The Potential for Greenhouse Gas Emission Reduction Through Small Distributed Cogeneration at Residential Sites.

by Andrew J. Roberts

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Ryerson University

ABSTRACT

This paper investigated the potential for cogeneration to reduce carbon dioxide emissions from residences, and whether available technologies were competitive under market conditions. Building energy archetypes were developed using building envelopes estimated from aerial photos and a computer aided design (CAD) system, and the HOT2000^{TM} energy modeling system. Cogeneration packages were selected to meet baseload and average annual thermal demands for groups of building archetypes. Expected emissions from cogeneration units were compared to those of a separate boiler, and a combined cycle gas turbine. A levelized unit electrical cost (LUEC) method was employed to compare the competitiveness of cogeneration plants to a combined cycle gas turbine. The study revealed that cogeneration for residential use provides CO_2 reductions, and the significance of these reductions increases with greater levels of aggregation. The levelized unit electrical cost method revealed that small cogeneration packages are not currently cost competitive.