

EO 1: RE-TUNE LARGE BUILDINGS EVERY SEVEN YEARS

NYC Building Code

This proposal was developed by the Energy & Ventilation Committee.

Summary

Issue:

Even the best-designed building systems drift away from optimal performance over time, due to broken parts, changes in use, and the accumulation of small changes in procedures and equipment.

Recommendation:

Every seven years, buildings larger than 50,000 square feet must be retro-commissioned, re-tuning the major building systems to ensure they all work together correctly. A similar proposal was incorporated into the Greener, Greater Buildings Plan, which became law prior to the issuance of this report.

Proposed Legislation, Rule or Study

Amendments to the New York City Administrative Code:

1. Add a new subchapter to Chapter 3 of Title 28 as follows:

Chapter 3 MAINTENANCE OF BUILDINGS

Article 308 RE-COMMISSIONING AND RETRO-COMMISSIONING OF EXISTING BUILDINGS

308.1 Definitions:

The following words and terms shall, for purposes of this chapter, applicable appendices and as used elsewhere in this code, have the following meanings:

CENTRAL SYSTEM. Includes (i) the exterior building envelope, as defined in Section 1402.1, and (ii) all energy-using building systems, not including that portion of any energy-using building system that the building owner may not access to the extent necessary for inclusion in any commissioning process under the terms of any applicable lease executed with respect to a portion of a large building occupied by more than one tenant prior to the effective date of the local law that added this section.

COMMISSIONING. A systematic process for investigating, analyzing, and optimizing the performance of building systems through the identification and implementation of low or no cost Facility Improvement Measures and ensuring their continued performance. The term "commissioning" shall include re-commissioning and retro-commissioning, as defined below.

COMMISSIONING AGENT. A person or agency approved by the department to perform commissioning and produce a commissioning report.

COMMISSIONING REPORT. A document setting forth the results of any commissioning process in the form provided by the department.

LARGE BUILDING. Any building or combination of buildings with a gross floor area equal to or greater than 50,000 square feet and located on a single lot.

RE-COMMISSIONING. The periodic re-implementation of the commissioning.

RETRO-COMMISSIONING. The application of the commissioning process to an existing building that has not previously undergone the commissioning process.

308.2 Re-commissioning or retro-commissioning required. a. With respect to a large building having received either a temporary or permanent certificate(s) of occupancy pertaining to the entire building as of the effective date of the local law that added this section, the owner shall submit a commissioning report indicating that a commissioning

agent has re-commissioned or retro-commissioned the central system of such building no earlier than two years prior to the date set forth in Section 308.3.

308.3 Schedule. A commissioning report shall be submitted to the department:

1. Within 180 days of issuance of an amended certificate of occupancy for a large building or any portion thereof that (i) changes the permitted use or occupancy of an area equal to or greater than 10,000 square feet, or (ii) changes the gross floor area of such large building by an area equal to or greater than 10,000 square feet; and

2. On a regular basis, as set forth below:

(a) A commissioning report shall be submitted to the department prior to the second anniversary of the effective date of the local law that added this article; and (b) Subsequent commissioning reports for the building shall be due seven years after the submittal date of the previous commissioning report.

308.4 Notification. The department of finance shall notify every building two years prior to the due date, and each year thereafter until the due date.

Supporting Information

Issue - Expanded

There is growing recognition that most existing buildings have major opportunities for energy use reductions by better utilizing systems and equipment already in the building. Commissioning existing buildings, either through “retro-commissioning” or “re-commissioning”, as described in the proposed code language, can result in both substantial energy use reductions and improvements in occupant comfort conditions.

While commissioning of new buildings has become more common in recent years due to initiatives such as LEED and other high performance building programs, existing building commissioning has taken somewhat longer to catch on in the building industry. Recent research (see cost/savings section below) has demonstrated the significant energy savings potential from existing building commissioning, along with the extremely attractive economics. Beyond energy cost savings, many case studies of existing building commissioning also show additional non-energy benefits, such as improved system capacity and availability for comfort conditioning systems, and improved indoor environmental quality leading to increases in occupant comfort and productivity.

Environmental & Health Benefits

The need to address indoor air quality issues is often a driver of an existing building commissioning project. In fact, a recent review of 332 existing building commissioning projects, representing over 90 million square feet, showed that more than half of those projects were undertaken to “ensure adequate indoor air quality” or “ensure or improve thermal comfort.”¹ While the valuation of improved occupant productivity is less rigorous than energy cost savings, many analyses have shown that productivity improvement benefits can often be several times larger than energy benefits.

This proposal was found to have a high, positive environmental impact per building and to impact a large number of buildings. It was thus given an environmental score of 3.

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 cost \$0.30/square foot. It was thus categorized as incurring a higher cost increment. This proposal was also estimated to generate financial savings that will pay for the costs in less than three years.

Precedents

No direct requirement for commissioning has been found. California enthusiastically endorses the practice.²

LEED

For new construction, LEED Enhanced Commissioning requires the involvement by the CxA in reviewing building operation within 10 months after substantial completion, including a plan for resolution of outstanding commissioning-related issues. However, there is no long-term re-commissioning initiative in LEED for new construction projects.

Under LEED EB-EA prerequisite 1 Existing Building Commissioning, teams may carry out a comprehensive commissioning process, or the team may choose to submit a 1- to 5-Year Plan for continuous improvement of commissioning requirements until all aspects are completed. While this time frame differs from the 7-year recommendation in this proposal, projects pursuing this 5-year LEED path will inevitably find it more feasible to document re-commissioning for the revised NYC building code.

Additional credits under LEED EB-EA credit 3.1, 3.2, & 3.3 Building Operations and Maintenance, require supporting appropriate operations and maintenance of buildings and building systems so that they continue to deliver building performance goals over the performance period. The LEED for Existing Buildings Performance Period is the period during which building performance data is collected for inclusion in a LEED for Existing Buildings certification application. While this time frame also differs from the 7-year recommendation in this proposal, projects pursuing the LEED path will similarly find it more feasible to document re-commissioning for the NYC building code.

Implementation & Market Availability

There is currently a shortage of energy engineers and auditors to supply the required services; however, this is quickly changing due to other PlaNYC initiatives.

ENDNOTES:

¹E. MILLS, LAWRENCE BERKELEY NATIONAL LABORATORY, BUILDING COMMISSIONING: A GOLDEN OPPORTUNITY FOR REDUCING ENERGY COSTS AND GREENHOUSE GAS EMISSIONS (2009), <http://cx.lbl.gov/documents/2009-assessment/LBNL-Cx-Cost-Benefit.pdf>.

²Green California, Commissioning and Retro-Commissioning Buildings (2007), <http://www.green.ca.gov/CommissioningGuidelines/default.htm> (last visited Jan. 28, 2010).

EO 2: Measure Electricity Use in Tenant Spaces

Amendments 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

Because electricity is often unmetered in commercial tenant spaces, tenants are unaware of the energy they consume. This, in turn, can lead to excessive use and waste.

Recommendation

All new residential dwelling units and all new commercial tenant spaces of 10,000 square feet or larger shall be metered for electricity. A similar proposal was incorporated into the Greener, Greater Buildings Plan, which became law prior to the issuance of this report.

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:

1. Add a new Section 8.4.2 as follows:

8.4.2 Electrical Metering

8.4.2.1 Residential metering. In buildings having individual dwelling units, electric metering shall be included capable of measuring, at a minimum, the electrical energy consumed in each dwelling unit on a monthly basis or more often. Metering may be supplied either by the owner or by the electric utility.

8.4.2.2 Commercial metering. Commercial spaces occupied by a single tenant and comprising one or more complete floors of a building or 10,000 square feet or more shall be supplied with electric metering capable of recording, at a minimum, electric energy consumption and peak demand within the space either monthly or more often. Metering may be supplied either by the owner or by the electric utility.

Exceptions:

a) In the case of renovations and retrofits of existing commercial spaces, this requirement is waived if it would require that the space be re-wired.

b) This requirement is waived for tenant spaces for which the inception of the lease of the commercial space that would otherwise be covered by this requirement precedes the enactment of this requirement.

Supporting Information

Issue – Expanded

It is well established that payments directly coupled to energy and/or demand usage lead to lower consumption. NYSERDA studies indicate that sub-metering a master-metered multifamily building can reduce apartment electricity consumption by approximately 17% - 27%.¹ This measure will ensure that all newly constructed residential buildings, and all or almost all new or renovated commercial spaces will have meters installed and available for use. Since building code has no control over operations, the actual use of the meters as a basis for billing will be controlled by Public Service Commission regulations. Whether new or existing buildings are master metered with no individual billing (despite the presence of individual meters), master metered with sub-meters, or directly metered by Con Edison is under the purview of the PSC and cannot be decided within New York City.

Environmental & Health Benefits

Lower electricity consumption will lead to lower emissions from generating stations, improved air quality and decreased release of greenhouse gases.

This proposal was found to have a low, positive environmental impact per building and to impact a small number of buildings. It was thus given an environmental score of 1.

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 0.07% to 0.1%, depending on building type. It was thus categorized as incurring a 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 certain building types, assuming that billing for individual usage is instituted in one form or another.

Precedents

This item is included in the New York State Energy Conservation Construction Code, 805.8, for multifamily residential buildings. It is repeated here since ASHRAE 90.1 2007 has been designated as a replacement for the New York State code, and there is no metering provision in 90.1.

Other Jurisdictions

Metering is nearly universal. No specific information available.

LEED

This measure will have little impact on LEED certification.

Implementation & Market Availability

Electric sub-meters are widely available.

¹ NEW YORK STATE ENERGY RESEARCH AND DEVELOPMENT AUTHORITY, APPLIED ENERGY GROUP: INCENTIVES TO REDUCE ELECTRICITY USAGE, <http://www.nyserda.org/programs/pdfs/Applied%20Energy%20Group.pdf>.

EO 3: TRAIN BUILDING OPERATORS IN ENERGY EFFICIENCY

Amendments to the New York City Building Code

Proposal developed by the Energy & Ventilation Committee

Summary

Issue:

Current requirements for building operators do not include training in efficient building operations, energy efficiency, or monitoring of overall building performance.

Recommendation:

In buildings larger than 50,000 square feet, require operators to be trained and certified for energy-efficient operations. Fund a study to establish the appropriate training and certification requirements.

Proposed Legislation, Rule or Study

Proposed Legislation, Rule or Study

Amendments to the New York City Building Code, Title 28, Chapter 4

1. Amend Section 28-401.3 as follows:

Building Operator. Engineering staff involved in the direct supervision, management, and maintenance of a building’s mechanical and electrical systems and equipment. For commercial office buildings and institutional buildings, this shall refer to Stationary Engineers. For multifamily apartment buildings, this shall refer to Building Superintendents. In some cases, where mechanical and electrical Operations and Maintenance is largely outsourced, the term shall refer to Mechanical and/or Electrical Maintenance firms and their mechanics and supervisors. The term “Building Operator” shall not refer to Owners or to Property Managers, who may be direct staff of the Owner or who may be in the employ of third-party property management firms.

2. Add a new Article 420 as follows:

Article 420

Building Operator Certification

Section 28-420.1 Certificate required. It shall be unlawful to operate mechanical equipment in a building over 50,000 square feet in size unless such work is done by a person trained and certified as a building operator under the provision of Article 420.

Section 28-420.2 Classification: Training and certifications shall be classified (Class A, Class B, Class C, etc.) as determined by (rules of the Department of Buildings).

Section 28-420.2 Phasing: An optimal phase-in schedule for the size of buildings the mechanical equipment of which are to be managed by a trained and certified building operator shall be determined by the proposed study.

Proposed Study

The City of New York should allocate sufficient funds (an estimated \$50,000 to \$100,000) for the Department of Buildings, working in coordination with the Office of Long-Term Planning and Sustainability, to hire consultants to analyze what trainings and certifications should be required for building operators and to make recommendations to the City.

Schedule and Content of Study:

No later than July 1, 2010, the City should issue an RFP for a study to be completed by April 1, 2011. The study should contain an analytical portion and a set of recommendations.

Analysis:

- An analysis of the skill sets required to efficiently operate building equipment of various types in buildings of various type and size (larger than 50,000 sq. ft.) that are typical in NYC.
- A description of existing training programs and/or certifications for operators that concentrate on energy efficiency, including standards and training products that have been developed by NYSERDA and the unions and requirements that have been set in the Housing Maintenance Code.
- An analysis of how well existing trainings and certifications meet the skill sets required in NYC buildings, and what gaps exist.
- A study of best practices in North America and around the world in setting standards for operators, looking at large portfolios such as government agencies, universities, businesses, etc.; any mandated standards for the private sector; or industry standards such as LEED or Green Seal.
- A determination of whether a certification program or a license requirement will best serve the purpose of this proposal.

Recommendations:

- The study should recommend an overall structure for trainings and certifications to be required to operate buildings of various sizes and types, with a range of equipment types. Should there be a single training or certification required for all building operators? Should there be a graded series of requirements – i.e. Class A, Class B, Class C, etc. – depending on the complexity of the building systems? Or should there be a general module required for all building operators, with additional specialized modules for different building types or systems?
- The study should recommend what existing trainings and/or certifications the city could start to require right away with fairly minor modifications. Continuing education requirements should be included because technologies and regulations are changing rapidly.
- The study should assess whether those initial standards are sufficient or whether the city should develop more stringent and/or more comprehensive standards.
- If it is determined that more stringent and/or more comprehensive standards should be developed, the study should outline what the city should require in terms of trainings, certifications, experience, and continuing education, along with the outline of any curriculum that should be developed.
- If curriculum should be developed, the study should make recommendations on how the city might best partner. Possible partners to consider include NYSERDA, CUNY, USGBC, BPI, the unions, the Department of Energy, and/or the professional organizations such as ASHRAE or AEE.
- The study should determine an optimal phase-in schedule, e.g. buildings larger than 200 ksf by 2013, 50ksf by 2016, etc.

Supporting Information

Issue – Expanded

The best equipment cannot ensure energy efficiency without the proper training of building operators. Current requirements for operating and stationary engineers and for multi-family building superintendents are meant to ensure that equipment is operated safely, but they do not include required training in sustainable building operations, energy efficiency, or associated monitoring. In order to ensure that the efficiency requirements mandated by the energy code achieve the intended results, New York City needs to establish minimum standards for the building operators who operate and manage the city’s largest buildings – those that are over 50,000 square feet in size. Such standards would be located in Title 28 (The New York City Construction Codes), Chapter 2 (Licensing and Registration of Businesses, Trades, and Occupations Engaged in Building Work). Since standards have not yet been developed, the City needs to undertake a study to develop the appropriate standards and then require them.

This proposal would ensure that the operators of the largest buildings in New York City are trained to operate their equipment efficiently. The impact of this will be quite large, since the buildings directly impacted constitute roughly half of the city’s total square footage, and are responsible for roughly 40% of the city’s overall energy consumption and greenhouse gas emissions. In addition, over time there will be indirect impacts on smaller buildings, since there will be a certain amount of movement of trained operating staff from large buildings into smaller ones.

Environmental & Health Benefits

The impact of proper operations and maintenance on building efficiency is significant. The experience of Texas A&M University and the Council Rock School District in Pennsylvania show that aggressive improvements in O+M, including monitoring and continuous commissioning, can result in as much as a 35% decrease in energy consumption across a portfolio. One would not expect such radical improvement across the board in NYC, and proper training is only one part of a preventative maintenance plan. Still, if training resulted in only a 2% improvement in efficiency in the largest buildings, it would result in a greenhouse gas emissions reduction of 0.8%, and decreased annual energy expenditures of

approximately \$150 million citywide. Reduced demand for energy would also result in reductions in the emissions of air pollutants from the burning of fossil fuel within buildings and at electrical power plants.

This proposal is for a study, and therefore environmental and health rankings are not applicable.

Cost / Savings

This proposal is for a study that will have no direct impact on construction or operating costs.

Precedents

In NYC, subchapter 2 of the Housing Maintenance Code, section 27-2055 "Certification of Competency" requires a similar process for building superintendents in multifamily housing, under HPD enforcement. Training programs exist. Training also exists, in particular through unions, on the non-residential side, for the state title of Stationary Engineer but this designation is not a NYC legal requirement.

LEED

Training of operators is consistent with LEED scoring, in particular for the EB product.

Implementation & Market Availability

By Oct. 1, 2011, DOB should submit to the City Council proposed code changes establishing initial requirements for building operators in buildings larger than 50,000 square feet.

If the study has determined that a second generation of standards is required, by Dec. 31, 2013, DOB should submit to the City Council code changes with amended standards.

The proposed code changes should allow for a phase-in of the requirements as required to allow sufficient time for the training of all impacted operators.

Appropriate training is available, e.g. union courses such as 32BJ. However, based on existing requirements, sustainability and energy efficiency are not emphasized, if included at all. NYSERDA and its related service providers have developed standards and training products. National training and certifications do exist. A list of such certifications is provided in the table below. Phasing-in would be necessary to avoid the market of service providers from being swamped.

Certifications relating to building operations for sustainable high-performance buildings *

Organization	Certification
Building Owners and Managers Institute (BOMI)	<ul style="list-style-type: none"> ▪ Real Property Manager (RPM) ▪ Facilities Management Administrator (FMA) ▪ Systems Maintenance Technician (SMT) ▪ Systems Maintenance Administrator (SMA)
USGBC	<ul style="list-style-type: none"> ▪ LEED Accredited Professional (AP)
Association of Energy Engineers (AEE)	<ul style="list-style-type: none"> ▪ Certified Energy Manager (CEM), original and flagship certification ▪ Certified Lighting Efficiency Professional ▪ Certified Power Quality Professional ▪ Certified Indoor Air Quality Professional ▪ Distributed Generation Certified Professional
Association of Heating Refrigeration and Air-conditioning Engineers (ASHRAE)	<ul style="list-style-type: none"> ▪ Operations and Performance Management Professional (OPMP)
International Facilities Management Association (IFMA)	<ul style="list-style-type: none"> ▪ Certified Facility Manager (CFM) ▪ Facility Management Professional
Building Operator Certification (the non-profit that manages this has the same name as the certification)	<ul style="list-style-type: none"> ▪ Building Operator Certification (BOC)

Building Performance Institute	<ul style="list-style-type: none">• Energy Analyst I and II• Residential Retrofit Specialist• Multifamily Energy Analyst• Energy Efficient Building Operations (multifamily)
National Association for Technical Excellence (NATE)	<ul style="list-style-type: none">• Provides a range of certification standards aimed primarily at the installation and service trades.
Association of Physical Plant Administrators (APPA)	<ul style="list-style-type: none">• Educational Facilities Professional• Certified Educational Facilities Professional
Association for Facilities Engineering (AFE)	<ul style="list-style-type: none">• Certified Plant Engineer• Certified Plant Maintenance Manager• Certified Plant Supervisor

Source: Michael Bobker

Notes

1. Note possible savings redundancy with controls measures, system documentation, and retro-commissioning.

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 E002 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.

EO 5: INSPECT & MAINTAIN COMMERCIAL HVAC SYSTEMS

New York City Mechanical Code
Proposal developed by the Energy & Ventilation Committee

Summary

Issue:

Without routine inspection and maintenance, HVAC systems do not deliver on energy efficiency, thermal comfort and indoor air quality.

Recommendation:

Adopt ASHRAE 180P for the inspection and maintenance of HVAC systems in commercial buildings.

Proposed Legislation, Rule or Study

Amendments to the New York City Mechanical Code:

1. Amend Section 102.as follows:

102.3 Maintenance. Mechanical systems, both existing and new, and parts thereof shall be maintained in proper operating condition in accordance with the original design and in a safe and sanitary condition. Devices or safeguards that are required by this code shall be maintained in compliance with the applicable provisions under which they were installed. The owner shall be responsible for maintenance of mechanical systems. To determine compliance with this provision, the commissioner shall have the authority to require existing mechanical systems to be inspected. For all buildings of 20,000 square feet or more and, for all buildings classified in occupancy group R-2 that are four stories or more in height above grade, "ASHRAE Standard 180-2008 -- Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems" or a more recent version of such standard approved by the Commissioner shall be a part of minimal compliance with this section, in accordance with the schedule in Table 102.3. Buildings shall file a copy of the Maintenance Plan called for in ASHRAE Standard 180-2008 with the department in accordance with the schedule in Table 102.3.

Table 102.3

<u>Building Size (square feet)</u>	<u>Compliance with ASHRAE Standard 180-2008 Required</u>	<u>Maintenance Plan Submitted to Dept. Of Buildings</u>
Over 250,00 sf	July 1, 2013	July 1, 2014
Over 100,000 sf	July 1, 2016	July 1, 2017
Over 50,000 sf	July 1, 2019	July 1, 2020
Over 20,000 sf	July 1, 2022	July 1, 2023

2. Amend Section 1502 as follows:

ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. 1791 Tullie Circle, NE Atlanta, GA 30329-2305	
Standard Reference Number	Title	Referenced in code section number
180 - 2008	<u>Standard Practice for Inspection and Maintenance of Commercial Building HVAC Systems</u> 102.3	
ASHRAE—2001	ASHRAE Fundamentals Handbook—2001 312.1, 603.2	
15—2001	Safety Standard for Refrigeration Systems 1101.6, 1101.11, 1104.2, 1105.3, 1105.7, 1105.8, 1105.10, 1108.1	

34—2001	Designation and Safety Classification of Refrigerants202, 1102.2.1, 1103.1
ASHRAE—2000	HVAC Systems and Equipment Handbook—2000312.1

(Line for “180-2008” added.)

Supporting Information

Issue - Expanded

Current building codes and regulations do not set forth a specific minimum standard of care in the inspection and maintenance of commercial building heating, ventilating and air conditioning (HVAC) systems. The owners of commercial, institutional and other building facilities often enact inconsistent practices for inspecting and maintaining their HVAC systems. Many choose to follow rigorous polices that maintain the system in new or nearly new condition. Other owners either lack policy in this area or have adopted a run-to-failure approach where the system or components of the system are attended to only when there is a total failure. When there is no routine inspection and subsequent adjustment or maintenance of system operation and components, the system typically performs poorly. Consequently, the system does not provide the intended energy efficiency to the owners or thermal comfort and indoor air quality to the occupants.

ASHRAE 180 was developed in response to this situation to provide a basic guideline to good practice in HVAC maintenance. It is now a mature and approved standard. The primary requirement is that a specific plan be developed for the building at hand that recognizes each significant piece of equipment and establishes a schedule for inspection, adjustment, and replacement when needed. The description of Standard 180 specifically states that it does not comprise a complete maintenance program by itself: “Ancillary maintenance issues related to equipment reliability, equipment robustness and minimizing overall maintenance costs are also appropriate in order to protect the HVAC capital investment and/or minimize system downtime. These issues, however, are outside of the scope of this standard.” Hence Standard 180 is necessary but not sufficient for minimal compliance with Section 102.3.

Environmental & Health Benefits

This measure will help ensure that the indoor environment in all buildings where persons work, visit, or reside will be maintained at the healthiest and most comfortable level possible. The enhanced energy efficiency and boiler operations will result in lower emissions of pollutants and greenhouse gases.

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 2.

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 is not expected to have any significant impact on capital costs. This proposal was also estimated to generate significant annual financial savings.

Building operators and owners will bear the slight cost of inspection and maintenance program, but the increment over a competent maintenance program is minimal or negative once the Maintenance Plan has been prepared. These statements refer to the cost of setting up and following the protocols of Standard 180P, but do not include the cost of actual maintenance. However, any apparent increase in actual maintenance costs, such as the cost of fan belts that might not otherwise have been replaced, will be returned many times over either in fuel and electric savings or in avoided lack of services.

Precedents

The Mechanical Code explicitly considers maintenance to be within its purview: “101.2 Scope. This code shall regulate the design, installation, maintenance, alteration and inspection of mechanical systems that are permanently installed and utilized to provide control of environmental conditions and related processes within buildings.”

This measure ensures that the mandate above will be carried out professionally.

LEED

EO 5: INSPECT & MAINTAIN COMMERCIAL HVAC SYSTEMS

Adherence to this requirement will provide material assistance for buildings striving for a LEED for Existing Buildings - Operations and Maintenance certification.

Implementation & Market Availability

This service is widely available and can be procured from HVAC service contractors. Expertise with the precise requirements of 180P will grow rapidly and naturally as the market expands.

EO 6: ESTABLISH MAXIMUM HEATING & MINIMUM COOLING TEMPERATURES

Study

Proposal developed by the Energy & Ventilation Committee

Summary

Issue:

The City Multiple Dwelling Law requires a minimum indoor temperature during the heating season. However, there is no maximum temperature, allowing for overheated buildings. In addition, there are no temperature regulations during the cooling season.

Recommendation:

Undertake a study on the feasibility of limiting heating in winter and cooling in summer from central systems.

Proposed Legislation, Rule or Study

The City of New York should undertake a study, to assess the practicality of establishing an upper temperature limit for heating in winter and lower temperature limit for cooling in summer. This study should be completed within a six-month period and should examine whether temperature limits are enforceable and feasible given the range in capacities of existing central systems. If the study determines the limits are enforceable and feasible, it should also propose a regulatory framework for implementing this proposal.

Supporting Information

Issue- Expanded

Many apartment buildings are overheated in winter and many office buildings are overcooled in summer. It is not uncommon for New Yorkers to leave a sweater at work in August or bring one when going to the movie theatre, or to see open apartment windows in the depth of winter. In addition to being wasteful, these practices increase the likelihood of summer brownouts and can affect worker health.

The Multiple Dwelling Law establishes minimum temperatures for multi-family residential buildings. However, neither this law nor any other establishes maximum heating temperatures or limits on summer cooling.

While limiting heating and cooling of central systems may seem like matter of simply changing the temperature on a thermostat, the reality of complex building systems means that regulation of temperatures may prove challenging. For instance, the top apartment in a building might require excessive heat due to poor roof insulation, leading to overheating on lower floors. Conversely, a strong “stack effect” may cause heat to rise rapidly in the building, overheating the top floors. In addition to these technical issues, it may be difficult to enforce such temperature limits. Nonetheless, the potential energy savings for doing so make this an issue for further investigation.

Environmental & Health Benefits

Reducing winter heating and summer cooling would save energy, improve air quality, and improve working and living environments. Reductions in summer electricity demand would also reduce the likelihood of brownouts. Since this proposal is for a study, there are no direct environmental or health impacts.

Cost & Savings

This proposal is for a study, which will have no direct impact on construction costs. However, this proposal was estimated to generate financial savings that will pay for the capital costs in less than three years depending on the building type.

Precedents

There are no known precise precedents for this proposal. The Multiple Dwelling Law provides precedent for regulating indoor temperatures during the heating season.

LEED

Implementation of temperature limits could help a project achieve LEED energy points under almost all of the various LEED rating systems.

EO 6: ESTABLISH MAXIMUM HEATING & MINIMUM COOLING TEMPERATURES

Implementation & Market Availability

There are no implementation or market barriers to this proposal.