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STUDY ON NEW DISCOVERIES IN RECENT YEARS REGARDING THE ALTERNATIVE ENERGY IN THE WORLD

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Abstract: Human activity is overloading our atmosphere with carbon dioxide and other global warming emissions, which trap heat, steadily drive up the planet's temperature, and create significant and harmful impacts on our health, our environment, and our climate. Most renewable energy sources produce little to no global warming emissions.

Renewable electricity generation from biomass can have a wide range of global warming emissions depending on the resource and how it is harvested. Sustainably sourced biomass has a low emissions footprint, while unsustainable sources of biomass can generate significant global warming emissions.

Generating electricity from renewable energy rather than fossil fuels offers significant public health benefits. The air and water pollution emitted by coal and natural gas plants is linked to breathing problems, neurological damage, heart attacks, and cancer. Replacing fossil fuels with renewable energy has been found to reduce premature mortality and lost workdays, and it reduces overall healthcare costs.

Keywords: Air pollution, environmental protection, protection and conservation of the environment.

1. INTRODUCTION

Throughout the world, strong winds, sunny skies, plant residues, heat from the earth, and fast-moving water can each provide a vast and constantly replenished energy resource supply. These diverse sources of renewable energy have the technical potential to provide all the electricity the nation needs many times over.

Estimates of the technical potential of each renewable energy source are based on their overall availability given certain technological and environmental constraints.

However, it is important to note that not all of this technical potential can be tapped due to conflicting land use needs, the higher short-term costs of those resources, constraints on ramping up their use such as limits on transmission capacity, barriers to public acceptance, and other hurdles.

In the future, civilization will be forced to research and develop alternative energy sources. Our current rate of fossil fuel usage will lead to an energy crisis this century. In order to survive the energy crisis many companies in the energy industry are inventing new ways to extract energy from renewable sources. This page contains articles about the future of energy technologies.

2. RENEWABLE ENERGY FOR BIOFUEL

With global climate change, some researchers are exploring sources other than petroleum for fuel. Organic matter is one such source. Materials like corn and soybeans have oil extracts that can be converted to ethanol or biodiesel. These and many other organic materials are more sustainable than petroleum, meaning they can be regrown and remain productive with less negative impact on our ecosystem.

With the different types of biofuels at varying stages of research, it is important to remember that no two biofuels are created equally. Difficulties like competition for land, high costs of processing and developing technologies have slowed some resources from finding a place in the market, as well.

Ranking these different possibilities depends on a variety of aspects such as economic factors, how well developed the technology to produce the fuel is, the amount of material that could be used, and several other factors, according to Runge. The sources for biofuels listed here all have potential, and when used in combination could go a long way toward meeting our energy needs in the coming decades [1].

Cellulose

Cellulose is basically fiber, and can be found in things ranging from switchgrass to trees such as hybrid poplar and willow. Even materials from other industries, like corn stalks after harvest, could be used for cellulose fuel. While there is some debate over devoting land to growing crops specifically for fuel, the sheer volume of cellulosic material still makes it a tremendous source for biofuel. To use cellulose as a fuel, it must be broken down into sugar [11].

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Figure 1. Cellulose

Because cellulose is so abundant, can be continuously regrown and harvested, and is one of the cleanest burning materials.

Algal Oil

Because algae are grown in water, they overcome one of the major problems faced by other biofuels competition for land with agricultural crops. Some common forms of algae are seaweed and pond scum, which aren't true plants but do perform photosynthesis.

Algae can store up to 50 percent of their body weight in fat, just waiting to be rendered into oil for ethanol production. They also grow amazingly fast, so it's a crop that could meet high demands for energy over the long term. However, their productivity can be algae's own worst enemy.

The algae can grow so fast, they overcrowd each other. This blocks light and doesn't allow the algae to perform photosynthesis, causing massive die-offs. There are currently no commercial producers of algal oil because no technology has been able to control and maintain the algae growth.

Corn

The biggest biofuel in the world right now, corn sometimes gets a bad wrap. Corn ethanol is more sustainable than petroleum, but it has been a centerpiece for debates on using agricultural crops for fuel.

It's true that corn used for fuel is corn that could have been someone's dinner, but that even once the corn oil has been extracted for ethanol, there is still a byproduct of distiller corn that can be fed to animals.


Figure 2. Corn and sugar cane [1]

Even given the possible by-products it seems that corn is, at best, a short-term solution. Much like sugar cane, corn is one of the best options we have available now, but because the process is expensive and has high energy consumption rates, Runge felt it should be high on the list, but may fade from use over time.[12]

Soy

Soy has been a popular biofuel for several years now. In a process called trans-sterification, producers squeeze the oil from seeds and use it in products such as biodiesel and jet fuel. It is a relatively easy and inexpensive rendering process.

As is the case with many agricultural crops, there is debate over the extent to which soy could be utilized. Crops like soybeans are dietary staples to many people, and researchers are reluctant to rely too heavily on traditional food crops as fuel sources. The seed oil that goes in a gas tank could have gone to someone's stomach, and it may prove difficult to say one destination is more valuable than the other.

While soy is used widely, it is not as popular as corn or sugar cane, nor does it have the amount of resources that cellulose or algae provide. This makes it a short-term solution that deserves attention.

Sugar Cane

In the world of biofuel production today, sugar cane is second to corn as the most widely used, but Runge said this is likely to change in the coming decade. Sugar cane grows in warm parts of the world in abundance, and has helped countries like Brazil to become energy independent. Sugar cane ethanol isn't the easiest on a car's internal workings as it can gum up the engines of older cars, but with flex-fuel cars and gasoline blends varying from 20 percent ethanol all the way to 100 percent ethanol, Brazil shows it can work.

Sugar cane uses more of the plant than seed-based fuels like corn and soy, but it still does not utilize all of the plant. Also, because it can only be grown in the tropics, there are limits to how much sugar cane can be grown. Still, because sugar cane is a developed technology that is already in wide spread use, it earns a higher place on the list [12].

Camelina and Jatropha

Camelina and Jatropha are both plant-based fuel sources that are found all over the world and are the up and comers for the biofuel revolution, according to Runge.

These flowering plants have an advantage over other seed-based fuels like soy because they can be grown in very dry areas. Thus, they aren't diverting land that could be used for agriculture in the way soybeans are, and can be grown in a wider variety of places.

Figure 3. Camelina [11],[12]

Jatropha is a plant whose seeds contain 30 to 40 per cent of their mass in inedible lipid oil, making them an ideal source for Biofuel. The Jatropha plant can grow in difficult soil conditions (including arid and otherwise non-arable areas), so it does not compete for prime land with food crops [11].

Figure 4. Jatropha [2]

Camelina and Jatropha both offer a lot of options that other feedstocks don't provide, but much of their potential has gone unrealized, leaving them in the middle of this biofuel countdown [2].

Rapeseed

Better known as canola oil, rapeseed oil is rendered from a plant found commonly throughout Canada and the United States. Similar to soy, it is cheap and easy to produce and burns far cleaner than petroleum, making it a seemingly quick fix to energy problems.

While easy and cheap, the question remains whether enough could be produced to properly address our needs. Rapeseed will have to compete for land like many other biofuels, and in order to produce a significant amount of fuel; the plant would need a lot of acres.

Methane

In Stockholm, Sweden, an entire fleet of busses is already running on the natural gas methane, and the resource has been gaining popularity as a biofuel in recent months. Microorganisms decomposing organic matter like food, compost and other landfill materials create methane, so it is already being produced in dumps around the world. The gas also burns cleaner than many of the fuels in use [2] .

While methane is being implemented as vehicle fuel in Europe and some U.S. cities like San Francisco and Washington D.C., most car designs would have to undergo major changes to utilize the fuel.

Figure 5. The U.S. Forest Products Laboratory in Madison, Wisc.[2]

Because of the technological complications that have proved to be less of a problem for sources like sugar cane and corn, combined with the huge financial costs of developing methane-friendly engines and gas stations, methane is considered a possible solution, but not one of the best.

Paper Waste

Recycled paper, paper sludge from production and even sawdust from the early processing stages of paper have all been examined as possible sources of biofuel.

The paper is difficult to convert to liquid fuel because of its waxy coating and how the paper is made.

Paper waste rounds out the bottom of the countdown because it's a source that is already being widely used for products other than biofuel.

Combined with the fact that it is difficult to process and somewhat expensive makes this biofuel a limited opportunity.

Power from Potatoes

This could very well be the magic formula for future power generation. Scientists are busy crafting what is now called as "solid organic electric battery based upon treated potatoes." These are absolutely

eco-friendly batteries – based on the hidden powers of potatoes – which will be an economical answer to the growing power needs of developing and developed countries.

We all know that the scientists are trying hard to find alternate energy resources that can replace the thermal and the nuclear energies to generate electricity. This is to both save the earth from the negative impact of pollution as well as bring down the costs that one has to bear for the use of electricity.

People are trying new methods from using the wind to the solar power and some of these are even showing great results. There is a real issue on our hands and we need to keep trying in order to find something that can replace the conventional energy resources.

The potato electricity voltage we know is not better than that a normal torch cell, but the principle involved can be of great use for the development of more efficient batteries in the future.

3. FLOATING SOLAR ISLANDS

Solar power is an obvious solution for relatively resource-poor nations. It is clean, cost-competitive, has no restrictions on where it can be used and has the capability to make up for the energy shortfall. A small fact that solar researchers love to trot out is that enough sunlight falls on the earth's landmass around every 40 minutes to power the planet for a year.

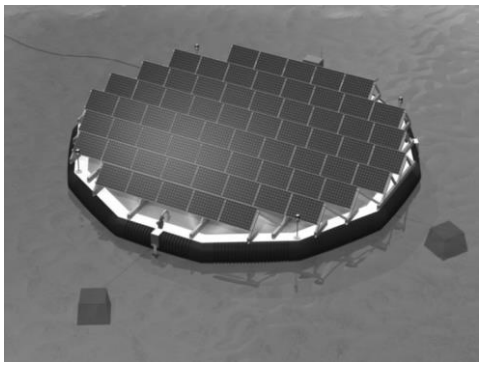

Figure 6. Energy projects in Japan

To put this another way, if we covered a fraction of the Sahara desert in solar panels we could power the world many times over.

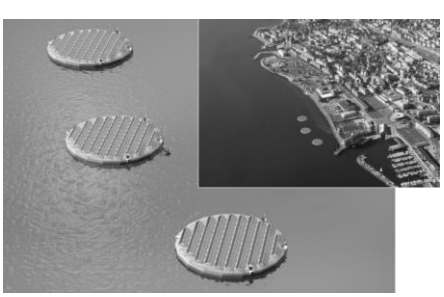

Fig. 7 Energy projects in Japan

In places like Japan where space is limited, more inventive solutions are required. This is the principle reason behind the decision to move their solar power generation offshore. While the land is highly congested, and therefore expensive, the sea is largely unused. It therefore makes a good degree of sense to use this space for floating power plants[3] .

Figure 8. Energy projects in Japan: floating solar islands

Thermal power plants cogeneration

The world´s largest biofuel CHP plant is in Alholmens Kraft, Pietarsaari.The full load is achieved with peat and wood
residue mixture and/or coal combustion. It is also possible to reach the full load when relatively dry wood fuel is used. There are altogether 11 fuel feeding points in the boiler.

The requirement set on fuel feeding system is very high since it has to supply almost 1000 m^3 of fuel in hour. The power plant's turbogenerator is a three casing, reheated, condensing turbine with extractions to district heat and process steam.

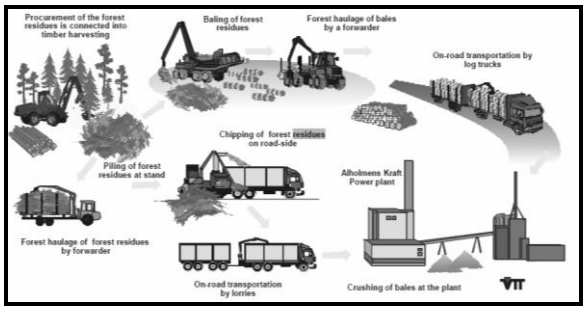

Figure 9. Forest fuel supply chain from forest to the plant

Cogeneration is the process of producing two types of alternative energy (heat and electricity) using a single source is increasingly used, and thanks to the new technology becomes more accessible and widely used, including in Romania [4].

Thermal power cogeneration systems using heat generated by burning both mechanical energy production / electricity, and for technological purposes or heating / hot water heating.

The advantage of cogeneration systems are: up to 20% energy saving; access to the use of the modern energy solutions, higher yield; rational use of fuel (percentage of primary energy saved is approximately 10 to 20%); Production and operating costs low; use of electricity for own needs; surplus pumping system, National energy (in the case of solutions the broader impact

4. GEOTHERMAL POWER PLANTS

The enormous advantage that it offers such a concept is to eliminate the idea of burning fossil fuels and ensuring energy independence of the house (or town) those (depends on the power plant). The idea of "free energy" is questionable. Even if you do not consume fossil fuels or other and this plant, like any other, it has its construction mechanisms, electrical appliances and / or equipment that require maintenance and that means spending large or small.

This power is based on its operation efficiency "over unity" of heat pumps used for heating in recent years Any refrigerator compressor, regardless of the purpose for which it was built, does the same and is based on the same operating principle. Here's a simplified diagram:

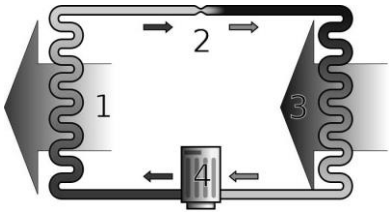

Figure 10. The condenser installation

The condenser installation:
2 - valve expansion (refrigerators is typically a capillary tube of a certain length and diameter, which depends on the power plant);
3 - evaporator plant;
4 - compressor

Geothermal heat pumps take heat from the soil environment from a well or water and compressed air through the condenser refrigerant in the plant that heats the water in the heating system of the house in question.

Because taking the heat from one medium and transferring it to another, heat pumps evacuate the plant condenser heat quantity greater than the equivalent power consumed by the motor compressor was introduced term "coefficient of performance"(COP) that expresses the ratio of the thermal energy discharged through the condenser and compressor motor consumed electric equivalent.

Power station types

- **Dry steam power stations**

Dry steam stations are the simplest and oldest design. They directly use geothermal steam of 150°C or greater to turn turbines.

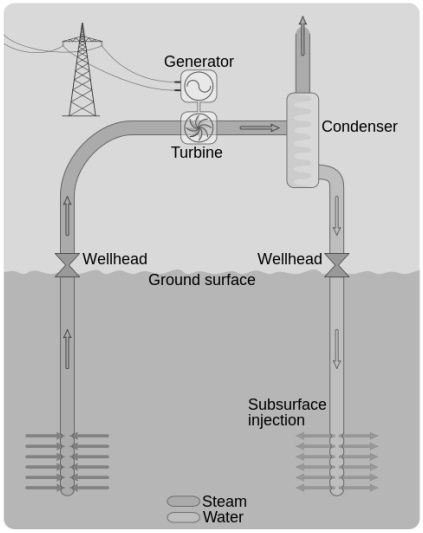

Figure 11. Dry steam station

- **Binary cycle power stations**

Binary cycle power stations are the most recent development, and can accept fluid temperatures as low as 57°C.[11] The moderately hot geothermal water is passed by a secondary fluid with a much lower boiling point than water. This causes the secondary fluid to flash vaporize, which then drives the turbines. This is the most common type of geothermal electricity station being constructed today.[26] Both Organic Rankine and Kalina cycles are used. The thermal efficiency of this type station is typically about 10–13%.

- **Flash steam power stations**

Flash steam stations pull deep, high-pressure hot water into lower-pressure tanks and use the resulting flashed steam to drive turbines. They require fluid temperatures of at least 180°C, usually more. This is the most common type of station in operation today.

Flash Steam plants use geothermal reservoirs of water with temperatures greater than 360°F.

The hot water flows up through wells in the ground under its own pressure. As it flows upward, the pressure decreases and some of the hot water boils into steam.

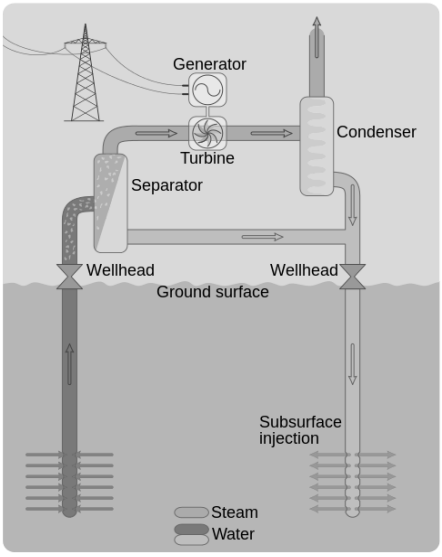

Figure 12. Flash steam station

The steam is then separated from the water and used to power a turbine/generator. Any leftover water and condensed steam may be injected back into the reservoir, making this a potentially sustainable resource.

At The Geysers in California, twenty years of power production had depleted the groundwater and operations were substantially reduced. To restore some of the former capacity, water injection was developed

How the United States Navy Plans to Turn Seawater into Jet Fuel

Approximately 71 percent of the Earth's surface is covered in water, and the oceans hold about 96.5 percent of it. As concerns regarding climate change continue to encourage the exploration of alternative energy sources, research institutes, governments, and businesses are starting to look towards water as a potential alternative source of energy. Usually this conversation tends to be steered towards more conventional technologies of hydropower, hydroelectric dams or wave generators. However the United States Navy has developed a proof-of-concept method for converting the carbon dioxide and hydrogen in ocean water into jet fuel for their fighter planes right on board their aircraft carriers. Viability of the fuel was demonstrated using a radio controlled replica of a World War II era P-51 C Mustang powered by an off-the-shelf two-stroke engine. Let's take a look at the science behind the Navy's latest discovery.

It is estimated that 30 - 40% of carbon dioxide (CO_2) emissions produced by human civilization is absorbed by the Earth's oceans. Ocean acidification can best be described as a physiochemical process driven by the gas concentration differential between the air and the sea. Henry's Law states that when a body of water is in contact with the atmosphere, the amount of gas that dissolves into the body of water is proportional to its partial pressure. As the concentration of CO_2 in the Earth's atmosphere increases due to the burning of fossil fuels and other carbon intensive activities, the system as whole seeks to reach equilibrium driving the dissociation of CO_2 into seawater as carbonic acid (H_2CO_3) and other byproducts [10]. Most of this weak acid dissociates further into bicarbonate ions (HCO_3-), carbonate ions and hydrogen ions. The concentration of CO_2 in the oceans today is roughly 142 ppm, or approximately 100 times the concentration of CO_2 in the air, making the ocean an excellent source of carbon and hydrogen for the synthesis of complex hydrocarbons [5].

5. MORE NEW ENERGY :

- Artificial photosynthesis
- Space based solar power
- Race for new energy
- Universal forces: black holes, electro gravities and deep space propulsion
- The early pioneers
- Cold fusion
- Zero point energy and other energy
- Turn seawater into jet fuel
- Ultra capacitors[6]

6. WIND TURBINES USING SOLAR ENERGY

On the southern side of the solar-wind power plant bird-shaped solar cells are placed heat sink. Due to the "chimney effect" inside the building half glass, heated air moves upward through a double wall structure, resulting in rooftop turbine. In addition to generating electricity, bizarre building functions as a wind organ because the organ is equipped with tubes that can be used by visitors.

7. THE MOST INNOVATIVE SOURCES OF THE ENERGY

Energy every step

After realizing a quite obvious idea, people can produce energy even themselves from their steps by walking on power sidewalks, which generate electricity. Pavement elements made from recycled rubber will be introduced to the general public on the London Olympic Games. Tiny sensors in special casings provide energy from the pressure caused by steps, which can be stored in the pavement's battery up to three days.

Figure 13. Energy every step

Visitors of London can meet the electricity generating pavement between the Olympic Stadium and the recently opened Westfield Stratford City shopping Centre. Every single step produces as much energy as a LED bulb would need for 30 second. Since about 30 million customers will show up at this area per year, the energy captured from their steps will be enough to ensure the building's outdoor lighting [8].

Solar energy on highways

Engineers of several countries have been interested in the idea to produce energy from motorways which connects countries and continents. Although Spain and Germany are the leaders in renewable energy in Europe, but now Italians were the fastest; in 2011 they opened the world's first sun-powered motorway.

Figure 14. Solar energy on highways

The energy-producing highway connects two cities, Catania and Siracusa. Along the 30 kilometers all the energy supplies of screens, tunnel lightings, emergency phones and electric equipment's are provided by solar panels installed along the road.

The solar panels produce 12 million kWh energy per year, which will save the equivalent of10 thousand tons worth of CO_2 emission in every year [7] .

There is a similar innovation in process in the USA, but the solar cells would not be built along the highway but into the asphalt.

The biggest challenge is to create such solar cells which are able to resist the weight of trucks passing through all days. But if the idea comes true, a 1,5 - kilometer-long part may produce energy for around 500 families.

Wind turbines working with solar energy

Actually both of them, but why do not fuse the two types of energy? The strange idea was born in the home of unusual architectural solutions, Dubai, where both sources of alternative energy, the sun and the wind, are abundantly available.

The plan was made for an art competition about renewable energy plants. There are solar cells on the south part of the bird-shaped sun-wind power plant, which collect the heat. It is achieved by the "chimney effect" that inside the half-glazed building the heated air moves upwards in a double-walled structure, and makes the wind turbine move on the roof.

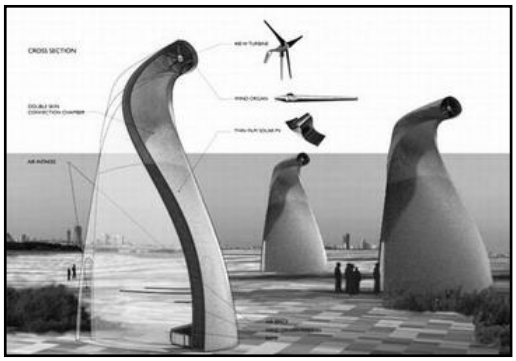

Figure 15. Wind turbines working by with solar energy

Besides generating electricity, the bizarre building also serves as a wind organ, since there are organ-pipes in it, which can be used by visitors as well [7] .

There is something new under the Sun: fusion energy

Due to processes in the Sun incredible amount of energy is released in every second. Scientists have been trying for a while to repeat this under controlled conditions, which would solve the world's energy problem immediately.

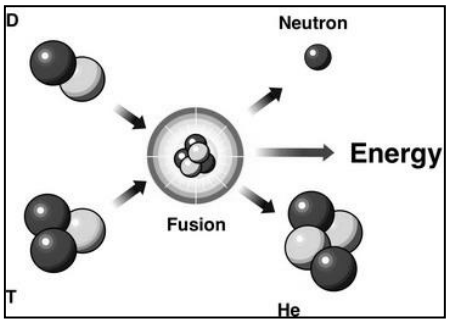

Figure 16. Fusion energy

The Culham village, England, is giving home to the world's largest fusion experiment, where the most famous scientists are trying to copy the process, when Hydrogen atoms fuse together to form Helium atoms, which produces a huge amount of energy.

The experiments require an incredible amount of electricity, which slow them down. Every time they

want to switch on the device they need to ask permission from the electricity works [7],[10].

Besides the Helium, super-hot neutron-plasma with high-kinetic energy is also produced during the fusion process, which could be used to drive turbines to generate electricity.

Only the hardest materials are able to resist the extreme conditions, which are continuously tested by the research team. Currently these components have to resist temperature twenty times higher than the core of the Sun and gravity thousand times more powerful than Earth's.

Interesting facts

There are really extreme innovations about how to replace the petrol. For example, a Canadian company does experiments on how to produce energy from used baby nappies. The idea stands the test, since plastics and fibers can be converted to a mixture of gas, oil and coal. According to the company's plan, 11 million liters of diesel oil could be produced from 180 million nappies in every year.

Another research group has built and tested a car that 30% runs with diesel oil converted from chocolate. Other interesting parts of the vehicle are the steering wheel made from carrots and the mudguards made from potatoes. Someone developed a car paint, which absorbs solar energy and is able to produce electricity, which can also be used to run a car [8].

Can we harvest the energy of lightning?

A single bolt of lightning contains 5 billion joules of energy, enough to power a household for a month. The energy of a thunderstorm equals that of an atom bomb.

If we're already generating power from unexpected sources like ocean currents in our quest to wean ourselves of polluting- and limited- fossil fuels, why not pull electricity from the air, especially when everyone can see it lighting up the night sky? In 2007, a company tried to make it happen, with a design that involved a tower, grounding wires and a capacitor, but they couldn't make it work.

Figure 17. The energy of lightning [14]

Second, it's not so easy to capture energy delivered in one enormous blast in a split second. It has to be stored and converted to an alternating current, without blowing out the collection system in a single large strike.

The energy contained in a lightning bolt disperses as it travels down to Earth, so a tower would only capture a small fraction of the bolt's potential. In the end, barring the development of a technology that could capture the energy from lightning before it strikes, it's probably best to focus on other, more earthly sources of energy [9].

Conclusions

In addition to these sources of energy listed and summarized in this paper there are many alternative sources that are in the study. Consequently conventional energy can be successfully replaced by alternative energy. All this can be done by involving the wider community and state through the development of well thought out and structured projects that can result in obtaining funds.

A sustainable energy mix will be broader that it is today where oil and natural gas make up more than 50% of our supplies. And energy in total will likely be more costly than our energy bill today. The transition to this wider diversity of energy sources will proceed slowly and probably be somewhat provincial depending on what regional resources are available.

Thus we will be able to bring our contribution to environmental protection by replacing conventional energy sources with alternative.

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