Commission of Sustainable Development (CSD)

Addressing the Limitations of the Adoption of Renewable Energies for Sustainable Development

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I. INTRODUCTION

History of the Committee

The Commission on Sustainable Development (CSD) was created by the General Assembly of the United Nations (ONU) in December 1992 with the purpose of protecting the insurance development of the proposals and plans given during the "United Nations Conference on Environment and Development (UNCED), also known as the Earth Summit." (UN, 2022). Its creation was in Brazil, moreover, in Rio de Janeiro specifically because of where the Earth Summit of the year took place. The purpose of its creation furthermore was to better manage the proposals and plans the UN had in addition to being a major stakeholder as an organ inside the United Nations, furthering its purpose due to its nature of creation, supporting the ideas at the time and putting on top of the panorama the options there were. Focusing on Agenda 21, one of the first projects evaluated by the CSD. Agenda 21 was "a comprehensive plan of action to be taken globally, nationally and locally by organizations of the United Nations System, Governments, and Major Groups in every area in which human impacts on the environment," which is somewhat the ancestor of the current SDGs. (UN, 2022)

The Commission of Sustainable Development holds a relatively high responsibility inside the UN as it is an organ in charge of managing and taking into action the goals and agendas the United Nations might propose in addition to validating the above-mentioned. The CSD is the organ in charge of the Sustainable Development Goals, one of the most ambitious goals, and works on projects the UN has. Even though it is not considered one of the Main Organs inside the UN, the Commission of Sustainable Development still has a fair share of power compared to other non-main-organs. (Quick Note: Currently the CSD is known as the High-Level Political Forum on Sustainable Development (HLPF)). (UN, 2022)

Furthermore, the CSD has been working on the planned agendas, plans, goals, etc. Working on its purpose and sometimes helping with political guidance in addition to also facilitating dialogue and partnerships between parties and the United Nations, in general being a support organ throughout, to aid, maintain, follow, and ensure the policies planned by the UN. (UN, 2022)

Introduction to the Topic

First, to define renewable energy. It is the kind of energy obtained from natural sources that is very extensive or replenished very fast, making them non-exhaustive or limited. These kinds of energy sources naturally come from nature due to their scale factor, and how each process of energy extraction is done is such that it doesn't eliminate the source of the energy but uses the source as the core of the energy production. In other words, "energy derived from natural sources that are replenished at a higher rate than they are consumed." (UN). The types of renewable energy are solar, eolic, geothermal, hydraulic, and biological, which will be explained in detail later.

These renewable energies are the solution for many of our energetic crises of today and the ones to come in the near future, in addition to the issue of climate change, which is severely affected by the burning of fossil fuels to produce energies. Even though the presented renewable energies can have some obstacles to being implemented, these obstacles could be the economic factor, where many industries or governments are not interested in such initiatives for renewable energy because the change in the infrastructure and the change in how processes normally are taken would be costly at first. Another problem that might arise is social acceptance and the ignorance of people about such renewable energies, for example, a time ago a town rejected a project for a solar farm because "it would suck up all the energy from the sun". 11 ABC News, 2015) Something that might sound absurd but is the harsh reality, furthermore, social acceptance is the greatest limitation because people are what has a resistance to change and is the greater obstacle to going into a new era,which might be highly different from what the civilians are used to. On the other hand, another limitation might be the lack of investment in this sector of renewable energies, which in the years has been advancing, yet it isn't sufficient or still insufficient to cover the increasing demand for energy worldwide.

This topic is important to discuss in PASMUN 2025 so that, as an international community, proposals can be generated in order to ensure the planning of a correct and effective follow-up on the use of sustainable energies. The adoption of renewable energies for

sustainable development in order to play a role in improving both the quality of life and services. It is important to look for solutions on sustainable energies to improve the environment and, in the future, not have consequences such as depletion of natural resources or environmental imbalance. The purpose is to discuss proposals to improve water pollution, air pollution, and emission of greenhouse gases, as well as deforestation. The United Nations states that "the transition involves not only a change of energy source but also ensuring that The new source is cost-effective, sustainable, and beneficial for development. Cities around the world are committing to 100% clean energy: Copenhagen has pledged to become carbon neutral by 2025; Aspen, in the US state of Colorado, is expected to use 100% renewable energy by 2025; and Munich plans to get 100% of its electricity from renewables by 2025." (United Nations).

II. HISTORY OF THE PROBLEM

Carbon Footprint & Climate Change

First, to define Carbon Footprint, it is all the actions or activities a person or entity does that generate greenhouse gasses. Such actions can range from using a car or vehicle reliant on combustion, for example, burning gasoline, diesel, or any kind of fuel that has hydrocarbons to produce mechanical power impacts a person or entity's carbon footprint because of the residual carbon dioxide left on the atmosphere, which is what generates climate change. In short words, "carbon footprint is the amount of carbon dioxide released into the atmosphere by a person or entity through the use of" (Eckly N. 2024) combustion or any process that releases carbon dioxide into the atmosphere. This opens up for the next increase in the carbon footprint of entities and individuals. (Eckly N. 2024)

The first start of concern for carbon footprint was when the industrial revolution started in England and it started the age of mass production and consumption of resources, especially coal, which powered the steam engines. The problem with using coal is that it is a fuel rock, which liberates high levels of carbon dioxide when used for combustion, in addition, for steam engines and other processes, it releases water vapor, which is also a greenhouse gas. The start of the industry was an inflex point in history that carved the path for the machinery and industry of today. (Britannica, 2024)

Modern industry has been fueled by the mass production of resources via other resources, to satisfy the high demand of millions of humans worldwide. Around the middle 2010s, the global population was about 7 billion people. All consumers of some sort and each of them adds to the demand for energy and products. Modern industry is powered up by highly combustible petroleum, a hydrocarbon-rich resource used for generating electricity and kinetic force to power up all the heavy machinery to produce items, to move water around the city, and to provide electricity to millions of houses. Petroleum is somehow the centerpiece that keeps together the modern industry because of how many appliances it has, not only for producing energy and used as fuel but also to produce all sorts of materials such as plastics or polyesters. As above mentioned, petroleum is used to create fuels and combustibles; for example, gasoline for cars, one of the most used ways of transportation, relies mostly on this petroleum product, and by using it, a person generates carbon dioxide and its release to the atmosphere. Another example is jet/airplane fuel, stronger and more combustible than regular gasoline. Used to power up planes and other aircraft, it releases much more carbon dioxide because of the enormous power usage of the engines and the equitable fuel consumption.

So, the world has relied on carbon-rich fuels to produce and maintain the infrastructure worldwide, but as each year passed, the average carbon footprint increased, thus accumulating high amounts of greenhouse gases in the atmosphere, which produce a global greenhouse effect. The problem with producing such high quantities of carbon dioxide is that a part of the heat radiated by the sun is trapped inside the earth's atmosphere, which then transforms into a change in the average temperature of the surface of the earth, producing the well-known climate change. (NASA) Unfortunately, it is not a 0% producing carbon dioxide solution because the transportation and the production of the parts that create a renewable energy source that is still based on fossil fuels or produce some greenhouse gas, therefore mass-producing such kinds of renewable energy producers.

Therefore, renewable energies would somewhat solve the problem because they don't produce any carbon dioxide during energy production but are still connected to the carbon footprint web. This problem has been fixed throughout the years and made renewable energies more renewable and much more efficient, whereas at the start, solar panels or wind turbines didn’t produce as much energy and were very costly, so they didn’t have any big appeal for the industry and could not contend with the oil-producing giants.

The Revenue from Fossil Fuels

“At the beginning of the 21st century, about 80% percent of the world’s energy supply was derived from fossil fuels, such as coal, petroleum, and natural gas(Selin, 2019). “ Fossil fuels are those resources that are determined, for the most part, by the fact that proven oil reserves are large enough to meet world demand, at least by the middle of the 21st century”(Britannica, 2024). However, fossil fuels have negative consequences for the environment; for example, power plants use fossil fuels that emit many atmospheric pollutants that seriously damage the environment. These pollutants are sulfur dioxide, nitrogen oxides, particulates, and toxic chemicals, such as strong metals such as chromium, mercury, & arsenic.

It is worth mentioning that even mobile sources, such as vehicles that use fossil fuels, emit certain nitrogen oxides, particulates, and carbon monoxide, chemicals that can cause diseases or health problems, such as asthma and heart problems, when exposed to these environmental pollutants. These “emissions from fossil fuels are those that cause acid rain, which seriously affects ecosystems, not only lakes and marine ecosystems, it also affects and develops the deterioration of forest leaves and the production of smog near urban areas(Britannica, 2024). “ Furthermore, the burning of fossil fuels releases carbon dioxide (CO_2), one of the main greenhouse gasses that cause global warming (Selin, 2019)

It should be noted that the role of renewable energy sources represented almost 2% of world energy consumption at the beginning of the 21st century, the majority of which came from certain traditional uses (biomass, wood for cooking, and heating). In “2015, approximately l6 % of the world’s electricity came from hydroelectric power plants. In contrast, other types of renewable energy sources such as solar, wind, and geothermal accounted for only 6 % of total electricity (Britannica, 2024). worldwide. “Growth in wind power exceeded 20 percent, and photovoltaics grew at 30 percent annually in the 1990s, and renewable energy technologies continued to expand throughout the early 21st century. Between 2001 and 2017, world total installed wind power capacity increased by a factor of 22, growing from 23,900 to 539,581 megawatts. Photovoltaic capacity also expanded, increasing by 50 percent in 2016 alone.” (Selin, 2019).

In 2005, “the European Union (EU) produced approximately 6.38% of its energy from renewable sources, while in 2007 it adopted the objective of increasing this percentage to 20% by 2020(Britannica, 2024). However, in 2016, approximately 17% of the European Union’s (EU) energy came from renewable sources. This objective was clearly to increase the percentage of energy production on renewable energies, as well as to increase the share of renewable energies in the energy mix of the European Union (EU). “ Between 1990 and 2016, the countries of the EU reduced carbon emissions by 23 percent and increased biofuel production to 5.5 percent of all fuels consumed in the region. In the United States, numerous states have responded to concerns over climate change and reliance on imported fossil fuels by setting goals to increase renewable energy over time.” (Selin, 2019)

Lack of Demand for Renewable Energies

Lastly, renewable energies were not required nor demanded by the world governments or by the people a decade ago. Renewable energies were considered mere secondary sources that could aid with energy production but still have as the main source the fossil fuel market. So the problem from a decade ago and further years is that the demand for renewable energies was not high because fossil fuels covered most of the abovementioned market. In addition, renewable energies didn’t have any major propaganda or marketing at the time; in addition, in the public view, they were not appealing and consumed large amounts of land, which for many contractors and investors was not attractive since there was no demand for these kinds of infrastructure; the technology didn’t advance as much; but most importantly, the usage of renewable energies was not a global concern back then. (Rodriguez, 2021). Until more recent years around the global pandemic, the effects of climate change began to show much stronger effects on the global temperature, and more natural disasters occurred worldwide, for example, forest fires or stronger hurricanes, which furthered the idea that renewable energy was required to minimize the impact of global warming and most importantly reduce the carbon footprint of everyone to therefore reduce the number of greenhouse gases in the atmosphere. So in short words, renewable energies didn’t have high demand in the energy market because there was no apparent need globally up until climate change started changing the opinions of people, therefore creating a new demand for these energies, which still isn’t highly incentivized by large companies.

III. CURRENT SITUATION

The importance of discussing this theme is because contamination is a concern today. It is an investment for the future to improve society's services, quality of life, air, and ecosystems. It brings important advantages that must be developed, for example, to reduce the emission of greenhouse gases as well as other pollutants that are the consequences of climate change. Searching for viable & clean solutions to the demands of environmental degradation. UN scientists indicate that in order "to avoid the negative impacts of climate change, it is necessary to reduce emissions by approximately half by 2030 and reach net zero by 2050. However, to achieve this goal, it is necessary to stop relying on fossil fuels and invest in alternative energy sources that are accessible, sustainable, clean, reliable, and affordable. Renewable energies are found in our environment as they are provided by the sun, wind, water, and even waste of heat from the earth itself." (United Nations, n.d.).

These energies are renewed by nature; they are more natural than others because they emit very few or even no pollutants in the water as well as greenhouse gasses in the air (United Nations, n.d.). "Earth's average surface temperature in 2023 was the warmest on record since record-keeping began in 1880 (source: NASA/GISS). NASA's analysis generally matches independent analyses prepared by the National Oceanic and Atmospheric Administration (NOAA) and other research groups. Overall, Earth was about 2.45 degrees Fahrenheit (or about 1.36 degrees Celsius) warmer in 2023 than in the late 19th century (1850-1900) pre-industrial average. The 10 most recent years are the warmest on record." (United Nations, n.d.) This increase in the average temperature of the earth is global warming. This is negative because levels of ozone and air pollutants increase respiratory and cardiovascular diseases. This temperature changes is on the next graph

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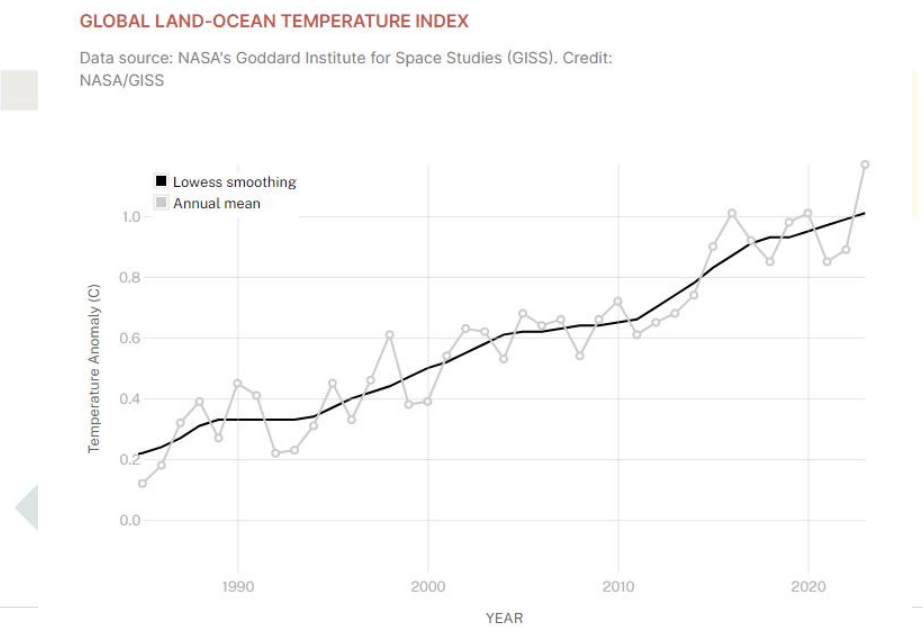

(NASA, 2024)

" About $7 trillion was spent on subsidizing the fossil fuel industry in 2022, including through explicit subsidies, tax breaks, and health and environmental damages that were not priced into the cost of fossil fuels. In comparison, about $4.5 trillion a year needs to be invested in renewable energy until 2030, including investments in technology and

infrastructure—to allow us to reach net-zero emissions by 2050”(United Nations, n.d.). The initial cost of investment for the implementation of renewable energies at the global level is very high, which is discouraging for many countries that lack sufficient economic resources, and this means that they need some technical and financial assistance to be able to implement renewable energies.

Approximately “80% of the world’s population lives in countries that are net consumers of fossil fuels. Nearly 6 billion people depend on fossil fuels, which originate in other countries, making them vulnerable to both crises and geopolitical impacts”(United Nations, n.d.). In my country, they have already been implementing renewable energies. However, they have not been used 100%; the International Renewable Energy Agency (IRENA) has calculated that 90% of the world’s electricity must have come from renewable energies by 2050. These allow a diversification in economies over several countries, together with proper protection against unexpected price fluctuations on fossil fuels.

Current Limitations for the Storage of Energy

Electrical storage is one of the main issues for adopting renewable energies. This is because of the nature of renewable energies, which come from natural sources such as the sun, wind, flowing water, etc. The problem that surges from such nature is that energy production is not constant and is likely to fluctuate daily. For example, solar panels might produce a large amount of energy when the day has clear skies or a drop in the production rate because of a cloudy day. Therefore, not having a constant rate that is dependable on. Additionally, with the same type of renewable energy, solar paneling doesn’t work properly at night because there is no direct sunlight coming into the paneling. The same issue could happen with wind turbines; windy days produce larger amounts of energy while still days produce little to no energy. Putting it on an industrial scale, or for powering up towns or cities, the irregular production of electricity by renewable energies might not seem viable because of such fluctuations.

The solution for the fluctuation issue is large storage systems that are able to withstand, retrieve, store, and output all the energy produced by renewable energies. These batteries would help to store energy for the future and cover up for the energy that wasn’t produced for the day; in addition, they would store the overflow of energy from days that had favorable conditions for the renewable energy production devices. The problem is that the

amount of energy that needs to be stored is gigantic, ranging from a couple of MWh to hundreds of them yearly. Requiring large amounts of storage and infrastructure to sustain life for thousands of people.

Then, there is the issue of which type of energy storage is going to be used. There are three main types of batteries that might function for large-scale energy projects. The first one is "vanadium redox flow battery (VRFB) uses chemical energy from two chemical components dissolved in electrolyte fluid flowing through the rechargeable central unit from two exterior tanks." (Qmerit, 2023) But is not completely viable to implement in housing storage still because of its chemical composition. The second option is lead-acid batteries, a form of batteries consisting of lead plating inside acid, typically sulfuric acid. This type of battery is great for scalability and also has a great factor for charging and discharging, making them useful for constant energy transmission and storage for long periods; car batteries are a small example of lead-acid batteries. The last type of battery and the one which is mostly recommended and has the practicality and better storage than lead-acid batteries is lithium-ion batteries. These batteries can withstand large amounts of power and are great for space usage due to their size relative to its size and weight, which makes them the best solution for large operations of electrical storage, which decreases the limitation on implementing renewable energies, but it has one great limitation for large-scale usage, their cost. (Qmerit, 2023).

The cost of lithium has been reduced drastically over the past years but is still expensive to acquire, and even though it is efficient, it is not a complete solution to solve the energical storage crisis. The price per metric tonne of lithium is around 97,500 US dollars, which is expensive if a government or nation wants to cover up, for example, 20 MW; it would take more than 100 metric tonnes. (TSE), totaling around 10 million dollars for just 100 tonnes, and this number is without the cost of producing the batteries. So, in short words, lithium is expensive, might cover short-handed demands but might be overly costly in large scales of production, and would sometimes be inefficient, whereas there is still demand for new sources of energy storage better than the ones available today.

IV. UN ACTIONS

Green Climate Fund

The Green Climate Fund is a UN project paired with the World Bank that focuses on acquiring funds for sustainable development but more specifically to fund any operations, installations, or projects worldwide that are focused on green energy or reducing greenhouse gas emissions. The Green Climate Fund was established in 2010. “It was set up by the 194 countries that are parties to the United Nations Framework Convention on Climate Change (UNFCCC) in 2010 as part of the Convention’s financial mechanism” (UN). The primary objective of the GCF is to incentivize any projects that might arise worldwide to contribute developing solutions to reduce greenhouse gas emissions, which directly affects the adoption of renewable energies because they are part of the solution to reduce such emissions. Furthermore, when the project was officially active and initiated its first resource mobilization, it was quick to acquire a large number of funds totaling around 10 billion dollars in 2014.

Sustainable Development Goals

“In 2015, world leaders adopted a series of global goals, known as Sustainable Development Goals (SDGs), which aim to eradicate poverty, protect the planet, and improve citizens' rights. In the case of renewable energies, these occupy SDG number seven, which aims to ensure access to affordable, reliable, sustainable, and modern energy for all. Energy is the main contributor to climate change, accounting for around 60% of all global greenhouse gas emissions, according to the United Nations in a report on this SDG.” (fiiapp, 2019).

The United Nations has undertaken initiatives for climate action. Businesses, members of civil society, and governments have joined forces to generate climate initiatives to improve and accelerate climate change based on renewable energy, industry, and transport, resilience, and adaptation, as well as nature-based solutions and more.

These actions took place at the Summit; this is the 2019 climate action of the United Nations. It should be noted that the participation of the United Nations as a convenience is more important than ever because it tends to encourage governments, business, and people to collaborate, take action, and take necessary measures that change people’s ambitions. The United Nations is working together to take action to limit the increase in global warming, and also supports sustainable, low-carbon economies that are beneficial to all. Some examples of

the climate action initiatives that the United Nations established were "accelerating the transition to renewable energy in SIDS, climate action for jobs, coalition for jobs, the global alliance for energy efficiency, and the carbon partnership(UN, n.d.).

SEforALL

SEforALL, short for the UN project Sustainable Energy for All, is a UN initiative focusing on developing infrastructure and the technology for such infrastructure to achieve Sustainable Development Goal number 7. For example, the framework of this initiative/organization is to have a large number of partners that can help with funding and aid to the cause of regression towards sustainable energy, with the limitation that without any patterns and external help, it would be very hard to achieve such goals, promoting help between companies, industries, and individuals. Furthermore, “projects focus on providing targeted country support in various areas, such as policy and regulatory reforms, improving local energy data and insights, and more” (SEforALL), meaning that this organization cannot support large-scale projects and is more specialized in centered and targeted projects worldwide, making the need for other initiatives, but still helping to adopt renewable energies by making a large amount of little changes around the globe.

V. POSSIBLE SOLUTIONS

Energy efficiency improvements

- Efficient use of energy in industry, buildings, appliances, and transportation will reduce greenhouse gas emissions and, in turn, reduce costs for customers and businesses.

- These effective measures could be to officially publish a law establishing building standards, requiring the effective use of renewable energies, as well as to encourage efficient energy from labeling programs and take into account incentives for energy-saving renovations.

Change to low-carbon transportation

- Implementing the use of electric vehicles (EVs) as well as improving public transportation systems and investing in pedestrian and cycling infrastructure.

- Governments can implement charging infrastructure and offer incentives for the adoption of EVs, as well as establish regulations that prohibit the use of vehicles powered by fossil fuels (Renewable Energy and Climate Change: Combating Global Warming, 2024).

Reduce reliance on fossil fuels

- "Governments can encourage and promote the use of renewable energy, through tax credit programs, feed-in tariffs, and subsidies (Renewable Energy and Climate Change: Combating Global Warming, 2024). As well as investing in R&D in order to increase the utility as well as the cost of renewable technologies. (Renewable Energy and Climate Change: Combating Global Warming, 2024).

- Decrease our dependence on fossil fuels and make use of renewable energies such as wind, solar, hydroelectric, & geothermal energies as a solution to climate change, because these are cleaner energies and emit fewer greenhouse gases.

International cooperation and policy frameworks

- Countries discuss climate policies through the United Nations Framework Convention on Climate Change (UNFCCC). In order to reinforce international commitments and exchange best practices, support developing nations technologically and financially for their evolution and implementation on the use of renewable energies.

- It is important to continue to invest in research to develop effective solutions to climate change, improve carbon storage techniques, and identify environmentally friendly replacements for companies with high emissions. (Renewable Energy and Climate Change: Combating Global Warming, 2024).

VI. COUNTRIES INVOLVED

1. United States of America: The state is one of the major economies in the world in addition to one of the largest consumers and investors of fossil fuels, whereas it is a developed country and is seeking viable solutions for the implementation of

renewable energies and competing with other nations to reach the solution faster. Furthermore, the United States is one of the largest energy consumers worldwide. Even though it has a diverse portfolio regarding energy sources, the nation has made clear that it wants to progress. Additionally, the United States is a role model for many other nations worldwide and a major exporter of innovation and products, making it subject to changes and the decisions of the nation might also shape other countries. (Environment America)

2. People's Republic of China: The state is the largest energical consumer worldwide in addition to having the largest population currently, making it a highly dense nation. China is one of the major exporters and traders in the East; thus, innovations and solutions produced inside Chinese territory are likely to spread throughout that side of the globe rapidly because of the highly industrialized processes and relations. Additionally, China is a United States market competition, making the processes go faster to win such competition. Furthermore, China in recent years has had a renewable energy boom; for example, "*China aims to build more than 200 such bases to help to raise its renewables capacity to about 3.9 terawatts by 2030*" (Hilton, 2024), carving the path into the adoption of renewable energies in a viable manner.

3. Japan: One of the nations with the largest technological advance. Japan, due to being on a set of islands, has limited space to expand, in addition to the lack of abundance of natural resources due to the same fact. Therefore, the country has developed and focused on efficient utilization of spaces and optimal future planning to ensure the best use of its space and resources. Therefore, Japan focuses on affordability, accessibility, and practicality in its innovations. So, the relationship between the debate and Japan is that the technological advancements and the focus on affordability might help with the acquisition, distribution, and overall adoption of renewable energies in the most efficient way possible, taking into account space (which many nations don't have much to spare) and production to supply larger amount and be sustainable. (CSIS, 2024)

4. Republic of India: As also like China, India has one of the largest populations worldwide. India has a dense population that is growing rapidly, thus also the requirements for energy; therefore, the government has decided to invest in renewable energy because, in the long run, fossil fuels and other non-renewable sources will not

be sufficient to cover the energical supply without having any heavily damaging effects on the environment. Thus, India has become the fourth largest user of renewable energies in the world, setting an example for the rest of what could be done even in such conditions of high popular density. (Manohar)

5. Federal Republic of Germany: "*By 2025, 40-45% of electricity consumed in Germany is to derive from renewables. This is the aim set out in the Renewable Energy Sources Act.*" (BMWK, 2024) Germany is one of the countries with the largest amount of renewable energy usage and supply, where, as mentioned, the goal for 2025 is to have almost half of the energy in the country coming from renewable sources. Germany, for addressing the limitations, would be a great example of what could be done, what programs, and in general what could be the framework, as the previous countries, Germany offers a specific part to address the limitations, in this case, the framework and how the projects should scale and what could be the appropriate aims, which might prove useful for other nations and as a base for the adoption of renewable energies. (BMW K, 2024)
6. Russian Federation
7. Republic of Singapore
8. Republic of South Korea
9. United Kingdom of Great Britain and Northern Ireland
10. Kingdom of Spain
11. Italian Republic
12. French Republic
13. Federative Republic of Brazil
14. United Mexican States
15. Canadá

16. Kingdom of Saudi Arabia

17. Kingdom of Sweden

18. Kingdom of Norway

19. Kingdom of the Netherlands

20. Arab Republic of Egypt

21. Federal Republic of Nigeria

22. Argentine Republic

23. Republic of Chile

24. Republic of South Africa

25. Republic of Turkey

26. Commonwealth of Australia

27. United Arab Emirates

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