**FEASIBILITY AND ECONOMIC ASPECTS OF WIND FARM INSTALLATION IN THE STATE OF JHARKHAND**

ABSTRACT

In ancient time people does not know that what is an electricity means no any knowledge of an electricity. But in 600 BC finally we came to know that what is an electricity. we do lot of things and utilized for our daily purposes by the help of an energy sources. In ancient time they used for many purposes such as farming, water sources, helps at night to visible, pumping water and many more things for utilized. Today’s date we are getting an electricity from many sources like RES & NRES. Due to NRES its effects global warming day by day which make a whole in our ozone layer due to that its effects peoples, animals, & all living organism. Not in India but all over the world each Country Government are investing in RES. From RES we can generate an electricity from nature & also its reduced cost of generation energy sources as compared to NRES. The RES which give’s a clean energy and also fulfill the demand of consumers.

 **1. Introduction**

Generation of power by the help of wind which we are getting from nature or we can say RES. The WPP (Wind power plant) which convert KE (Kinetic Energy) into RE (Rotating Energy) So by the help of rotating blades its transfer the energy to generator. It’s convert {KE – ME} & the generator converts{ME – EE} the WPP Growth very fast since 2001.

**2. Wind power plant and its working**

 WM (Wind mill) / WPP (Wind power plant) that convert (KE-ME) & generator that converts (ME– EE). It is shown in the figure that how its working, how to GE (Generate Electricity).The WPP Blades has there own structure known as AFS (Air Flow Structure) from which laminar flow can be minimize. If we talk about the WB (Wind Blade) & its tower its depend upon the power production of WM, Air, Areas to setup the WPP.

|  |  |  |  |
| --- | --- | --- | --- |
| SN(Serial numbers) | MWPPM(Mega watt production per minute) | WPPTS(Wind power plant tower size) | WPPBS(Wind power plant blade size) |
| 1 | 1MW-2MW | 175F-220F | 75F-266F |
| 2 | 3MW-4MW | 275F-425F | 275F-300F |
| 3 | 5MW-6MW | 465F-510F | 335F-375F |
| 4 | 7MW-8MW | 545F-625F | 395F-477F |
| 5 | 9MW-10MW | 640F-705F | 515F-580F |
| 6 | 15MW-17MW | 745F-830F | 620F-735F |

Table 2.1 {Towers and Blades detail}



Fig 2 {a}



Fig 2{a} & 2{b} Working of wind power plants.

The wind Blades rotates very slowly Its turns per minutes around 8 RPM – 10 RPM or 8 RPM – 12 RPM. But if we talk about the Thermal power generation station its rotates is around 3000 RPM. If we are generating an electricity at the speed of 8 RPM – 12 RPM thus its cannot able to generate an electricity for huge amount.so that you can easily seen in the diagram that there is a Nacelle part which automatic move there direction where airy direction is moving the blades are connected to the shaft & shaft connected to gear box which increase the revolution of blade 1000 RPM – 1500 RPM. The generators converts (ME-EE) some controllers are also there which send the signals to the control room. The Anemometer tell the directions of air that in which direction air is flowing.

Fig {c}: ONSWPP  Fig {d} : OSWPP Fig {e} : NSWPP

* ONSWPP = {On shore wind power plants}
* OSWPP = {Off shore wind power plants}
* NSWPP = {Near shore wind power plants}

Anywhere we cannot able to setup the WPP, Airey places matters, So before setup the WPP Planning is very necessary. The minimum speed should be 10 km/h – 15km/h So that a small amount of energy sources can be generated to fesible for district’s. But if we talk about the high amount of wind generation the speed should be minimum 50 km/h to 60km/h Higher airey places are good for setup the WPP.

** 3. Challenges and Opportunity**

Fig 3.1: Challenges in wind generation

* It’s a very difficulty to chose places to setup the WPP. Reasons WPP is totally dependent upon Air. Without air it’s not possible to generate energy sources. So that it’s a big issue to setup the WPP anywhere.
* It’s produces humming and irritating’s sounds which effects all living organism’s specially Human beings. Also its kills thousands of birds per months also its effects farming.
* To prevent the birds we are using a radian on its blade so that birds can be easily able to seen from such a far distance and they never came near to thr WPPB { Wind power plants blades}

 **4. Literature Survey**

* In terms’ of generation India produce 7500 MW but consumed 3415 MW only. India became 4th largest country in the world & in consumption 3rd. Still the remaining energy sources are sells to other country so that they gets benefits.
* After surveying and studying finally I came to know that till 2050 the RES {Renewable energy sources} will take place over NRES {Non renewable energy sources} which is very good news. The NRES Effects the global warming which makes whole in ozone layers. If continuously we depend upon NRES thus Its destroyed every things in nature, Human beings and all living organism.
* To Setup the WFPP {Wind farm power plants}its cost is too much high. If we talk about single wind pole of 5.5 MWPP {Mega watt production power} thus its cost around 15 Crore – 20 Crore think how much its costly but this OWMT {One wind mill tower} fulfill around 40000 Homes yearly very easy if the airy conditions is very good. Its clean energy, reliable & polluted free .

**5. Mathematical Calculation of Wind Velocity**

Mathematical example solutions taken from the state of Gumla districts of year 2018 January on the basis of daily & hourly wise.

9.2+8.2+7.1+7.2+8.6+6.3+2.2+2.6+7.5+5.7+9.2+6.9+6.5+3.4+3.7+11.3+2.8+7.5+7.3+9.5+2.0+1.7+2.8+6.4+5.2+6.5+5.1+9.5+8.6+9.4+6.3

31

= 196.23

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 31

= 6.33

Table 5.1 : An {AAWV}Average annual wind velocity for {24}districts of Jharkhand year 2K18.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| D{Dist} | J{Jan} | F{Feb} | M{Mar} | A{Apr} | M{May} | J {Jun} | J{July} | A{Aug} |  S{Sep} | O{Oct} | N{Nov} | D{De} |
| D{Dhanbad} | 7.66 | 16.2 | 9.6 | 2.92 | 2.83 | 2.93 | 2.82 | 2.84 | 2.91 | 2.84 | 2.95 | 2.83 |
| R {Ranchi} | 9.87 | 13.5 | 12 | 13.5 | 14.3 | 17.4 | 22.6 | 18 | 19.5 | 14.3 | 13.2 | 15.1 |
| B {Bokaro} | 9.53 | 13.5 | 12.2 | 12.7 | 14 | 15.3 | 22.5 | 16.2 | 17.5 | 14.8 | 12.9 | 14.7 |
| D{Deogha} | 7.6 | 18.7 | 11.1 | 9.12 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| G {Giridhi} | 7.31 | 19.3 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| HZB  | 9.81 | 12.8 | 12.6 | 13.2 | 15.4 | 16.7 | 23.2 | 17.5 | 19.5 | 14.7 | 13.2 | 15.3 |
| R{Ramgar} | 10.2 | 13.8 | 13.2 | 13.2 | 14.9 | 17.1 | 23.6 | 18.3 | 19.3 | 15.3 | 12.8 | 18.8 |
| D {Dumka} | 6.33 | 19.6 | 9.11 | 5.65 | 2.31 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| K {Khunti} | 10.3 | 13.2 | 12.6 | 12.9 | 14.6 | 15.3 | 22.8 | 18.3 | 19.7 | 14.5 | 12.8 | 13.4 |
| G {Gumla} | 6.22 | 17.2 | 8.64 | 4.87 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| L{Loharda} | 10.2 | 13.3 | 13.2 | 13.6 | 14.8 | 17.5 | 23.2 | 17.6 | 20.2 | 15.2 | 12.9 | 14.8 |
| P {Palamu} | 7.62 | 22.3 | 12.3 | 5.12 | 5.68 | 4.65 | 4.32 | 4.86 | 3.91 | 3.92 | 1.47 | 2.03 |
| J {Jamtara} | 5.3 | 4.36 | 4.97 | 3.25 | 3.97 | 4.95 | 4.16 | 4.03 | 4.23 | 3.53 | 2.58 | 3.28 |
| P{Paku} | 7.92 | 14.3 | 11.2 | 6.27 | 5.38 | 5.38 | 4.93 | 4.87 | 5.35 | 5.32 | 3.75 | 4.31 |
| S{Simdega} | 1.91 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| G{Garhwa} | 8.81 | 15 | 14.4 | 9.53 | 10.28 | 8.95 | 26.5 | 24 | 22.9 | 21.2 | 20.3 | 19.5 |
| G{Godda} | 5.32 | 4.87 | 6.67 | 3.84 | 4.76 | 5.62 | 6.52 | 5.41 | 6.42 | 4.53 | 3.22 | 4.66 |
| C {Chatra} | 14 | 17.2 | 18.3 | 20.2 | 19 | 18.7 | 15.8 | 18.4 | 17.6 | 15.2 | 14.3 | 10.3 |
| S{Sahibgan} | 12.3 | 13.6 | 19.2 | 18.2 | 22.2 | 18.2 | 17.6 | 15.9 | 22.7 | 14.5 | 15.6 | 22.3 |
| KQR  | 13.6 | 16.6 | 18.6 | 19.3 | 20.2 | 19.2 | 16.3 | 16.6 | 17 | 14.7 | 13.4 | 10.3 |
| LTHR  | 4.68 | 13.3 | 11.2 | 5.21 | 5.21 | 4.87 | 4.21 | 4.55 | 4.11 | 4.92 | 1.47 | 2.11 |
| SKW | 6.99 | 9.33 | 11.7 | 14.5 | 12.3 | 10.31 | 11.3 | 13.2 | 11.2 | 9.31 | 7.21 | 7.21 |
| ESB | 6.64 | 10.55 | 12.8 | 13.32 | 11.84 | 9.87 | 9.97 | 10.87 | 10.9 | 8.61 | 6.51 | 6.52 |
| WSB | 7.31 | 7.85 | 12 | 14.2 | 13.4 | 8.41 | 9.37 | 9.87 | 11.0 | 9.41 | 8.28 | 7.24 |

Table 5.2 : An {AAWV}Average annual wind velocity for {24}districts of Jharkhand year 2K19.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| D{Dist} | J{Jan} | F{Feb} | M{Mar} | A{Apr} | M{May} | J {Jun} | J{July} | A{Aug |  S{Sep} | O{Oct} | N{Nov | D{De} |
| D {Dhanbad} | 5.63 | 13.8 | 8.92 | 3.09 | 2.99 | 2.92 | 2.67 | 2.95 | 2.87 | 2.82 | 3.01 | 2.93 |
| R {Ranchi} | 10.0 | 13.6 | 11.87 | 13.4 | 14.3 | 17.3 | 24.7 | 19.8 | 19.5 | 14.3 | 13 | 14 |
| B {Bokaro} | 8.92 | 13.8 | 12 | 13.2 | 13.4 | 15.9 | 24.2 | 15.2 | 19.3 | 19.2 | 13.2 | 14.3 |
| D {Deoghar} | 5.79 | 16.3 | 9.76 | 1.1 | 1.1 | 2.32 | 1.99 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| G {Giridhi} | 9.32 | 18.8 | 10.32 | 1.1 | 1.87 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| HZB  | 10.3 | 12.6 | 12.9 | 13.9 | 14.8 | 14.8 | 21.6 | 18.1 | 18.8 | 14.3 | 12 | 15.3 |
| R {Ramgarh} | 10.0 | 12.9 | 12.9 | 12.4 | 15.2 | 16.5 | 24.3 | 19.2 | 19.4 | 14 | 13.9 | 19.3 |
| D {Dumka} | 7.3 | 14.8 | 9.32 | 8.11 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| K {Khunti} | 11.2 | 11.3 | 12.7 | 12.8 | 15.3 | 15.1 | 19.3 | 18.8 | 19.6 | 13.8 | 13.9 | 13.7 |
| G {Gumla} | 6.32 | 16.2 | 9.32 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.99 |
| L{Lohardaga} | 9.52 | 13.4 | 12.8 | 13 | 13.8 | 17.9 | 20.3 | 19.3 | 18.9 | 15.2 | 13.2 | 13.6 |
| P {Palamu} | 7.39 | 21.5 | 14.5 | 4.11 | 4.32 | 4.52 | 4.37 | 4.65 | 3.17 | 3.55 | 1.33 | 1.31 |
| J {Jamtara} | 5.36 | 5.22 | 4.27 | 3.22 | 3.52 | 4.87 | 4.65 | 4.11 | 4.22 | 3.09 | 2.96 | 3.09 |
| P{Pakur} | 8.11 | 14.6 | 12.3 | 6.19 | 5.86 | 5.31 | 4.34 | 5.31 | 5.39 | 5.66 | 4.27 | 4.26 |
| S {Simdega} | 1.46 | 1.32 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| G {Garhwa} | 8.87 | 13.6 | 14.3 | 10.32 | 10.27 | 9.11 | 26.2 | 24.5 | 23.2 | 21.4 | 21.2 | 20.4 |
| G{Godda} | 5.82 | 5.02 | 6.87 | 4.32 | 4.39 | 6.71 | 6.25 | 6.51 | 6.33 | 4.34 | 3.57 | 4.09 |
| C {Chatra} | 15.3 | 17 | 19.3 | 20.3 | 19.7 | 18.3 | 16.5 | 20.2 | 17.3 | 14 | 14.6 | 14.2 |
| S {Sahibganj} | 12.6 | 12.8 | 19.3 | 19.2 | 22.5 | 18.6 | 17.6 | 18.2 | 23.3 | 14 | 14.5 | 21 |
| KQR  | 15.1 | 16.7 | 17.7 | 19.8 | 19.6 | 19.5 | 16.8 | 17.8 | 13.4 | 16.7 | 13.4 | 11.6 |
| LTHR  | 6.11 | 16.5 | 11.2 | 11.2 | 4.98 | 4.34 | 3.87 | 4.55 | 3.66 | 3.37 | 1.96 | 1.99 |
| SKW | 6.32 | 9.34 | 11.6 | 14.6 | 12.8 | 10.55 | 12.3 | 12.6 | 12.4 | 9.12 | 7.72 | 6.99 |
| ESB | 6.65 | 9.52 | 11.5 | 14.1 | 11.3 | 9.33 | 9.69 | 10.6 | 10.5 | 8.66 | 5.63 | 6.31 |
| WSB | 7.06 | 8.93 | 11.3 | 14.6 | 14.3 | 9.51 | 9.55 | 9.62 | 9.86 | 9.61 | 7.69 | 7.53 |

Table 5.3 : An {AAWV}Average annual wind velocity for {24}districts of Jharkhand year 2K20.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| D{Dist} | J{Jan} | F{Feb} | M{Mar} | A{Apr} | M{May} | J {Jun} | J{July} | A{Aug |  S{Sep} | O{Oct} | N{Nov | D{Dec} |
| D {Dhanbad} | 6.99 | 13.8 | 9.6 | 2.96 | 2.64 | 2.66 | 2.59 | 2.99 | 2.91 | 2.58 | 2.78 | 2.98 |
| R {Ranchi} | 10.3 | 11.6 | 13.4 | 13.6 | 16.8 | 20.5 | 18.3 | 20.2 | 14.2 | 12.1 | 12.3 | 14 |
| B {Bokaro} | 9.62 | 13.9 | 12.8 | 12 | 13.8 | 14.6 | 22.4 | 16 | 15.6 | 14.3 | 12.8 | 14.6 |
| D {Deoghar} | 7.13 | 17.5 | 9.87 | 3.4 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 11 |
| G {Giridhi} | 10.9 | 12.3 | 10.57 | 3.46 | 3.11 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 11 |
| HZB  | 10.1 | 13.4 | 13.1 | 13.2 | 13.8 | 16.3 | 22.7 | 17.5 | 19.3 | 14.5 | 12 | 13.6 |
| R {Ramgarh} | 10.2 | 13.6 | 12.9 | 13.4 | 14.2 | 17.4 | 19.5 | 18.5 | 20 | 14.8 | 13.5 | 17.6 |
| D {Dumka} | 6.06 | 16.7 | 8.53 | 1.32 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| K {Khunti} | 9.87 | 13.8 | 13 | 12.6 | 13.7 | 16.5 | 21 | 15.9 | 19.5 | 14.6 | 13.3 | 13.5 |
| G {Gumla} | 4.93 | 11.6 | 13.8 | 2.3 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1 |
| L{Lohardag} | 9.67 | 13.4 | 12.6 | 13.7 | 13.5 | 17 | 24.5 | 18.3 | 19 | 14.6 | 17.5 | 14.3 |
| P {Palamu} | 7.01 | 21.5 | 12.3 | 6.11 | 5.52 | 4.62 | 4.52 | 4.22 | 3.26 | 3.51 | 1.92 | 1.86 |
| J {Jamtara} | 5.3 | 4.56 | 4.31 | 3.14 | 3.28 | 4.24 | 4.29 | 4.66 | 3.28 | 2.87 | 2.32 | 3.11 |
| P{Pakur} | 8.12 | 15.3 | 11.2 | 6.16 | 5.9 | 5.64 | 4.34 | 4.68 | 5.52 | 4.99 | 4.11 | 3.27 |
| S {Simdega} | 1.22 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1 |
| G {Garhwa} | 8.06 | 15 | 14.3 | 9.23 | 10.23 | 9.25 | 26.2 | 23.3 | 22.4 | 22.5 | 20.5 | 18.2 |
| G{Godda} | 6.12 | 4.56 | 6.42 | 3.86 | 4.34 | 5.61 | 6.57 | 5.33 | 6.22 | 4.23 | 3.29 | 4.57 |
| C {Chatra} | 15.1 | 17.6 | 17.5 | 19.8 | 20.6 | 17.8 | 16.3 | 14.3 | 16.8 | 14.8 | 14.2 | 9.79 |
| S {Sahibganj} | 12 | 12.6 | 12.9 | 18 | 22.2 | 18.6 | 18.1 | 21 | 14.9 | 14.8 | 22.1 | 18.5 |
| KQR  | 14.5 | 17.9 | 18.6 | 20.5 | 17.5 | 17.4 | 18.5 | 17.4 | 19.5 | 13.8 | 10.3 | 10.8 |
| LTHR  | 4.66 | 14.6 | 13.5 | 5.22 | 5.68 | 4.22 | 4.24 | 4.34 | 4.05 | 3.58 | 2.31 | 1.99 |
| SKW | 7.42 | 8.25 | 12.4 | 13.8 | 13.6 | 10.66 | 11.6 | 11.9 | 10.6 | 7.25 | 7.23 | 7.24 |
| ESB | 6.22 | 8.23 | 12.3 | 13.8 | 11.3 | 8.99 | 10.5 | 10.7 | 8.24 | 6.5 | 6.44 | 5.62 |
| WSB | 8.12 | 8.64 | 11.7 | 14.2 | 13.5 | 8.68 | 8.75 | 10.0 | 9.69 | 8.31 | 8.01 | 6.59 |

Table 5.4 : An {AAWV}Average annual wind velocity for {24}districts of Jharkhand year 2K21.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| D{Dist} | J{Jan} | F{Feb} | M{Mar} | A{Apr} | M{May} | J {Jun} | J{July} | A{Au} |  S{Sep} | O{Oct} | N{Nov | D{Dec} |
| D{Dhanbad} | 7.7 | 13.4 | 8.6 | 3.11 | 2.31 | 2.81 | 2.72 | 2.84 | 2.91 | 2.64 | 3.1 | 2.82 |
| R {Ranchi} | 9.7 | 14.3 | 11.8 | 13.3 | 14.8 | 16.3 | 22.3 | 18.6 | 19.4 | 13.2 | 11 | 13.2 |
| B {Bokaro} | 10.0 | 12.8 | 12.7 | 12 | 13 | 15.3 | 22.4 | 16.2 | 17.3 | 15.2 | 12.4 | 15.3 |
| D {Deoghar} | 18.0 | 10.0 | 5.32 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 4.31 | 1.1 |
| G {Giridhi} | 7.51 | 18.8 | 10 | 8.72 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| HZB  | 9.0 | 13.6 | 12.6 | 13 | 13.8 | 17.3 | 22.8 | 17.6 | 18.4 | 15.3 | 12.4 | 15.5 |
| R{Ramgarh} | 9.95 | 13.2 | 12.8 | 13.3 | 13.8 | 16.9 | 24.6 | 17.3 | 20.6 | 13.8 | 13 | 18.5 |
| D {Dumka} | 6.9 | 17.6 | 8.15 | 6.7 | 1.1 | 1.1 | 1.1 | 4.31 | 1.1 | 1.1 | 1.1 | 1.1 |
| K {Khunti} | 10.7 | 13.2 | 13.4 | 12.2 | 13.8 | 14.8 | 22.6 | 19.5 | 19.3 | 14.9 | 14.1 | 14.3 |
| G {Gumla} | 5.32 | 17.8 | 9.22 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| L{Lohardag} | 10.2 | 13.6 | 13 | 13.3 | 14.8 | 17.3 | 23 | 18.3 | 20.2 | 14.3 | 12.6 | 14.5 |
| P {Palamu} | 6.55 | 23.2 | 12.6 | 5.41 | 5.32 | 4.72 | 4.26 | 4.32 | 4.22 | 3.46 | 1.52 | 1.75 |
| J {Jamtara} | 5.66 | 4.35 | 4.56 | 3.55 | 4.22 | 4.25 | 4.25 | 4.15 | 4.14 | 3.6 | 3.56 | 2.36 |
| P{Pakur} | 7.62 | 15.4 | 11.5 | 6.12 | 5.35 | 5.66 | 4.32 | 3.54 | 6.5 | 3.3 | 3.41 | 3.99 |
| S {Simdega} | 1.21 | 1.22 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| G {Garhwa} | 8.33 | 15 | 14.3 | 10.66 | 10.25 | 8.93 | 26 | 24.9 | 23.2 | 21.5 | 20 | 18.3 |
| G{Godda} | 4.89 | 4.69 | 6.31 | 4.32 | 4.69 | 5.62 | 6.94 | 5.66 | 6.31 | 4.08 | 3.51 | 3.98 |
| C {Chatra} | 13.6 | 19 | 18.4 | 18.6 | 19 | 14.6 | 15.4 | 17.6 | 19.7 | 10.8 | 10.2 | 10.1 |
| S{Sahibgan} | 13.4 | 13.8 | 19 | 18.7 | 22.1 | 20.6 | 17.3 | 18.3 | 14.3 | 16.5 | 15.3 | 20 |
| KQR  | 13.6 | 16.7 | 18.9 | 19.4 | 20.3 | 19.5 | 15.4 | 17.5 | 17.3 | 14.5 | 13.5 | 9.99 |
| LTHR  | 11.9 | 15.7 | 10.66 | 5.32 | 5.66 | 5.11 | 5.19 | 4.59 | 4.27 | 3.29 | 3.27 | 3.16 |
| SKW | 6.99 | 8.87 | 10.32 | 14.2 | 12.7 | 10.6 | 11.5 | 11.9 | 11.2 | 7.69 | 7.99 | 7.11 |
| ESB | 6.51 | 9.54 | 9.99 | 13.8 | 12.7 | 9.33 | 9.14 | 11.2 | 11.4 | 8.82 | 6.4 | 6.23 |
| WSB |  7.32 | 8.12 | 12.1 | 14 | 13.6 | 7.35 | 7.99 | 10.3 | 10.5 | 9.25 | 9.24 | 9.06 |

Table 5.5 : An {AAWV}Average annual wind velocity for {24}districts of Jharkhand year from {2018 – 2021} respectively which shoes its wind velocity

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| D{Dist} | J{Jan} | F{Feb} | M{Mar} | A{Apr} | M{May} | J {Jun} | J{July} | A{Aug |  S{Sep} | O{Oct} | N{Nov | D{De} |
| D {Dhanbad} | 6.09 | 14.8 | 9.25 | 2.99 | 2.71 | 2.84 | 2.71 | 2.89 | 2.9 | 2.74 | 2.94 | 2.88 |
| R {Ranchi} | 9.58 | 13.4 | 12.2 | 13.4 | 15 | 17.7 | 17.5 | 18.9 | 18.3 | 13.6 | 12.5 | 14.2 |
| B {Bokaro} | 9.58 | 13.7 | 12.5 | 12.5 | 13.6 | 15.3 | 22.9 | 15.8 | 17.64 | 15.6 | 12.8 | 14.7 |
| D {Deoghar} | 9.1 | 16.4 | 9.24 | 3.16 | 1.1 | 1.34 | 1.27 | 1.1 | 1.1 | 1.1 | 1.74 | 1.1 |
| G {Giridhi} | 8.44 | 17.8 | 8.52 | 3.09 | 1.65 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| HZB  | 10.0 | 13.5 | 12.9 | 13.2 | 14.5 | 16.3 | 22.7 | 17.7 | 19 | 14.7 | 12.5 | 14.9 |
| R {Ramgarh} | 10.2 | 13.2 | 13.0 | 13.1 | 14.6 | 17 | 23.1 | 18.3 | 19.7 | 14.5 | 13.2 | 18.5 |
| D {Dumka} | 6.5 | 17.7 | 8.9 | 4.57 | 1.34 | 1.1 | 1.1 | 1.74 | 1.1 | 1.1 | 1.1 | 1.1 |
| K {Khunti} | 10.4 | 13 | 13 | 12.7 | 14.4 | 15.3 | 21.8 | 18.1 | 19.4 | 14.5 | 13.5 | 13.8 |
| G {Gumla} | 5.81 | 16.1 | 10.1 | 2.09 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.27 |
| L{Lohardaga} | 10.0 | 13.6 | 13 | 13.4 | 14.3 | 17.3 | 22.9 | 18.3 | 19.5 | 14.8 | 13.8 | 14.4 |
| P {Palamu} | 7.05 | 22.4 | 13 | 5.17 | 5.24 | 4.62 | 4.35 | 4.56 | 3.71 | 3.67 | 1.54 | 1.79 |
| J {Jamtara} | 5.04 | 4.52 | 4.7 | 3.28 | 3.79 | 4.65 | 4.3 | 4.19 | 4.02 | 3.32 | 2.81 | 3.02 |
| PKR {Pakur} | 8.0 | 15.1 | 12 | 6.18 | 5.67 | 5.47 | 4.58 | 4.65 | 5.66 | 4.91 | 3.87 | 4.07 |
| S {Simdega} | 1.4 | 1.2 | 1.2 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| G {Garhwa} | 8.6 | 15 | 14.5 | 9.9 | 10.3 | 9.1 | 26.4 | 24.1 | 22.8 | 21.5 | 20.5 | 19.1 |
| G{Godda} | 5.6 | 4.9 | 6.6 | 4.1 | 4.6 | 5.9 | 6.52 | 5.66 | 6.33 | 4.35 | 3.37 | 4.41 |
| C {Chatra} | 14.5 | 17.8 | 18.6 | 20.0 | 20.1 | 18.0 | 12.8 | 17.7 | 17.7 | 13.9 | 13.3 | 10.9 |
| S {Sahibganj} | 13.0 | 13.5 | 18.2 | 18.5 | 22.1 | 19.1 | 17.7 | 18 | 19.7 | 14.8 | 16.4 | 20.6 |
| KQR  | 14.0 | 17.1 | 18.6 | 19.9 | 19.9 | 19.2 | 16.7 | 17.4 | 16.8 | 14.9 | 12.7 | 10.6  |
| LTHR  | 6.8 | 16 | 11.0 | 6.6 | 5.5 | 4.7 | 4.36 | 4.56 | 4.04 | 3.82 | 2.09 | 2.27 |
| SKW | 7.3 | 9 | 11.5 | 14.5 | 12.8 | 10.5 | 11.6 | 12.4 | 11.3 | 8.33 | 7.52 | 7.15 |
| ESB | 6.6 | 9.8 | 12 | 14 | 11.7 | 9.39 | 9.87 | 10.8 | 10.4 | 8.29 | 6.29 | 6.24 |
| WSB | 7.6 | 8.8 | 12 | 14.5 | 13.6 | 8.47 | 9.01 | 9.93 | 10.4 | 9.2 | 8.29 | 7.53 |

 **6. Result and Comparison’s**

Fig 6 {a} Wind speed chart of yearly & monthly graph of all districts.

Fig 6 {b} Wind speed chart of yearly & monthly graph.{Small production}

Fig 6 {c} Wind speed chart of yearly & monthly graph {No production}

Fig 6 {d} Wind speed chart of yearly & monthly graph.{Large production}

**7. Conclusion and Futures Scope**

The RES Which produce GE{green environment}Which makes the system more stability, economics, reliability, offering jobs etc. While surveying I found that only few states which produce a huge amount of ES {Energy Sources}such as SKW, ESB, WSB, KQR, SBG, CTR, GHD, LAD, HZB, BKSC, RAH, KHU & RNC. and remaining districts cannot able to produced an electricity.

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