Committee: COP28 (Conference of the Parties to the United Nations Framework Convention on Climate Change UNFCCC)

Issue: Phasing out of all fossil fuels

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PERSONAL INTRODUCTION

My name is Pavlos Voloudakis. I will be a senior in high school next year and I am attending Arsakeio Lyceum of Patras. My goals for this committee are for the delegates to have a better understanding of the issues facing the world through climate change and how they can implement positive changes towards the problems that we are all facing in today's changing world. Also, the purpose of this guide is to help with the orientation of the delegates in order to be able to complete their given assignments and tasks. My email is paulvoloudakis2@gmail.com in case you have any questions.

INTRODUCTION

The word 'petroleum' comes from the Greek word stone and the Latin Oleum, meaning oil and was used for the first time by the German mineralogist Agricola in 1556. Oil, as proved by excavations, was used since ancient times. Its use by ancient people begins 5000 years ago. It is known that it was used in the caulking of ships, in the construction of roads, in the manufacture of waterproof mats and baskets and as an adhesive in mosaics. Also, it was used in medicine as a laxative, as a rubbing liquid and like a disinfectant. The ancient Greeks were well aware of many of its uses, but did not transmit them to the Roman conquerors.

The first drilling specifically for prospecting oil was made by Edwin Drake in western Pennsylvania in August 1859 and at a depth of 21 meters. Thus, the way was opened for the oil industry. Around the same period, petroleum fields were discovered in Europe and the Far East. In the 20th century the Industrial Revolution, characterized by the appearance of the car, the use of oil had proceeded so far that the refined oil for lighting use ceased to have the first importance and oil use industry became the world's first source of energy. So, while the 1870 world oil production was less than 1,000,000 tons per year, over the years it even exceeded 3,000,000,000 tons.

Today, oil is an important raw material in industry of petrochemicals, but its greatest application is in energy production, on which the present and the future depend on the global economy. The phasing out of fossil fuels is one of the most important tasks that needs to be completed for the health and wellbeing of our planet. Fossil fuels might have been economically effective for the big oil companies since their time but have certainly been affecting our world in a negative way. This is why we need innovative solutions to this age-old problem.

Figure 1 The phasing out of fossil fuels is one of the most important tasks that needs to be completed for the health and wellbeing of our planet. Source: https://www.bbc.com/news/science-environment

DEFINITION OF KEY TERMS

Petroleum

An oily, flammable liquid found in the earth, consisting mainly of a mixture of various hydrocarbons.

Viscous

A word used to describe a substance that is very thick and lacks in fluidity.

Volatile

A word used to describe a substance that gives of a distinct smell very quickly.

Fuel

A material that stores potential energy that can be released and used as heat or power.

Flammable

This word means that something is able to catch on fire easily.

Carcinogenic

This is when a substance or has potential to cause cancer.

Fossil fuel

A natural gas that is formed from the remains of living organisms.

Non-renewable

This is when something is used up at a faster rate than it can be replaced.

Finite

A finite resource is something that will eventually run out.

Pollution

This is the contaminating or the destroying of the environment as a result of human activity.

Petrochemical

A compound that is obtained from petroleum or natural gas.

Impurities

This is something that impairs the purity of a substance.

Carbon capture

A process of capturing carbon dioxide emission from large point sources, such as fossil fuel power plants, transporting it to a storage site, and depositing it where it will not enter the atmosphere, normally an underground geological formation.

Renewable energy

Renewable energy is energy derived from natural sources that are replenished at a higher rate than they are consumed. Sunlight and wind, for example, are such sources that are constantly being replenished.

BACKGROUND INFORMATION

THE CREATION OF THE OIL MAJORS

By the late 19th century, there was one dominant oil company in the United States, Standard Oil Company, founded by John D. Rockefeller in 1870. Standard Oil Company controlled as much as 80 percent of the production and distribution of petroleum products in the United States at the end of the 19th century. In 1911, Standard Oil was split up into 34 separate companies. The largest of those split companies have evolved over the past century to become the supermajors of today's U.S. oil industry. Around the time Standard Oil Company was broken up in the United States, the oil supermajors in Europe were established. Shell Transport and Trading Company merged with Royal Dutch to form the Royal Dutch Shell Group in 1907. The Anglo-Persian Oil Company was issued in 1909 in London and Glasgow which was created to explore and find oil in Persia. It would become one day as what we know now as BP.

HOW WE USE FOSSIL FUELS TODAY

Today, the world uses enormous amounts of energy, and most of that energy comes from fossil fuels. Energy demand is expected to continue to increase, although the share of coal in the global energy mix is set to drop in the coming decades, increasingly replaced by natural gas and renewable energy sources. The advance of hydraulic fracturing and the shale revolution in the past decade made the United States the world's top crude oil and natural gas producer. Primary energy consumption in the United States hit a record in 2018, rising by 4 percent from 2017. The increase in 2018 was the largest increase in energy consumption, in both absolute and percentage terms, since 2010. U.S. consumption of fossil fuels—petroleum, natural gas, and coal—increased by 4 percent in 2018 and accounted for 80 percent of U.S. total energy consumption. Global energy demand in that same year, 2018, increased by 2.3 percent—the fastest growth rate since 2010. China, the U.S., and India together accounted for more than two thirds of the global growth in energy demand. Energy consumption in the United States rose at its fastest rate for 30 years, as per BP estimates.

The use of oil as a source of energy has been used for many years, but the results of its use have shown that there are many effects on the environment that drag and create effects on humans as well. For this reason, other forms of energy sources were sought that are less harmful to the environment and humans.

REASONS WHY IT IS NOT BENEFICIAL TO USE OIL AS A SOURCE OF ENERGY

Flammability:

During combustion the hydrocarbon gases react with the oxygen in the air and produce carbon dioxide and water. The reaction releases heat to form a visible flame. When the gas above the liquid hydrocarbon is ignited, the heat produced is such that it vaporizes new gas that feeds back the combustion that takes place.

The toxicity:

Inhaling even small amounts of petroleum gases can cause symptoms similar to those of intoxication, impaired responsiveness and dizziness. These symptoms are observed at rates well below the lower flammability limit. Petroleum gases vary in terms of their consequences, just as the resistance of the human body naturally varies. The toxicity of petroleum gases varies greatly and depends on the hydrocarbons that constitute their main components. The smell of petroleum gases varies greatly and in some cases the gases can impair the sense of smell. The impairment of smell is particularly severe if the mixture contains hydrogen sulphide.

THE RISKS OF THE ENVIRONMENT

The natural environment is at serious risk from the use of oil. Local communities, where hydrocarbon extraction takes place, and the tourism economy from hydrocarbon extraction

are at risk from contamination and economic impacts. Environmental organizations highlight the dangers and fight every day to inform the public at a time when the oil industries and the government are trying to reassure the public. Risks are visible to both the marine and terrestrial environments, which will affect local communities in the short and long term. As for the natural environment (both marine and terrestrial), it is pointed out that it is in immediate danger. At the same time, it is expected that rare species, coastal communities and the tourist economy will be threatened, due to the work that will be carried out for the extraction of hydrocarbons. Hydrocarbon exploration and extraction is a very serious threat to many protected areas. All the land plots granted occupy in whole or in part several areas of the National System of Protected Areas. The effects on the natural environment will be multiple from the first stages of the process that will be followed in order to extract the hydrocarbons resulting in the disruption of marine and terrestrial life to a large extent. In addition, the local communities that support their economy on tourism and by extension on maintaining the good state of the environment will be significantly affected as pollution and the occurrence of oil spills is a rule during the mining process. The implications for the marine environment and marine life in research areas are multiple. They are not limited to the effects of seismic surveys – although these are the most studied and perhaps the most problematic. They also refer to test drilling until commercially exploitable deposits are identified and in general to research, the opening of wells created for the extraction of oil, the placement of production facilities, the establishment of export facilities, their operation and the transportation of products by ships or pipelines, until their final dismantling.

DANGERS IN MARINE AND TERRESTRIAL WILDLIFE

In all marine organisms studied to date, similar types of effects have been systematically recorded, including problems in physiology (e.g. hearing), development of organisms (e.g. deformities), disturbances in the behavior of individuals or herds, reduced ability to capture food, loss of orientation and increased stress levels. Removal of populations from feeding and breeding areas and quite often, reduction of populations are also observed. Particularly in marine mammals, the extraction of hydrocarbons mainly during seismic surveys is also associated with eruptions and therefore with increased mortality of individuals. The most sensitive species to anthropogenic noises are mainly the blow whale, but the rest of the marine mammals are also seriously affected. The moorings, the opening drilling rigs and their waste, and in general the placement of mining and transport facilities on the seabed, in addition to the degradation they cause to the seabed itself, as expected, cause serious problems for the organisms that live there (e.g. loss of oxygen from the body or brain) and general physical wear and tear (e.g. corals). It is generally estimated that for each platform, the ecological balance of 20 hectares of seabed and 3.2 hectares per kilometer of transmission pipeline is disturbed. The duration of the effects varies, although in several cases it has been established that we are talking about long-term effects that affect the survival of the populations of certain rare or even threatened species. The environmental impact of hydrocarbon extraction cannot be isolated either from the possibility of an accident, which can occur during all phases of the process of exploration and extraction of hydrocarbons in the marine space.

Figure 2 The most sensitive species to anthropogenic noises are mainly the blow whale, but the rest of the marine mammals are also seriously affected.Source: https://www.marinemammalcenter.org/

EFFECTS

Effects that may be caused to the environment of the seismic survey areas include deforestation of woodlands and solid forest, soil erosion, hydrological alterations, waste pollution, land use change, vehicular traffic pollution, alterations to ecosystems from road construction, flights of helicopters, construction of helipads and use of motorized equipment.

POSSIBLE SOLUTIONS

On the contrary, there are other forms of energy which are more environmentally friendly and can replace oil. An environmentally friendly energy source is an energy source that has very little impact on the environment. Although environmentally friendly energy sources mainly consist of renewable energy sources, environmentally friendly energy sources are different from renewable energy sources. The key to environmentally friendly energy sources is that they do not harm the environment by releasing greenhouse gases into the atmosphere. They emit very little or no pollutants into the environment that could cause air pollution, water pollution or land pollution.

Environmentally friendly energy sources are very important in this century. This is because they constitute an accumulation of greenhouse emissions from fossil fuel energy that are not environmentally sustainable, leading to an increase in gases such as carbon dioxide, methane,

etc. These energy sources are responsible for global warming, climate change and the destruction of the ozone layer, whereas environmentally friendly energy sources have helped and continue to help mitigate the damage caused by fossil fuel energy that balances the ecosystem.

Although eco-friendly energy sources are not very popular in use with most of the world's energy sources still fuelled by fossil fuels, eco-friendly energy sources are growing in popularity annually by being integrated into commercial, residential and transport sectors. Eco-friendly energy sources are also energy sources that are friendly to humans, who are a very critical part of the environment.

Fossil fuel energy has been characterized by a high fatality rate as a result of industrial accidents that are mostly familiar with fossil fuel energy. Environmentally friendly energy sources are often readily available.

An example is natural gas where the impact on the environment is smaller. Natural gas consists of hydrocarbons in gaseous form, of which mainly methane in a percentage of more than 90%. It is lighter than air and non-toxic. Natural gas can be used both in industry, by professionals and power plants, and at home. Domestic use mainly concerns central or individual heating, hot water, cooking and air conditioning. The use of natural gas also has beneficial effects on the environment. Its combustion creates the least pollution compared to other conventional fuels, contributes to a limited extent to the greenhouse effect, since it produces smaller amounts of carbon dioxide than oil, and does not cause acid rain, as it does not contain any sulphur. Therefore, it contributes to the protection of the environment.

The use of natural gas in industry is also favoured because it increases energy efficiency, reduces operating costs for fuel management, improves product quality and limits environmental pollution.

EXAMPLES OF ENVIRONMENTALLY FRIENDLY ENERGY

Other examples of environmentally friendly energy are:

- Solar power
- Wind power
- Hydropower
- Geothermal energy
- Biomass energy

SOLAR ENERGY

Solar energy is simply the use of radiation from sunlight to produce energy. The sun produces a very large amount of solar radiation and a huge amount of this radiation reaches the earth

and is scattered all over the earth. Solar energy is one of the most popular environmentally friendly energy sources with its popularity increasing annually and its acceptance by countries and organizations. Apart from the fact that this energy source is environmentally friendly, it is also cheap and can be installed in one's building, making it available to consumers such as individuals, businesses and organizations. Solar energy is a key source of renewable energy.

WIND ENERGY

Wind energy is an important environmentally friendly energy source that is usually classified as a type of solar energy. It is classified as such, because wind speed and direction are controlled by temperature differences between locations driven primarily by solar radiation. Wind energy describes the type of energy obtained by harnessing the wind through the use of a wind turbine. A wind turbine converts the kinetic energy from the rotation of the turbine into mechanical power to power a generator to convert the mechanical power into electrical power. Wind energy is one of the fastest growing green energy sources due to the fact that the price of green energy sources is in a massive decline because the world is opening up to see the need for these green energy sources.

HYDROELECTRICITY

Hydroelectricity is the production of electricity from the mechanical movement of water. As the water moves, it produces kinetic energy that is used to drive turbines that turn a generator that converts the potential energy of the falling or rapidly moving water into mechanical energy.

Hydroelectric power is also called hydroelectricity. Hydroelectric power is the most widely used form of environmentally friendly energy source. Hydroelectricity, as one of the environment friendly sources of energy, is used for mass production of energy that could be for a community or a state. Geothermal energy is the heat stored beneath the Earth's crust. The core of the earth is about the same temperature as the surface of the sun and this is due to the slow decay of radioactive particles in the rocks at the center of the earth. Geothermal energy as one of the environmentally friendly energy sources is very powerful. The process is both natural and cost effective.

BIOMASS

Biomass is organic material derived from waste products produced by agricultural, industrial and domestic processes, including plants and animals. When biomass is burned, the chemical energy produces heat that can be used to generate electricity with a steam turbine. From the conversion of agricultural, industrial and domestic waste into solid, liquid and gaseous fuels, biomass produces energy with very little economic and environmental cost.

CHARACTERISTICS OF A FRIENDLY ENERGY SOURCE

A friendly energy source with significant benefits for the environment should have the following characteristics:

1. No carbon at all

Carbon footprint is the net carbon emission of a person, event, company, place or product, but in this case a product. To be an environmentally friendly energy source means that the energy source has very little to zero net carbon emissions, which are greenhouse gases per day. This form of energy source does not raise the issue of increasing greenhouse gases in the atmosphere because there is no emission of greenhouse gases as there is no burning of fossil fuels of any kind. The integration of environmentally friendly energy sources should help balance the excess emission caused by the burning of fossil fuels.

2. Green living

Green living is a way of life that tries to integrate everyday life with the use of products that try to reduce the use of the Earth's natural resources or the use of products that do not deplete over time. Eco-friendly energy sources are energy sources that try to reduce the use of natural resources. Fossil fuel energy sources make use of the burning of certain natural resources such as coal, crude oil, wood, natural gas, etc. Not only does this cause adverse effects on the environment, but also depletes these resources, which can cause a loophole because these resources are not replaced. But when eco-friendly energy sources are used, green life is enhanced because the energy sources that are natural resources are not depleted. For example, solar energy that uses sunlight, wind energy that uses the wind and hydroelectric dams that use water as a natural resource.

3. Pollution Reduction

Environmental pollution is one of the environmental problems facing the world today and this has been accelerated by the burning of fossil fuels. The burning of fossils has harmful effects on the environment by causing air pollution from gas explosions and exhaust from vehicles, soil and water pollution from the production and transport of fossil fuels.

4. Fewer Production Accidents

Environmentally friendly energy sources are energy sources that are relatively safe from the production level to the consumption level. They are categorized with a low number of accidents. Eco-friendly energy sources are human-friendly energy sources and this is due to their low statistics in accidents producing pollution with the most important pollution being the use of large land mass.

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