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Role of community acceptance in sustainable bioenergy projects in India

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HIGHLIGHTS

- Local communities' negative perception about bioenergy projects, impact its operation.
- We identify concerns of local community regarding bioenergy projects in India.
- Air pollution from bioenergy plants is a major concern for the local community.
- We identify factors influencing perception of communities about bioenergy projects.
- Local energy availability influences community's perception of bioenergy plants.

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ABSTRACT

Community acceptance has been identified as one of the key requirements for a sustainable bioenergy project. However less attention has been paid to this aspect from developing nations and small projects perspective. Therefore this research examines the role of community acceptance for sustainable small scale bioenergy projects in India. While addressing the aim, this work identifies influence of community over bioenergy projects, major concerns of communities regarding bioenergy projects and factors influencing perceptions of communities about bioenergy projects. The empirical research was carried out on four bioenergy companies in India as case studies. It has been identified that communities have significant influence over bioenergy projects in India. Local air pollution, inappropriate storage of by-products and credibility of developer are identified as some of the important concerns. Local energy needs, benefits to community from bioenergy companies, level of trust on company and relationship between company and the community are some of the prime factors which influence community's perception on bioenergy projects. This research sheds light on important aspects related to community acceptance of bioenergy projects, and this information would help practitioners in understanding the community perceptions and take appropriate actions to satisfy them.

1. Introduction

Renewable energy sources were the first to be accessed by mankind for fulfilling their simple daily needs and running basic machines. In fact controlled wood fire can be considered as one of the first steps in our advancement. There are number of advantages in using renewable energy. It is local, thus protecting the country from foreign reliance and fluctuating prices of the fossil fuel resources. The most important advantage is of saving the environment. Still, in the era of fossil fuel based industrialization share of renewable energy dwindled to a few percent. For example, in 2012 renewable energy accounted for 10.7%, 6.5%, 3.1%, 3.8% and 4.7% of the total primary energy consumption in industrialized countries such as China, USA, Russia, Japan and UK, respectively (Enerdata, 2013a). Such a low share of renewable energy shows that a large share of energy demand is met by fossil fuels, which leads to global warming.

The total energy consumption and share of renewable energy in the total primary energy consumption in India during 2012 were 774 million tonnes of oil equivalent (Mtoe) (Enerdata, 2013b) and 24.3% (Enerdata, 2013a) respectively. When compared to other developed nations India's energy consumption per capita is low

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and share of renewable energy is higher. However, in 2010, the overall electrification rate in India was only 75%, with a share of 94% and 67% of electrification in urban and rural areas respectively (IEA, & OECD, 2012). In addition to that, in accounting year 2010–2011, in India the official electricity supply shortage during normal and peak loads were 8.5% and 9.8% respectively (Central Electricity Authority, 2012). Also, India is currently in the process of transformation from a developing nation to a developed nation through economical growth. Energy is one of the important requirements for growth and development (IEA, 2002), and the projected growth of India will lead to a further increase in energy demand. Therefore, in the context of lack of access to modern energy for considerable amount of population, increasing energy demand and heavy dependence on imported fossil fuel resources and carbon footprints left by their use, India is looking to increase its utilization of renewable energy sources such as biomass, solar, wind and hydropower.

It should be noted that in most of the developing countries, biomass continues to be one of the important source for fulfilling local household energy needs. Biomass is mainly used in these households for cooking, space heating and water heating. For example, the percentage of various fuels used for cooking in India based on the national census 2011 data, is given in Fig. 1. These data show that nearly 67% of all households in India use any one form of bioenergy for cooking, whereas in rural areas approximately 85% of the households use bioenergy for cooking (Deloitte, 2013). However, the exposure to indoor pollution and toxic by-products of combustion due to traditional biomass use in households, affects the health of women and children particularly (IEA, & OECD, 2006; South Centre, 2008). Keeping the above mentioned issues such as low rate of electrification in rural areas of India and health issues arising from traditional biomass use and the availability of biomass in mind, the Indian government's ministry of new and renewable energy (MNRE) is initiating “National Bioenergy Mission”, which will further support the uptake of bioenergy in India (Jain et al., 2011; Shweta, 2012). In particular small scale bioenergy systems have been increasingly promoted in Indian context because of their decentralised energy production capability, significant benefits to community and its ability to utilise small quantity of biomass resources available in the local area (Hiremath et al., 2010; Kumar et al., 2009). Hence given its need, importance and potential, focus of this paper is on small scale biomass based energy production.

For electric power generation through biomass, availability of appropriate fuels in adequate quantity, mature technologies that match the demand and sustainable business case are necessary (Camerata and Bansal, 2011; Ravindranath and Rao, 2011). Nevertheless studies have identified that in some cases even when technology and feedstock was available and business case for projects was in place, still the bioenergy projects faced resistance due to opposition from the communities (Rohracher et al., 2004; Rosch and Kaltschmitt, 1999; Walter and Gutscher, 2011). If the concerns of communities are not properly addressed it can create a bad perception and insufficient acceptance of bioenergy projects among the communities (Harrison et al., 2011; Rosch and Kaltschmitt, 1999). Hence community acceptance is identified as one of the critical success factors for bioenergy sector in the developed world (Blumer et al., 2013; Buchholz et al., 2009; Cherni et al., 2007; Roos et al., 1999; Rosch and Kaltschmitt, 1999; Thornley et al., 2009; Walter and Gutscher, 2011; Wegener and Kelly, 2008; Wright, 2006).

All the studies reviewed during this work pertain to medium to large size plants. Some of these studies state that small scale bioenergy plants could be viewed positively by local communities (Dockerty et al., 2012; Rohracher et al., 2004; Upham, 2006; Walter and Gutscher, 2011) and this can even help to create a positive image about the medium or large applications as well (Rohracher et al., 2004). In small scale bioenergy systems, local communities can be a highly dominant stakeholder group because they can hold multiple roles in the project such as energy consumers and biomass suppliers. Therefore given the scope for small scale bioenergy systems and limited research in this area, there is a need for further investigations on the role of community in this sector. In addition to that Walter and Gutscher (2011) and Upham (2006) argue that local context has a huge influence over public perceptions towards bioenergy projects. Level of energy security can be one of the important contextual factors. Therefore, perceptions of community towards bioenergy projects under energy deprived conditions as in some parts of India, can be significantly different from that in other developed countries and such a difference provides an interesting setting to study.

The significant role of community in sustainable bioenergy projects in India has been recognised in the following studies.

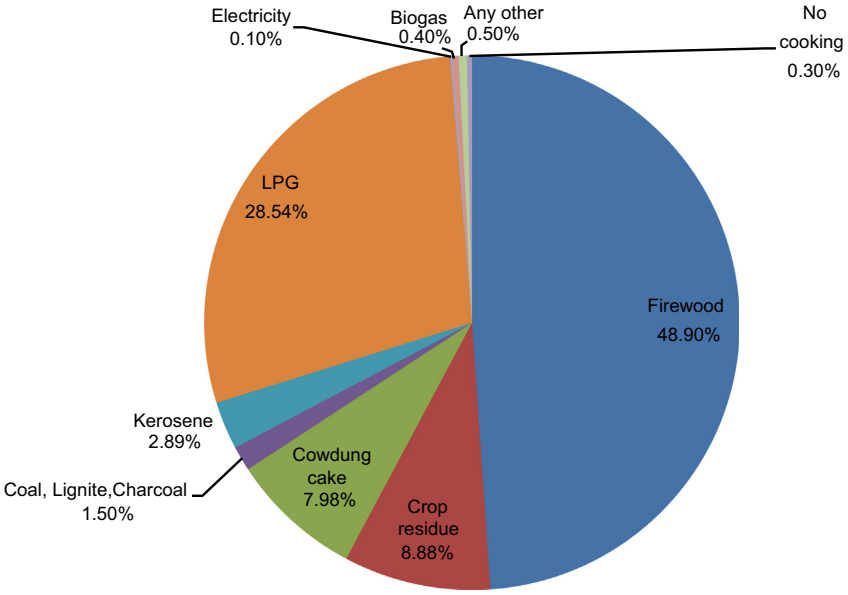

Fig. 1. Various fuels used for cooking in India.