

Forum:	General Assembly 2
Issue:	Implementing effective ways to transition from non-renewable sources of electricity and power into renewable ones
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Introduction

Our world has had a past of using many kinds of different sources for electricity and power, whether these sources are non-renewable or renewable. Commercial use of electricity first began in the Industrial Revolution in the 18th century, starting with coal, which is a major non-renewable source along with fossil fuels, natural gas and petroleum. These sources are available in limited supplies and take a long time to replenish. On the other hand, renewable sources such as sunlight, wind and water replenish naturally over relatively short periods of time (Aust). Nowadays, all over the world we are trying to begin a crucial transition from using non-renewable sources of electricity to renewable ones to avoid negative consequences that impact the atmosphere, rain, temperature, wildlife, etc. However, there are multiple barriers that slow down this process. This report discusses each source of electricity and why the transition is difficult, to assist delegates to provide appropriate solutions.

Definition of Key Terms

Non-Renewable Sources of Electricity/Energy

Sources of electricity that will run out and/or not restore in a short amount of time (Morse). As an example, once the coal is used as fuel, coal will not be produced until millions of years later (Turgeon). Throughout the report, the terms “electricity” and “energy” will be used interchangeably.

Renewable Sources of Electricity/Energy

Sources of electricity that replenish naturally over relatively short periods of time (Aust).

Greenhouse Gases

Gases that can absorb infrared radiation/heat, that was emitted from the Earth's surface and can radiate it back to Earth's surface (Mann).

Greenhouse Effect

Warming in the Earth's surface due to the presence of water vapor and greenhouse gases ("Greenhouse Effect").

Climate Change

A change in global or regional climate patterns apparent from 20th century onwards due to increased levels of greenhouse gases produced by human activities ("Climate Change Concepts").

Background Information

Popularization of Electricity

The industrial revolution was the pivotal period that put electricity into everyday use. In 1820, Michael Faraday and Joseph Henry invented an electric motor as well as discovering that electrical current can be generated by moving a wire near a magnet, i.e. generator, in 1831. Based on this, the electric motors and generators were developed and improved by several inventors (Harvey).

However, Sir Charles Parsons discovered a way to generate electricity more efficiently - using steam to rotate copper coil inside a magnet ("How A Generator Works.") - and built a steam generator that was powered by coal (Harvey).

In 1896, Charles Curtis used the same principle that induces electricity to invent a gas turbine - a generator that is powered by natural gas, which is a type of fossil fuel (Harvey).

These methods allowed electricity to be produced in large quantities that were available for households. They also assisted the rate of technology developments, enabling machines to be produced in larger quantities and better qualities (Harvey).

Discovery of Other Non-Renewable Energy Sources

Atomic energy was also discovered by scientists as a method of harvesting energy. In 1934, Enrico Fermi learned that neutrons - a subatomic particle that exists in the nucleus of an atom with no charge - could split atoms. In 1938, Otto Hahn and Fritz Strassman discovered fission, more specifically, that energy is released when atoms are split. This discovery plus Einstein's theory of relativity, which states the increased relativistic mass (m) of a body times the speed of light squared (c^2) is equal to the kinetic energy (E) of that body, or $E = mc^2$ (Perkowitz), showed that energy could be obtained by splitting atoms (Harvey).

Then, in 1951, the first nuclear reactor was built in the U.S.A. The nuclear reactor was capable of converting nuclear energy into electricity.

Discover of Renewable Energy Sources

As discussed previously, one main method that is used to generate electricity is through the principles of a generator - spinning copper coil inside a magnet. In addition to steam generators and gas turbines, some renewable energy sources also rely on this method. However, there is also a method that merely uses the movement of electrons to generate electricity.

Hydropower

Facilities that use the energy from the water flow to generate electricity are called dams ("Hydropower Basics."). It was discovered as a source of electricity as early as the late 1800s and was put into commercial use soon after (Harvey). Hydropower manipulates the natural flow of water to spin the turbine that is located in the dam. Then, similar to the previous methods that involve using turbines, the coils spin which generates electricity.

Wind Power

Wind turbines use the same principle as hydropower except using wind instead of water. When the wind blows on facilities such as windmills, the blades spin which causes the coil inside the wind turbine to spin and generate electricity. Wind power was first discovered in 1888 when Charles Bush built a wind turbine in his backyard.

Solar Power

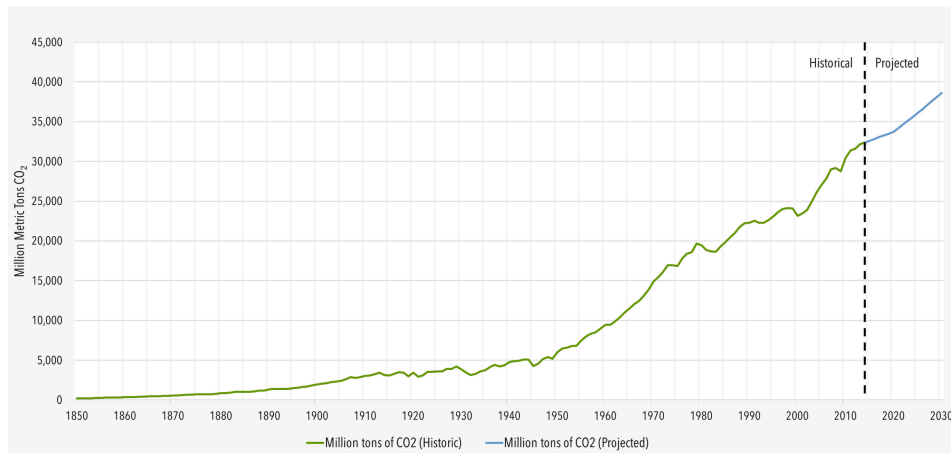
The principle behind solar power is different from the other sources of electricity. Solar panels, facilities used for generating solar power, have individual cells in them. Each cell is surrounded by a semiconductor (usually silicon). For each cell to work, they need to have an electric field, or a side with a positive charge and another side with a negative charge. To accomplish that, phosphorus is added to the top layer of phosphorus to add electrons, hence, negative charge, and boron is added to the bottom layer, which results in fewer electrons, making the bottom layer more positively charged. Then when light shines on each cell, the photons, particles which make up light, break the electron free from the top layer. Then metal plates collect those electrons and transfer them to the wires, allowing electricity to be generated (Dhar).

The principle behind the cells was discovered as early as 1839. However, it was produced commercially in the 1950s because it was discovered that silicon generated the most electricity (Harvey).

Key Issues

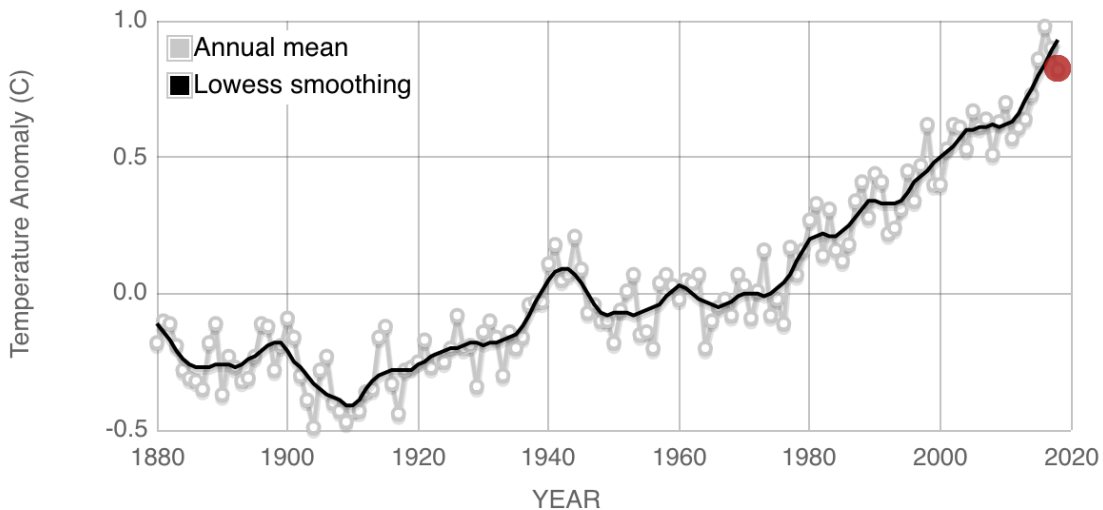
Negative Consequences Caused by Non-Renewable Energy

The consequences caused by non-renewable energy source mostly impact the environment. The most well-known consequence is that burning coal and natural gas produces greenhouse gases such as carbon dioxide and methane (“Coal: Why”). These greenhouse gases trap sunlight and heat in the atmosphere, blocking them from returning into space (“Environmental Impacts”). For the past decades, the emission of greenhouse gases increased at an exponential rate, as shown in caption 1.



Caption 1: Carbon dioxide emission from 1850-2030 (“Global Emissions”)

The consequences arising from the rise of greenhouse gases can be shown by the increase in the global temperature recorded by NASA in caption 2.



Caption 2: Temperature anomaly from 1880-present (“Global Temperature.”)

A temperature anomaly is a difference from a baseline temperature (“Anomalies vs. Temperature.”). As shown in caption 2, the global temperature has been increasing as well. This leads to global warming, which could lead to further consequences such as climate change, destruction of natural habitats, and rising sea levels (“Global Warming Effects.”).

In addition to global warming, wastes produced from burning coal and natural gas also contribute to air and water pollution, which could damage the quality of life people live in (“Environmental Impacts”).

Nuclear energy also has negative consequences. When generating electricity from nuclear power, radioactive wastes are produced and dumped into the wild. Not only is that dangerous to the environment but also to people (“Nuclear Energy.”). When people are exposed to radiation, it can increase the chance of those people getting cancer or even dying (Condliffe).

Why Countries Cannot/Would Not Completely Abandon Non-Renewable Energy Sources

The information from the previous section raises a question: since there are so many disadvantages of using non-renewable energy sources, why cannot energy be extracted merely from renewable energy sources?” There are a number of reasons why we cannot fully transition out of using non-renewable energy sources.

The reasons why non-renewable energy sources are still being used are mostly economic.

Sources of energy such as coal and natural gas have a cheaper cost, making electricity more accessible to lower income groups (“Why Do We”). Extracting these sources are often subsidized by the government which makes it even cheaper for private companies to produce electricity, which, in turn, will make it cheaper for people to buy.

In addition, most economies are built around the use of non-renewable energy sources. Governments make plans around predictions of what will happen to the economies and what measures they should take. A portion of those plans is based on non-renewable energy sources. If those change, plans need to amend on how businesses can change their investments (“Why Do We”). However, those changes have costs. Additionally, if those plans fail, it will cost even more, which can be a downturn in a country’s economy.

There are also more job opportunities around non-renewable energy sources. Extracting the sources, transporting them, generating energy, discarding the waste, etc. Those jobs make more people employed. If non-renewable energy sources are eliminated, however, those jobs will not be available to people, which may increase unemployment.

Why Renewable Energy Sources Cannot be Fully Adapted

Renewable energy sources might be able to reduce the number of greenhouse gases emitted, but they have other disadvantages as well.

Renewable energy sources cannot generate as much electricity as non-renewable energy sources can. Their electricity-generation is inefficient which makes it hard for those sources to be fully adapted and meet the same demand as the non-renewable energy sources do (“Renewable Energy:”).

In addition, renewable energy sources can cause environmental and economic issues as well.

Using the three gorges dam, a dam in the Yangtze river in China to power China's electricity usage, as an example. The construction of the dam caused some of the land around the river to erode. This caused sand, soil, and pebbles to fall into the river and polluted the water. In addition, this project caused habitats around the river to be destroyed ("Advantages & Disadvantages").

Because of this dam, more than 1.1 million of the local citizens had to be resettled ("Advantages & Disadvantages"). This could potentially add more costs to the government in addition to the construction of the dam.

Major Parties Involved and their Views

United States of America

The U.S. seems to have a contradicting stance on renewable energy. On June 1, 2017, U.S. President Donald Trump announced that the U.S. will withdraw from the Paris agreement signed in 2015. The agreement contained terms to make the global-temperature increase "well below 2°C", i.e. 1.5°C or below, limit the number of greenhouse gases and switching to renewable energy. Trump claimed that the U.S. withdraws because it "disadvantages the United States" ("US Notifies UN"). However, despite the withdrawal, there is still evidence that the U.S. is taking measures to increase its use of renewable energy. In April 2019, according to the U.S. Energy Information Administration, the U.S. produced more energy from renewable energy sources than the non-renewable ones.

International Renewable Energy Agency (IRENA)

IRENA is an intergovernmental organization that supports countries through spreading knowledge of renewable energy ("About IRENA."). The organization is created to promote the use of knowledge energy. Its role is to "seek out, establish and develops new synergies, facilitate dialogue, share best practices, promote enabling policies, build capacity and foster co-operation at the global, regional and national levels". As an example, recently IRENA and the U.A.E. Ministry of Education signed an agreement to include renewable energy and sustainable development in the country's education system (Dhabi).

All Member States

There are not countries as a whole that go against transitioning into renewable energy sources. All countries, even countries who are in the middle of a conflict, such as Yemen, and those that are remote from the international community, such as DPRK, have signed the Paris accords. Although Syria and Nicaragua, in addition to the U.S., did not sign. They justify it is because, for Syria, the civil war makes it difficult for the government members to travel to Paris and, for Nicaragua, it thought the accord did not go far enough to solve the issue (Siddique).

Timeline of Relevant Resolutions, Treaties, and Events

Date <i>MM/DD/YY</i>	Description of Event
1998	Iceland was the first country to propose using 100% renewable energy (Gissurarson).
Feb 16, 2011	The UN General Assembly declared the year 2012 as the “International Year of Sustainable Energy for All” (resolution number 65/151) for the purpose of achieving more usage of renewable energy (“Background”).
Mar 20, 2013	The UN General Assembly declared the years 2014-2024 as the “Decade of Sustainable Energy for All” (resolution number 67/215).
Sep 25-27, 2015	Member states of the UN created 17 Sustainable Development Goals (SDGs) for the purpose of sustainable development. Among these goals, the 7 th goal, “ensure access to affordable, reliable, sustainable, and modern energy for all”, and the 13 th goal, “take urgent action to combat climate change and its impacts”, are related to this topic.
Jun 26, 2017	The U.S. Conference of Mayors (USCM), despite the U.S. President’s decision to withdraw from the Paris Agreement, approved a resolution to aim to have 100% renewable energy by 2035 (Walton).

Evaluation of Previous Attempts to Resolve the Issue

Most attempts to resolve the issue are in the process. As of now, there are 12 countries leading the way for this crucial transition. Iceland is currently the only country that obtains 100% of its energy from renewable sources, meaning that the issue is already resolved in some countries. When dissecting the case for Iceland, it can be found that their situation is quite unique because it relies on geothermal and hydropower to support a relatively small country. What is also important to take note of is that there was cohesion between municipalities, the government, and the public (Logadóttir) due to raising awareness effectively that helped the transition to renewable sources happen faster and smoother.

Costa Rica is also among the top renewable energy users with 99% of its energy coming from hydroelectric, geothermal, solar and wind sources. Factors that helped with this transition include its small size and population of just 5 million people, and its unique geography (67 volcanoes).

Another country almost fully transitioned is Norway, with 98% of their energy coming from renewable energy sources. They are the largest hydropower nation in Europe with vast water resources spread around the country, which has laid the foundation for electricity supply. Other than that, they are currently rapidly developing in wind power, floating solar power and they are using their own energy resources that would otherwise go to waste. However, even though Norway is close to fully transitioning to a completely green country, non-renewable sources including oil and gas will remain one of their top exports in the coming years. Currently, they are the world's third largest natural gas exporter ("Renewable Energy Flows through Norway").

Possible Solutions

To come up with a solution, we need to look at the negative impacts and how we can reverse them. In the Key Issues section, the issue was broken down into three main sections: the negative consequences caused by non-renewable energy sources, why countries keep using non-renewable energy sources, and barriers that slow down or even stop countries to transition into using renewable energy sources. The solutions to tackle each section could be: to suppress - how can countries temporarily deal with the consequences caused by non-renewable energy sources to better transition in the long term? For example, one of the negative impacts is acid rain. Acid rain is caused by a chemical reaction that occurs when sulfur dioxide and nitrogen dioxide is released into the atmosphere. To deal with this problem, the

country as a whole could try to conserve energy, especially when it comes to transportation because driving trucks and cars releases large amounts nitrogen oxide. Next, to plan - what long-term plans can countries come up with to build an economy that is not reliant on non-renewable energy sources? And lastly, to raise awareness - how can countries' governments raise awareness to gain support from municipalities and the public to better transition into using renewable energy?

Reflecting on Iceland's situation, in order to achieve that cohesion, spreading awareness is crucial because that ensures that the transition is smoother and faster, which is the exact purpose of the Year and Decade of Sustainable Energy for All.

However, that is just the foundation, rigorous actions need to be taken because there is not much time until the global temperature increase becomes 1.5°C (Roberts).

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