Analytical Study of Renewable Energy Technologies in Vaishali District of Bihar- Schemes, Barriers and Future Scope

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Abstract. Present paper deals with the current status of the renewable energy in the city of Vaishali, Bihar, a state of India. Although India has adopted several renewable energy technologies but the majority of people residing in the country are unaware of this emerging environment friendly technology which is composed of large renewable energy based power plants but due to lack of awareness in people, its usage is very limited. There are several government sponsor schemes and subsidies provided by the government of India.

Keywords: Renewable energy; pollution; economic growth; consumption.

1. INTRODUCTION

Lexically, the word ‘energy’ has multiple meanings with respect to different fields. Energy can be defined as the capacity to do work and we all are fully depended on it to perform our daily chores [1]. It is found in variety of forms on our planet, like in the machines, factories, rivers, the smart-phones, remote controlled devices as well as inside ‘the human body’. Energy can be defined in number of ways. Scientifically, energy may exist in form of potential, kinetic, thermal, nuclear and electrical energy etc. In physics, energy is the property that must be transferred to an object in order to perform work on, or to heat the object. In the International system of units (SI), energy is measured in Joules (J). According to the law of conservation of energy “Energy can neither be created nor destroyed but can be converted from one form to another”. Energy can never be lost; it only changes its form from one to another [2].

With the advancement of modern science and mathematics, there are several possible definitions, but one that is perhaps the easiest to put into words is that “energy is the quantity that becomes a constant of the motion (i.e. a conserved quantity) if a system is invariant under time translation (i.e. it is governed by laws that are same today as they were yesterday and will be the same tomorrow)”.

Energy is always very closely linked to the economic growth and development of the century. Present strategies for development have focused on rapid economic growth have required energy utilization as their index for economic development [3]. This index, however does not take into...
account the long term ill effects on society of excessive energy utilization from almost 200 years which was the primary source of energy as it fuelled the industrial revolution in the 19th century. At the close of the 20th century, oil accounts 39% of the world’s commercial energy consumption, followed by coal (24%) and natural gases (24%) with nuclear (7%) and hydro/renewable (6%). However, energy plays an important role in all the aspects of life. It has been said that “date is an ultimate lie”, considering the human body as a system and our soul as energy [4].

Energy can be simply categorized into two forms as a Renewable and Non-Renewable sources of energy. In many countries, mostly the energy used for doing work are nonrenewable sources of energy which includes petrol, nuclear energy, coal, natural gas etc [5]. These energy sources are called non-renewable because their supplies are limited to the amounts that we can mine or extract from the earth. Coal, natural gases and petroleum are formed over thousands of years from the buried remains of ancient sea plants and animals which have lived millions of years ago and that is why we call these energy resources as fossil fuels.

On the other hand, the renewable resources of energy are those energy sources that can be naturally replenished. The major type of energy resources are Solar energy (generated from the sun), Hydro power (generated from flowing water), Biomass (generated from plants), Geo thermal energy (generated from heat inside the Earth) and Wind energy (generated from winds). Throughout most of the human history, biomass energy from plants was the main energy source. Non-renewable sources begin replacing most of renewable sources in the early 1800’s and by the 1900’s, fossil fuels were the main source of energy. In the mid 1980’s the use of renewable energy sources began on a large scale because of the incentives for their use, especially for the generation of electricity [6].

All energy sources like fossil fuels – coal, oil and natural gas have some negative impact on our environment and substantially cause much harm to the atmosphere including air and water pollution, damage of public health, wild life and habitat loss, water use, land use including global warming emission [7]. On the other hand, renewable sources such as wind, solar, geo-thermal, bio-mass and hydropower also have environment impacts but most of them are insignificant. The exact type and intensity of environmental impact depends on the specific technology used like the geographic location and a number of other factors. By understanding the current and potential environmental issues associated with renewable energy sources, we can take steps to effectively avoid and minimize these impacts as they become a larger portion of our electric supply for further use [8-9].

2. DISCUSSION

Bihar is the country’s less develop state and there is a lot of possibilities for development in the state. The development always derived by the power and there is a huge opportunity in the development of non-conventional energy resources. Vaishali is a district in the Bihar state of India which has ancient roots in the history. The district has headquarters at Hajipur and agricultural as a main source of income. The present survey was conducted in the throughout Vaishali district from both Vaishali urban district and Vaishali rural district) and around two hundred response had been recorded for the survey of renewable energy. Approximately 63.6% respondents are from urban Vaishali while other 36.4% respondents are from the rural Vaishali. The 7.3% of the respondents are under the age of 18 years, the 87.3% of the respondents are between the age of 18 to 25 years, the 2.4% of the respondents are between the age of 26 to 35 years, the rest 3.0% of the respondents are between the age of 35 to 45 years and there is no respondent above the age of 45 years. It has been noted that the maximum percentage of the responders are young and they are ready to adopt the new technologies.
Fig 1: Educational level of the responders of the survey

In the survey as presented in Fig 1, the 77.4% of the respondents have attained education from university or college, the 14.5% of the respondents are educated from secondary school, the 6.5% of the respondents have no education while remaining have polytechnic education. The educational sub type of the university or college responders of the survey in Fig 2 is define as the 83.6% of the respondents are from the science (including mathematics) background, the 6.2% of the respondents are from the arts background, the 2.9% of the respondents are from the commerce and business background and the rest 7.3% of the respondents are from other backgrounds. The responders of the survey are educated and have certain knowledge about the different renewable energy technologies such as solar, wind energy etc.

Fig 2: Educational sub type of university or college responders of the survey

Fig 3: Knowledge about the renewable energy

As presented in the above Fig 3, the 92.7% respondents are aware about the renewable energy, its impact and uses but around 7.3% of the respondents are still not aware about the renewable energy. As mentioned in the above Fig 4, the 56.4% respondents are environmentally conscious and familiar, while the 23.6% respondents are not much familiar about the renewable energy and rest 20% of the respondents have insufficient knowledge regarding renewable energy.

Fig 4: Environment conscious among responders

Fig 5: Awareness of the respondent towards the type of renewable energy

Fig 6: Awareness and support of the respondent towards the hybrid technology automotive vehicle

As presented in the above Fig 6, the 80.4% respondents support the use of hybrid technology automotive vehicles, while around 19.6% of the respondents are not much aware about the hybrid technology vehicles and rest 9.6% of the respondents have insufficient knowledge regarding the hybrid technology vehicles.
As presented in the above Fig 5, the 63.6% respondents are familiar with solar energy, 7.3% respondents are familiar with solar wind energy, 1.8% respondents are familiar with hydro energy, 1.7% respondents are familiar with wind energy and 25.5% of the respondents are aware about all types of energies. As mentioned in the above Fig 6, 80.4% of the respondents are familiar with hybrid technology of automotive vehicles while 19.6% respondents are not familiar with hybrid technology of automotive vehicle.

As presented in the above Fig 7, 89.3% of the respondents are in support of the Electric Vehicle (EV) which is powered by battery in Vaishali, 7.1% of the respondents are not sure about this while 3.6% do not know about this technology. Also only 91.1% of the respondents are aware about the pollution caused by the automotive vehicle while remaining 8.9% are still not aware by the destruction caused to the environment by these vehicles as shown in the Fig 8.

Fig 7 : Awareness and support of the respondent towards the hybrid technology automotive vehicle

Fig 8 : Awareness and support of the respondent towards the impact of pollution by automotive

Fig 9 : Size of the house and utilization of electricity

Fig 10 : Power consumption of the responders

Fig 11 : Barrier to renewable energy developments

Fig 12 : Issue with the pollution in daily life
As presented in the Fig 9, 46.7% of the respondents live in a 3BHK house, 16.7% of the respondents live in a 2BHK house, 5% of the respondents live in a 1BHK house, 11.7% of the respondents live in a villa while the rest 18.3% of the respondents live in a hut. As presented in Fig 10, 35% of the respondents have utilization of less than 200 unit of electricity at their home while 50% consume electricity of 201 unit to 500 unit. The rest of the responders in the survey have higher consumptions of electricity in the home.

As mentioned in Fig 11, the 37.1% respondents consider unfavorable energy sectors policies, the 9.7% respondents consider unfavorable costs, subsidies and energy prices, the 9.7% respondents consider inadequate financing, the 8.1% respondents consider limited financial information, the 22.6% respondents consider lack of awareness, the 3.3% respondents consider lack of access of technology, the 3.4% respondents consider lack of cost benefit valuation, the 3.3% respondents consider lack of social acceptance while remaining 2.8% limited involvement of private sectors. As mentioned in Fig 12, 87.1% of the respondents consider pollution as a big issue in the future, the 6.5% of the respondents are not sure about pollution as a big issue in the future while remaining the 6.4% of the respondents do not consider pollution as a big issue in the future.

As presented in Fig 13, 21% of the respondents strongly agree that state and central government start new project increase level of awareness among the citizens, the 53.2% of the respondents partially agree about this, the 14.5% of the respondents do not have any opinion about this while remaining 11.3% of the respondents have no opinion about this. From Fig 14, 38.7% of the respondents consider that state government is responsible for cleaning up the environment, 19.4% of the respondents consider that central government is responsible, 32.3% of the respondents consider that general public is responsible, the 8.1% of the respondents consider that local medium to small enterprises are responsible while remaining consider that local large-scale enterprises are responsible.
As presented in Fig 15, the 38.7% of the respondents consider that state government is responsible for cleaning up the environment, the 19.4% of the respondents consider that central government is responsible, the 32.3% of the respondents consider that general public is responsible, the 8.1% of the respondents consider that local medium to small enterprises are responsible while remaining consider that local large scale enterprises are responsible. As presented in Fig 16, 25.8% of the respondents strongly agree that coal will run out within the next 110 years, and gas within the next 54 years, the 24.2% of the respondents also agree to this, the 25.8% of the respondents say yes to this while the remaining 24.2% of the respondents have no opinion regarding this.

3. CONCLUSION

It has become a necessity for the upcoming generation to inculcate awareness regarding the renewable resources of energy and for this the state as well as the central government must make policies to implement these topics at a basic school level. All academic institutions in India must take steps to introduce the need of renewable energy resources in their curriculum. Focusing upon the rural population as the majority of Indian reside in there, advertising campaigns must be initiated by the government to spread awareness among them. Keeping in mind the major drawbacks of non-renewable energy resources such as its as adverse effects on environment like air and water pollution, one must switch to renewable energy resources which are environment friendly and abundantly available in nature. The energy produced by the sun per second is sufficient to sustain the Earth’s need for over 500,000 years and this is only possible if techniques to generate energy from these resources are implemented on a large scale and the people are aware regarding the beneficial outcomes of the usage of renewable energy. The electricity can be accessed in an eco-friendly manner by using the renewable energy resources especially in the rural areas where the problem of electricity shortage still dwells and thus benefitting the people as well as the farmers who require electricity for large scale irrigations because agriculture is the main occupation in there. The need to inculcate awareness regarding the benefits of renewable energy and the subsidy schemes provided on it by the government and several steps must be taken in order to do so. Apart from this the Non Governmental Organizations must also take initiatives especially in the rural areas in order to spread awareness.

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