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Analysis of Social Acceptability and Impact of Biogas Energy in Pakistan (A Study of District Faisalabad)

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ABSTRACT

Biogas energy is one of the feasible options for Pakistan's future sustainable energy needs. Biogas systems have been installed for nearly two or three decades, but due to relatively high costs, significant market penetration has not been achieved in much of Pakistan. While there are some ambitious targets to increase the share of biogas technology implemented in different Pakistani provinces, there is a growing recognition that social acceptance and impact may constitute a factor that constrains its implementation and its expansion. Objective of the study is to assess the social acceptability and impact of biogas technology in Pakistan. In order to investigate the social perspective of biogas technology we conduct a survey in Pakistan (Faisalabad District), a multi-choice questionnaire was designed and divided into three groups: (i) biogas background information, (ii) Social acceptance of biogas technology (awareness and willingness to invest in biogas energy) and (iii) Social impact of biogas energy. The answer shows that 20.52% of respondents are willing to pay extra money (up to 50%) to get biogas energy. 81.27% of respondents said that by installing new plant numerous job opportunities has created and 50.86% respondents agreed biogas plants contribute to the country economy. About 70.35% of respondents are aware that biogas energy can improve public health. More than 69.72% of respondents think that government departments should take the first step in biogas power generation. Similarly, in the eyes of respondents, the government sector should take the initiative to implement biogas technology and provide subsidies and incentives to encourage people, especially villagers, to install biogas plants at Agri farms.
KEYWORDS: Biogas Energy; Social Acceptance; Social Impact; Economy; Public Health

INTRODUCTION

Energy is considered the lifeline of any economy and the most important tool for a country's socio-economic development. Energy is of great importance to all activities in daily life. That is why energy shortages have a serious social impact on people's lives and the economy of the country. That is why it is considered the most fundamental right of the people. Pakistan's energy infrastructure is imperfect, but it is considered underdeveloped and mismanaged. Pakistan is currently facing a serious energy crisis. With the increasing awareness of energy, we have also started to study the fundamental changes in the development of new energy sources such as coal in the 19th century and oil in the 20th century in Europe and the fundamental changes in society. We have fundamentally reshaped our system and social structure as a nation (Khalid, 2003).
Biogas is the product of bacterial activity during the biodegradation of organic matter under anaerobic conditions, and it produces to a large extent small quantities of flammable gases (methane) and other gases such as carbon dioxide (CO_2), hydrogen sulfide (H_2S) and water vapour, Environmental friendliness coupled with the import of fossil fuels, the rising price of hydropower energy, limited and tilted grid distribution in rural areas, limited forest reserves for firewood and charcoal (TDBP, 2009) make biogas technology the best alternative (Homlish, 2004)

Socially recognized biogas is considered as an important issue for the widespread application of renewable energy technologies and the achievement of energy policy objectives. In addition, it is generally agreed that there is a need to change “social attitudes” and to make the implementation of biogas technology more radical (Robert, 2005).

There are several indicators that can be used to measure social acceptability and impact in a given context. These include participants, socio-economic background, age group, political beliefs, attitudes and behaviours. In addition, usefulness, intent, facilitation, cost, trust, location, and participant's stance on biogas energy all play a crucial role (Jaffrelot, 2006).

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Rural development involves a wide range of farm and non-farm activities within rural areas and small towns. Like many developing countries, Tanzania's energy problems are related to the development of rural areas, where most of the population live. Biomass energy comes from natural forests and plantations, accounting for 94% of the total energy consumption in the country and has a significant impact on the progress of environmental degradation (Kurhor, 2009).
The majority (74.99%) of the population live in rural areas and only 3.01% have access to electricity. Reasons for this include high installation and operation costs, unstable availability, political disruption and inefficient operations. This low-channel power puts additional pressure on kerosene, diesel, dry-cell, biogas, solar, wind and other available energy sources such as renewable energy. Because of the availability of raw matrices (matrices) in rural biogas digesters, biogas can be offset by a correct combination as biogas mainly produces energy suitable for cooking and lighting (Orgam, 2010).

The study of public perceptions that sought to different forms of energy technologies and their effects produced a rather complex set of findings, in part because of the nature of the issues raised. In addition, while individuals are aware of different sources of energy, the results show that the deeper understanding of these sources varies widely and the terminology that experts use to refer to different kinds of fuels or resources is not always well-known. (Mooren, 2013).

Objectives of the Study
Particular goals of the study are as under:

- To discover the socio financial characteristics of the respondents.
- To know the energy needs and problems of people
- To access the social acceptability of biogas energy.
- To find out the impacts of biogas technology on society.
- To suggest some measures to tackle the issue.

Theoretical Overview
Semeth, (2010) a series of potential interpretations can be identified at three levels of analysis. These include individuals (age, gender, class, and income), social psychology (knowledge and direct experience, perceived impact, environmental and political beliefs, local attachment) and background.
Wilson, (2012) In the UK, some regional surveys have found that older respondents are more aware of and opposed to renewable energy. In contrast, a national study conducted there compared with middle-aged respondents (35-44 and 55-64) found that both young and old (16-24 and older) of the cognitive level and the level of opposition is low. Support for nuclear energy appears to be age-related, and older people are more supportive of young people than younger people.
Temerson, (2013) In the case of the social strata, the level of income-class and support for renewable energy and nuclear power appears to be positively correlated. Also in Finland, recent research shows that men and high-income earners are more supportive of nuclear power. Although some studies suggest that the negative perception of renewable energy is due to a lack of knowledge and public understanding, there is limited evidence that more insiders are embracing renewable energy technologies.
Greogory, (2015) Empirical evidence from the United Kingdom shows that political beliefs are associated with social acceptance of different low-carbon technologies. Pointed out that 37% of the Conservatives support new nuclear power plants (compared with only 12% of labour supporters and 14% of liberal democrats), while the development of new renewable energy sources Support is not large 62%, 86% and 84% respectively). Likewise, in Finland, the Greens and left coalition voters have been opposed to nuclear energy not to those who vote for other parties.

METHODOLOGY OF THE STUDY

In order to measure social awareness and impact of biogas technology, certain procedures and steps were designed starting from the selection of population and sample to the data analysis. A study of cross sectional survey was conducted to discover the research objectives and reliability of the whole dynamics of the research. In order to ensure an effective study researcher used quantitative research design. There was multi stage examining strategy utilized for information accumulation. At the 1st stage I was chosen three Tehsil of Faisalabad, Punjab, Pakistan (Faisalabad, Samundri and Tandlianwala) through simple random sampling technique. At 2nd stage 162 respondents were selected in each Tehsil by using convenient sampling technique. The information was collected with the assistance of interview schedule, consisting of an arrangement of inquiries Which Were Asked from the Respondents by meetings in personal circumstance questions that could be seen in the following sections. Section 1 of the survey is for background information on all respondents, (age group, occupation / Profession and city location). Section 2, in this section, asks for information on whether

biogas technology are acceptable (to measure biogas awareness and willingness to invest in biogas energy) in Pakistan. Section 3 of the survey was asked about the social impact of biogas technology in Pakistan.

The Collected information was analyzed by utilizing SPSS (Statistical Package for Social Sciences). Expressive (recurrence, rate) and inferential (chi-square and gamma) was connected factual systems for information examination.

RESULTS

(Section 1) Background Information

The respondent's recruits were surveyed from different age groups. However, participants for the study were divided into four age groups (15–20, 21–35, 36–50 and 51-65). A total number of 162 people responded to the survey, 29 from (15 to 20), 71 people from (21 to 35), 37 people from (36 to 50) and 25 people from (50 to 65). These age groups are specifically chosen to understand the role of age conditions in the social acceptability and impact of biogas energy. Most participants are agriculturist (54.70%), the second largest group of participants were students (26.43%), some of participants were employed (13.82%) and few of participants were unemployed (5.05%). The survey represents 48.76% of respondents from Faisalabad city, 40.74% from Samundri city while the remaining 10.49% of them from the Tandlianwala city.

Results of this study are lying very close to the research conducted by Greogary (2015).Tube Biogas Production Technology. In Profession/occupations of the interviewees, most of the respondents came from agriculture groups. This is important because biogas technology mainly involves the agricultural sector. More generally, respondents' employment, unemployment and student status seem to be positively related to income and support for different biogas technology. All the results of the above mentioned indicators are very close the study conducted by Mooren (2013), societal acceptance of wind farms: *analysis of four common themes across Australian case studies. S*ocio-economic profiles of the respondents are clearly reflect the poor picture of the residents of the tehsil Sumandari and Tandlianwala from district Faisalabad, Pakistan, which means that they are bound to use wood as a fuel, very dangerous for the health of the women as well as for the children

(Section 2) Acceptability (Awareness and Willingness) of Biogas Energy

Knowledge about biogas energy was also probed and this question tested respondents' knowledge of biogas energy. About 91.18% of respondents are aware of biogas energy. However, 8.82% of the respondents did not know about biogas energy. In the response towards the important of biogas energy for social human beings was very impressive. Here, results shows that 59.05% of respondents think "very important", 31.19% are "average" and 9.76% do not understand the importance of biogas energy. Who should take the first step in biogas energy production? 69.72% of respondents think this is the responsibility of government departments. While 27.98% of respondents think this is the responsibility of private energy producers, while 2.30% of respondents think other energy distributors or production in homes at local level. 51.49% of respondents think this is very important, while 43.57% of respondents mean on average, 4.94% of respondents do not know the importance of local biogas production. It is worth noting that people / communities refuse biogas plants in their house backyards or Agriculture farms. Therefore, researcher has developed this question to understand how many people make these as part of their farm or backyard. Most of the answers were interestingly divided into "YES" by 54.78% of respondents and 37.21% of respondents refused to install a biogas plant in their backyard. However, "may be 8.01% of respondents." So we can see that many people do accept them as part of their everyday routine.

On this issue, 73.01% of the respondents are willing to pay an additional cost of up to 15%, 20.52% are willing to pay up to 50% extra cost, and about 6.47% are willing to pay up to 100% extra cost. In these answers, we clearly see a marked change in opinion. However, they may not have the real resources to invest in biogas energy. Generally, everyone really wants to use the cheapest option. The government must work to establish a cost-effective business model that parallels today's energy costs. To overcome the cost barrier, biogas energy recovery is likely to increase among people of villages in Punjab Province of Pakistan.

Results of the study are close in line with the results of the study done by Khalid (2003) that people are very interested to avail this facility and get benefits because this is very cheaper alternative of the gas. Moreover, community are interested to get awareness about the Bio gas, its production and its utilization. Temerson (2013) made a comprehensive research on Reconsidering public acceptance of renewable energy technologies, and the results of this study also favouring the researcher's results of the current results.

(Section 3) Social Impacts of Biogas Energy

81.27% of respondents think that by installing new plant numerous job opportunities has created, whereas 15.80% respondents think opposite to it and 2.93% people don't know about it. The results show that as more jobs are created by the development and operation of biogas energy plants, more people are able to find jobs and more people will have the money to contribute to the country's economy. Yes by 50.86% of respondents and 7.19% of respondents refused that technology means they think that biogas do no contribute in country

economy. “May be” answer given by 41.95% of respondents. The energy generated by biogas power generation is very small air pollution, so biogas combustion is cleaner than fossil fuels. The villages or areas that decide to use biogas to generate electricity will thus enjoy cleaner air quality in the area and thus make people and workers in healthier areas. About 70.35% of respondents are aware that biogas energy can improve public health and 29.65% of respondents refused it.

This research reliability is more prominent because the results of this study are very similarly to the research conducted by Wilson (2012). In Wilson’s research “Exploring domestic energy-saving: the role of environmental concern and background variables” social impact of the Bio gas was clearly focused. Homlish (2009), conducted research on social acceptance of bio gas, and the results of this study were very similar to the current research. When governments or private companies decide to build and operate biogas projects, these projects often help create significant employment opportunities. Workers need to plan projects to develop and implement these projects; this will help reduce the unemployment rate in specific regions.

DISCUSSIONS

Energy is very important for all the activities in daily life. Energy is considered the lifeline of any economy and the most important tool of a country's socio-economic development. Energy is the source and control of all things, all values and all human and natural behaviour. Biogas energy is one of the viable options for Pakistan's future sustainable energy needs. The current biogas market is growing rapidly, with an average annual compound growth rate of 9.20%. Biogas systems have been installed for nearly two or three decades, but due to the relatively high cost, significant market penetration has not yet been achieved in most parts of Pakistan. In addition to the quantitative results, personal circumstances vary from interview to interview. Middle-aged people (aged 21-35), for example, are more conscious of the concept of biogas technology and are more concerned with the environmental issues in Pakistan and the development of biogas technology in response to the questionnaire. The results show that there is a certain difference between the level of public understanding of biogas energy and its social impact and its level of understanding, with 91.18% of the respondents having an understanding of biogas energy. Based on quantitative analysis can come to some qualitative conclusions. The results show that the understanding of biogas technology more profound differences significantly. About 59.05% of respondents recognized that the current development of biogas technology is very important. About 54.78% of respondents are willing to take practical measures to develop biogas energy, such as installing biogas plants or their Agricultural farms or in their backyards. The results also showed that all respondents were willing to pay extra for biogas, 6.47% paid up to 100% additional cost, 20.52% paid up to 50% additional cost and 73.01% paid up to 15% % Extra cost. However, they showed a mixed acceptance of locally produced biogas. 50.86% of respondents think biogas can create huge employment opportunities for the national economy. 70.35% of respondents think biogas plants emit little pollution and they help to improve public health. In this regard, knowledge, perception, fear and political beliefs relate to social acceptance. A large number of respondents (69.72%) think that the public sector should take the first step toward biogas energy production. In the long run, increased use of biogas technology will not only benefit the environment, but also the national economy and reliance on foreign fossil fuels will be minimized.

CONCLUSION

The objective of this study is to understand the acceptability and social impact of biogas technology in Pakistan (District Faisalabad). It is concluded that people of Pakistan have higher expectations of biogas energy production in the public sector. The relationship between Pakistani people's expectations and government expectations is important for taking some action to build confidence in biogas energy technologies and their application in the real world. This step therefore enables us to understand the public's knowledge, perceptions and trust in public responses to biogas energy issues and their social impact. Most biogas users are very satisfied with biogas technology. However, in some cases, the number of user complaints due to inadequate biogas production, poor equipment quality and poor construction was identified as a major challenge. In addition to all these challenges, biogas systems remain the best alternative farm energy that Pakistan's rural areas can easily access and get benefit from it. The government will play a very important role in promoting the development of biogas energy and this concept will soon be developed into a viable solution.

In short, the general public does not have the same perspective on biogas technology issues as energy technologist do. In order to develop biogas energy, future work needs to provide insight into the importance of using existing biogas technologies and to consider all variables related to the social acceptability and social impact of biogas energy.

Recommendations

- Some positive steps can be taken at the start of biogas projects as societies accept not only the bilateral relationship between local communities and biogas energy projects but also the wider social norms, social and political structures.
- Mass media and print media play an important role in raising community awareness of the benefits of biogas energy, and biogas technology is easily accessible and affordable.
- The promotion of this technology; initiatives to attract public-private partnerships, which will help to achieve success.
- Support research and development of effective technology solutions. Energy-efficient use of biogas for production should be the key criterion for environmental permitting and financial support systems.
- The government should take steps to broaden the youth environmental protection and biogas technology horizons.

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