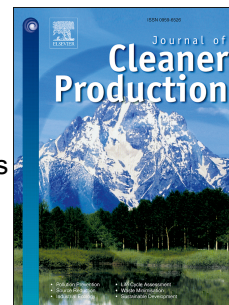


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Households Energy Conservation in Saudi Arabia: Lessons Learnt from Change-Agents Driven Interventions Program

Kh Md Nahiduzzaman^{1*}, Adel S. Aldosary², Abdullatif Said Abdallah³, Muhammad Asif⁴, Harn Wei Kua⁵ & Abdulaziz M. Alqadhib⁶

Abstract

Saudi Arabia is one of the most energy intensive countries in the world in terms of per capita consumption. Highly subsidized energy prices and low tariffs are driving up domestic energy consumption. The rapidly growing energy demand has prompted the country to undertake several energy-saving measures. These initiatives, however, are all technology driven and no apparent measures have yet been taken to modify end users' behavior. In order to reduce the rate of growth of residential energy consumption, besides appropriate regulations, it is critical to engage end users through better education and awareness. Thus, this study aims to investigate the impact of behavior-based, non-technical interventions on end users' perceptions of energy conservation and, subsequently, any actual reduction in household energy consumption. Taking Khobar city as the geographical focus, 88 participating households were randomly chosen for interventions. The households were divided into two treatment and one control group. Analysis of the six-month intervention revealed a positive but statistically insignificant impact on energy conservation. The results suggest that there is a positive relation between the number of adults in the family and level of education with the energy consumption while number of female members in family, family size, building area shows a negative association attributing to 'economies of scale' and existence of pro-environmental behavior. In the end, this study attempts to build a foundational ground for policy prescription on energy conservation based on 'investment' and 'curtailment' behavior approaches to assess the 'longevity' effects.

Keywords: Energy conservation; Behavioral change; Longevity effects; Conservation practice

Introduction

Saudi Arabia has one of the highest per capita energy consumption in the world (Alshehry and Belloumi, 2015). The country relies completely on oil and gas to meet its electricity requirements (Asif et al., 2017; Khan et al., 2017). The domestic oil consumption has grown rapidly during the last four decades to nearly 3 million barrels per day (Gately et al., 2012). Since 2000, the electricity consumption in the country has increased by over 125% due to several factors, including population growth, worsening energy efficiency, subsidized electricity and transportation fuel prices, and lavish usage leading to an overall increase in demand (Kinninmont, 2010; ERCA, 2014; Asif et al., 2017). The annual growth rates in electricity consumption and the number of consumers over the last decade have been reported to be as much as 8% and 5% respectively (Asif, 2017). In a business as usual scenario, the demand is forecasted to continue to sharply rise in future as some studies predict a 100% increment by 2025 compared to the level in 2009 (Asif, 2016). In 2008, out of a total 3.2 billion barrels of oil produced, 560 million barrels (17.5 percent) was domestically consumed and this is expected to rise to 1,500 million barrels (47 percent) equivalent/year by 2030 (Gately et al., 2012).

The building sector, contributes to this domestic oil demand, is experiencing a rapid growth in the Gulf Cooperation Council (GCC) region, owing to economic growth, burgeoning population and modernization. This sector plays an important role in the energy sector as it accounts for more than 40 percent of the materials' consumption and over one third of the total greenhouse gas emissions in the world (Asif, 2011; Alrashed and Asif, 2015). To address climate change related problems, GCC nation states have started to implement policies aimed at transforming their energy sectors (Nader, 2009; Flamos et al., 2010; Reiche, 2010; Mezher, 2011). Pioneering projects such as Abu Dhabi's Masdar city (Alusi et al., 2011; Mezher et al., 2012; Cugurullo, 2013)

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