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Macro-Economic Benefit Analysis of Large Scale Building Energy Efficiency Programs in Qatar

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Abstract

This paper evaluates the economic, environmental, and social benefits of large-scale energy efficiency programs for new and existing buildings in Qatar. Using data obtained from detailed energy audits, several proven energy efficiency measures have been analyzed through optimized based analysis to assess their impact on the energy performance for both new and existing buildings in Qatar. Moreover, a bottom-up analysis approach is considered to quantify the multiple benefits for implementing large-scale building energy efficiency programs for the building stock in Qatar. In particular, a more stringent energy efficiency code for the new constructions and three energy retrofit levels for the existing buildings are considered in the analysis. A novel macro-economic analysis using the concept of energy productivity is used to assess the cost-benefit of large-scale energy efficiency programs in Qatar. It is determined that the implementation of a government funded large-scale energy retrofit program for the existing building stock is highly cost-effective in Qatar. In particular, it is found that a large-scale energy efficiency retrofit program of existing buildings can provide a reduction of 11,000 GWh in annual electricity consumption and 2,500 MW in peak demand as well as over 5,400 kilo-ton per year in carbon emissions. In addition, over 4,000 jobs per year can be created when this large-scale energy retrofit program is implemented over 10-year period.

Keywords: Energy Efficiency; Energy Productivity; Energy Retrofit; Optimization; Qatar; Buildings

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