EE 3: Assess Co-generation Feasibility in Large Buildings

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

Summary

Issue:
Properly designed co-generation systems are roughly twice as efficient as electricity from the grid because these systems utilize waste heat from electric generation. Owners are often unaware of the potential for co-generation in their buildings.

Recommendation:
Require new developments of 350,000 square feet or more to analyze the potential for co-generation.

Proposed Legislation, Rule or Study

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

1. Add a new Section 1.1.5.1.2(4) as follows:

1.1.5.1.2 Energy Analysis
4. For new building projects or substantial improvements larger than 350,000 gross sq. ft., including one or more new buildings on a lot, a feasibility analysis, as defined by the department, for combined heat and power shall be provided. At a minimum, such analysis shall include an identification of operational or technical barriers, conceptual engineering, and a preliminary economic analysis, including a simple payback calculation, as per a Level 1 Feasibility Analysis as defined by the United States Environmental Protection Agency.

Amendments to the New York City Building Code

2. Amend Section 202 to include the following definitions:

**CO-GENERATION SYSTEM**: See COMBINED HEAT AND POWER SYSTEM

**COMBINED HEAT AND POWER SYSTEM**: A system, including but not limited to turbines, micro-turbines, reciprocating engines, and fuel cells, that generates both electrical power and heat that can be productively utilized for the heating or cooling of space, domestic water, or processes.

Supporting Information

Issue – Expanded
Cogeneration offers substantial fuel savings when utilized in larger buildings to produce both electric power and heat. But because it is a somewhat unfamiliar technology, which is sometimes thought of as “only for the real pros”, cogeneration is not even considered during design development for many buildings that could profit from its use. This proposal would require buildings large enough to be reasonable candidates for cogeneration to conduct a simple feasibility study to determine whether the option would be worth examining further.

A level 1 feasibility analysis identifies potential operational or technical barriers, such as power purchase contracts that prevent installation of on-site power generation or local utility and regulatory policies that hamper distributed generation. This exercise also includes an economic analysis of the projected budget and payback. The budget estimate includes the cost of construction, CHP system tie-in, and operations and maintenance. The payback calculation takes into account: (1) the amount of heat and power produced by the CHP system, and the estimated amount of each to be used on the site, (2) the avoided costs of utility-purchased heat and power, (3) the amount and cost of fuel associated with running the CHP system, and (4) the budgetary cost to install and maintain the system.
Environmental & Health Benefits
Co-generation offers considerable environmental benefits when compared with purchased electricity and on-site-generated heat. By capturing and utilizing heat that would otherwise be wasted from the production of electricity, co-generation systems require less fuel than equivalent separate heat and power systems to produce the same amount of energy.\(^2\)

Because less fuel is combusted, greenhouse gas emissions, such as carbon dioxide (CO2), as well as criteria air pollutants like nitrogen oxides (NOx) and sulfur dioxide (SO2), are reduced.\(^3\) With electricity created on site, co-generation also means a reduction of the strain on New York City’s Electricity grid.\(^4\)

This proposal was found to have a positive indirect environmental impact.

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

Cost / Savings
This proposal, which requires only a simple study, is not expected to have any significant impact on capital costs. Nor will the study itself generate any savings.

Precedents
The Revised Code of Washington state includes a section on the investigation and development for cogeneration projects in new and existing state facilities, which includes performing a feasibility study on the project’s cost-effectiveness and energy efficiency.\(^5\)

LEED
There are no LEED credits affiliated with the completion of a feasibility analysis.

Should the analysis result in actual co-generation systems being implemented, LEED for Neighborhood Development GCT cr.12 On-Site Energy Generation addresses this type of system. Additionally, there would be applicable LEED credits for meeting energy performance standards under the Energy & Atmosphere sections of the various rating systems, and improved air quality resulting from a reduction in CO2 emissions, which would assist in complying with Indoor Environmental Quality credits.

Implementation and Market Availability
There are no known implementation issues for this proposal.

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3. Ibid.

4. Ibid.