

A Survey on Household Energy Saving Measures for Last Decade in Western India

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ABSTRACT

There has been a large interest in household energy-saving measures as they are major consumers of energy. The higher level of awareness need not culminate into the household energy savings. This study investigates the impact of the changes on both home-based and transport -based energy-saving measures over a period. In addition, it also investigated the percentage of money spent on these energy-saving activities. A postal based self-reported survey was undertaken in western India. The result suggested that only 24% of the respondents reported that money spent on household energy-saving measures have increased in the last 10 years. Whereas 43% have reported they have not spent any money on the energy saving measures. Little study is done on the changes in household energy saving measures. In this study, the authors extend the research on household energy-saving measures by addressing the gap in extant literature in understanding the changing paradigm of household energy-saving measures in a decade

KEYWORDS

Behavioural Change, Energy Information, Energy Management, Energy Saving Behaviour, Energy Savings, Household Energy Conservation, Household Energy Use, Interventions

1. INTRODUCTION

Household energy-saving measures have been a hot topic in the last four decades. Early interest in the topic was due to the oil crises and energy shortage, due to global warming. The behaviours of individuals and households have a major and cumulative impact on the ecology and sustainable development (Verplanken, 2017). For energy savings, households are a substantial target group. They are responsible for 15-20% of total energy requirements. There are two ways households can consume energy. One way is direct energy usage such as electricity, natural gas and other fossil fuels. Other is indirect, which refers to the energy used for production, transportation and disposal of goods and services (Steg, 2008). Due to the importance of topic there has been a number of studies on household energy savings (Abrahamse, Steg, Vlek, & Rothengatter, 2005; Barr, Gilg, & Ford, 2005; Dieu-Hang, Grafton, Martínez-Españeira, & Garcia-Valiñas, 2017; Johnson, Horton, Mulcahy, & Foth, 2017; Poortinga, Steg, Vlek, & Wiersma, 2003; Steg, 2008; Verplanken, 2017).

Previous studies, have addressed several aspects of household energy savings: 1) Antecedents interventions to promote household energy conservation behaviour (Abrahamse et al., 2005; Brandon & Lewis, 1999; Steg, 2008); 2) Consequence interventions of household energy saving behaviour (Abrahamse, Steg, Vlek, & Rothengatter, 2007; Dietz, Gardner, Gilligan, Stern, & Vandenberg, 2009); 3) Household energy gap (Barr et al., 2005); 4) Dimensions of household energy conservation (Karlin et al., 2014; Lopes, Antunes, & Martins, 2015; Urban & Ščasný, 2016); 5) Household energy

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behaviours (Boudet, Flora, & Armel, 2016; Gadenne, Sharma, Kerr, & Smith, 2011); 6) Social norms and Household energy-saving behaviour (Allcott, 2011; Frederiks, Stenner, & Hobman, 2015). However, in addition, household energy-saving measures encompasses several unexplored dimensions that have attracted attention recently. To cite an example, the economy is the most important reason for people indulging in energy-saving measures, followed by comfort and at last environmental concern (Aravena, Riquelme, & Denny, 2016). Despite many empirical studies, a key knowledge gap remains as regards to the determinants of household energy consumption (Dieu-Hang et al., 2017).

Household energy is a dynamic concept and needs further investigation about the changing nature. An investigation about the changes in household energy saving measures for the last ten years becomes perennial to further understand and enrich the body of knowledge. The very little study is done on the changes in household energy saving measures. In this study, we extend the research on household energy saving measures by addressing the gap in extant literature in understanding the changing paradigm of household energy-saving measures in a decade. Household energy-saving measures are broadly delineated into- a) Indoor (Home based energy-saving measures) and b) Outdoor (Transport based energy-saving measures) (Poortinga et al., 2003). The distinction between homebased and outdoor based energy saving measures are based on sojourning of space(indoors) and bridging of space (outdoors). Both the activities require energy. For example, indoor energy use is energy used inside the house e.g. air conditioners, lighting, household appliances. The outdoors activities are basically transportation for example, for work, leisure etc. The indoor and outdoor energy saving measures have different consequences on the people's quality of life. Therefore, the acceptance of energy saving measures by people will also change. This study investigates the impact of the changes on both home-based and transport-based energy-saving measures over a period. In addition, it will also investigate the percentage of money spent on these energy-saving activities.

2. BACKGROUND THEORY

Researchers, policy makers and other stakeholders have agreed, that households are major consumers of energy. This results in serious environmental and financial costs (Michael Sony & Mekoth, 2018; Thondhlana & Kua, 2016). The main areas of energy use for households are 1) for space heating and cooling, 2) water heating, 3) cooking and running appliances. Besides private transport, it is the only energy use under homeowners' control (Wang & Moriarty, 2017). Household use energy for a wide variety of activities. These activities are classified as Indoor or Outdoor activities. Indoor activities consume energy for indoor use e.g. heating, ventilation, air-conditioning, lighting etc. Outdoor or External activities consume energy for transportation, shopping, holiday activities (Poortinga et al., 2003). In India a typical trend in energy consumption in the household is food 18%, 51%, fuel and light, 15% durable goods, 8% Misc goods and services, 1% Pan tobacco and intoxicants and 7% clothing and footwear (Jain & Kumar, 2018). Within these larger domains, the activities can be classified as technical and behavioural based activities. Technical based activities require initial investment and are expensive means of energy-saving measures e.g. Electric vehicles. Behavioural measures are activities with additional effort or decreased comfort. To cite an example, to reduce car use or walking a short distance, an individual needs to adjust lifestyle (Poortinga et al., 2003). Such a strategy may require some effort and it may result in decreasing comfort level. Consequently, there may be differences in the acceptability of technical and behavioural energy-saving measures. Another manner of distinguishing the product is based on the reduction of direct and indirect energy use. Direct energy use is the use of electric vehicles compared to conventional. In the household, the savings are indirect e.g. energy is needed for manufacturing, transportation and disposal of goods and services, consumed by households e.g. giving chocolates instead of flowers are less energy intensive, as flowers are grown in gas heated chambers (Poortinga et al., 2003).

There are many factors which influence household energy conservation. First, is the knowledge dimension, wherein the individuals need to be aware of the need for and possible ways to reduce

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