Forms Of Alternative Energy: Analysis Of Wind Energy

This report is meant to teach the common public about the advances and benefits of the modern alternative energy and why it is crucial for the future. Alternative energy is one of the most reliable sources of electrical energy and its construction (primarily wind power) dates back to as long as 5000 BC where Egyptians used to power their vehicles using the winds around the coastlines of the Nile river. After thousands of years people finally understand the benefits of alternative energy and the situation the planet is in, this passage explains all the problems relating to the current methods of extracting energy.

In this report I have chosen the most sufficient form of alternative energy, explained its functions and factually expressed how it is compared to the other forms of alternative energy.

1. Research renewable or alternative energy and provide a description of what they are and their importance. Renewable energy is energy that is collected from renewable resources, which are naturally filled on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat. Renewable energy often provides energy in four important areas: electricity generation, air and water heating/cooling, transportation, and rural (off-grid) energy services.

As the world's renewable sources slowly reduces in quantity, engineers have to work to figure out how to get more energy without wasting more resources that ultimately lead to the demise of our planet and us. The main purposes of renewable resources are:

- Reduced greenhouse gas emissions: Prioritised since the main problem the renewable energy collectors were made to solve was the increased global warming issues.
- Create jobs: Renewable energy agencies have given the world 11 million jobs and continue to grow by about 7% every year.
- Diversify our energy supply: Americans run through 15000 pounds of coal emissions every year for everyday energy consumptions. Which increase the world's average temperature by 0.8%.
- Improve public health: As our climate changes, the risk of injury, illness, and death from the resulting heat waves, wildfires, intense storms, and floods rises. However, a warming atmosphere also holds more moisture, so the chance of extreme rainfall and flooding continues to rise in some regions with rain or snow.
- People individualise energy independence: When a country is able to produce enough of its own fuel to meet its own demands, then it is referred to as being energy independent. Energy independence is something that large and energy-rich countries are attempting. Some methods of renewable energy take the users off the grid in terms of some energy requirements, mainly electricity.
- Save money: Renewable energy is a onetime payment thing that may seem considerably high but end up saving the family quite a bit of money. Solar energy costs range between $3k-$5k for 12 3Kw panels. Wind energy on the other hand costs between $1.3m and $2.2m but has the ability to provide for almost an entire town. An average family spends about $1.2k a year on their electricity but as the resources decrease the prices are guaranteed to increase, so is the average household usage with the new technological evolutions that are set to happen in the next few years.

2. History of the wind turbines and wind mills:

Ancient History of Wind Power. The earliest known use of the windmill was in the 1st century AD by Heron of Alexandria. However the use of wind energy dates even further back. The ancient Egyptians were the first people known to harness wind energy, using it to power boats up and down the Nile River as long ago as 5000 B.C. In ancient Persia, windmills were used to grind harvested grain and pump water through early plumbing systems. It was used to power his organ, and was the first known windmill used to power a machine. Around the 9th century AD in Persia many vertical axis windmills were used to grind grains and pump water from the ground.

For modern times, the first use of the wind being converted into electrical energy was by Charles F. Brush in Cleveland, Ohio. The blades of his design were 17 meters in diameter and produced about 12 kilowatts of electricity. In 1941 in Vermont, the most powerful wind turbine to date was built. It was constructed mostly out of steel with a 175 foot diameter rotor blade, and produced 1.25 megawatts of electricity. This special turbine, knows as the Smith-Putnam turbine, did not have a very long lifespan due to its grand size and weight.

3. What were windmills used for:

windmills usually were used to mill grain (gristmills), pump water (windpumps), or both. The majority of modern windmills take the form of wind turbines used to generate electricity, or windpumps used to pump water, either for land drainage or to extract groundwater.

The Advantages of Windmills

1. Clean: Windmills do not produce any carbon emissions, thus they are considered clean energy sources that help fight against global warming. However, windmills do generate some minor pollution during their manufacturing, installations, maintenance, and eventual teardown. This pollution is extremely small when compared to every other form of energy production, such as fossil fuels and nuclear power.
2. Renewable: Fossil fuels and nuclear power are not renewable, because there is a limited or finite amount of those resources. On the other hand, wind power is virtually unlimited and continuous, thus windmills are renewable sources of energy.
3. Independence: With wind power, countries can move from being dependent on other countries to being independent for their energy needs. Some countries, such as Germany and China, are already embracing wind power.
4. Cost: Currently, the two cheapest forms of energy are wind and coal. Notice that all the other sources of fuel, including oil, natural gas, hydropower, and nuclear, are all significantly more expensive than wind and coal. Furthermore, windmills are becoming appreciably cheaper and more efficient, while coal is becoming more expensive. As a result, the long term costs make wind power the cheapest form of energy.
5. Potential: Wind power has vast potential. It is estimated that wind power could supply a majority of the world’s energy needs.
6. Safety: Finally, windmills are considerably safer than most other forms of energy.

The Disadvantages of Windmills

1. Politics: Fossil fuels, such as coal, oil, and natural gas, are big businesses, and they

have successfully lobbied governments for subsides; while at the same time, denying subsidies for alternative and renewable forms of energy. As a result, the prices for fossil fuels are lower than they should be in a true free market. Eventually, the decreasing cost of wind power will make the prices for fossil fuel with their subsidies less appealing. Alternatively, maybe politicians will realize the long term folly of their current subsidy policies.

2. Animal Death: While it is true that old models of windmills killed a large number of birds and bats, newer windmills have been redesigned to address this issue. For instance, newer windmills move at slower and more efficient spends thus saving many animals. Newer windmills have smooth towers to prevent animals nesting near the rotating blades. Some windmills intentionally produce unnatural sounds to scare aware animals. As a result of these innovations, domestic cats are far more dangerous to wildlife than windmills.
3. Initial Cost: Windmill farms have a very high initial cost for purchasing and installing a large number of windmills. Fortunately, the costs for long term maintenance is considerable lower than any other forms of energy production. This is where government subsidies should be applied to support wind power.
4. Visual Appearance: The 'Not In My Backyard' or NIMB is a common opinion that windmills are visually unappealing. On the other hand, other people do find them visually appealing. The real question is if people prefer smoke stacks over windmills.
5. Noise: A lot of people living near windmills often complain about noise being generated by windmills. Newer models of windmills have decreased these noises, and future models will surely address this issue even more.
6. Inconsistent: Wind farms produce an inconsistent amount of energy. The obvious solution is to increase the number of wind mills over large areas to mitigate the variability of energy production of each windmill. The second obvious solutions is having other forms of energy as backups when needed.
7. Storage: Sometimes, wind farms produce too much energy than is currently needed. Storing energy has never been very cost effective, however I believe that breaking down water into hydrogen gas and oxygen gas is a good and reasonably safe way of storing extra energy.
8. Transmission: Finally, most wind farms are located in remote areas without any convenience means of transmitting energy to high populated areas. More transmission lines can easily solve this problem.

4. Make a list of the different types of renewable energy.

Biomass:

The most widely used form of renewable energy is biomass. Biomass simply refers to the use of organic materials and converting them into other forms of energy that can be used. Although some forms of biomass have been used for centuries – such as burning wood – other, newer methods, are focused on methods that don’t produce carbon dioxide.

Solar:

Solar power (aka. photovoltaics) is one of the most popular, and fastest-growing, sources of alternative energy. Here, the process involves solar cells (usually made from slices of crystalline

silicon) that rely on the photovoltaic (PV) effect to absorb photons and convert them into electrons. Meanwhile, solar-thermal power (another form of solar power) relies on mirrors or lenses to concentrate a large area of sunlight, or solar thermal energy (STE), onto a small area (i.e. a solar cell).

Wind:

Wind power has been used for thousands of years to push sails, power windmills, or to generate pressure for water pumps. Harnessing the wind to generate electricity has been the subject of research since the late 19th century. However, it was only with major efforts to find alternative sources of power in the 20th century that wind power has become the focal point of considerable research and development.

Tidal:

Tidal power is considered to be a potential source of renewable energy because tides are steady and predictable. Much like windmills, tide mills have been used since the days of Ancient Rome and the Middle Ages. Incoming water was stored in large ponds, and as the tides went out, they turned waterwheels that generated mechanical power to mill grain.

Geothermal power:

Geothermal electricity is another form of alternative energy that is considered to be sustainable and reliable. In this case, heat energy is derived from the Earth – usually from magma conduits, hot springs or hydrothermal circulation – to spin turbines or heat buildings. It is considered reliable because the Earth contains 1031 joules worth of heat energy, which naturally flows to the surface by conduction at a rate of 44.2 terawatts (TW) – more than double humanity’s current energy consumption.