Wind Power: Use Of Renewable Energy In Kazakhstan

Renewable energy is the trend of the 21st century. Our technological advancement has spontaneously went up. Solar panel, hydroelectric dams, nuclear power plants e.t.c. All of these innovations were meant to help us save the Earth and move on from usage of fossil fuels as energy sources. One of the ways of getting renewable energy is wind power. It is very effective since it is completely renewable and eco-friendly.

How to wind turbines work? Each wind turbine has a wind vane, which indicates the direction, so that the blades will turn with the wind. The blades also rotate around their axes for maximum resistance. When wind blows, it carries kinetic energy, which moves the blades of the wind turbine. The blades are connected to the wind turbine through the hub. The hub, then is connected to the low-speed shaft which turns at the same speed as the blades. To get electricity, the speed of the low-speed shaft should be increased, which is what the gearbox does. It increases the speed almost by a hundred times, and transferred it to the high-speed shaft. The high-speed shaft can make up to 1500 revolutions per minute. It is connected to the generator, which converts the kinetic energy into electricity. Then, it is easier to transport this type of energy and store it. From the generator, electricity is sent to the banks, interiorly, directly from the top to bottom. There, a converter converts it into alternating current, the most common type, and the transformer, another part of the turbine, raises the voltage. In the end, the alternating current is sent through underground cables to the substation. The voltage is increased again, to feed it into the power grid and transport it to end consumers. ('How Does A Wind Turbine Work? | Sustainability')

Since the wind turbines exist in different sizes, the length of the blades also varies, they can be up to 60 m. The majority of wind turbines start operating at 3-5 m/s, which is not a strong wind. There are many parts of the wind turbine, but only the main ones are discussed. When the blades of the turbine rotate, they turn a shaft in the nacelle, and the generator which is built into it converts this kinetic rotational energy into electrical energy. Wind turbines also have brakes, which would stop the operation of the technology in emergencies. After the procedure, the electricity produced should be transformed into a suitable voltage to be used by a local site. Most onshore, or wind turbines that are on land, have a capacity from 2-3 MW up to 9 MW, and as a result can produce as much as 6 million kWh per year. That is enough to supply 1500 households with power. However, it all depends on the frequency of windy occasions, or the speed of the wind, so predicting the average amount of wind energy produced in general, is hard. ('How Do Wind Turbines Work?')

The usage of wind power has many benefits. Firstly, wind energy is one of the most environmentally friendly renewable energy sources today. Most non-renewable sources of energy need to be burned. As a result, greenhouse gasses such as carbon dioxide (CO_2) and methane (CH_4)are released into the atmosphere. As well as being eco-friendly, it is completely renewable. Wind power will never run out, since wind will always blow. It is not a limited resource, unlike fossil fuels which are expected to run out in the near future (oil, gas, coal). Also, there are many benefits from the practical point of view. As a result of more demand for renewable energy, new jobs are created. They include planning, manufacturing, installing and maintenance. There are even wind consultants, where specialists determine whether the

installation will be profitable or not. In 2017, IRENA (International Renewable Energy Agency) employed over 1.15 million people. When it comes to money, wind turbines are, in fact, expensive to build, but when they are already built, using wind turbines is almost free, unlike the production of fossil fuels. This makes wind energy a good way of generating cheap electricity. Also, when solar panels need a lot of space, wind turbines don't. They take up space higher up, rather than on land. Since they take minimal land base, farmers can still be able to use the fields for farming, and when wind turbines are offshore, fishermen can still be able to fish. ('Advantages And Disadvantages Of Wind Energy - Clean Energy Ideas')

Just like any other energy source, wind energy has limitations. Wind turbines are believed to pose a threat to wildlife, such as birds and bats. However some other man-made technology, such as radio towers, are much more dangerous to birds than wind turbines. As well as threatening wildlife, it does also ruin a landscape with noise and visual pollution. Wind turbines create a lot of noise and a single one can be heard from as far as 100 meters. When there are multiple turbines combined, the sound effects are even greater. Even though they are usually built further form urban areas, sometimes they are too close to people and create discomfort for those living near. Like noise pollution, wind farms also cause visual pollution. That is when wind turbines 'ruin' the landscape and it is unpleasant to look at them. Although some people like the sight of wind farms, some don't. However, this limitation is based on personal opinion and public acceptance is becoming more common. And, as being mentioned before, it takes a large amount of money for installations alone, which is a problem to second to third world countries. As for the 'natural' limitations, wind is not constant. Just like solar energy, wind isn't constant. Although it will never run out, it doesn't always blow. This can cause an issue to wind turbine establishers since they will need time and money for investigating the best place for wind farms. ('Advantages And Disadvantages Of Wind Energy - Clean Energy Ideas')

Currently, in Kazakhstan, not wind energy is not so popular. However, that doesn't mean it is not encouraged. By 2020, Kazakhstan plans to have 34 new power plants (solar, hydro, wind), 13 of which would be wind farms. There are many places where wind farms can be installed.(??????????) Kazakhstan has many windy places, like Astana and Atyrau regions, and has a lot of land. About 1081 MW will be produced from wind farms alone. Already, in 2013, wind power plants were commissioned to North and East Kazakhstan. In the period of 2014-2018, wind turbines were installed in the Almaty region. The wind turbines are at the 80 m altitude, and according to UNDP, the potential wind resources are 929 kWh per year. As for now, there wasn't a turning point, but little by little progress is made. Especially after EXPO 2017, which was held in Astana, Kazakhstan got more ideas for moving away from fossil fuels, and leaning more to renewable energy. Anyways, Kazakhstan has got the land and all the climate requirements, so project like these are possible. However, to this day, oil gas and coal are the main energy sources in Kazakhstan. (?????????)