



Research Article

GOVERNMENT PARTICIPATION IN WIND ENERGY PRODUCTION IN INDIA
- AN ANALYTICAL STUDY

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ABSTRACT

India's energy demand has been growing rapidly. On the other hand, supply of energy too has grown but has been outstripped by demand. India has severe power demand supply gap, especially from past two decades. India derives most of its energy from fossil fuels such as coal, natural gas and oil where coal is dominant fuel. Fossil fuel based energy sources are not good for the environment. Burning of coal releases huge amount of greenhouse gases (GHGs) into the atmosphere and contributes towards adverse effects of climate change. Considering the importance of renewable energy in India's total energy mix, the Government of India came up with National Action Plan on Climate Change (NAPCC) in year 2008 under the prime minister's office. Under the plan, the Government of India has set a target of reducing country's carbon emissions intensity of GDP by 20 percent to 25 percent between 2005 and 2020. Since there is no (GHG) green house gas emission during renewable energy generation, NAPCC encourages addition of renewable energy such as wind, solar etc., based capacity in the country. Most of the Installed Wind Capacity in India is located in the southern and industrial states of the country. Tamilnadu plays a major role and occupies the first place but to install the windmill there is a Lack in getting approval from various levels. Due to this, the project is getting delayed and they are not able to do it in sanctioned time duration especially from local panchayat and TNEB is taking so much of time for approval and they are having some political and environmental issues. So, the government has to take necessary Steps to prevent these issues and also to avoid the unwanted political issues by taking measures and made the wind energy a successful one.

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INTRODUCTION

India's energy demand has been growing rapidly. This demand has been boosted by industrial growth as well as a rise in household consumption. On the other hand, supply of energy too has grown but has been outstripped by demand. India has severe power demand supply gap, especially from past two decades. India derives most of its energy from fossil fuels such as coal, natural gas and oil where coal is dominant fuel. Fossil fuel based energy sources are not good for the environment. Burning of coal releases huge amount of greenhouse gases (GHGs) into the atmosphere and contributes towards adverse effects of climate change. Considering the importance of renewable energy in India's total energy mix, the Government of India came up with National Action Plan on Climate Change (NAPCC) in year 2008 under the prime minister's office. Under the plan, the Government of India has set a target of reducing country's carbon emissions intensity of GDP by 20 percent to 25 percent between 2005 and 2020. Since there is no GHG emission during renewable energy generation, NAPCC encourages addition of renewable energy based capacity in the country.

All this triggered the development of renewable energy sector in India. India is geographically, a very diverse country. Therefore, renewable energy sources are not equally available. India has wind energy potential in only six states i.e. Tamil Nadu, Karnataka, Gujarat, Rajasthan, and Andhra Pradesh. Other states have no or very less wind energy potential. For other sources like geothermal and biomass, the same scenario can be observed. Therefore, the distribution of installed capacity for renewable energy in India across all the states is not uniform.

Government of India has set a target of reducing country's carbon emissions intensity of GDP by 20 percent to 25 percent between 2005 and 2020. Since there is no GHG emission during renewable energy generation, NAPCC encourages addition of renewable energy based capacity in the country. Most of the Installed Wind Capacity in India is located in the southern and industrial states of the country. The other states like UP, Bihar lacks sufficient Wind Energy Capacity despite having high power tariffs and substantial electricity deficits. It can be said that Wind Power in India is being developed only in the progressive states like Gujarat, Maharashtra and others. To continue to grow at the same rate, the industry needs to diversify geographically but that would need the backward state governments to pull up their socks.

The above table shows the cumulative installed capacity of wind potentials in India in megawatts. The table shows the various states of India which produces a major portion of wind energy ie Tamil Nadu, Gujarat, Maharashtra, Rajasthan etc for the last six year.

The above table shows the eight states wind potentials. According to the table, TamilNadu plays a major role and occupies the first place; Maharashtra occupies the second place in the production of wind energy. Gujarat occupies the third place; Rajasthan occupies the fourth place and so on. Kerala is the place where the minimum capacity of wind energy produced.

In the year 2014-2015 the total cumulative installed capacity of wind potentials in India were 23448 Megawatts. out of 23448, TamilNadu is the number one and has the total capacity of 7455.2 MW, Maharashtra 4450.8, Gujarat was 3654 , Rajasthan 3430.7, Karnataka 2638.4, Andhra Pradesh 1031.4, Madhya Pradesh 879.7, Kerala 35.1 and others 4.3. The researcher concluded that from the table that overall performance of wind potentials, Tamil Nadu occupies always first. So that the wind energy producer can utilize that Opportunities in proper manner.

to fulfill the RPO obligation. The floor and forbearance price of 1 Non-solar REC is Rs. 1500 and Rs. 3300 respectively. Non-compliance of RPO has a direct bearing on REC mechanism. The developer can participate in the REC market, in which case its revenue stream would consist of the market value of the REC at the time plus a tariff on par with a conventional source of power. The price of 1 REC can range between Rs 1,500 (~\$25) and Rs 3,300 (~\$56).

National Clean Energy Fund

Under the National Clean Energy Fund (NCEF), funded through India’s coal tax, the MNRE allocates support to the Indian Renewable Energy Development Agency (IREDA). IREDA then disburses loans to wind and other renewable energy projects via banks at an approximately 8 percent interest rate, as opposed to the market interest rate of 13 to 14 percent. Renewable energy projects can receive a maximum of 50 percent of their funding through the NCEF.

Clean Development Mechanism and Carbon Markets

India has the second-largest number of wind power projects registered under the Clean Development Mechanism (CDM), which grants certified emission reduction (CER) units to clean

Table 1 Cumulative Installed Capacity of Wind Potentials In India (MW)

S.NO	STATE	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15
1.	Tamil Nadu	4907	5904.4	6987.7	7162.3	7253	7455.2
2.	Gujarat	1864	2175.5	2966.6	3174.9	3414	3645.4
3.	Maharashtra	2078	2310.8	2733.3	3021.8	2976	4450.8
4.	Rajasthan	1088	1524.8	2070.9	2684.9	2820	3.4307.2
5.	Karnataka	1473	1730	1933.6	2135.3	2409	2638.4
6.	Andhra Pradesh	200.2	236	245.6	447.7	753	1031.4
7.	Madhya Pradesh	229	275.5	376.4	386	439	879.7
8.	Kerala	28	32.8	35.1	35.1	55	35.1
9.	Other	0	4	4.3	4.3	4.3	4.3
	TOTAL	11867.2	14193.8	17353.5	19052.3	21264.3	23447.5

Source: (I) Wind mill power
 (II) [www.eia.in/club/user/amsapna/blogs/2040\(karnataka wind energy, wind policies\)](http://www.eia.in/club/user/amsapna/blogs/2040(karnataka%20wind%20energy,%20wind%20policies))
 (III) https://en.wikipedia.org/wiki/Wind_power_in_India 2015

Government contribution and incentives to wind energy producers at national level

The government of India provides to the wind energy producers to the following benefits at present

Depreciation

Accelerated Depreciation withdrawn w.e.f 01.04.2012. • Ministry trying to re-instate the same in consultation with MoF. At present, a total of 35% Depreciation allowed in the 1st year of the project (15% normal + 20% additional depreciation for infrastructure project)

Generation Based Incentives (GBI) Scheme

GBI- Rs.0.50/kWh subject to max Rs. 1.00 crore /MW (increased from Rs. 62 lakh/MW). GBI over and above the FIT Duration > 4 years, and < 10 years .Total disbursement in a year not to exceed Rs. 25 lakhs per MW during first four years.GBI scheme applicable for the 12th FYP period having a target of 15,000 MW. Captive producers allowed but open access (merchant power) not allowed. Effective retrospectively w.e.f. 01.04.2012

Renewable Energy Certificate (REC)

Launched in 2010, REC is a tradable certificate where one certificate is equal to 1MWh of wind energy generated. Purchased by DISCOM, Open Access and Captive Consumer

energy projects under the Kyoto Protocol. As of May 2012, wind power accounted for 10 percent of all CERs issued to Indian CDM projects. This participation had spurred technology transfer of high-capacity wind turbines to India, although on average the capacity of wind turbines produced by Indian manufacturer’s remains below the capacity of manufacturers in other nations. Doubts raised over the future of the CDM market have dampened expectations of CERs as a viable revenue source.

Central Fiscal Policy

Direct taxes Exemption on Income Tax on earnings from the Project u/sec 80IA for 10 years. Indirect taxes, Exemption of Excise Duty on WEG. Custom duty concessions for certain wind turbine components available – Special bearings – Gear Box – Yaw components – Wind turbine controllers – Parts of the above components – Rotor blades of wind turbines – Parts and sub-parts of blades – Raw materials for blades, parts and sub-parts of blades

Foreign Direct Investment

100% FDI is allowed in wind power sector. Has helped greatly in bringing investment. After introduction of GBI, FDI has increased in wind sector

State government contribution and benefits to the wind energy producers

The state Government of Tamil Nadu provides the following benefits to the wind energy producers.

Tamil Nadu energy development agency

TNEB to buy surplus energy at the rate of Rs.2.75 per unit from the existing wind mills commissioned before 15.5.2006 from the date of renegotiation of existing agreement Rs.2.90 per unit from the wind mill commissioned after 15.5.2006 as per the new tariff order of May 2006 by Tamil Nadu Electricity Regulatory Commission's 3.51 per unit from the wind mill commissioned after 1.8.2012 as per the new tariff order of August by Tamil Nadu Electricity Regulatory Commission. Rates have come in to effect as per TNEB order dated 1.8.2012

Confessional wheeling charges levied at 5% for captive use of power under which industries can draw power produced anywhere in the state at the point of consumption Banking facility allowed subject to 5% charges for using power any time of the year up to 31st March of the financial year

Manufacturers / suppliers

Selection of suitable sites, purchase and registration of land. Co-ordination and follow up with Government and other Statutory Agencies for necessary clearances. Assembly, erection and commissioning, Operation & maintenance services under AMC

Small aero Generators

It is a standalone type generator which can be used to produce electricity for (Mini-wind Mills) captive purpose. It can be installed at places where wind speed is more than 15 kmph. 41 sites identified. (a) Economics (Tentative) • Cost of the system – Rs.2.50 – 3.00 lakhs/ kW. Saves around 2500 kWh per kW per annum depending on wind speed and duration.

(b) Eligible categories of Community users such as street lighting, Direct use of Central and state Govt. agencies, Individuals, Industrial users, R&D and Academic Institutions

Procedure for Obtaining Approval and Technical requirement to be complied with

For Registration 3 sets of application to be submitted to CE/NCES office (As per details given in the order). Payment at the time as per details given in the order of registration

Metering arrangement

Electronic trivector meter with TOD provision to be provided.

Energy purchase

Individual Energy Purchase Agreement shall be executed with TNEB for purchase

Agreement (EPA) of power by TNEB. EPA to be for a period of 15 years or useful life of the plant whichever less is.

Power Evacuation Facilities

Wind electric generator is interfaced at 11 kV, 22 kV, 33 kV level depending upon the voltage level of the net work available in the area. Developers to carry out the above work with material specified by TNEB after paying 11% charges on

DCW basis. Power to be dispatched to the load centre by means of 110 kV and 230 kV lines.

Renewable purchase obligation

- (I) 26 SERCs specified the mandatory purchase obligation under Section 86, 1(e) of the Electricity Act, 2003, for purchase of fixed percentage of energy generated from RE sources.
- (II) The RPO percentage varies from 0.5% to 10.25%, depending on the local renewable resources and the electricity distributed in those states.
- (III) RPO obligation can be fulfilled through direct purchase via bilateral contracts and tradable REC mechanism which can further generate revenue for RE projects.

Incentive in Research & Development

The income tax department provides for a weighted deduction for an in house R&D activity, which entitles wind turbine manufacturers to claim 200% of the expenditure (other than expenses on land and building) incurred for in-house R&D activity

Wheeling, banking & third party sale

Favorable provision for wheeling, banking and third party sale by wind power. For wind, wheeling charge for the different states are in the range of 2 percent (MP and MH) to 7.5 percent (WB) the states of Karnataka, Tamil Nadu and Andhra Pradesh charge 5 percent of the total energy fed to the grid. For wind, Tamil Nadu and Karnataka allow 5 percent and 2 percent of the total renewable energy fed to the grid as bankable energy and can be availed anytime during the financial year. Rajasthan and Maharashtra provide 6 months (Apr-Sep) and 12 months of banking period respectively. The state of Andhra Pradesh doesn't permit banking.

Other incentives electricity duty

1. Renewable energy projects are exempted from electricity duty by state government VAT
2. Reduced or no VAT on Renewable energy components in some states
3. Tamil Nadu has reduced VAT from 14.5% to 5% • Karnataka offers 5.5% VAT for all the renewable energy components
4. Gujarat, Tamil Nadu and Maharashtra offer 5% VAT for all renewable components

Project facilitation

C-WET provides all technical support to developers including wind resource assessment and DPR preparations. State nodal agencies (SNAs) facilitate project development right from resource assessment to the final commissioning. SNA supports the developer by facilitating development of infrastructure at identified sites and also verifies the legal statutory clearances sought by the developer from different departments.

Banking

Allowed for One financial year April to March. Banking charges 0.94 Rs/unit. Unutilized energy at the end of FY to be paid by utility @75% of the relevant tariff (preferential tariff). WEGs availing REC will be allowed to bank power for 1 month, surplus power after a month will considered to be lapsed.

Transmission & wheeling charges

40% of the transmission charges and 40% of the wheeling charges as applicable to the conventional power to the Wind power. Apart from these charges, the WEGs shall have to bear the actual line losses in kind as specified in the respective orders of the Commission and amended from time to time.

The benefits which are offered by other states to the concern wind energy producers apart from what the state of Tamilnadu provides.

Rajasthan energy development agency

Benefit of Industry status (eligible for incentives to industrial units under the schemes administered by Industries Department). Rajasthan provides soft loan equal to 1/3 of capital cost at low interest rate. Exim Policy. Green technology (including wind energy) is listed as a focused group scheme. Under this scheme, export of RE product to all countries is entitled for an additional duty credit equivalent to 2% - 5% of freight on board (FOB) value of exports

Madhya Pradesh energy development agency

Benefit of Industry status (eligible for incentives under State's Industrial Promotion Policy); Pro rata reduction in contract demand on a permanent basis (for industrial consumer buying energy from WEGs

Maharashtra energy development agency

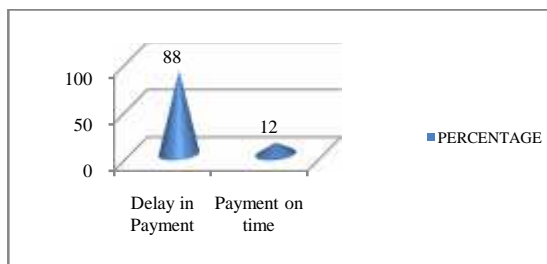
The 100% expenses incurred on Octroi/Entry Tax during the import of machinery for the project shall be refunded by MEDA. Maharashtra has the provision for capital subsidy to the extent of 11% for wind energy projects set up by the cooperative sector

CONCLUSION

The other states like Rajasthan, Madhya Pradesh, and Maharashtra were providing the benefits more than what the state of TamilNadu is providing. The researcher suggested that our Tamil Nadu state government should provide what other states are providing the facilities. The TamilNadu state government has to provide and motivate the wind energy producers to produce more Quantity of electricity.

Payment Delay to Wind Farm Owners

The produced wind energy is sold to the government. The Majority of the wind owners have not been paid for a period for last one year of generation. The nonpayment will affects the capabilities of IPP Due to the delay in payment some of the wind energy produced have no alternative source of income even to meet out their debts and essential needs. It creates a lack of confidence and drop outs among the wind energy producers



Source: Primary Data 2016

Figure 1 Payment Delay to Wind Farm Owners

The above Figure shows that the payment will be made on time or delay in payment to the wind energy producers. According to the table, 18 respondents out of 150 respondents said that they getting payment in time. The remaining 132 Respondents out of 150 respondents stated that they faced the problem of delay in payment.

The Researcher concluded that from the above table the majority of the Respondents said that they are facing the problem regarding payment. So the state Government of Tamil Nadu would take necessary steps to make payment in time. So that the wind energy produced could get motivated and come forward for the investment in wind energy sector.

Status of Land

The wind energy producers have their own land or at the time of installation they purchase land and fulfill the legal formality and install the wind mill. (As of now only 2-3 percent of the wind energy producers depend on the lease land). In other state like Rajasthan they utilized the forest land or government unutilized land as lease for the purpose of production of wind energy. The energy producers will pay a meager amount paid as a lease amount and had a lease contract with government for nearly 38 to 40 years.

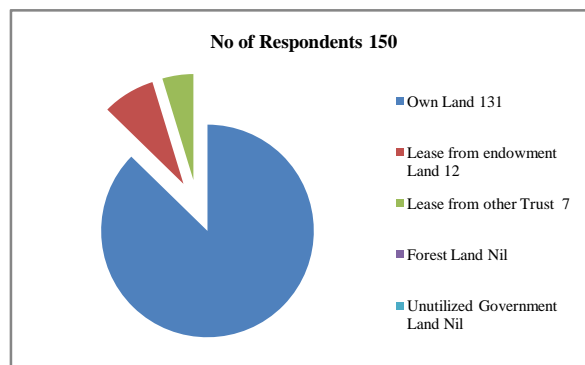


Figure 2 Status of Land

Source: Primary Data 2016

The Figure 2 describes the status of land. The table shows that the 131 respondents out of 150 respondents use their own land for the production of wind energy. The 12 respondents out of 150 respondents install the windmill in the endowment land as a lease period for 35 years and the remaining 7 respondent out of 150 uses the Trust lands or NGO's land for the installation of windmill. The unutilized government land and forest land is not used for their purpose.

The Researcher was found that from the table after thorough analysis have their own lands is 87.3 percent of owners have their own land 8% of the owners utilizes the endowment land. Only 4 percent utilized the other Trust lands. No one Respondents used unutilized government lands and forest land, the government has to take necessary steps to make use of unutilized government land and forest land to encourage and motivate the windmill owners to install and produce more energy and fill up the gap at our level best

Permission Details

The wind energy producers in the state of Tamil Nadu will need to obtain permission from local village. The High Court of India has ruled that windmills come within the definition of 'factory' in the state's village government law and project developers must obtain permission from 'panchayats', local

village governments, before installing turbines. Prospective investors may consult Tamil Nadu Energy Development Agency (TEDA) or Tamil Nadu Electricity Board (TNEB) or other Consultancy Agencies and plan for early Wind Energy Generation. Select suitable land in a wind potential area and purchase the same based on the wind potential. Apply for consent letter for wind power generation with the following details to the TNEB directly or through TEDA.

- (I) Topo sketch of the land marking the proposed location of Wind Electric Generator (taking into consideration of the nearby WEG area i.e. leave reasonable space from the border area for your neighbor).
- (II) Village Map.
- (III) Ownership records for the land.

Apply for tie up arrangement with TNEB grid and execute the interfacing work as per TNEB norms. 11% charges towards supervision of the interfacing line works has to be paid to TNEB before taking up the interfacing work. Arrange for erection of Wind Electric Generators from approved manufacturers. Remit the prescribed development charges towards infrastructural facilities for evacuation of wind power to TNEB. Arrange for inspection by Chief Electrical Inspector to Government and obtain Safety Certificate simultaneously from the Chief Electrical Inspector of Government of Tamil Nadu. Commission the Wind Electric Generator and get it tied up with the Board's grid. Arrange to commission the Wind Electric Generator before 30th September or 31st March to avail depreciation allowance and other tax benefits.

There are about 13400 MW of project application spending with TNEB. The main reason for delay in approvals seems to be the inadequacy of the existing infrastructure to evacuate the proposed power. A prolonged delay in project approvals is one of the biggest impediments to accelerated wind deployment. Urgent and effective actions are needed to grant express approvals to pending projects. Load flow studies of 2011/12 conditions indicate that a large number of 100 kV and 220 kV lines get loaded beyond their thermal limit during the high wind season.

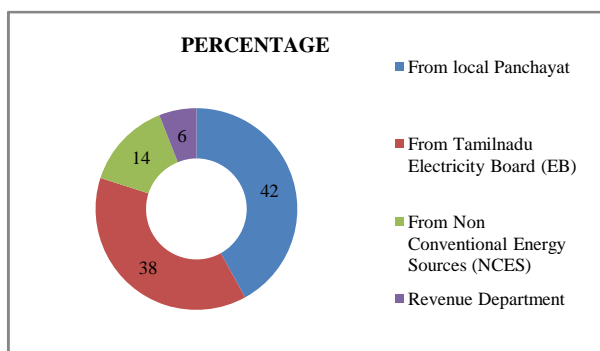


Figure 3 Awaiting For Permission from Various Departments

Source: Primary Data 2016

The above figure shows the problems in getting permission from various Departments. The table describe that 63 out of 150 Respondents faces the problems in getting permission from local panchayat. The 57 respondents out of 150 respondents have stated that clearly from EB is getting

delayed. The 21 respondent out of 150 respondents said that they are facing the problem in getting approval from Non-conventional energy sources, The remaining 9 respondents out of 150 respondents stated that there is a problem in the Revenue Department.

The researcher has founded that from the above table that it has a lack in getting approval from various levels. Due to this the project is getting delayed and they are not able to do it in a sanctioned time duration especially from local panchayat and TNEB is taking so much of time for approval so the Government has to take necessary steps to prevent these issues and advice to the authority of different levels.

Windmill Through Various Sectors

The concept of Co Operatives can briefly be described as an autonomous association of person united voluntary to meet their common social and economic needs through a jointly-owned and democratically controlled enterprises. In some developed countries like Danish and Denmark wind energy production is by private individual and cooperatives have played an important role. Is percent of the Danish wind turbines are owned by co-operative basis approximately. The wind energy production can also be done by other service organization.

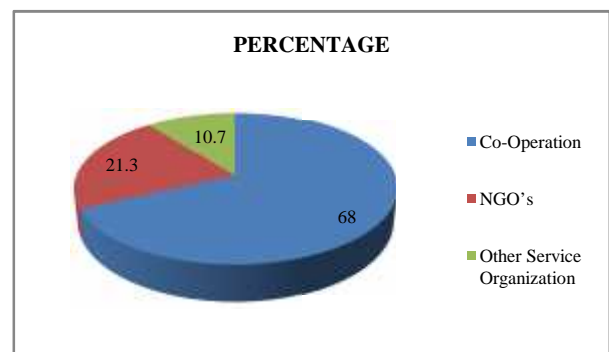


Figure 4 Windmill Through Various Sectors

Source: Primary Data 2016

The above figure stated that the wind energy production through co-operatives and other Non Government Organizations. The table depict that 102 Respondent out of 150 respondents stated that wind energy production by co-operative basics. The 32 respondents out of 150 respondents stated that the non Government organizations make take participation in the installation and production of wind energy. The remaining 16 respondent's states that other service organization can also involved in the process of installation of wind energy from the above.

The Researcher has concluded that 68 percent of respondents preformed that the installation & production of wind energy in co-operative basis. This is already in practice in some other developed countries. So, that Government can arrange such a facilities for wind energy producers.

Problems Faced During Production Process

Social and Environmental Concerns

Although wind power plants have relatively little impact on the environment compared to fossil fuel power plants, there is some concern over the noise produced by the rotor blades, aesthetic (visual) impacts, and birds and bats having been killed (avian/bat mortality) by flying into the rotors.

Most of these problems have been resolved or greatly reduced through technological development or by properly siting wind plants.

The visibility of a particular wind system will depend on many factors, including tower height, proximity to neighbors and roadways, local terrain, and tree coverage. Some people may object to a wind turbine being in their field of view, and this could be an issue when applying for a zoning permit. Therefore it may be worthwhile to investigate your neighbors' concerns before investing in a wind turbine. In most areas of the state, wind turbines are an uncommon sight, so it is natural to expect some reservations about their introduction. Objections are more likely to occur in populated and tourist areas. Opposition is least likely to surface in rural settings

Television interference

Small wind turbines, such as those sized for residential and farm use, have not been found to create interference with television signals. In fact, small wind systems are commonly used today to power remote telecommunication stations for both military and commercial uses. Most wind turbines use blades made of wood, fiberglass or composite materials that don't cause reception problems. Many years ago, a few wind turbines equipped with long, metallic blades did cause some localized problems, but they are no longer commonly used.

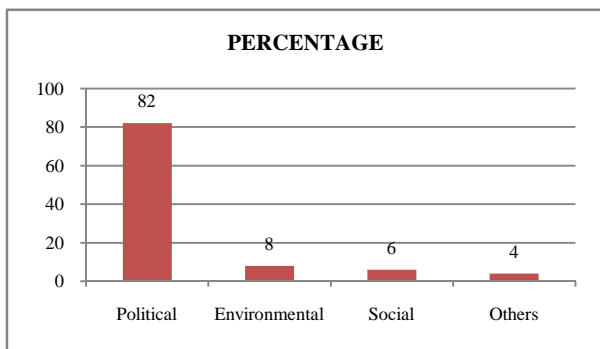


Figure 5 Problems faced during production process

Source: primary Data 2016

The above figure shows the problem faced by the wind energy production while installation as well as during the production process. According to the table, 123 respondents out of 150 respondents states that they have political issues.12 out of 150 respondents stated that they have Environmental issues.9 out of 150 respondents stated that they have Social issues.6 out of 150 Respondents stated that they have other issues.

The researcher concluded from the above that majority 82 percent of the respondents stated that they are had Political issues during installation and production process.8Percent of the respondents stated that they are had environmental issues. 6 percent of the respondents stated that they are had environmental issues. The government has to take necessary Steps to avoid the unwanted political issues by taking measures and made the wind energy a successful one.

CONCLUSION

India's energy demand has been growing rapidly. This demand has been boosted by industrial growth as well as a rise in household consumption. On the other hand, supply of energy too has grown but has been outstripped by demand. India has severe power demand supply gap, especially from past two decades. In the years Government of India has set a target of reducing country's carbon emissions intensity of GDP by 20 percent to 25 percent between 2005 and 2020. Since there is no GHG emission during renewable energy generation, NAPCC encourages addition of renewable energy based capacity in the country. To continue to grow at the same rate, the industry needs to diversify geographically but that would need the backward state governments to pull up their socks

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