

Indian Journey towards a Greener Future -Need, Prospect, Job Potential & Training

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ABSTRACT

This paper presents a discussion on global warming, the most burning issue of human civilization and on green house effect; the very cause of the former. Renewable Energy across the globe is being getting special focus to mitigate global warming. India is also taking a leading role to generate more energy from renewable sources like wind, solar, small hydro etc. Thus the wind energy sector is growing leaps and bounds in this country, creating a huge demand of trained / skilled people to push and sustain the growth. This situation has created a shortage of trained man power. People are to be recruited from other industries and directly from institutes to fill up this gap. This fresh team needs to be made industry ready within shortest possible time to match up the sector growth pace. Thus there is a serious need to carry out social engineering to address the issue. Industry, institutes and government nodal bodies have to join hands and chalk out a long term plan. A brief analysis has been done on this topic and some measures have also been suggested in order to improve up on the prevailing situation.

Index terms: Global Warming, Green House Effect, Human Resource, Training, Wind Energy Sector.

I. INTRODUCTION

Temperature of earth is rising at a continuous rate. Scientists have termed it as 'Global Warming'. In a study it is found that between 1906 and 2005 surface temperature of earth has been increased at a rate of 0.6 °C to 0.9°C on an average. In last 50 years this rate has almost increased to a double fold and moving ahead nonstop [1].

Global Warming is working as a silent killer for our civilization. Across the globe 'think tanks' are raising serious alarm and relentlessly working to counter it; finding out all possible solutions. India has also joined the league and committed to save our planet from this evil. In the 'Climate Summit' held at Paris in November 2016, India targeted to generate 175GW of renewable energy by the year 2022. Out of which 60GW will be from wind [2].

Renewable Energy is also popularly known as 'Clean Energy' or 'Green Energy' and in comparison to fossil fuel burning it has negligible negative impact on the eco system. It doesn't consume any natural resources. Therefore, it can be considered as a gift from the Mother Nature.

As on September, 2017 renewable energy (wind, solar & small hydro) is shearing 18 % of countries total power generation. Out of this about 9.8% is being generated from wind [3]. Thus, wind energy is playing a very promising role in country's journey towards creating sustainable cum renewable energy power bank and the present research will revolve around this (wind) Energy sector of India.

II. GLOBAL WARMING

What is causing global warming is also very interesting to understand. It is the progress of our human civilization itself. In the run of social and industrial progress we are burning fossil fuels such as, gasoline, diesel, coal etc. in an uncontrolled manner, in order to operate power plant engines, to drive vehicles, running our offices, industries, establishments and households. This uncontrolled usage of fossil fuels is generating green house gasses in a continuous incremental proportions completely throwing earth's environmental eco system out of gear.

Whole world, including India is highly dependent on fossil fuel for its day to day energy requirement. As on date 52.16% of India's energy requirement is being fulfilled by fossil fuels [3]. As per World Bank data, (2014), 80.8% of world's energy consumption is coming from fossil fuel. Developed countries like USA & UK are using fossil fuel more than 80% for their total energy requirement. Denmark a pioneering country for the development of wind energy is also consuming 65.7% fossil fuel energy [4]. These figures are alarming and calls for serious remedial actions.

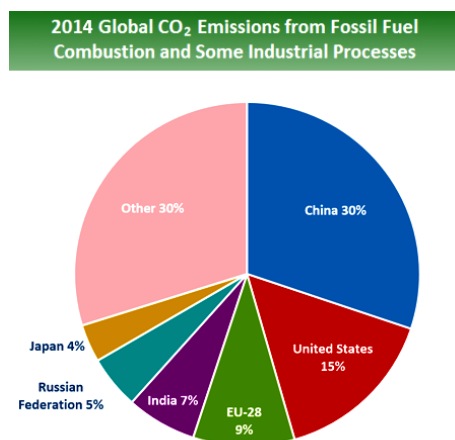
Moreover, countries like India and China are in the phase of rapid growth and are in demand of huge energy to support the growth. Simply speaking, 'when car ownership per 100 inhabitants in India and China, with a combined population of 2.6 billion, reaches the levels of the USA and European Union, the greenhouse will intensify significantly and global warming will accelerate' [5]. So, it is high time now that India work sincerely to save its environment and contribute in

controlling global warming. Incremental shifting towards Renewable Energy, replacing energy generated from fossil fuels is the only alternative.

III. GREEN HOUSE EFFECT

When gasses like Carbon Dioxide, Methane and other green house gasses forms an invisible shield over the earth's atmosphere, it returns some portion of heat waves back to earth making it warm. More it returns more is the temperature rise on earth and this is going on now. Interestingly, life on earth is dependent on a natural green house system and no life on earth was possible without it as it maintains an inhabitable surface temperature on earth [5]. Then, why this green house effect is detrimental to world's environmental eco system? It is because it causes increase in earth's temperature beyond comfort level. One of many adverse impact of this is, it in turn melts the polar ice and increase mean sea level & may engulf low lying lands of many countries like USA, Bangladesh, and Netherlands etc. According to an estimate in 2014, the top carbon dioxide (CO₂) emitters were China, USA, EU, India, the Russian Federation, and Japan (ref.fig.1). These data include CO₂ emissions from fossil fuel burning, manufacturing activities like cement and gas flaring. Together, these sources contribute to a sizable proportion of total CO₂ emissions globally.

Figure: 1



(Boden, T.A., Marland, G., and Andres, R.J., 2017)

Economic sector wise break down of green house gas emission is as under:

- Electricity & Heat production: 25%.
- Industry: 21%.
- Agriculture, Deforestation etc.:4%.
- Transportation: 14%.
- Use in Buildings: 6%.
- Other Energy: 10% [6].

IV. WIND ENERGY POTENTIAL

Within the premises of renewable energy, wind energy is drawing considerable attention from the experts worldwide. Total wind energy potential of the globe is probably unlimited because of continuous technological development. In India, present estimate says about 302 GW at a Hub height of 100M [7].This is far more than earlier estimation of 49GW at 50M Hub height and 103GW at 80M Hub height[7].

MNRE (2015) cite that: 'Renewable Energy offers opportunity to contribute to social and economic development, energy access, secure energy supply, climate change mitigation, and the reduction of negative environmental and health impacts' and mention it as one of the driver for the energy generation business.

Progress of wind energy industry was not smooth sailing in recent past. It had to face the challenges of blame of adversely affecting the social and cultural environment globally. Perception of people and even many scientists were not in favor of wind parks. They thought that the rotating windmill shadows impairs human vision, whistling sound from blades impacts human psychology, it may hit the flying birds, and deter the monsoon cloud thus may reduce growth of crops, so on and so forth [8].However, this industry is growing high addressing and balancing all such social issues.

V. INDIAN SCENARIO

Wind Energy journey of India has begun late fifties and early sixties in the southern region of the country. Importing windmills from Europe along with the drive of developing new designs had been made, but that effort did not sustain for long [9]. The second phase of development has begun in nineties and further growth in real term has been seen from 1998 and continuing.

As on December, 2016, worldwide installed capacity of wind power reached approx. 487 GW. Out of that, China (168.69 GW), USA (82.184 GW), Germany (50.018 GW) are ahead of our country. India is in fourth position (28.7 GW) just ahead of Spain (23.7 GW) [10].

Table: 1
World Wind Power Installation (as on 2016)

(Compiled from NIWE, 2017 and GWEC, 2017)

Country	Total Capacity 2016 [GW]	Total Capacity 2015 [GW]	Total Capacity 2014 [GW]	Total Capacity 2013 [GW]
China	168.7	145.4	114.6	91.4
USA	82.2	74.5	65.8	61.0
Germany	50.0	44.9	39.2	34.2
India	28.7	25.0	22.5	20.1
Spain	23.0	23.0	22.9	29.9
Italy	9.2	8.9	8.6	8.5
France	12.0	10.3	9.3	8.2
UK	14.5	13.6	12.4	10.5
Canada	11.9	11.2	9.7	7.8
Portugal	NA	5.0	4.9	4.7
Brazil	10.7	NA	NA	NA
Rest of the World	75.6	70.8	174.1	48.4
Total	486.7	432.9	369.6	318.1

India is a new player in this energy sector, when compared with Denmark, USA, Germany or Spain, but it is displaying a high level of commitment and rapidly catching up a faster pace to become a well recognizable wind energy producing country in the world. In the financial year 2016-2017, it has added record 5.4GW wind energy, exceeding the government target of 4GW and totaling to 32.6 GW in countries wind energy generation capacity. Out of total 50.018GW present renewable energy production capacity, 55% is from wind energy [11].

In comparison to 2005, now India has set a target of:

- 20%-25% reduction of green house gases by 2020.
- 30%-35% reduction of green house gases by 2030.
- 40% increase in renewable energy production by 2030.

India has a potential to contribute 10% of global Carbon dioxide emission mitigation by 2030.

In India wind industry is always closely dependent on the technological advancement in the European wind energy world. The technological advancement comprises of parameters like increased hub height & swept diameter, turbine rated capacity, windmill designed for low wind sites, improved grid stability control etc. All contribute to the development and introduction of new windmills in the market [12].

Indian wind sector is continuously evolving, higher capacity models with improved control system are being installed every year. Tower height is getting taller in order to trap maximum energy from the low wind sites. Component raw materials are changing for cost effectiveness without compromising the performance quality.

Table: 2 Models introduced in India year wise data (tentative)

Year	Rated Power	Manufacturer
1998	350KW	Suzlon
2000	850KW	Vestas, Gamesa
2001	1000KW	Suzlon, WinwinD
2002	1250KW	Suzlon
2003	1500KW	Suzlon, Regen Powertech
2004	1650KW	Vestas
2006	2100KW	Suzlon
There could be more models and manufacturers those are not included as detail is not available		

(Researcher’s personal data bank)

This spree for continuous technological and engineering development and the drive for efficient cost reductions brighten the future of the sector for long term growth [12].

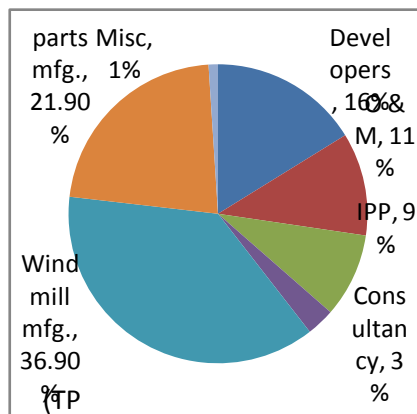
Technological environment in Indian windmill manufacturing industry is also keeping pace with world development and is continuously evolving. The advantages of Indian windmills are: cost of Indian windmills among lowest in the world, wide range capacity available from 250KW to 2.1MW, gear & gearless both types are available, hub height goes up to 120 m, rotor diameter goes up to 113 m.

India is exporting to USA, Europe, South America, Australia and Asia. Indigenization achieved up to about 70%, rotor blades, gear boxes, yaw components, nacelle cover, raw material for blades are being manufactured in this country [13].

VI. JOB POTENTIAL

This growth in windmill sector in India is creating tremendous positive impact on rural economy. It has already created 4, 16,000 jobs in 2013-2014 [14] and is expected to create over 1,000,000 jobs till 2022 [15]. Despite limited data, solar and wind energy is estimated to have created nearly 70,000 FTE (full time equivalent) jobs in India so far. If India is to reach its target of installing 60 GW of wind energy capacity by 2022, approximately 183,500 FTE jobs would be created [15]. Another report says, India could add over 3 lakh jobs in renewable sector by 2022 (Hindustan Times, 2017, June 21).

Figure: 2 Wind energy jobs by type of functions



Ironically, there are no trained people available to fill up the projected demand. ‘The sector is facing challenges in sourcing skilled manpower in many functional areas like manufacturing, production, installation, operation & maintenance, marketing and research & development’ [16]. Renewable energy sector is new in the country and moving ahead at a fast pace. It is becoming difficult to satisfy the requirement of skilled and experienced workforce for this newly emerged energy sector. A Global Energy Talent Index survey across the globe including India indicates that this is a crunch time for renewables sector [17]. ‘60 GW wind target is projected to create a further 183,500 jobs across the various phases. These projections do not include jobs created in the manufacturing sector, another significant opportunity. But availability of appropriately skilled manpower is the big challenge’ [18].

VII. TRAINING & EDUCATION

In this scenario if anybody new opt to join in wind energy sector he probably will get ample of opportunities but, may not get enough formal training facilities or institutes to train him up for wind energy business. It is necessary for a new comer to get a good training to understand the technology and other aspects to deliver safely and efficiently. ‘Skill development is of paramount importance in job creation, improving productivity ... Hence it calls for concerted efforts by MNRE, industry and institutions to address the gaps identified’ [16].

In Europe, many institutes regularly participate in joint programs and work closely together with the wind industry. European Institute of Innovation and Technology (EIT) has established a ‘Knowledge and Innovation Center (KIC). European education and research institutions also work on development of renewable energy. IRENA is also working through its Renewable Energy Learning Partnership (IRELP) program. As a result of all these efforts the shortage of skilled people there will decline from 2% in 2012 to 1% by 2030. In India it appears to be equally necessary to do similar things. Some companies have established training centers with a limited effort and not focusing towards training of all aspects. They primarily aim to develop people for working in O & M. Focus on improvement of manufacturing system & process, quality, operation management etc. are appears to be missing. Some institutes like The Energy and Resources Institute (TERI), National Institute of Wind Energy (NIWE) and couple of vocational training centers also teaches some aspects of wind energy business. Suzlon Excellence Academy and Wind World Training Academy (WTA) are two centers run by turbine manufacturers for employees.

From various literature studies it is apparent that:

- People are to be equipped with necessary knowledge and skills before putting hands in this specialized field.
- This is a big challenge for the sector, because so far it is relying majorly on limited in house trainings, but now would need support from training and educational institutes for conducting programs on windmill industry.
- Few institutes those who are running wind energy courses are not sufficient to meet the growth demand. More needs to be done urgently.

VIII. CONCLUSION

Looking to the growth pace and trained people shortage scenario in wind energy sector, there is an urgent need to chalk out joint action plan between industry, government agencies and educational institutions in order to:

- Improve training curriculum to encompass engineering, technology, behavioral & attitudinal aspects.
- Make more ITIs and vocational Institutes to join hands in wind skill training.
- Standardize the curriculum and develop certification standards across the country.
- Strengthen existing training facilities and to establish new centers pan India.
- Run more wind energy courses in graduate and post graduate level engineering and management curriculum.

Finally to make this novel aspiration successful and, for the growth of Indian wind energy sector, all the stakeholders to put hand in hand and mobilize resource to develop skilled human capital.

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