand, and water use, and from sub-meters installed for any building system including heating, ventilating, air-conditioning, elevators, and transportation systems expected to use more than 20% of the building's annual electric energy, or 20% of the building's annual peak electric demand, or 20% of the building's annual fuel use, or 10% of a building's water use, and from sub-meters installed in the spaces of individual tenants.

28-308.3 Reporting from the computerized building management system shall take place monthly with an annual summary to building tenants and building operators, with a minimum format to be established by Commissioner.

Supporting Information

Issue – Expanded

Although readily feasible with existing technology, most current Building Automation/Control/Building Management Systems do not integrate data from existing energy and water meters nor do they facilitate tracking of usage back to systems, equipment and their operations. Data as presently made available through current practice does not allow building performance to be matched against building models and does not adequately support on-going monitoring and commissioning. When high consumption is identified available building-level data is of limited use in diagnosis and correction of system-specific problems. Moreover, there is currently no requirement for transmission of energy or water data. Operators and tenants do not receive regular information that would help them to understand how energy is being used at the building, space or system levels.

This proposal has two components, a requirement of a Building Management System and associated meters to be installed when a building is constructed or upgraded, and a separate requirement that the equipment be used to further awareness of building operations.

The proposed measure will effectively put an end to buildings with only “master meters” where individual energy usage cannot be directly identified. It will inform tenants in those buildings with “utility rent inclusion” of their energy usage so that they may be able to understand their improvement opportunities. Other measures propose a requirement for sub-meters or direct meters and the abolition of utility rent inclusions. The availability and feedback of actual usage data has been shown repeatedly to have a strong impact on the control and reduction of energy use.

The proposed system is in many respects similar to the sub-metering that is commonly used for pass-through billing of tenants. The proposal would systematize data and provide improved uniformity across properties and would thus enhance fairness and transparency in the real estate market.

This measure does not call for public disclosure of the data, since it refers to detailed internal operations. Current legislation before City Council will require publication of overall building data as part of the benchmarking program.

Environmental & Health Benefits

Knowledge of energy use invariably results in less energy use, although with wide variation in the extent of the reduction. Reductions in energy use will result in reduced emissions of climate change gasses and pollutants affecting human health.

This proposal was found to have a low, positive environmental impact per building and to impact a large number of buildings. It was thus given an environmental score of two.

This proposal was found to have a positive, indirect health impact.

Cost & Savings

As described in the Executive Summary, Bovis Lend Lease prepared cost estimates for each Task Force proposal in the context of well-defined construction projects in specific buildings. Where possible, members of the Technical Committees prepared savings estimates for some of these projects and buildings. These cost and savings estimates are presented in the February 1st draft version of Appendix A. The innate uncertainty in how construction and operation will vary from one building to another, the complexity of the Task Force proposals, and the wide range of applications in which the proposals may be realized mean these figures are truly estimates.
This proposal was estimated to increase first capital costs by 0.01% to 0.2%, depending on building type. It was thus categorized as incurring a low to medium capital cost increment. This proposal was also estimated to generate financial savings that will pay for the capital costs in less than three years for the building types studied.

**Precedents**
Similar provisions for reporting and posting (labeling) of building energy performance are part of the European Directive on Buildings. The proposed energy recording and reporting is well below the standard set by the European Directive on Buildings.

**Other Jurisdictions**
Similar provisions for reporting and posting (labeling) of building energy performance are part of the European Directive on Buildings.

**LEED**
Supports the LEED points for Monitoring and supports the LEED EB product.

**Implementation & Market Availability**
Necessary technology is available “off-the-shelf” in terms of hardware. In most cases, existing building control systems will accept the necessary meter inputs and can download the data to a computer for storage and management.

Specific configurations will vary. Guidance should be provided for acceptable metering and reporting under various building/system configurations. This would enhance the market’s comfort with the requirement.

**Notes**
1. The original proposal suggested this be a modification to section 405 of the Mechanical Code. Since that refers only to ventilation systems, and this proposal reaches across all building systems, it is a better fit in ASHRAE 90.1.
2. This measure works in tandem with EO02 for tenant sub-meters.
3. The $1/sf in 6.4.6.2 (b) is exemplary and presented for comment and adjustment. Similarly, the 20% and 10% are intended to capture a few items of major equipment and can be adjusted per advisement.