

Committee: SPECON

Topic: The question of environmentally sustainable transportation systems

Student Officer: Kareem Hussein

Position: Deputy President

Personal Introduction

Dear delegates,

My name is Kareem Hussein and I will be serving as the Deputy-President for the Special Conference on the Environment: Sustaining Mother Earth during the 8th Annual Champion School Model United Nations Conference. I am privileged to have been given this opportunity to participate in this conference, as it is a great opportunity for all of us to address global issues of vast importance, see how the world around us works and what we can do to make it a better place. This year, the Special Conference addresses a very interesting topic. The question of environmentally sustainable transportation systems is a topic that is quite relevant in this day and age. Through discussion and debate, you will be able to understand why this topic is of mass importance. You will be able to understand the benefits from environmentally sustainable methods of transportation whilst also understanding the flaws.

If you face any difficulties regarding your research, or if you have any questions, please do not hesitate to ask me at khussein@champion.edu.gr and I would be more than happy to answer and help you.

I wish you all a productive preparation and look forward to meeting you at the conference.

Yours truly,
Kareem Hussein



Topic Introduction

One of the most recognisable advancements in society has been in the transportation sector. Land, air, and water are all considered to be modes of transportation with pipelines, rails and railways and road and offroad transportation also being considered forms of land transportation. Ever since the Industrial Revolution in 1760, and ever since the production of the first car in 1885, the necessary requirements for transportation have always been met but the one constant problem was: at what cost.

One of the most important requirements for transportation is fuel, and ever since the production of the first automobile in 1885, the type of fuel that has been used has not changed for most countries since then, this being petrol. Global warming is a process that has been occurring ever since the formation of the planet. However, scientists clarified that in the early 1800s, human-caused global warming had started to have a notable impact on the planet with global temperatures rising continuously. Global warming is a topic that has been discussed for many decades as its impacts are devastating. Fossil fuels are one of the main contributors to the process of global warming. Petrol is a fossil fuel used to power many vehicles, including cars, planes, boats, etc.



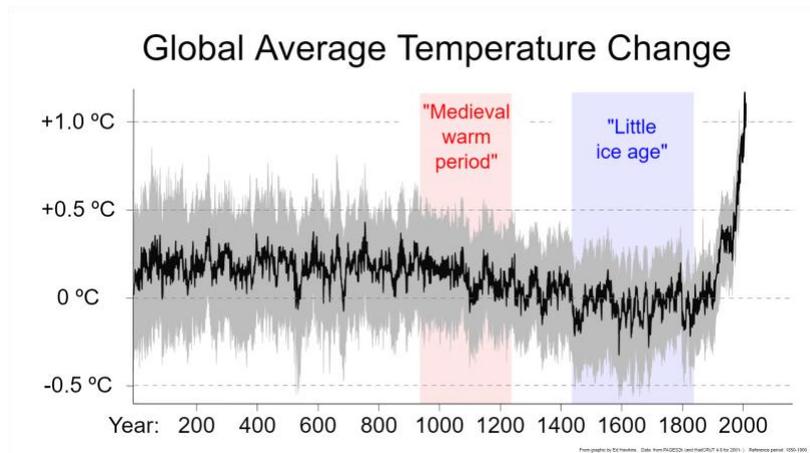


Fig.1 The global average temperature changes every 200 years. As can be seen by the lines' gradient becoming increasingly steeper after the 1800s, temperature change has been drastically increasing ever since then, with temperatures increasing annually ever since then.

Many developed countries such as Norway are very dependent on the use of fossil fuels for everyday life, as they are always readily available. In doing so, the emission of greenhouse gases is almost always incessant due to the constant incineration of these fuels; hence, global warming is always continuous. In spite of that, there are also countries in which fossil fuels are not as readily available, allowing them to contribute to the reduction of the rate of greenhouse gas emissions. In many cases, these are countries with little access to fossil fuels which turn to cheaper, alternative sources of energy of greater availability.

The reason behind the concentration of greenhouse gases being high in developed countries is due to many reasons, such as great traffic congestion, human activities such as leisure, short distance travelling, meat consumption, and most importantly, the excessive use of fossil fuels, this primarily being due to the fact that people opt to use their own vehicle over public transport, which increases the

¹ "Temperature record of the past 1000 years - Wikipedia."

https://en.wikipedia.org/wiki/Temperature_record_of_the_past_1000_years. Accessed 14 Aug. 2020.



amount of fossil fuels needed to be incinerated for a city or country's transportation needs. If the aforementioned activities were to occur on a smaller scale, the emission of greenhouse gases would be reduced. Global warming endangers our health, jeopardizes our national security, and threatens other basic human needs. Some effects, such as unusually high temperatures, rising sea levels, and acute flooding and droughts, have become quite frequent.

However, science and technology have had a colossal impact in reducing carbon dioxide emissions, through the use of photovoltaics. This is a scientific phenomenon which allows the conversion of light into electricity using semiconducting materials that exhibit the photovoltaic effect. This concept is widely used in solar panels so as to generate electricity used in our everyday lives.

It has been proven that cars which apply the concept of photovoltaics, on average produce less than half the greenhouse gas emissions of comparable gasoline-powered vehicles, despite producing higher emissions in their manufacturing. Another point that is worth mentioning is that electric cars are becoming increasingly efficient and reliable. This has been proven in various ways, which include the comparison of wheel-to-tank efficiency, short distance speed tests, and supply and charging efficiency. Through such analysis we are able to reach the conclusion that fuel powered cars have 100% efficiency and that the efficiency of electric cars is between 89% and 94%, due to the main charger or the internal resistance of the battery itself. When examining how effective the vehicles are in terms of short distances covered, we have been able to deduce the fact that electrical cars are more effective as they can reach distances of 120 km using only 25 kW whereas fuel powered vehicles require slightly below double the energy to reach the same distance. In terms of wheel-to-tank efficiency, we have been able to discover that electrical vehicles have a higher efficiency than fuel powered vehicles with electric vehicles having an efficiency of 92% whilst fuel powered vehicles have an



efficiency of around 91%.² Although this change may seem minor, it will have an effect in the future.

“Over the past century, the temperature of the planet has increased by 0.7 degrees Celsius, roughly ten times faster than the average rate of ice-age-recovery warming, and models are predicting that the temperature of the Earth will rise between 2 and 6 degrees Celsius over the next century³”. In the last two million years, the earth has taken approximately 5000 years for the temperature to increase by 5 degrees celsius. The estimated rate of temperature increase for the next 100 years is at least 20 times quicker. With proper application of possible solutions, we can reduce the amount of greenhouse gas production and reduce the rate at which global warming is occurring.

Definition of key terms

Transportation systems

The state transportation infrastructure and related systems, including highways and toll roads open to the public and associated rights-of-way, bridges, vehicles, equipment, park and ride lots, transit stations, transportation management systems, intelligent vehicle highway systems, and other ground transportation systems.⁴ A transportation system is the way people move around and with what means whether it be car, plane, boat etc.

² "REAL-LIFE COMPARISON BETWEEN DIESEL AND ... - Core."
<https://core.ac.uk/download/pdf/55627041.pdf>.

³ "Global Warming - NASA Earth Observatory." 3 Jun. 2010,
<https://earthobservatory.nasa.gov/features/GlobalWarming/page3.php>.

⁴ "Transportation system | legal definition of Transportation"
<https://www.lawinsider.com/dictionary/transportation-system>.



Environmental sustainability

The rates of renewable resource harvest, pollution creation, and non-renewable resource depletion that can be continued infinitely. If they cannot be continued indefinitely then they are not sustainable.⁵ Some examples of environmental sustainability include: sustainable Agriculture (repeated cultivation of the same crops on the same patch of soil can lead to the depletion of the quality of the soil and the quality of the produce), sustainable forestry, waste management, sustainable water management, renewable energy resources, biofuel etc.

Fossil fuels

Any of a class of hydrocarbon-containing materials of biological origin occurring within Earth's crust that can be used as a source of energy.⁶ Fossil fuels include: coal, petroleum, natural gas, oil, bitumens, and tar.

Global warming

Global warming is the ongoing rise of the average temperature on the Earth's climate system.⁷ The effects of global warming include rising sea levels, more intense and extreme weather conditions, the temperature of the oceans increasing and becoming more acidic and many more.

⁵ "Definition of Environmental Sustainability - Thwink.org."

<https://www.thwink.org/sustain/glossary/EnvironmentalSustainability.htm>.

⁶ "fossil fuel | Meaning, Types, & Uses" <https://www.britannica.com/science/fossil-fuel>.

⁷ "Global warming - Wikipedia." https://en.wikipedia.org/wiki/Global_warming



Mode of transport

A term used to distinguish between different ways of transportation or whether certain transport is purposed to transport people or goods.⁸ There are three modes of transport, air, water and land.

Photovoltaics

Photovoltaics is the direct conversion of light into electricity at the atomic level.⁹ This concept is widely used in solar panels so as to generate electricity for the powering of buildings, etc.

Photovoltaic effect

The photovoltaic effect is a process that generates voltage or electric current in a photovoltaic cell when it is exposed to sunlight.¹⁰ This phenomenon is studied in Physics and Chemistry and allows us to have a better understanding of photovoltaics as a whole and hence understand how objects such as solar panels and solar cars function.

Digital Age

Otherwise known as Information Age, or Computer Age, it is estimated to have begun between 1950 and 1970, right after the Industrial Revolution, where the rapid manufacture of electronic goods, software products and IT services have completely integrated into our everyday lives.¹¹

⁸ "Mode of transport - Wikipedia." https://en.wikipedia.org/wiki/Mode_of_transport

⁹ "How do Photovoltaics Work? | Science Mission Directorate." 6 Aug. 2008, <https://science.nasa.gov/science-news/science-at-nasa/2002/solarcells>.

¹⁰ "Photovoltaic effect - Energy Education." 26 Aug. 2015, https://energyeducation.ca/encyclopedia/Photovoltaic_effect.

¹¹ "What is Digital Age | IGI Global." <https://www.igi-global.com/dictionary/resource-sharing/7562>



Science Governance

The effect of science being so deeply embedded into our lives, that in some cases they might affect the evolution of society and governmental constitutions, and therefore question the ethical nature of democracy.¹²

Sustainable Transport

Transport that supports society's mobility needs in a manner which is least detrimental to the environment, as well as not hindering the mobility needs of future generations.¹³ The most common example of sustainable transport is the electric car as it doesn't rely on fossil fuels and therefore is eco-friendly.

Multimodal Transport

The combination of many modes of transport in a journey.¹⁴ A good example of multimodal transport is Rail-Truck.

Greenhouse gases

Any gas that has the property of absorbing infrared radiation (net heat energy) emitted from Earth's surface and reradiating it back to Earth's surface, thus

¹² "Governance of Science | Encyclopedia.com." 6 Jun. 2020, <https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/governance-science>

¹³ "Transport and Sustainability | The Geography of Transport" https://transportgeography.org/?page_id=5725.

¹⁴ "Sustainable transport - European Commission - Europa EU." https://ec.europa.eu/transport/themes/sustainable_en..



contributing to the greenhouse effect.¹⁵ The three main greenhouse gases are carbon dioxide, water vapour, and methane.

Background Information

Innovation has always existed, whether that was in the form of fire, pottery, railways or computers. The huge innovative breakthrough that provided the spark to the revolutionary era of technology, that we are lucky enough to experience today, was the Industrial Revolution of the 18th century. The Industrial Revolution reached its peak in the United States in the 1920s, where greed and the consumerist tendencies of the American public grew so much, that these factors both contributed to the Wall Street crash, which brought upon what became known as the Great Depression, a period of heavy economic decline, depression, which led to heavy unemployment and worsened living conditions globally. Of course, not all countries managed to keep up with the fast pacing technologies following global recovery from the Great Depression, due to internal or external problems they were facing, with a great portion of such countries being classified as LICs as per now. Some of these LICs were able to become NICs (Newly-Industrialized Countries) after the discovery of fossil fuels and other natural resources in their countries, allowing them to grow their economy and speed up their development through exports of such resources as well as the usage of such within their own country, eliminating the need to import fuel etc. from other countries; they have been heavily reliant on them ever since.

Scientists clarified that human-caused global warming began in the 19th century; the very first electric car was created in 1885. During this time, electric cars were used extensively and that contributed to the reduction of global warming immensely. With that being said, the use of electric cars began to depreciate over time due to their unreliable nature. This nature stemmed from their range and

¹⁵ "greenhouse gas | Definition, Emissions" <https://www.britannica.com/science/greenhouse-gas>.



production costs. Gas-powered vehicles could travel farther than their electric counterparts, and Henry Ford's work on mass production for the Model T made gas-powered cars cheaper to produce. This combination nearly wiped out electric cars for nearly 100 years.

Environmental aspects of the electric car¹⁶

Electric cars have several benefits in comparison to fuel powered vehicles. Some of these benefits include low maintenance and operating costs, the production of little or no greenhouse gases which create air pollution, reduced dependence on petroleum, which is a great contributor to global warming. However, the UK Government estimates that two thirds of air pollution is due to the usage of tires and brakes and since electric cars are overall heavier, they produce more air pollution than fuel powered vehicles . However, they are beneficial in reducing CO₂ emissions since they are battery-powered, and eradicating the need for non-renewable sources of powering vehicles that contribute to global warming through them emitting greenhouse gases.

When discussing air pollution in different countries, a study in the United Kingdom discovered that greenhouse gas emissions could be reduced by at least 40% through the use of electrical vehicles and more eco-friendly methods of transportation, taking into consideration the emissions due to current electricity generation in the UK and emissions relating to the production and disposal of electric vehicles.¹⁷ In the United States of America, the percentages of energy sources were: 33.8% natural gas, 30.4% coal, 19.7% nuclear, 6.5% hydro, 5.5% wind, 1.5% biomass, and 2.6% other. It is clearly evident that the United States of America are heavily reliant on fossil fuels as their main source of energy instead of relying on

¹⁶ "Environmental aspects of the electric car - Wikipedia."
https://en.wikipedia.org/wiki/Environmental_aspects_of_the_electric_car.

¹⁷ "Environmental aspects of the electric car - Wikipedia."
https://en.wikipedia.org/wiki/Environmental_aspects_of_the_electric_car.



biorenewable resources such as hydroelectric power or wind power. Norway and Sweden produce all their electricity with carbon-free sources such as hydropower, biomass, and wind power which whilst is very unreliable as it depends on nature, has had a significant increase in capacity in certain years.¹⁸ Along with that, the CO₂ emissions from driving an electric car are extremely low almost equating to zero.

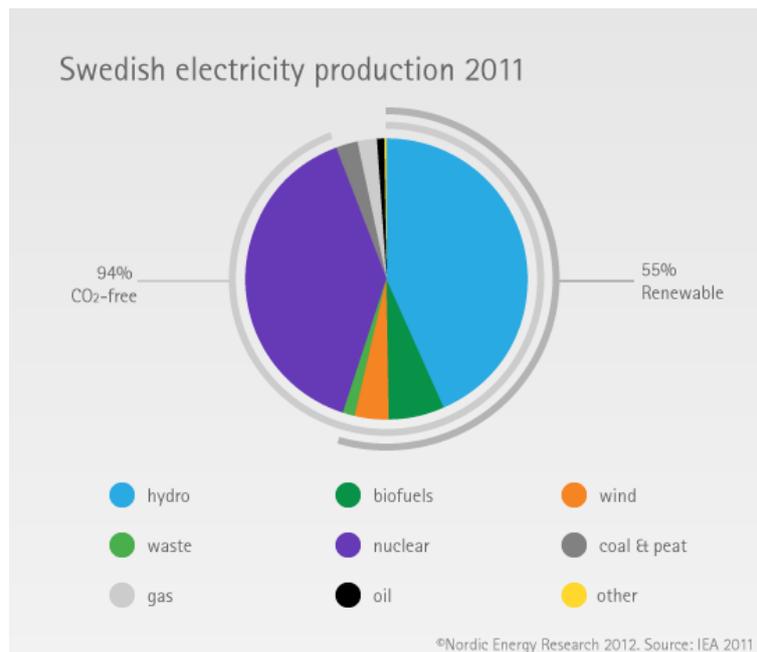


Fig.2: The different sources of electricity generation in Sweden.¹⁹

¹⁸ "Sweden: 96% CO₂-free electricity - Nordic Energy Research."

<https://www.nordicenergy.org/figure/two-thirds-renewable/96-co2-free-electricity/>.

¹⁹ "Sweden: 96% CO₂-free electricity - Nordic Energy Research."

<https://www.nordicenergy.org/figure/two-thirds-renewable/96-co2-free-electricity/>.



Major countries and organizations involved

Luxembourg²⁰

Luxembourg is a highly developed country with one of the highest GDPs per capita in the world, despite being the smallest country in all of Europe. Luxembourg has managed to create a system in which the environmental effects of car usage have been significantly reduced. The Luxembourgian government has agreed to invest in certain modes of transportation that will reduce the use of cars by citizens, and hence reduce CO₂ emissions. The government has decided to make all buses, trains, and trams free of charge.

France²¹

In terms of development, France is an extremely developed country. With that being said, France has also managed to identify the problems caused by the extensive use of fossil fuels and has therefore attempted to reduce the use of fossil fuels, by increasing taxes for fossil fuel usage and rebates for the purchasing of electric cars. In doing so, the taxes paid are expected to cover all negative attributes and consequences caused by fuel powered engines which also include, noise pollution, air pollution etc. However, this solution is not completely effective as implementing this provides those who are struggling financially at a disadvantage due to financial issues such as low or poor income. Along with that, it also does not take into account the feelings of certain people and this reminds us that the issue of social acceptability,

²⁰ "Moving toward green mobility: three countries, three different" 19 Dec. 2018, <https://blogs.worldbank.org/transport/moving-toward-green-mobility-three-countries-three-different-paths>.

²¹ "Moving toward green mobility: three countries, three different" 19 Dec. 2018, <https://blogs.worldbank.org/transport/moving-toward-green-mobility-three-countries-three-different-paths>.



needs to be an integral part of climate policy. Additionally, France's public transport company, RATP, has set a goal that by 2025, buses will operate solely on biogas and electrical energy.²² With all of that being said, France is not an extremely eco-friendly country since 75% of its energy comes from nuclear energy which is one of the many causes of greenhouse gas production and is one of the biggest contributors to the greenhouse effect.²³

Norway²⁴

Norway is one of the most developed countries in the world, ranking as the most developed country in 2018 and 2019. Having said that, the country has managed to acknowledge the ongoing issue of global warming and has attempted to reduce the effect of global warming and CO₂ emissions by focusing most of its efforts on promoting more eco-friendly sources of energy for cars, such as by incentivizing electric cars, as can be seen from the fact that electric car purchases have no Value-Added Tax, no import tariffs and no need to pay on toll roads. Norway has the highest use of electric cars, with electric cars representing approximately 47% of all transport vehicles.

²² "Getting to and around in Paris without polluting the environment."

<https://en.parisinfo.com/discovering-paris/sustainable-tourism-in-paris/getting-to-and-around-in-paris-without-polluting-the-environment>.

²³ "Nuclear Power in France - World Nuclear Association." <https://www.world-nuclear.org/information-library/country-profiles/countries-a-f/france.aspx>.

²⁴ "Moving toward green mobility: three countries, three different" 19 Dec. 2018,

<https://blogs.worldbank.org/transport/moving-toward-green-mobility-three-countries-three-different-paths>.



The United Kingdom²⁵

The UK Parliament is addressing the issue of global warming and is attempting to respond in many ways creating many targets and evaluating them. By doing this they are able to limit the use of fossil fuels and contribute to the long term effect and how the planet will benefit from it. The Parliament has managed to identify the fact that the use of plug-in vehicles will be beneficial in the long term and short term. However, the continuous use of fuel powered vehicles are not compatible with the Parliaments long term plans for climate change. In February of 2020, British Prime Minister Boris Johnson announced that over 5 billion pounds would be invested into infrastructure for “active transport”, such as cycling, walking, as well as in local buses’ infrastructure. The purchase and use of 4000 buses with zero carbon emissions were part of this investment.²⁶

The Climate Change Act is the first legally binding national commitment to reduce greenhouse gas emissions. The purpose of the Climate Change Act is to commit the government to reduce greenhouse gas emissions by at least 100% of 1990 levels by the year 2050 and to agree on carbon-budgets that will progressively allow the country to accomplish its main goal in reducing greenhouse gas emission at the lowest possible cost. With that being said, the original goal was to reduce greenhouse gas emissions by 80%, however in 2019 this was amended to achieving a 100% reduction by 2050.²⁷

²⁵ "Electric vehicles: driving the transition - Parliament (publications)." 11 Jan. 2019, <https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/1881/188102.htm>.

²⁶ "UK announces 'ambitious' plan to become hub for green" 31 Mar. 2020, <https://www.euronews.com/living/2020/03/30/uk-announces-ambitious-plan-to-become-hub-for-green-transport>.

²⁷ "How is the UK tackling climate change? | Energy & Climate" <https://eciu.net/analysis/briefings/uk-energy-policies-and-prices/how-is-the-uk-tackling-climate-change>



UK Greenhouse Gas Emissions in 2018

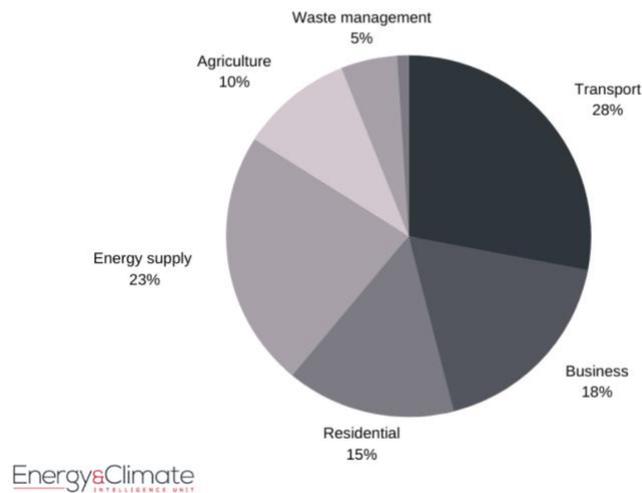


Fig.3: Greenhouse gas emissions in the UK in the year 2018.²⁸

Austria²⁹

Austria has managed to reduce the use of cars by at least a third over the past 28 years with car usage dropping from 40% to 27%. The way Austria managed to achieve this was by promoting the use of electrical vehicles and making transportation for fuel powered vehicles more challenging whilst simultaneously easing transportation for walking, cycling and more through the narrowing of roads and creating of more bicycle paths and walking lanes. The U-Bahn metro was expanded, and parking regulations along with management were also increased causing a reduction in parking spaces which would allow people to use public

²⁸ "How is the UK tackling climate change? | Energy & Climate"

<https://eciu.net/analysis/briefings/uk-energy-policies-and-prices/how-is-the-uk-tackling-climate-change>

²⁹ "Full article: Vienna's path to sustainable transport." 27 Oct. 2016,

<https://www.tandfonline.com/eprint/BzYH2eWA4KgCFwTmBpxp/full>.



transport such as metros and buses. This act can be noticed as one of the most important policies and changes that were made to help contribute to the reduction of CO₂ emissions.

Hong Kong Special Administrative Region³⁰

Hong Kong is an extremely developed country and has managed to find a solution or apply one to the everyday lives of its citizens. The way the country has managed to do so is through the use of public transport. The citizens of Hong Kong rely heavily on public transport and even more so on the metro. Hong Kong has one of the highest public transport usership rates in the world. The way the country managed to make the multi-layered transport was by using two basic characteristics of the area. One a rapidly growing population, and secondly, a region so small that the use of cars for transportation would become impractical.

Timeline of events

Date	Description of event
1988	The UN Intergovernmental Panel on Climate Change (IPCC) is set up by the World Meteorological Organization (WMO) and the United Nations Environment to provide an objective source of scientific information. ³¹
1990	The IPCC released the First Assessment Report (FAR) underlining

³⁰ "No, Hong Kong has the best transport system in the world" 12 Sep. 2018, <https://www.citymetric.com/transport/no-hong-kong-has-best-transport-system-world-mtr-trams-boats-4148>.

³¹ "Climate Change | United Nations." <https://www.un.org/en/sections/issues-depth/climate-change/>.



	the importance of climate change and global warming. ³²
1992	The UN 'Earth Summit' produced the United Nations Framework Convention on Climate Change (UNFCCC) as a first step in addressing the climate change problem.
1995	Countries launched negotiations to strengthen and increase global reaction to global warming, and, two years later, adopted the Kyoto Protocol. ³³
1995	The IPCC released the Second Assessment Report (SAR) providing important material for governments to assess before the taking up of the Kyoto Protocol.
2001	The IPCC released the Third Assessment Report (TAR) and focused the attention on the consequences of global warming and the impacts that it is having and the need for adaptation.
2007	The IPCC released the Fourth Assessment Report (AR4) and readied governments for a post-Kyoto agreement.
2008	The first commitment period for the Kyoto Protocol started.
2012	The first commitment period for the Kyoto Protocol ended.
2013	The second commitment period for the Kyoto Protocol started.
2014	The IPCC released the Fifth Assessment Report (AR5) which provided the scientific input to the Paris Agreement
2015	The Paris Agreement was established which builds on the concept of reducing global warming and ways to reduce it.
2015	A/RES/70/1 Transforming our world: The 2030 Agenda for sustainable development was released and aims to manage consumption rates. ³⁴

³² "History — IPCC." <https://www.ipcc.ch/about/history/>.

³³ "Climate Change | United Nations." <https://www.un.org/en/sections/issues-depth/climate-change/>.

³⁴ "the 2030 Agenda for Sustainable Development - the United" 21 Oct. 2015, https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf.



2018	The IPCC issued a special report recognizing that the challenge of reducing global warming to 1.5°C would require fast unprecedented changes to all living ways of society.
2019	Climate Action Summit was held in which Secretary-General António Guterres brought into perspective the need to increase and accelerate climate action and ambition. ³⁵
2019	World's first fully electric fully-electric commercial flight takes off in Vancouver, Canada. Companies described it as the "first step to building the world's first all-electric commercial fleet and that the push to electric could help slash carbon emissions in the high-polluting aviation sector." ³⁶ The United States officially begins the process of withdrawing from the Paris Agreement.
2020	The second commitment period for the Kyoto Protocol ended. In this period, EU members as well as Australia promised to make further reductions in their emissions, namely, ones of 20%, with this target being formally set and member states working towards the accomplishment of this. ³⁷

Previous attempts to solve the issue

Nordea's Sector Guidelines for the Fossil Fuel Industry³⁸

Nordea developed a sector guideline for the fossil fuel industry in the Nordic countries (Finland, Denmark, Norway, Sweden, and Iceland as well as the Faroe Islands, Greenland, and Åland). The reason Nordea developed this guideline was to limit the use of fossil fuels in the countries to a certain limit. Evidently, this guideline

³⁵ "Climate Change | United Nations." <https://www.un.org/en/sections/issues-depth/climate-change/>.

³⁶ "'World's first' fully-electric commercial flight takes off - BBC News." 11 Dec. 2019, <https://www.bbc.com/news/business-50738983>.

³⁷ "Kyoto 2nd commitment period (2013–20) - European" https://ec.europa.eu/clima/policies/strategies/progress/kyoto_2_en.

³⁸ "Nordea Sector Guideline for the Fossil Fuels Industry." <http://www.nordea.com/sector-guideline-fossil-fuels>.



has proven to be effective as the Nordic countries are amongst the cleanest countries in terms of air pollution and ground pollution in the world having acquired the top 4 spots in the list of cleanest countries. The guideline produced by Nordea tackles the extensive use of fossil fuels and more specifically explains the expectations for the fossil fuel industry, meaning that countries follow certain quotas and use fossil fuels in small quantities and not extensively.

When addressing the issue of fossil fuels and climate change, Nordea has managed to bring the global issues that have been caused by the extensive use of fossil fuels and hence global warming into perspective, and has set out a plan in which they attempt to make emission pathways which lead to net zero emissions by 2050. Nordea has also managed to raise awareness on the Intergovernmental Panel on Climate Change (IPCC) -which is the United Nations body responsible for evaluating the science related to climate change- setting out in its 2019 Special Report (Global Warming of 1.5 °C) the foundations for strengthening the global response to the threat of climate change.

With everything that has been said, Nordea has acknowledged certain organisations and treaties which have played an important role in helping reduce or draw attention to the issue of global warming such as the Paris Agreement, the EU Action Plan for Financing Sustainable Growth and many more.

Fossil fuel regulations in the United States of America

Although the United States relies heavily on fossil fuels to provide electricity and energy to power the necessities, it has recognised the issue of global warming and is looking to reduce it as much as possible through the implementation of certain regulations restricting the use of fossil fuels in certain ways. Such regulations on fossil fuels are part of the USAs energy policy and have gained great significance with the strong dependence on fossil fuel based energy. This has been proven by the reduction in greenhouse gas emissions which between 2005 and 2017 was reduced



by 13%. Such regulations address oil, coal and natural gas usage, which tackle the concerns from fossil fuels and their overuse.

However, even with all the reductions in fossil fuel usage, the United States of America decided to formally exit the Paris Agreement as of November 4th 2019. The reason the United States of America decided to leave the Paris Agreement was, according to President Donald John Trump, the “unfair economic burden imposed on American workers, businesses, and taxpayers by U.S. pledges made under the Agreement.” In spite of that, even with the exiting from the Paris Agreement, the United States of America has managed to maintain its aim to continue efforts at reducing the severity and worsening of global warming.

The term “phase out” describes the radial decrease in reliance on the use of fossil fuels as a main source of energy in the United States.³⁹ Since the Obama administration, there has been a major shift throughout the nation to reduce the use of fossil fuels and instead use green alternatives. However, many of the actions roll back Obama-era policies that aimed to curb climate change and limit environmental pollution, while others threaten to limit federal funding for science and the environment⁴⁰. When discussing the topic of natural gas, the United States Of America has been able to identify the extensive and increased use in the fuel and therefore decided to set certain regulations aimed at limiting the usage of it, having anticipated the fact that global energy consumption and demand is to increase by at least 50% in the next 20 years, and that more specifically, natural gas use is going to increase by 70% over the course of 20 years too.

In addition to that, a fossil fuel subsidy is any government action that lowers the cost of fossil fuel energy production, raises the prices received by energy producers or lowers the prices paid by energy consumers. The problem with fossil

³⁹ "Fossil fuel regulations in the United States - Wikipedia."
https://en.wikipedia.org/wiki/Fossil_fuel_regulations_in_the_United_States.

⁴⁰ "A running list of how President Trump is changing"
<https://www.nationalgeographic.com/news/2017/03/how-trump-is-changing-science-environment/>.



fuel subsidies is that they support an industry that pushes for negative public health impacts, local environmental pollution from fossil fuel extraction and infrastructure, and climate change impacts and costs. OilChange aims to get rid of insufficient subsidies and ensure a progression towards the use of alternative energy which is more eco-friendly.⁴¹ This is being done by bringing into perspective the incessant issue of extensive fossil fuel usage and how we are going to be affected by it. Along with that, OilChange has also started many campaigns in order to try and reduce fossil fuel usage. An example of this was the attempt in 2020 to end subsidies, in which they attempted to call on global leaders to end fossil fuel handouts, however, regrettably, with no success.

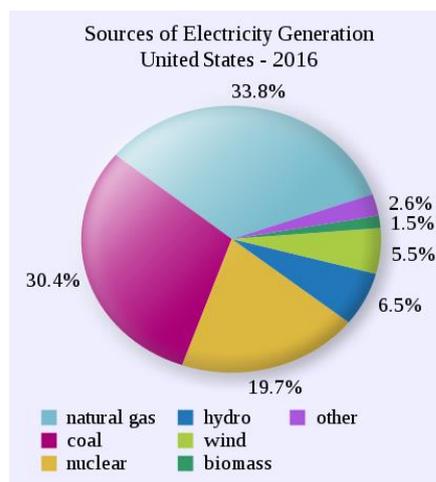


Fig.4: The different sources of electricity generation in the United States in the year of 2016

⁴¹ "Fossil Fuel Subsidies: Overview - Oil" <http://priceofoil.org/fossil-fuel-subsidies/>.



Relevant UN Resolutions, Events, Treaties and Legislation

United Nations Framework Convention on Climate Change (UNFCCC)

“The UNFCCC entered into force on 21 March 1994. Preventing “dangerous” human interference with the climate system is the ultimate aim of the UNFCCC.”⁴² The UNFCCC has managed to come up with possible solutions that can reduce the effect of carbon emissions on the environment and the rate of global warming. One of these solutions is the subsidizing of public transport. In this solution, students and people who work are given discounts for using public transport rather than using personal transport. Another possible solution could be to organise carpooling initiatives between co-workers who live in the same neighbourhood. In doing so, we are able to reduce the amount of traffic in circulation and hence reduce the amount of carbon emissions into the atmosphere.⁴³

A/RES/70/1 Transforming our world: The 2030 Agenda for sustainable development⁴⁴

This resolution aims to combine all levels of government and legislative bodies, as well as private businesses in promoting sustainability, and hence reducing the rate at which climate change is occurring. The most important part of this resolution is the commitment made by developed countries in financially contributing in helping LICs reach a similar level of development, so as to allow all countries to holistically participate in reducing greenhouse gas emissions and thus promote sustainable development. Another thing that is highlighted in the resolution is the promotion of mechanisms to raise awareness for effective climate change-related planning and management in LICs whilst simultaneously focusing on empowering and educating women, youth and local and small communities.

⁴² "What is the United Nations Framework Convention on Climate" <https://unfccc.int/process-and-meetings/the-convention/what-is-the-united-nations-framework-convention-on-climate-change>.

⁴³ "Reducing Emissions - Companies and Organizations | UNFCCC." <https://unfccc.int/climate-action/climate-neutral-now/i-am-a-company/organization/reductions-org>.

⁴⁴ "the 2030 Agenda for Sustainable Development." 21 Oct. 2015, <https://goo.gl/Cg3dxQ>.



A/RES/72/212 Strengthening the links between all modes of transport to achieve the Sustainable Development Goals ⁴⁵

This resolution recognizes the problems and ongoing challenges of global warming and provides multiple solutions to them. The resolution also discusses the need for continued international cooperation to address the issues relating to transport and transport corridors as an important element of sustainable development. The solutions which the resolution discussed included the hosting of another Global Sustainable Transport Conference to ensure the implementation of the objectives of the first conference that was held, and that the funding would be from extrabudgetary resources as well as the provision of material assistance to LICs.

Paris Agreement⁴⁶

The Paris Agreement is an Agreement that was established in 2015. The Parties of the UNFCCC reached an agreement to reduce the rate of climate change and to increase efforts in achieving a sustainable low carbon future. The Paris agreement builds on the concept, and brings all nations and governments together to tackle a common cause and allow us to adapt to the changes that will need to be made in all aspects of society. Whilst doing this, the agreement also mentions the need to support LICs in this process, in order for them to be able to be in parallel with the changes and implementations that are to occur. The Paris Agreement's main goal is to strengthen the global response to the threat of climate change by keeping the global temperature rise this century below 2 degrees Celsius (which is above pre-industrial levels) and to continue and encourage efforts to limit the temperature increase even further to 1.5 degrees Celsius.

⁴⁵ "Sustainable transport ... Sustainable Development Knowledge"

<https://sustainabledevelopment.un.org/topics/transport/documents>.

⁴⁶ "Climate Change | United Nations." <https://www.un.org/en/sections/issues-depth/climate-change/>.



Kyoto Protocol⁴⁷

The Kyoto Protocol was taken up by the United Nations Framework Convention on Climate Change (UNFCCC) in December of 1997 where over 160 countries agreed upon the passing of this Protocol. The Kyoto Protocol is very complex as it reflects the complicated political, economical, scientific and legal issues raised by human-caused climate change. The Kyoto Protocol mainly discusses the problem of global climate change and what can be done to improve the situation. Along with that, the Protocol describes the core commitments to the Protocol with there being 2 commitment periods with the first beginning in 2008 and ending in 2012 and the second commitment period beginning in 2013 and ending in 2020. The Protocol concludes by stating possible solutions for the future which will include “decades of elaboration, refinement, and expansion.”

Possible solutions

Education

Education is a long-term solution that can help with the reduction of greenhouse gas emissions, as educating the public sensitises citizens and can aid in getting them to refrain from actions that contribute to global warming. For example, education on the severity of climate change and ways to contribute to its reduction as individuals can result in someone opting to use public transport rather than their own car on their daily commute.

Another reason why education is one of the most important solutions is because it allows future generations to bring what their future is all about into perspective and what they can do to prevent their future from becoming harmful to

⁴⁷ "The Kyoto Protocol to the United Nations Framework ... - jstor."
<https://www.jstor.org/stable/2998044>.



them. Of course, education needs financial support that the country might not be able to provide.

In developing countries, the establishment of democratic institutions will contribute to eradicating inequalities in access to education due to currently prohibitive factors such as gender, background and financial status, and help in achieving student-oriented learning.

However, education in schools is not the only solution to solving the problem. As previously mentioned we are moving towards a more technological era and therefore there is more than one way to bring the topic into perspective. Such an example could be through social media. Currently, there are about 3.6 billion people who are using social media globally⁴⁸ which approximates to about 49% of the global population. If these 3.6 billion people were to take action against climate change, the rate at which global warming would be immense especially considering the fact that most of these social media users are in NICs where most greenhouse gas emission occurs.⁴⁹

Another method in which education can be provided is through celebrity speakings regarding the importance of slowing down climate change and ways of doing so at public events. In our time, the younger generation tend to be more inspired by and idolize celebrities, listening to them more than school, parents, etc. With more such speeches or campaigns by people with great influence in today's society, the problem of climate change will be brought into perspective for the younger and future generations, hence getting them to start to contribute to the reduction of greenhouse gas emissions such as by using public transport to go out rather than asking their parents to drive them.

⁴⁸ "• Number of social media users worldwide | Statista." 15 Jul. 2020, <https://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/>.

⁴⁹ "Which countries use social media the most and why?." 25 Jun. 2019, <https://www.languageinsight.com/blog/2019/countries-use-social-media-the-most/>.



Fuel efficient vehicles and cleaner fuels⁵⁰

Fuel efficient vehicles use less fuel to travel the same distance that normal vehicles use. With that being said, fuel powered vehicles produce less carbon emissions since they burn less carbon dioxide. If fuel emissions go down, the rate at which global warming is occurring can be reduced.

However, just like there are fuel efficient vehicles, there are also vehicles which use cleaner fuels and vehicles which use alternative forms of fuel, such as hydrogen and natural gas. By using cleaner types of fuel, vehicles produce fewer emissions when they operate and some fuels, such as those made from cellulosic biofuels have the potential to reduce carbon emissions by 80% compared to gasoline. There are also electric vehicles such as electric cars and electric trucks. Unlike fuel powered vehicles, many electric vehicles produce almost no emissions and this would benefit the environment greatly.

Efficient Parking Management⁵¹

In our society, one of the many ways in which extra fuel is emitted from vehicles is through parking. Nowadays, almost everyone has a vehicle of some sort and spends quite the amount of time to find a parking space. In doing so, extra and unnecessary carbon is emitted and this contributes to the greenhouse effect massively. In Germany, for instance, drivers are spending 560 million hours per year searching for a parking space; but, according to a study of the German automobile industry, this search time could be reduced by at least one third if parking data generated by reliable parking sensors were available to drivers. This would also result in 1.7 billion fewer miles driven per year and a reduction of 0.5

⁵⁰ "Car Emissions & Global Warming | Union of Concerned" <https://www.ucsusa.org/resources/car-emissions-global-warming>.

⁵¹ "Reducing Traffic's Role in Climate Change." 5 Mar. 2019, <https://meetingoftheminds.org/reducing-traffics-role-in-climate-change-30043>.



million tons of carbon dioxide. Nowadays, technology such as applications aiding in quickly finding one a space to park, e.g JustPark, provide a certain amount of satisfaction and ease in parking, simultaneously reducing traffic congestion, resulting in lower greenhouse gas emissions and thus contributing to a slower rate of climate change occurrence.

Bibliography

1. “Temperature record of the past 1000 years”
https://en.wikipedia.org/wiki/Temperature_record_of_the_past_1000_years
2. “Real-Life Comparison Between Diesel and Electric Car Energy Consumption”
<https://core.ac.uk/download/pdf/55627041.pdf>.



3. "Global Warming - NASA Earth Observatory." 3 Jun. 2010,
<https://earthobservatory.nasa.gov/features/GlobalWarming/page3.php>.
4. "Transportation system | legal definition of Transportation"
<https://www.lawinsider.com/dictionary/transportation-system>.
5. "Definition of Environmental Sustainability - Thwink.org."
<https://www.thwink.org/sustain/glossary/EnvironmentalSustainability.htm>.
6. "fossil fuel | Meaning, Types, & Uses"
<https://www.britannica.com/science/fossil-fuel>.
7. "Global warming - Wikipedia."
https://en.wikipedia.org/wiki/Global_warming
8. "Mode of transport - Wikipedia."
https://en.wikipedia.org/wiki/Mode_of_transport
9. "How do Photovoltaics Work? | Science Mission Directorate." 6 Aug. 2008,
<https://science.nasa.gov/science-news/science-at-nasa/2002/solarcells>.
10. "Photovoltaic effect - Energy Education." 26 Aug. 2015,
https://energyeducation.ca/encyclopedia/Photovoltaic_effect.
11. "What is Digital Age | IGI Global."
<https://www.igi-global.com/dictionary/resource-sharing/7562>
12. "Governance of Science | Encyclopedia.com." 6 Jun. 2020,
<https://www.encyclopedia.com/science/encyclopedias-almanacs-transcripts-and-maps/governance-science>
13. "Transport and Sustainability | The Geography of Transport"
https://transportgeography.org/?page_id=5725.
14. "Sustainable transport - European Commission - Europa EU."
https://ec.europa.eu/transport/themes/sustainable_en..
15. "greenhouse gas | Definition, Emissions" <https://www.britannica.com/science/greenhouse-gas>.
16. "Environmental aspects of the electric car - Wikipedia."
https://en.wikipedia.org/wiki/Environmental_aspects_of_the_electric_car.
17. "Environmental aspects of the electric car - Wikipedia."
https://en.wikipedia.org/wiki/Environmental_aspects_of_the_electric_car.
18. "Sweden: 96% CO2-free electricity - Nordic Energy Research."
<https://www.nordicenergy.org/figure/two-thirds-renewable/96-co2-free-electricity/>.



19. "Sweden: 96% CO2-free electricity - Nordic Energy Research." <https://www.nordicenergy.org/figure/two-thirds-renewable/96-co2-free-electricity/>.
20. "Moving toward green mobility: three countries, three different" 19 Dec. 2018, <https://blogs.worldbank.org/transport/moving-toward-green-mobility-three-countries-three-different-paths>.
21. "Moving toward green mobility: three countries, three different" 19 Dec. 2018, <https://blogs.worldbank.org/transport/moving-toward-green-mobility-three-countries-three-different-paths>.
22. "Getting to and around in Paris without polluting the environment." <https://en.parisinfo.com/discovering-paris/sustainable-tourism-in-paris/getting-to-and-around-in-paris-without-polluting-the-environment>.
23. "Nuclear Power in France - World Nuclear Association." <https://www.world-nuclear.org/information-library/country-profiles/countries-a-f/france.aspx>.
24. "Moving toward green mobility: three countries, three different" 19 Dec. 2018, <https://blogs.worldbank.org/transport/moving-toward-green-mobility-three-countries-three-different-paths>.
25. "Electric vehicles: driving the transition - Parliament (publications)." 11 Jan. 2019, <https://publications.parliament.uk/pa/cm201719/cmselect/cmbeis/1881/188102.htm>.
26. "UK announces 'ambitious' plan to become hub for green" 31 Mar. 2020, <https://www.euronews.com/living/2020/03/30/uk-announces-ambitious-plan-to-become-hub-for-green-transport>.
27. "How is the UK tackling climate change? | Energy & Climate" <https://eciu.net/analysis/briefings/uk-energy-policies-and-prices/how-is-the-uk-tackling-climate-change>
28. "How is the UK tackling climate change? | Energy & Climate" <https://eciu.net/analysis/briefings/uk-energy-policies-and-prices/how-is-the-uk-tackling-climate-change>
29. "Full article: Vienna's path to sustainable transport." 27 Oct. 2016, <https://www.tandfonline.com/eprint/BzYH2eWA4KgCFwTmBpxp/full>.
30. "No, Hong Kong has the best transport system in the world" 12 Sep. 2018, <https://www.citymetric.com/transport/no-hong-kong-has-best-transport-system-world-mtr-trams-boats-4148>.
31. "Climate Change | United Nations." <https://www.un.org/en/sections/issues-depth/climate-change/>.
32. "History — IPCC." <https://www.ipcc.ch/about/history/>.



33. "Climate Change | United Nations." <https://www.un.org/en/sections/issues-depth/climate-change/>.
34. "the 2030 Agenda for Sustainable Development - the United" 21 Oct. 2015, https://www.un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_70_1_E.pdf.
35. "Climate Change | United Nations." <https://www.un.org/en/sections/issues-depth/climate-change/>.
36. "'World's first' fully-electric commercial flight takes off - BBC News." 11 Dec. 2019, <https://www.bbc.com/news/business-50738983>.
37. "Kyoto 2nd commitment period (2013–20) - European" https://ec.europa.eu/clima/policies/strategies/progress/kyoto_2_en.
38. "Nordea Sector Guideline for the Fossil Fuels Industry." <http://www.nordea.com/sector-guideline-fossil-fuels>.
39. "Fossil fuel regulations in the United States - Wikipedia." https://en.wikipedia.org/wiki/Fossil_fuel_regulations_in_the_United_States.
40. "A running list of how President Trump is changing" <https://www.nationalgeographic.com/news/2017/03/how-trump-is-changing-science-environment/>.
41. "Fossil Fuel Subsidies: Overview - Oil" <http://priceofoil.org/fossil-fuel-subsidies/>.
42. "What is the United Nations Framework Convention on Climate" <https://unfccc.int/process-and-meetings/the-convention/what-is-the-united-nations-framework-convention-on-climate-change>.
43. "Reducing Emissions - Companies and Organizations | UNFCCC." <https://unfccc.int/climate-action/climate-neutral-now/i-am-a-company/organization/reductions-org>.
44. "the 2030 Agenda for Sustainable Development." 21 Oct. 2015, <https://goo.gl/Cg3dxQ>.
45. "Sustainable transport .. Sustainable Development Knowledge" <https://sustainabledevelopment.un.org/topics/transport/documents>.
46. "Climate Change | United Nations." <https://www.un.org/en/sections/issues-depth/climate-change/>.
47. "The Kyoto Protocol to the United Nations Framework ... - jstor." <https://www.jstor.org/stable/2998044>.
48. "• Number of social media users worldwide | Statista." 15 Jul. 2020, <https://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/>.



49. "Which countries use social media the most and why?." 25 Jun. 2019,
<https://www.languageinsight.com/blog/2019/countries-use-social-media-the-most/>.
50. "Car Emissions & Global Warming | Union of Concerned"
<https://www.ucsusa.org/resources/car-emissions-global-warming>.
51. "Reducing Traffic's Role in Climate Change." 5 Mar. 2019,
<https://meetingoftheminds.org/reducing-traffics-role-in-climate-change-30043>.

