Summary

Issue:
Energy is wasted due to the dumping of hot condensate from purchased Con Edison steam. In addition, substantial potable water is wasted cooling the condensate to 150 degrees F. before it is dumped in the sewer.

Recommendation:
Require all new or reconstructed heating systems that use Con Edison’s steam to maximize the recovery of heat from steam condensate. Doing so will lead to significant savings of energy and water.

Proposed Legislation, Rule or Study

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

1. Amend Section 6.8 as follows:

6.8 Minimum Equipment Efficiency [Tables]

6.8.1 Minimum Efficiency Requirement Listed Equipment Table – Standard Rating and Operating Conditions

(Tables 6.8.1A - 6.8.1J are unchanged.)

6.8.3 Minimum Pipe Insulation Thickness Table

(Table 6.8.3 is unchanged.)

6.8.4 Steam

6.8.4.1 General. Buildings utilizing district steam service shall either (i) incorporate the technologies listed below in sections 6.8.4.1.1 and 6.8.4.1.2, or (ii) meet the alternative performance standard described in subsection 6.8.4.1.3.

6.8.4.1.1 Service Hot Water. Buildings utilizing district steam for space heating or cooling shall incorporate heat exchangers utilizing the latent heat in the condensate to heat or preheat service hot water used in the building, in accordance with standards for such equipment established by the department.

6.8.4.1.2 Hot Water Space Heat. Buildings utilizing district steam for space heating and for which the design service hot water load will not lower the temperature of the condensate from all steam utilized to 100°F at winter design point conditions shall incorporate hydronic (hot water) radiation circulating the condensate through a portion of the building sufficient to bring the temperature of the condensate down to 140°F. The condensate shall then supply the service hot water heat exchanger required under subsection 6.8.4.2, 6.8.4.1.1.

6.8.4.1.3 Alternate Performance Standard. In lieu of the technologies listed in subsections 6.8.4.1.1 and 6.8.4.1.2, a building may utilize any design that will meet thermal loads within or contiguous to the building and will remove 100 Btus per pound of steam utilized for space heating from the condensate.

Supporting Information

Issue – Expanded
Buildings that use Con Edison district steam for space heat or cooling commonly dump the resulting steam condensate into the sewer. Because of the danger of damage to the sewer system and sanitary requirements, the condensate, which is normally at 212°F, must be cooled to 150°F before it can be released, and this is normally done by adding cold, potable water to temper it. This common practice is wasteful in three different ways: (1) the thermal energy available from the hot condensate is discarded rather than used; (2) potable water is wasted to cool the condensate; and (3) the useful but non-potable condensate is discarded when it could displace potable water for irrigation, sidewalk cleaning, or wet cooling tower use.
This proposal would require buildings to reclaim the useful heat from hot condensate for heating, hot water or other purposes. Using the thermal energy in condensate would also eliminate the waste of potable water, since it would no longer be necessary to cool the condensate for disposal or reuse. WE 7 Reuse Water from ConEd Steam would require the reuse of condensate, addressing the third and final issue noted above.

Environmental & Health Benefits
A 100 unit residential building might use 7,500 million Btu of steam in a year. Complying with the provisions in this proposal will save about 550 million Btu of steam and eliminate the need for over 700,000 gallons of potable water that would have been used to temper the condensate before disposal in the sewer.

This proposal was found to have a high, positive environmental impact per building and to impact a small 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 was estimated to increase first capital costs by 0.01%. It was thus categorized as incurring a low capital cost increment. This proposal was also estimated to generate financial savings that will pay for the capital costs in less than three years.

Precedents
There are no known precedents for this proposal. Many other district steam systems return the condensate to the plant; Con Edison does not.

LEED
Current LEED prerequisites for Minimum Energy Performance under the Energy & Atmosphere sections of almost all of the rating systems require that the scope of work complies with ANSI/ASHRAE/IESNA standard 90.1-2004. This proposed code requires compliance with measures exceeding ASHRAE 90.1-2007. Since LEED 2009 prerequisites for Minimum Energy Performance also reference ASHRAE 90.1-2007, the measures outlined in this proposal will be correlated with the next generation of LEED.

However, LEED qualifies that a more stringent local code requirement becomes the LEED prerequisite requirement as well. Therefore, this proposal will change the baseline criteria that registered projects must meet for LEED certification. Code revisions under this proposal do not apply to the LEED for Homes or the LEED for Existing Buildings rating systems, which reference Energy Star criteria. For existing buildings, LEED EB provides an alternate calculation method. LEED does not address water savings accomplished through reclaiming heat from steam condensate. However, the subsequent reuse of condensate water is addressed under LEED Water Efficiency credits.

Implementation & Market Availability
There are no known implementation issues for this proposal. Con Edison recommends condensate heat recovery as a practice, and has useful information at its website.

Notes
This requirement may not eliminate the need for any tempering water, since there are few thermal loads suitable to temper the steam used for absorption chillers once the service hot water loads have been met. It should be practical to make use of condensate from absorption chillers as wet cooling tower make-up water, but because precedents and examples are not available, this is not included as a requirement.

This requirement will only affect new or reconstructed buildings.

ENDNOTES: