Check List No.: 04

Detailed Note on The Project:

1.1 Power Sector Overview

India with an installed capacity of 367.28 GW ranks 5th globally in terms of power generation installed capacity.

1.2 Generation Sector

(a) Power is generated by central, state and private utilities. Central generating utilities include the National Thermal Power Corporation (NTPC), the biggest thermal generating utility in India, National Hydroelectric Power Corporation, Nuclear Power Corporation etc.

(b) SEBs own several generating units and many states have separate generation corporations. With the opening up of generation to private companies in the 1990s, many Independent Power Producers (IPPs) have come forward to set up generating stations

(c) The aggregate installed power generation capacity in the country stood at 367.28 GW as described below:

Table 1: Installed Power Capacity in India

S. No.	Fuel Type	Installed Capacity (MW)	% age share
1.	Total Thermal	**230701**	**62.80%**
	Coal	198495	54.20%
	Lignite	6760	1.70%
	Gas	24937	6.90%
	Diesel	510	0.10%
2.	Hydro	45399	**12.40%**
3.	Nuclear	6780	**1.90%**
4.	Renewable Energy	84400	**23.10%**
	TOTAL	**367281**	**100.00%**

Source: Central Electricity Authority

(d) The Figure below illustrates the plan targets v/s achievements.

PLAN WISE / YEAR WISE CAPACITY ADDITION TARGET VS ACHIEVEMENT

PLAN/ YEAR	CENTRAL SECTOR			STATE SECTOR			PRIVATE SECTOR			TOTAL		
	TARGET	ACTUAL	%	TARGET	ACTUAL	%	TARGET	ACTUAL	%	TARGET	ACTUAL	%
7th	9320	9534.5	102.30	12925	11867.1	91.82	0	0		22245	21401.6	96.21
8th	12858	8157	63.44	14869.7	6835.2	45.97	2810	1430.4	50.90	30537.7	16422.6	53.78
9th	11909	4504	37.82	10747.7	9352.8	87.02	17588.5	5262.2	29.92	40245.2	19119	47.51
10th	22832	13005	56.96	11156.8	6244.64	55.97	7121	1930.6	27.11	41109.8	21180.24	51.52
11th	36874	15220	41.28	26783	16732.4	62.47	15043	23012.5	152.98	78700	54964.9	69.84
12th	26182	20452.62	78.12	15530	24477.35	157.6	46825	54279.5	115.92	88537	99209.47	112.05
2017-18	6180	4060	65.70	3846.15	3985	103.6	3145	1460	46.42	13171.15	9505	72.17
2018-19	3470	2070	59.65	4636.15	2879.755	62.12	0	972	-	8106.15	5921.755	73.05

Source: Ministry of Power, GoI website

India has historically failed to meet its power sector targets by a significant margin. The power sector continues to be affected by the shortfall both on generation as well as transmission side.

1.3 Demand and Supply Conditions

(a) The peak deficit varies across India, ranging from 0.4% of peak demand in the Southern region to 4.1%% of peak demand requirements in the Southern region. Region-wise demand-supply mismatch as on Dec'2019 was as follows :

(b)

Table 2: Region-wise Demand-Supply Situation

Region	Energy				Peak			
	Requirement	Availability	Surplus / Deficit (-)		Demand	Availability	Surplus / Deficit (-)	
	(MU)	(MU)	(MU)	(%)	(MW)	(MW)	(MW)	(%)
Northern	371,934	365,723	-6,211	-1.7	60,749	58,448	-2,301	-3.8
Western	368,404	368,081	-323	-0.1	50,477	50,085	-392	-0.8
Southern	320,248	319,642	-606	-0.2	47,385	47,210	-175	-0.4
Eastern	136,522	135,490	-1,032	-0.8	20,794	20,485	-309	-1.5
North-Eastern	16,217	15,764	-452	-2.8	2,629	2,520	-109	-4.1

Source: CEA report on Demand-Supply position

(c) According to the 19th EPS, India's peak demand is projected to 225,751 MW by 2021-22 and energy requirement to 1566023MU. These assumptions are based on a growth of Energy & Peak demand growth by approximately 8% over the projection period, region wise projected demand is shown in the following table:

Table 3 : Energy Demand Projections

Region	Electrical Energy Requirement (MU)			Peak Electricity Demand (MW)		
	2016-17	2021-22	2026-27	2016-17	2021-22	2026-27
Northern	356,521	468,196	616,345	55,596	73,770	97,182
Western	352,304	481,501	627,624	50,141	71,020	94,825
Southern	307,047	420,753	550,992	44,782	62,975	83,652
Eastern	128,300	171,228	217,468	20,883	28,046	35,674
North - Eastern	15,876	23,809	34,301	2,810	4,499	6,710
Sub-total (Regions)	1160,048	1565,487	2046,730	161,757	225,643	298,632
A&N Islands	329	475	632	67	97	129
Lakshadweep	52	62	73	10	11	13
All-India	1160,429	1566,023	2047,434	161,834	225,751	298,774

Source: 19th EPS Report, CEA

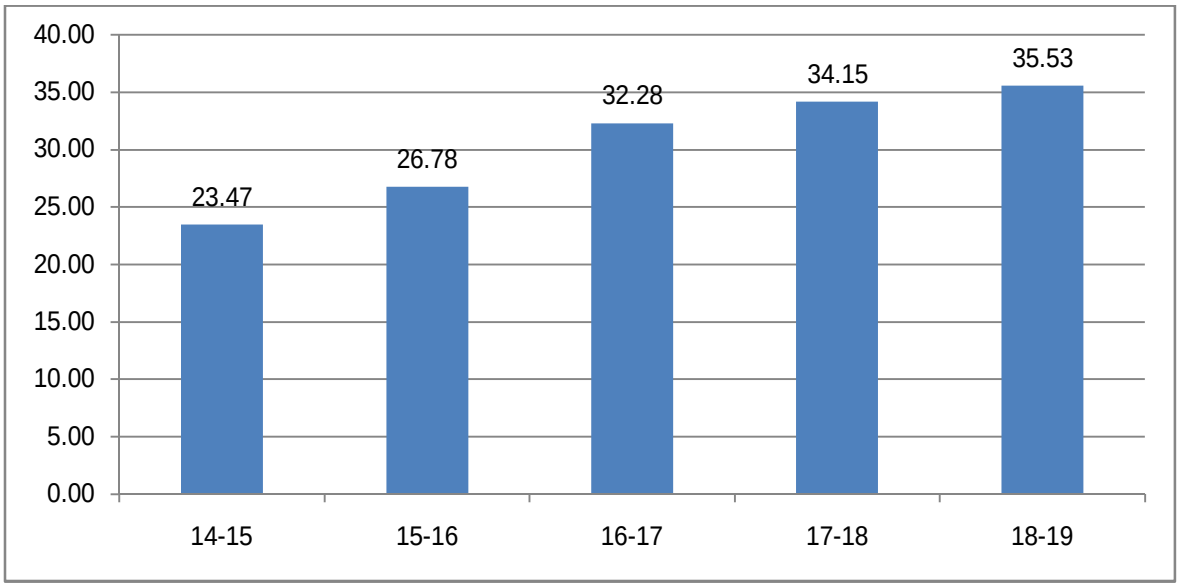
1.4 Renewable Energy (RE) in India

Renewable power is expected to constitute a significant part of India's incremental capacity addition, and a robust regulatory framework has been put in place to realize India's wind, hydro, solar and biomass potential. With the increasing demand for hydrocarbon resources and the limited global growth in their supply, an increase in the price of conventional fuels is inevitable. India is becoming vulnerable to price volatility due to its heavy dependence on import of fossil fuels. Globally-increasing coal prices, besides the domestic coal supply shortage, have made it imperative for India to diversify its energy sources

India stands 5th in the world with an installed renewable capacity of 84400 MW (excluding large hydro) as on December, 2019. Wind Energy in India

Installed renewable power generation capacity has increased at a fast pace over the past few years, posting a CAGR of 19.78 per cent between FY14–18.

India ranks fifth in the world in terms of wind energy installed capacity after China, USA, Germany and Spain. Graph below shows installed Wind power capacity in India over past 5 years (in GW).



Source: Ministry of New and Renewable Energy

Driving forces propelling the wind energy sector in India are huge potential, technological advancement, supportive legislative framework of various SERCs, incentives available for investment, private sector investment in wind energy sector and also rising prices of fossil fuels. The short gestation period for installing wind turbines and the increasing reliability and performance of wind energy machines has made wind power a favored choice for capacity addition in India. Major states with wind installations are Tamilnadu, Maharashtra, Gujarat, Karnataka,Rajasthan Andhra Pradesh and Telangana.

The wind energy scenario in the major states with wind installations is captured in the table below:

Table 4: Wind and installation in States

Particulars	Rajasthan	Gujarat	Karnataka	Andhra Pradesh	Maharashtra	Tamil Nadu
Installed Capacity (in MW)	4299	7203	4753	4077	4794	9231

Source: Ministry of New and Renewable Energy; CEA

1.5 Opportunity of Wind Energy in India

The Govt of India has embarked upon an ambitious vision of installing 175 GW of Renewable Energy plant in India by 2012-22. The share of Wind Energy is 60 GW . So far 35 GW Wind Energy Projects have been installed across the nation. There is huge opportunity of adding another 25 GW by 2021-22.

Solar Energy Corporation of India (SECI), National Thermal Power Corporation and multiple State utilities have come up with tenders for Procurement of Energy thru Wind

Energy Projects. SECI alone has awarded more than 9.5 GW of Wind Energy projects till 2019. SECI further plans to call bids for another 5 GW in the year 2020.

The conventional methods (Hydel, Thermal, Gas based Power Plants) of generation of electricity are using the scarce, costly & fast depleting natural resources i.e. fossil fuels where in not only its utilization is creating pollution but also in transportation to its end use through rail or road the pollutions gets added to the environment. Apart from usage of the fossil fuels which creates pollution which is very harmful to the environment, there is no remedy for the same and therefore since few years there is an emphasis on generation of electricity through the natural / renewable resources as fuel. Also the land required is less and there is no need for the displacement of the people and hence there is no cause for rehabilitation. Considering all these aspects there is an emphasis on using the renewable source of energy.

Within the various sources of renewable energy, wind power is considered to be most viable. There are several benefits of the wind power like it is easily available, its utilization does not create pollution and installation of wind Energy turbines requires less land and maintenance is also very easy.

1.6 Project Details:

A. Project Capacity :

The Project capacity is 648 MW of wind farms. The Project is planned for construction on 494.3387 Hectares of Reserved forest land in Kutch district, Gujarat.

B. Selection of Locations :

The locations selected are part of the forest land. These locations are selected as,

- The elevation with respect to the ground level is high and therefore there is no hindrance in the movement of wind. This facilitates in more utilization of the Wind Energy Turbines.
- Also the land selected is rocky in nature which does not have much vegetation and are bereft of trees.

C. Location and Topography

The project site is located in Kutch district in Gujarat State in India. The wind farm is located Villages: Laxmipur (Netra), Lifri, Nagviri & Ghadani in Nakhatrana Taluka and Matanamadh, Murachban, Samajiyaro, Ekaliyo, Junagiya, Ramaniya, Chakarai, Baranda, Lakhmirani, Bhujpur, Nareda, Ratipal, Mudhan & Ukher Villages of Lakhpat Taluka in Kutch for setting up 648 MW,The project site is The Hills having an altitude of 40-300 meters above MSL. The area comprises of minimum and sparse vegetation.

D. Climate

The climate is hot and dry. The maximum temperature is 45 degrees Celsius (ºC) and minimum temperature 10ºC. Average annual rainfall is 425 millimeters (mm), with maximum recorded annual rainfall of 700 mm. The predominant wind direction is south-west to North-East, with an average wind speed of 6-8 meters per second (m/s). The area is hot and dry having scanty rainfall. Most of the rivers in this region are therefore seasonal. The project site is located on a forest land.

E. Land Use

The entire project site is on forest land, largely scrub vegetation. The area under Proposal for Diversion is as follows:

Table 4: Project Area Details under Proposal alternate 1

Proposal	Item	Area (in Ha)
Forest area proposed for diversion in Villages: Laxmipur (Netra), Lifri, Nagviri & Ghadani in Nakhatrana Taluka and Matanamadh, Murachban, Samajiyaro, Ekaliyo, Junagiya, Ramaniya, Chakarai, Baranda, Lakhmirani, Bhujpur, Nareda, Ratipal, Mudhan & Ukher Villages of Lakhpat Taluka in Kutch for setting up 648 MW wind power project.	1) Tower Foundation & Platforms	271.7164
	2) Area Required Strip for crane and Assembly movement.	23.4140
	2) Area required for Road + Alongside Electric Line	174.2784
	3) Area required for only Electric Line corridor	24.9300
	Total	494.3387

Table 5: Project Area Details under Proposal alternate 2

Proposal	Item	Area (in Ha)
Forest area proposed for diversion in Villages: Laxmipur (Netra), Lifri, Nagviri & Ghadani in Nakhatrana Taluka and Matanamadh, Murachban, Samajiyaro, Ekaliyo, Junagiya, Ramaniya, Chakarai, Baranda, Lakhmirani, Bhujpur, Nareda, Ratipal, Mudhan & Ukher Villages of Lakhpat Taluka in Kutch for setting up 648 MW wind power project.	1) Tower Foundation & Platforms	144.0000
	2) Area Required Strip for crane and Assembly movement.	23.4140
	2) Area required for Road + Alongside Electric Line	174.2784
	3) Area required for only Electric Line corridor	24.9300
	Total	366.6224

The proposed wind farm will be of 648 MW where totally 144 Wind Energy Turbines will be erected. From each turbine it is expected that 157.7 Lacs units of electricity generation is expected per annum and therefore totally through 144 turbines annually it is expected that 22708 Lacs units of electricity will be produced. People of Kutch will be directly benefited with this project, direct employment 100 persons and indirect employment persons 200x365 man days.

F. Electricity Generation & Distribution

The generation of electricity will benefit a lot to the society as there is always a gap in demand and supply due to which affects several industries, load shedding for the domestic users and its effect is also felt farmers when there is little rainfall and due to non-availability of power farmers are unable to draw the water from their reservoirs.

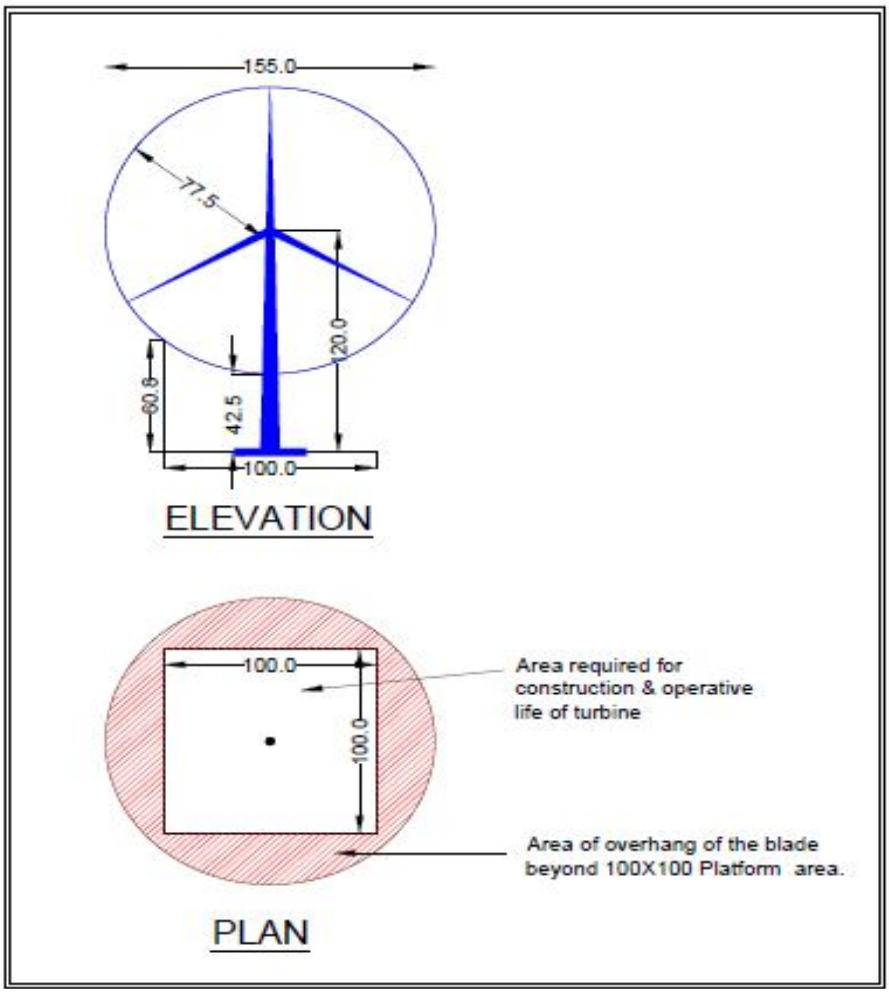
The electricity generated would be supplied to the state electricity authorities with whom already exists. Necessary electrical sub-stations and electrical lines have been planned which are presently also being used for transferring the electricity generated through the Wind Energy Turbines.

G. Note on optimization/reduction of diversion/usage of forest land.

Wind Turbines harness the Energy of the Wind by movement of the Blades against the thrust of the Wind. With advancement in Technology in Wind Energy over last two decades, the Capacity of Wind Turbines has grown enormously from 200-300KW to 4500 KW (4.5 MW). The uniqueness of Wind Turbines is, that despite massive increase in the capacity, the requirement on ground has grown very little because for harnessing larger WindEnergy, the height of Turbine is required along with increase in size of the blade.

The Wind Turbines Generators require only 100x100 M^2 area along with a narrow strip approximately 35 meters length during Construction phase and during O&M phase the Wind Turbine generator requires only 25x25M area. However aerially at a height of more than 40 meters, the blades of Wind Turbine Generators extend beyond the working area of 100x100 Meters. At the such height of lowest point of the blade, the Wind Turbine Generators do not disturb the flora and fauna of the on the ground.

Enclosed is the sketch explaining the possibility of reduction in the demanded area for diversion.



Therefore in order to minimize the diversion area of the land, we have proposed alternate 2 with total proposed 366.6224hectares of forest land for diversion.

For Bhudha Renewable Energy Private Limited.

(Authorised Signatory)

BHUDHA RENEWABLE ENERGY PVT. LTD.

Date: 9/07/2020
Place: Ahmedabad