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COURSE NAME:

**(Operation Management)**

**Assignment Title:**

**(Wind power or energy)**

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**Introduction**

**Operation management is the strategy, operation and control of the change process that converts such resources as labor and raw materials into goods and services that are sold to clients.**

**It comprises both services and industrial and it is important in effectively and efficiently managing output. It plays a strategic role in an organization’s economic realization.**

**Facility establishments used operation management in producing nonphysical outputs in the form of services for their customers.**

**Wind power or energy is the process of linking energy from the movement of the wind and converting it to useful forms of mechanical power and electricity. Wind power is a principal, maintainable, renewable energy source that has much smaller effect on the environment than red-hot fossil fuels. Wind farmhouses comprise of many separate wind turbines, which are devoted to the electric power diffusion network.**

**Agreeing to consistent information, in 2020, wind supplied almost 1600 terawatt-hour of electricity, which was over five per cent of universal electrical energy generation and about two per cent of energy concentration with over 100 GW added during 2020, mostly in China, overall fixed wind energy capacity extended more than 730 GW to help attain the Paris agreement goals to limit the effect of climate change globally. Experts say it should enlarge much quicker than this by one per cent of electricity generation per year. Expansion of wind power is being delayed because of fossil fuel subventions.**

**Body of Assignment**

**Wind energy farms are luxurious basis of electronic power, competitive with, or in many places inexpensive than coal or gas plants. Onto dry land wind farmhouses have better visual impact on the landscape than other power stations as they need to spread over more land and need to be erected in rural environment? Negligible onshore wind farms can nurse some energy into the grid or provide power to isolate off network settings. Offshore wind farms offer sounder and stronger source of energy and have less optical impact. Though there is less off shore wind power at the present and construction and maintenance cost are higher, it is forecast to grow.**

**Wind energy is flexible, renewable energy and power management methods are used to corresponding supply and demand such as wind hybrid power system. Hydro-electric power or other dispatchable power sources excess volume physically dispersed turbines, trading and importing power to adjacent areas or network storage. As the tender of wind in a region rises, they may want to be up graded. Climate forecasting lets the electric power network to be prepared for the foreseeable gaps in production that occur. Wind dynamism is the kinetic energy of aerial in motion also called wind. Whole wind energy flowing through a fictional surface with area A during the time t is: where p is the concentration of the air: v is the wind speed. Automatic voltage transfer (AVT) is the capacity of air passing through A which is measured vertical to the route of the wind: Avtp is thus the mass m passing through A½ pv² is the kinetic energy of the moving air per component volume.**

**Under greatest environments, the value of a wind producer in converting energy to electricity is about 45 per cent, although a research in New Zealand shows efficiency of 10 - 40 per cent is more common in daily operations. Studies have revealed that middling wind speeds in a particular location need to surpass at least 6-8 meters per seconds for a small wind turbine to be prudently viable.**

**Putting cost and economic viability into consideration, one must be aware that extra cost, consent costs, freight, the concrete bases wiring can be comparable to 30-80 percent of the cost of a turbine itself. A turbine sized at 2kw could cost around £20,000 to £30,000 plus installation. Maintenance costs should also be measured, wind turbines normally have greater maintenance requisite than, for example photovoltaic systems. Some controls have found that in many cases; a solar electricity method is likely to be more cost effective than wind turbine. Statistics from the electricity specialist suggest that almost no residential or small scale wind generator have been installed in recent years.**

**Wind energy is more suitable in remote locations areas as they can produce noise, disturbance and may be viewed as unpleasant. Wind turbines may not do well in urban areas because of impairments such as buildings tend to make the wind unsettled and inconsistent.**

**The formation of wind turbine includes:**

* **The turbine flippers: propellers with two, three up to five blades fixed on the parallel shaft, this gives greater output than when they are fixed on the vertical slide and are made of a lightweight material such as carbon fiber, fiberglass or wood that is robust enough to resist wind forces.**
* **The tail section: Usually a fin that turns the body of the wind generator to turn the turbine into the route of the wind, with the fin flexibly downwind.**
* **The Alternator: Ac electricity is produced by airfoil windings linked to the shaft from the wind turbine.**
* **The rectifier: Converts the AC to DC for electricity that is being sent to the battery storing system (the rectifier may be situated in the alternator or in a remote control box away from the tower).**
* **The Electricity cables: transfer the electricity from the generator to the energy source or battery storing system.**
* **The Slip rings: stop the cables snaking as they will otherwise twist within the tower as the wind turbine figure orbits.**
* **An Electric element: control is constantly made when the turbine spins, so if the power is additional to storage capacity, it must be diffused to a dummy load (mostly an electric ration that gets very hot).**
* **The Tower: the structure (regularly steel, concrete or wood) that hugs the turbine high in the air, and permits the turbine congress on top to rotate into the wind. For busy applications, it is a mast pole with guy wires.**
* **The Guy wires: uphold the post pole in effective position.**
* **The Gin pole and winch: let the turbine to be dropped for maintenance.**
* **The Concrete foundation: A 2-3 kilowatt turbine on a 10-15 m headlock will typically require a 3-5m³ protected concrete base.**

**An estimate capacity of wind installations are between the ranges of 35% to 44%. The top ten countries by increasing wind capacity in 2019 include the following China 43.3%, United State15.1% , United Kingdom 4.0%, India 3.9%, Germany 3.6%, Spain 2.7%, Sweden 2.6%, France 2.2%, Mexico 2.1% and Argentina 1.2% and other part of the world 18.8% proportionally.**

**Generally there is no accepted determined level of wind penetration. The boundary for a particular grid will be liable on the prevailing producing plants, pricing mechanisms, and capacity for energy storage, demand control and other factors.**

**According to the American Wind Energy Association (AWEA), wind power production in United states in 2015 reduced consumption of 280 million cubic meters corresponding to 73 billion US gallons of water and reduced co² emission approximately by 132 million metric tons, and providing US$7.3 billion in public health sector saving.**

**Factors that affect wind energy generation capacity:**

**The effectiveness of the system’s cohort capacity will depend on converting wind pressure into turbines rotary interia. Information like data should be available for the system supplier. This increases with:**

* **Greater turbine distances-There will be more turbine blade area for the wind energy to impact on and also more chances of greater noise.**
* **Appropriate profile blade for local wind speed. This differs pending on average wind speed, whether the wind is steady or greater in period of high velocity.**
* **Lesser friction fatalities in the turbine shaft assembly.**

**The capacity of the wind energy will decrease if turbine is situated:**

* **At low level on the ground: Wind velocity increase with height above the ground at least a minimum of 10 meters above the ground.**
* **If there are obstacle in the turbulent airspace downwind. Eg hills, trees, building and structures.**
* **A distance from an exposed obstacle of more than ten times a hurdle height.**

**As climate change becomes a global issue, countries, the world over have diverted investing into renewable energy. It has become one of the most popular renewable sources in U.S which accounts for 7% energy generation and has the potentials for a significant growth. To mitigate the threat on climate change and its impact it would be important to think about how to power the future with renewable energy source.**

**There are different ways to generate wind energy but the most commonly method used is wind turbines. The way the wind turbines work can be confusing but in simple terms, the kinetic energy deposited in the wind rotates the blades of the wind turbine around a rotor. Then the rotor turns a generator within the turbine, which is what generate usable electricity.**

**However wind energy also has its advantages and disadvantages as follows:**

**Some advantages of wind energy.**

1. **It is the cleanest energy sources. Wind energy generation using turbines does not radiate any greenhouse gases. It’s a fact that the manufacturing, transportation, and installation of wind energy turbines do released some pollution but is nowhere near the level of emissions released from burning fossil fuel.**
2. **Renewable: It is a renewable energy source. The source of energy is not exhausted when used. As we use wind turbines we don’t decrease the amount of wind available in the environment.**

**It is not the case with non-renewable energy like oil and natural gas. As we use fossils fuel it has consequence and reduces the amount that is available for future used.**

1. **Space efficient: wind turbines cannot be placed too close to one another which make solar farms larger. The wind turbines do not take that much space. The space in between poles can be used for farming which make it popular in rural zones. An each turbine has the capacity to produce a lot of electricity enough to supply an estimate of 2,500 homes.**
2. **Low coast energy: Despite wind turbines are costly, the energy produce is cheap. This are one of the reasons that there is no cost for turbines to function once established. Wind is free of charge and turbines need little maintenance.**

**If you consider the upfront investment costs of operations and maintenance over the lifetime of the turbines, studies shows that wind energy charges about $0.0029 per kilowatt hour. It is much cheaper than coal which would charges about $0.0036 per kilowatt hour.**

**This is so far cheaper than coal if you consider the cost to build and operate coal power plants.**

1. **Promote employment opportunity: Wind energy industry is rapidly growing yearly. From 2010 and 2018, the amount of installed wind energy capacity in the U.S is more than doubled creating enough wind energy production to over 30 million homes. This has created a great employment opportunity for new jobs.**

**At present, over 120,000 Americans have been employed because of the wind energy power creation, ranging from manufacturers, installers and technicians. The role of wind turbine technicians is the second fastest recruiting job in America.**

**It is predicted that as wind energy continue to magnify it would support more than 600,000 new jobs by 2050 which is a complement to UN 2030 sustainable development goal.**

**Some disadvantages of wind power or energy:**

1. **Unpredictable: The prime problem with wind power is that energy cannot be constantly produced. Energy is only produced when the wind blows.**

**The amount of turbines energy produced depends on the wind speed. Therefore, wind energy is not well suitable to be base load energy. But the energy storage technology remains to become more fees real, it is possible to become more dependent on wind energy.**

1. **Threat to wildlife: Turbines can have bearing on wildlife. Although it does not cause environmental problems through greenhouse gas emissions.**

**Birds, bats and other winged creatures are at risk when taking a direct hit from a rotating turbine blade. Studies have assessed that about 140,000 and 500,000 birds died from wind turbines annually.**

**Carefully planning where turbines farms will be built can mitigate how numerous birds collisions occur.**

**(C) It can create noise: People who live in the vicinity of wind turbines suffer from noise. The generators makes mechanical hum while the blades create “whizzing” sound as they rotate in the air. However due to advance in technology the newer turbines produce minor noise than the old ones.**

**(d) Looks: Wind turbines should be built high to enable enough wind capture which makes them meet part of any landscape. Some find that greater wind turbines are an eyesore, but this is more of a personal preference.**

**(e) Location limitations: For wind energy turbine to be economically viable, they should be installed in a place where they will generate adequate electricity. Wind farms are mostly suited in coastal locations, the top of hills, and open atmosphere essentially anywhere with strong and consistent wind.**

**In most cases suitable ranges are usually in remote locations outside of the cities and towns or offshore. Because of the distance, new setup, like power lines have to be built in order to connect a wind farm to the power grid. This is costly and may cause harm to the surrounding environment e.g. by clearing down trees to connect to power lines.**

**Conclusion**

**To be frank enough, wind energy has a livelier future according to growing strength around the world. Notwithstanding there are disadvantages to wind energy, such as it being an intermittent energy source and a threat to some wildlife, the cost benefits are unbearable to ignore. This are some of the major reasons why wind power or energy continue to grow both on and offshore.**

**While you can get wind turbines built to provide electricity for your home, it can be costly and difficult to find convenient space. When you want to power your house with clean energy consider installing solar panels.**

**Using solar energy is suitable, renewable, and is a significant financial investment for homeowners. Conferring to the International Energy agency (IEA) 2011, energy subventions preciously lower the fee of energy paid by customers, raise received by producers minimize the cost of production. Fossil fuel appropriations cost generally overshadow the benefits. Subsidies to renewables energy and low-carbon energy technologies can bring long-term economic and environmental benefits.**

**On public opinion survey in Europe and many other countries, people show strong public support for wind power energy. The survey found about 80% of European Union citizens supported wind energy.**

**Many wind energy companies work with local communities to mitigate environmental and other concerns associated with particular wind farms. Appropriate government consultation, planning and approval procedures can help minimize environmental risk associated with wind farms.**

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