Exploring Biogenic CO2 Utilization: A sustainable business opportunity for the pulp and paper industry

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INTRODUCTION:

The global population is facing the urgent challenge of climate change and the need to reduce carbon emissions to reach the goals of carbon neutrality and limit the impacts of global warming. One of the solutions is Carbon Capture, Utilization, and Storage (CCUS), a suite of technologies that captures carbon dioxide (CO2) and either repurposes it into valuable commodities or stores it to prevent its release into the atmosphere.

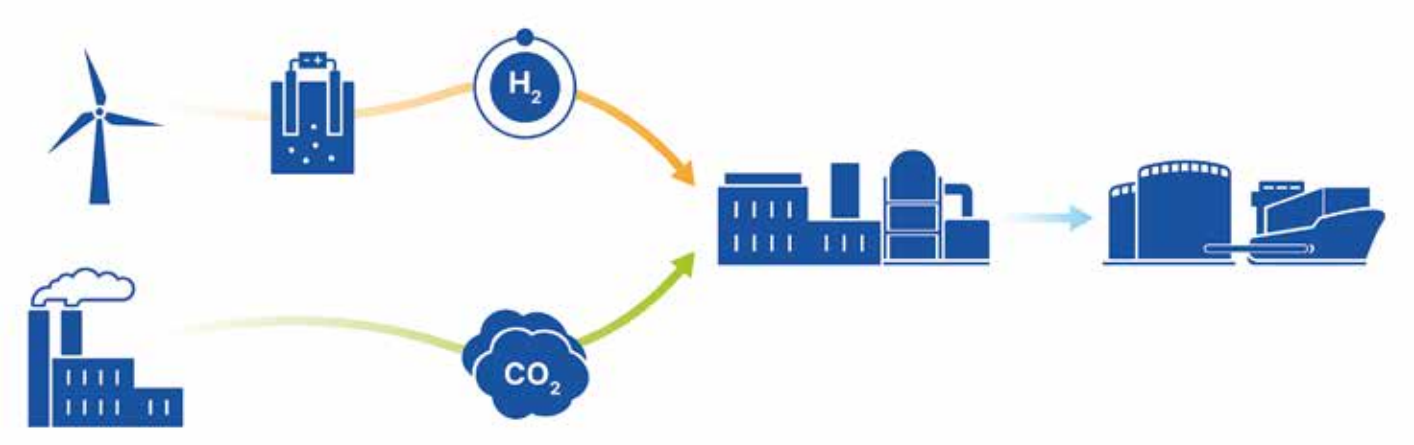

Figure 1: Graphic showing the production process of green electrofuel, eMethanol. By Liquid Wind.

The Promise of CCUS Technologies

CCUS encompasses two primary technologies: Carbon Capture and Storage (CCS) and Carbon Capture and Utilisation (CCU). CCS involves capturing CO2 emissions from power plants or industrial processes and storing them underground, preventing their release into the atmosphere and mitigating their contribution to global warming.

Conversely, CCU transforms captured CO2 into useful products such as synthetic fuels, chemicals like eMethanol, and building materials. This approach turns carbon emissions into an economic opportunity, paving the way for sustainable growth.

Liquid Wind: Pioneering eMethanol Production

Liquid Wind, a leading developer of eFuel facilities, produces eMethanol (or electro-methanol) by combining biogenic CO2 with hydrogen in a process powered by renewable energy. This process, known as power-to-x, enables the storage of excess renewable energy in the form of a versatile, easy-to-transport liquid fuel. eMethanol can be used in existing infrastructure and engines, making it a practical choice for reducing carbon emissions in sectors like shipping and heavy industry. By using biogenic CO2 as a feedstock, we're not only recycling waste products but also preventing additional fossil carbon from being introduced into the atmosphere.

The Urgency of Transition

The transition to this sustainable model needs to start now. The sooner we begin to integrate biogenic CO2 into our energy systems and phase out fossil fuels, the more effectively we can mitigate the impacts of climate change and advance the necessary technologies.

Given the urgent need to reduce our carbon footprint, Carbon Capture and Storage (CCS) technologies should primarily focus on mitigating fossil fuel emissions. Fossil fuels, when burned, release CO2 that has been locked away for millions of years, disrupting the natural carbon cycle and contributing to global warming. Unlike biogenic CO2, which is part of a balanced, renewable cycle, fossil CO2 represents a net addition to the atmosphere's carbon content. Therefore, prioritizing the capture and storage of fossil CO2 emissions through CCS technologies is a critical step in our transition towards a sustainable, low-carbon future.

The Pulp and Paper Industry: An Enabler for Sustainable Solutions

The pulp and paper industry, by supplying biogenic CO2 for the production of sustainable eMethanol, not only enhances its own sustainability performance but also enables other sectors to enhance their sustainability. This approach replaces the production

Figure 2: Image depicting a model of a Liquid Wind eFuel facility.

of fossil-based CO2, thereby reducing the associated environmental impact and avoiding upstream sustainability risks associated with fossil fuel extraction and processing.

While CCS focuses primarily on CO2 avoidance, the integration of CCU goes a step further. It transforms what would have been waste CO2 into valuable products, turning a challenge into an opportunity. Moreover, the benefits of CCU extend beyond reducing greenhouse gas emissions. It contributes to several Sustainable Development Goals (SDGs), such as promoting innovation and infrastructure, ensuring sustainable consumption and production patterns, and taking action to combat climate change.

It's important to note that sustainability encompasses a broad range of environmental, social, and economic considerations. By actively contributing to the production of sustainable fuels like eMethanol, the pulp and paper industry is demonstrating that industries can play a proactive and significant role in driving the global energy transition, contributing to a more sustainable and resilient future. This holistic approach to sustainability underscores the potential of CCU technologies to address multiple facets of sustainability, including promoting energy independence, stimulating local economies, and fostering resource efficiency.

Minimal Impact on the Pulp and Paper Production Process

One of the key advantages of integrating biogenic CO2 capture with CCU technologies in the pulp and paper industry is the minimal impact on the existing production process. Liquid Wind facilities are designed to work in harmony with a pulp and paper plant, sits adjacent to it and connects directly to the flue gas. The CO2, a byproduct of the pulping process, is captured and utilized for eMethanol production without interfering with the primary objective of producing pulp and paper. Moreover, the infrastructure required for CO2 capture and conversion can be co-located with existing facilities, further reducing the logistical challenges. This ensures that the pulp and paper production process can continue as usual, while simultaneously contributing to a sustainable fuel infrastructure. This low-impact integration makes the proposition of supplying biogenic CO2 for CCU technologies even more attractive for the pulp and paper industry.

Synergies between an eMethanol/CCU Plant and the Pulp and Paper Mill

An eMethanol facility not only has minimal impact on the pulp and paper facility, but it also offers attractive synergies. For instance, the heat and power generated by the mill can be used in the eMethanol production process, further enhancing energy efficiency. Oxygen is a waste product from the electrolysis process in eMthanol facility that can be provided to the mill. Additionally, these synergies extend beyond operational efficiency and will lead to revenue streams for the pulp and paper industry. The production of eMethanol creates local value, as the fuel is produced on-site, and is avoiding to just ship away the captured CO2. This not only reduces transportation costs and associated emissions but also contributes to local economies. The integration of an eMethanol facility with a pulp and paper mill thus presents a win-win situation, fostering economic growth while promoting sustainability.

CONCLUSION

In conclusion, the integration of biogenic CO2 from the pulp and paper industry with CCU technologies offers a promising pathway towards a sustainable future. It not only helps in reducing the carbon footprint but also provides economic benefits and enhances resource efficiency. As we move towards a post-2050 world, the role of CCU fuels, especially those produced using biogenic CO2, will be crucial in sectors that are difficult to electrify. By closing the carbon loop, we can ensure a sustainable and low-carbon future. The time to act is now.

Please visit: https://www.liquidwind.se/pulp-and-paper