

## Estimating the Impact of Appliance Energy Efficiency Improvement on Residential Energy Demand in Tema City, Ghana

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**Abstract :** Ghana is experiencing rapid economic development and its cities command an increasingly dominant role as centers of both production and consumption. Cities run on energy and are extremely vulnerable to energy scarcity, energy price escalations and health impacts of very poor air quality. The overriding concern in Ghana and other West African states is bridging the gap between energy demand and supply. Energy efficiency presents a cost-effective solution for supply challenges by enabling more coverage with current power supply levels and reducing the need for investment in additional generation capacity and grid infrastructure. In Ghana, major issues for energy policy formulation in residential applications include lack of disaggregated electrical energy consumption data and lack of thorough understanding with regards to socio-economic influences on energy efficiency investment. This study uses a bottom up approach to estimate baseline electricity end-use as well as the energy consumption of best available technologies to enable estimation of energy-efficiency resource in terms of relative reduction in total energy use for Tema city, Ghana. A ground survey was conducted to assess the probable consumer behavior in response to energy efficiency initiatives to enable estimation of the amount of savings that would occur in response to specific policy interventions with regards to funding and incentives provision targeted at households. Results show that 16% - 54% reduction in annual electricity consumption is reasonably achievable depending on the level of incentives provision. The saved energy could supply 10000 - 34000 additional households if the added households use only best available technology. Political support and consumer awareness are necessary to translate energy efficiency resources into real energy savings.

**Keywords :** achievable energy savings, energy efficiency, Ghana, household appliances

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