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TOPIC B

Carbon Capture and Clean Energy Innovations

UNEA
United Nations Environment Assembly

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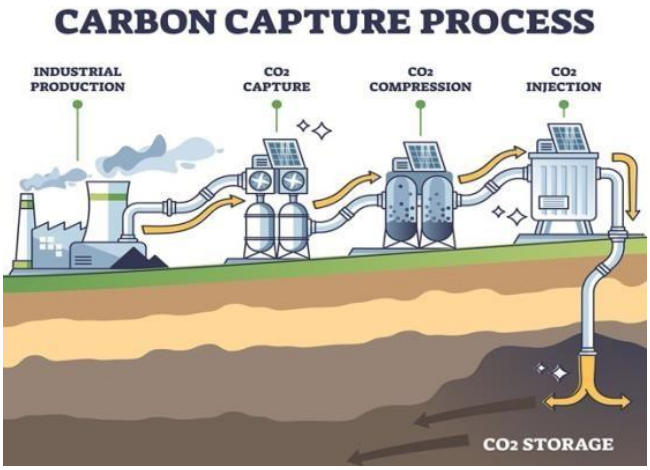
Introduction

Addressing climate change requires both reducing emissions and reverting the damage we've already caused. One way of reverting this damage is by displacing fossil fuels (through solar, wind, hydro, etc.) and another is to directly reduce fossil fuels' emissions. Technologies that aim to do this are called Carbon Capture and Storage technologies. They offset emissions that are otherwise impossible to remove.

In order to prevent a global catastrophe in the future, member states are attempting to approach "net zero". Regarding net zero, the United Nations Intergovernmental Panel on Climate Change states that:

"Global modelled mitigation pathways reaching net zero CO2 and GHG emissions include transitioning from fossil fuels without carbon capture and storage (CCS) to very low- or zerocarbon energy sources, such as renewables or fossil fuels with CCS' (IPCC, 2023)

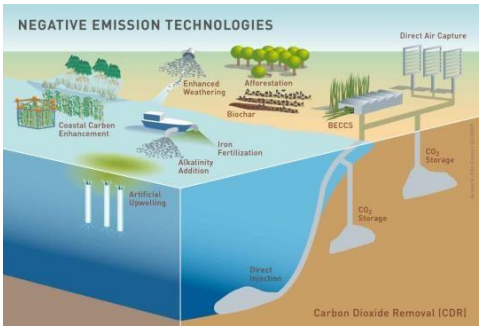
In other words, we must reach net zero through either: completely removing fossil fuels from our energy production systems, or having some fossil fuel energy generation along with Carbon Capture. This is what this UNEA committee will explore.



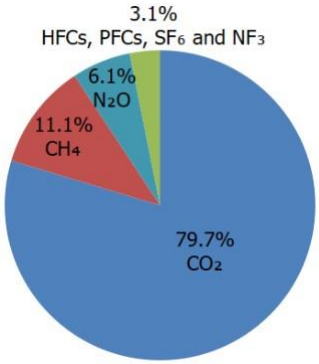
Definition of Key Terms

- **Carbon Capture and Storage (CCS)**
  These technologies remove carbon dioxide from the atmosphere, or directly from fossil fuel plants. According to the Center for Climate and Energy Solutions, CC can offset over 90 percent of emissions from power plants. Carbon is captured, then transported and stored deep underground, normally in rock formations. (National Grid, 2024)

- **Negative Emissions Technologies (NETs)**
  These technologies remove greenhouse gases from the atmosphere directly. Note that these technologies are very new and in their early stages.



- **Greenhouse Gases (GHGs)**
  Greenhouse gases in the atmosphere are what cause climate change and global warming. Human activity has greatly increased the proportion of these gases in the atmosphere. These gases include CO_2 and methane, to name a few.



- **Carbon Neutrality (net zero)**
  Achieving a balance between carbon emissions (human-generated) and removals. In other words, any CO_2 emitted into the atmosphere is absorbed.

- **Greenwashing**
  Greenwashing is a form of advertising that deceives consumers and the general public into believing that a company or another entity's policies, products and/or services are more environmentally-friendly than they actually are.

Background information

Carbon Capture covers a range of different techniques and technologies. On one hand, capturing CO_2 from sources is relatively straightforward and is currently implemented worldwide. An example of this is removing CO_2 from smokestacks in factories. The captured carbon is then compressed and transported. It is finally pumped deep underground through wells, or it can also be used to, for example, assist in oil extraction. Nowadays, CCS technologies capture 0.1% of global emissions, a non-insignificant number that amounts to 50 million metric tons of GHGs. Delegates should question if these technologies are worth pursuing further, or if it's best to focus global efforts on other initiatives instead.

On the other hand, renewable energy sources have also been greatly developed. Six years ago, in 2019, $366b USD was invested into renewables. Photovoltaic panel efficiency has grown from 15-17% in 2010, to 22-23% in 2024. And yet, more need be done, as UNEP warns that, in order to limit global warming to 1.5°C (as the Paris Agreement requires,) the world requires three times as many renewables by 2030. (UN Environment Programme, n.d.)

Another way of reaching 1.5°C is through the use of batteries. It has been brought to the world's attention by the International Energy Agency that in order to triple renewable energy capacity, batteries must account for 90% of the increase. This means that battery capacity must reach 1200GW. It's important to note that battery technologies have advanced greatly the past few decades, making them more efficient, allowing them to store more energy and driving down prices. The global market has noticed this. As states the IEA: "Global battery manufacturing has more than tripled in the last three years." (IEA, 2024)

Green hydrogen has also been thoroughly explored, although its full potential has not been reached.

Nevertheless, it still stands as a clean energy innovation. Green hydrogen is generated through water electrolysis, where a current flows through water, separating hydrogen ions from it, which eventually turn into molecular hydrogen, a gas. There are no emissions that come out of this reaction. This hydrogen's denomination of 'green' refers only to the sustainability of its production. This hydrogen can be used in all standard hydrogen applications, and has even been used in hydrogen car prototypes.

Major Parties Involved

- **China - BRICS**

Today, China produces over 75% of batteries sold globally. Thanks to the rapid influx of supply from China, prices have fallen over the last few years, making some electric vehicles cheaper than gas-powered ones. China is a major stakeholder in battery supply chains and technical know-how regarding lithium batteries.

- **United States of America – G7, OECD**

Under President Joe Biden, the United States sought to improve existing CCS and NETs. Some notable policies include the Inflation Reduction Act (IRA) which, according to the Climate Action Tracker, "[…] is mobilising historic levels of investment in clean energy solutions and activating subnational and non-state action on climate change." (Climate Action Tracker, 2024)

However, President Donald Trump's administration is not emphasizing climate action and investment in CCS and NETs. In fact, President Trump has already signed an Executive Order to withdraw from the Paris Agreement, where 194 countries pledge to follow their NDCs, or Nationally Determined Contributions, to keep below 1.5°C. This means that the United States will no longer be required to lower its emissions, paving the way for an overshoot of target emissions.

- **European Union**

While not one country, all EU countries roughly align in their end goals. For example, the EU has pledged to have no net GHG emissions by 2050 as part of its European Green Deal, financed by €600 billion euros, which outlines aggressive investment in green energy and CCS, as well as 3 billion additional trees being planted by 2030. Overall, the EU is a strong stakeholder in favor of climate preservation, striving for diplomacy and collaboration.

Delegates representing EU member states should familiarize themselves with the following initiatives: **LINK.**

- **Russsian Federation – OPEC+, BRICS**

Russia signed the Paris Agreement, however its NDCs have been deemed "highly insufficient" to meet 1.5°C. Its heavy reliance on fossil fuel extraction for economic growth and stability, as well as its primary energy supply, have made it resistant to change towards renewables. Nonetheless, it still has around 1% of renewable sources, as well as 18% of its energy coming from nuclear power.
A challenge for Russia will be to embrace CCS initiatives and direct investment towards it.

- **Norway - OECD**

Norway is one of the best-faring countries regarding emissions. Additionally, it's a pioneer in CCS innovations with the Northern Lights Project, a facility that receives

Figure 1: Northern Lights Project in Øygarden, Norway. and stores CO_2 underground.

Previous Attempts to Solve the Issue

The Paris Agreement is an international treaty with the special quality of being legally-binding, meaning members that ratify the treaty are legally obligated to follow what is stipulated. It was adopted December 12, 2015, during the COP21 conference in Paris. It has one clear goal: maintain global increases in temperature well below 2°C, with many scientists agreeing that 1.5°C is the most realistic goal. As mentioned before, countries must periodically submit their NDCs, which act as national climate plans for specific timeframes. It is governed by the United Nations Framework Convention on Climate Change.

One interesting market-based solution is carbon credits. These credits are tradeable certificates that represent the permission to emit a certain amount of GHGs. For example, say a farmer has a farm that removes 100 cubic tons of CO_2, and one carbon credit equates one cubic ton of CO_2. A farmer sells 100 carbon credits to a corporation. That corporation then has the right to emit 100 cubic tons of CO_2 and supposedly stay carbon neutral.

Carbon credits have received some backlash, though. One report found that the implementation of carbon credits and other offsetting schemes do little to help the environment. It is up to each delegate to find out their country's stance on this topic.

Possible Solutions

UNEA could promote a globalized strategy that streamlines innovation in CCS and NETs. This could be through technology-sharing, capacity-building and even entrepreneurship forums promoting investment in these areas of the economy.

Countries may also wish to agree on a standardized method for measuring carbon emissions and/or carbon credits to remove the risk of greenwashing or companies otherwise hiding their true emissions. This could include open data-sharing practices and collaboration across member states and their environmental government agencies.

More conservative member states may want to balance a country's required need of shifting to renewable energy sources (such as through the Paris Agreement) against its economic stability and capacity of carrying out said transitions, understanding that member states differ on their reliance on fossil fuels.

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