Economic Benefits And Pollution Reduction From Wind Plants In India

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Abstract- *Energy and Resources are the top most important factors that defining the economic growth and social expansion of any country. In India, fossil fuels were obtained electricity which were limited and increases the greenhouse effect because of the emissions of carbon and other harmful pollutants on the atmosphere. So, there is a need to generate environment friendly power at reasonable cost. India is moving on the way to a trend of producing power from renewable resources mainly Wind energy production for its fairly harmless and optimistic eco-friendly characteristics. Today, it is turned into a multibillion dollar industry because of the availability of high wind resource. This paper aims to study the economic benefits and the pollution reduction from windmill plants in India.*

Keywords- economic, windmill, pollution, resources, electricity. power

I. INTRODUCTION

Energy is the vital feature accountable for both industrial and agricultural growth and it has to be conserved in a most effective way. Import of fuel products establishes a major drain on nation's foreign exchange reserve. Renewable sources are considered to be the better choice to face these challenges. The use of renewable energy to face the energy demands has been gradually growing for the past few years. There have been some studies of the effect on emission of dangerous pollutants. This list would include Sulphur Dioxide (SO2), Nitrous Oxides (NOX), and Carbon Dioxide (CO2). The first two pollutants have long been known to have harmful effect on human fitness, as there have been a massive number of studies investigating the relationships. Wind energy can create a significant support to the goal of decreasing emissions of CO2. Thus, with the world fetching ever more conscious of the impacts of carbon and other contamination emissions on our world, the concern of whether or not wind will be capable to provide the country with clean electrical energy is at the forefront of many thoughts. Much of the investigation in the range of wind power generation inclines to attention on issues such as the inspection of the wind resource, cost of production, the maximum quantity of current that wind power may be able to deliver, and the potential conservational impact to environment, and so forth.

As a result of continuous industrial growth clubbed with reduction of fossil fuels and evolving environmental awareness, the demands for substitute energy resources have been growing exponentially in the 21st century. With increasing demand for energy, growing environmental pollution, and draining energy sources, human society today faces several challenges of change over on the way to a sustainable growth and the scarceness eradication. In emerging economies clean and energy-efficient tools can donate to sustainable development and energy security. Being are asonable and clean energy source, wind energy is among the world's fastest developing renewable energy forms. The challenge for India at present is rapid adoption of renewable energy sources to power increasing economy at a price that users can afford and on a scale large sufficient to create a major dent in scarcities. India has added large-scale conventional power resources, as request for power has developed since decades. Nowadays there are substitute options available in the form of wind power technologies and renewable energy (RE) resources have become commercially existing in the marketplace. This has added additional options for policymakers who are concerned with the technical, economic, and environmental characteristics of a future power system that keeps pace with economic growth.

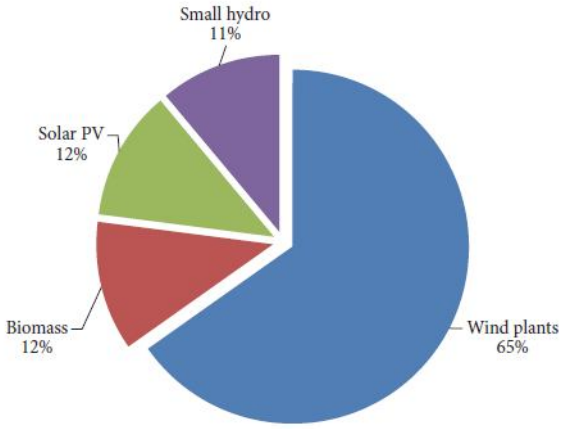

FIGURE 1: Grid interactive power generation.

II. RENEWABLE ENERGY IN POWER SECTOR

India with over 1.27 billion population is the seventh largest geography and today ranks fourth among high energy consuming countries in the world. In the past three decades total primary energy consumption has increased manifold from 18MTOE (in 1980) to 104 MTOE (2011) in India. Also, with the growing economy, the dependence of energy has increased magnanimously due to growing industrialization and the impetus given to infrastructure development. India is importing 79%of the petroleum it needs and has been heavily relying on imported coal. Therefore it is necessary now that India looks for domestic sources of energy .India's renewable energy potential is very vast and most of it remains untapped. According to recent estimates solar potential is greater than 10,000GWfor India and wind potential could be higher than 2,000GW. The percentage distribution of grid interactive RE power generation is presented in Figure 1.

To completely utilize the large energy potential, India requires new initiatives from both state and union governments. These new initiatives should be beyond existing policies and programs .Renewable energy contributes about 13% of the total power generation in India and this contribution is slowly increasing. Grid interactive power generating plants from RE sources constitute 38821MWwith the major share of wind energy plants (25088MW) followed by biomass/bagasse cogeneration plants (4688MW), solar photovoltaic (4879MW), and small hydro (4177MW). Municipal solid wastes accounts for a very small fraction in power generation [MNRE].

India's overall energy potential is more than the current total energy consumption India's renewable energy programme is the biggest and most extensive. The Government of India is committed to provide a conducive environment for harnessing offshore wind energy in India. The Government envisions carrying forward the development of offshore wind energy in the country, to overcome the existing barriers and to create technological and implementation capabilities within the country. The broad vision behind the integrated energy policy is to meet the demand for energy services of all sectors. The Ministry of New & Renewable Energy (MNRE), Government of India, has set a target of achieving overall renewable energy installed capacity of 41,400 MW by 2017. 2.1. Growth of Wind Energy. Wind energy is a very important contributor in the global power sector today, contributing nearly 4% of overall electricity generation.

This achievement is the result of exponential growth in wind power development across the world, particularly in the last decade. Continued technological development and innovation in design and manufacturing has resulted in large-scale deployment of onshore and offshore projects .Today's modern wind turbines with latest technology have made the wind energy generation into a mainstream electricity generation option. The primary drivers for this development include energy security, climate change, and energy access, while employment and economic development are additional benefits In India, preliminary assessments along the coastline have indicated prospects of development of offshore wind power. With nearly 24GW of wind power capacity India ranks 5th in the world. India also has an ambitious plan of increasing wind energy share in the 12th five-year plan this requires considerable investments in the core sectors including energy. Capacity addition in 2015-16 is expected to be around 4,000MW.

Today, there are nearly 20 plus wind turbine manufacturers in India, with about 52 turbine models certified by the National Institute of Wind Energy (NIWE) which is the nodal agency for wind development for grid connection. In March 2015, renewable energy (RE) sources formed more than 12% of India's total installed capacity. Between 2006 and 2015, the wind industry added between 1500 and 3000MWper annum. The primary reason for this is that for more than a decade now wind technology has been technically and commercially viable in India. Today, wind energy is a key constituent of India's energy basket. Recognizing the immense potential of wind resource, the Indian Government has set a target of installing 60GW of wind by 2022. This implies a quantum jump from the current level of annual deployment. Therefore, the Prime Minister's Council on Climate Change has proposed to induct a National Wind Energy Mission under India's National Action Plan on Climate Change (NAPCC). Even though there is a huge potential for wind energy, there are also many issues to be addressed for exploiting the full potential. Particularly, most regions of India are classified as low wind energy regimes necessitating identification of appropriate models for estimation and realization of potential. Besides, proper site selection, new composite materials for wind turbines, new techniques of manufacturing wind turbines and attractive policy for wind energy, and so forth are the other aspects to be focused on

At present, there are hardly any measures for estimating the performance of the existing wind-mill clusters. In the present research an attempt has been made to address this issue by proposing a quantitative and comprehensive performance index for the analysis of wind-mill clusters. In India the southern state of Tamil Nadu leads in wind energy extraction followed by Maharashtra, Gujarat, and Karnataka. The coastal region (west coast) of the country experiences

high wind speed which ranges from 3 to 5m/s annually. The southern and central part (west coast) experiences higher wind speed during monsoon (June–Sept) which will be more than 5m/s. Estimation shows that the western coast of Karnataka, Tamil Nadu, Kerala, Maharashtra, and Gujarat and plains of Rajasthan, Gujarat, and Karnataka are the ideal places for wind energy harvesting where the annual average wind speed is higher.

III. HEALTH IMPACT

Once the pollution reduction estimates were produced, the next step was to develop an estimate of the projected health impacts of a reduction in pollution. For this portion, the analysis focused on SO2 and NOX, as the health benefits of a CO2 reduction solely from India wind energy would be negligible. The greatest impact from a CO2 reduction would be a projected reduction in climate change in the future. Since the purpose of this study is not to develop a new method of analysis to convert emissions reduction to health impacts, the numbers from the Clear Skies analysis were normalized to the India case to produce an estimate of ratio of deaths, heart attacks, and so forth per ton of Sulfur Dioxide and Nitrous Oxides (although it should be noted that the overwhelming majority of the positive health impact will come from a reduction in the SO2 values, as it is SO2 that has been shown to be the most important from a health standpoint in previous research and so forth.

Current estimates for 2011 are for a reduction of over 1000premature deaths in India. Based on previous research, these deaths are most likely to be associated with respiratory ailments related to inhaling harmful pollutants for an extended period of time. Also for 2011, the estimated health benefits include a reduction of over 2000 hospital visits,500 cases of chronic bronchitis, and 1000 nonfatal heart attacks. these values have more than tripled over the last four years, and clearly illustrate the health Again, there is a notable increase over the last few years, with the values for the out sick variable, for example, changing from just over 25,000 in 2006 to over 90,000 in 2011.

IV. ECONOMIC ANALYSIS

Finally, an attempt was made to examine the potential economic impact of the pollution reduction. This was accomplished in two different ways. the first way was to examine the potential market value of the pollutants the rationale here is that part of a government program to allow a free-market incentive to reduce emissions, pollutants such as CO2, SO2, and NOX can be bought and sold on the open market in a program known as “Cap and Trade”, Spot prices for these commodities can also be found on the respective commodities trading boards and were used to estimate the potential market value of the pollutants should they be allowed to be traded in Asia. Thus, each ton of pollutant has a value associated with it. For example, although the spot price for Carbon Dioxide has varied dramatically, it can be estimated at approximatelyRs.130/ton.

This is split almost evenly between the three pollutants, with SO2 accounting for Rs. 135 crores,NOXRs.120 crores, and CO2 close to Rs.130 crores for 2016. Again, the reader is reminded that for NOX and CO2 no such program is currently in place, but rather these numbers are used as a guide for the potential benefits. A second estimate of the economic benefit associated with the reduced health problems described above was also undertaken. As mentioned above, SO2 is considered the major pollutant for respiratory and other pollution-related ailments. For India this represents a savings of Rs. 65 crores in 2011 and over Rs.240 crores since 2003.

V. CONCLUSION

India’s renewable resource assets place it among the leading states for potentially attracting future development in renewable energy and associated technologies that add value to the resource base. One way to measure the impact of wind energy is to measure the economic impact. In 2010, the economic impact in India was measured as supporting close to 2,00,000direct and indirect jobs, annual property tax payments of over Rs.54 crores and annual land lease payments of over Rs.22crores. Another, less common way to examine the impact is to attempt to measure the environmental, health, and economic impact associated with the reduction of pollution emissions as there is a switch from coal and natural gas to wind as the means to produce electricity in the state. Results show a savings of millions of tons of CO2, SO2, and NOX, with an associated health savings of over 1000 lives, and thousands of reduced cases of nonfatal heart attacks, chronic bronchitis, and hospital admissions. Using numbers estimated by previous methodological studies, these values represent a savings of Rs.60 crores annually. Finally, as mentioned above, DOE looked at ways to ensure that wind energy would meet 30% of the India energy demand by 2030 .In that report, they list India as having an estimated 26 GW of installed wind energy capacity by 2030, which is almost ten times the value reported for 2011, so one can take any of the numbers presented in the analysis here and increase it by an order of magnitude to obtain the projected future benefits of tens of thousands of lives and hundreds of millions of dollars annually. Thus, as we look to the future, the benefits of renewable energy are clear and provide a path to achieve

economic growth along with improved environmental stewardship.

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