



## How can cyclones play a role in negative emissions processes (removing CO<sub>2</sub> from the atmosphere)?

ACS secured several interesting projects during last quarter in quite different applications, from active pharmaceutical ingredients and protein recovery to diatomaceous earth dust separation and biomass combustion emission control in new projects in the US and Canada (please see list below). The bioenergy sector is showing substantial traction in times of soaring energy prices, especially for fossil fuels such as oil, coal, and gas. This trend is also helping to accelerate the development of carbon capture projects.

Bioenergy with carbon capture and storage (so called BECCS) is the process of using biomass, such as forestry residues or crops, for energy production through thermal decomposition processes like combustion, pyrolysis or gasification, while capturing the carbon in that biomass before it is released back into the atmosphere.

Being a gas at ambient temperature, CO<sub>2</sub> is impossible to capture or filter. However, several technologies are emerging for the conversion of biomass to fuels allowing for it to be successfully stored. That includes the conversion of woody biomass to biochar through fast pyrolysis (thermal decomposition at extremely low O<sub>2</sub> levels). Biochar stores large amounts of CO<sub>2</sub> and can be applied in the soil as a fertilizer.

Furthermore, the gases originated through pyrolysis can be combusted to produce energy after which CO<sub>2</sub> can be captured by several alternative means such as chemical absorption with amine scrubbing (liquid) or by solid sorbents such as calcium oxide, among others currently being developed. These powders can be designed to be easily separated from the air with cyclones.

In 2020 and 2021, ACS developed and supplied several high temperature cyclone systems to recover biochar after biomass pyrolysis and is presently involved in the development of new carbon capture technologies where specific sorbents can best target CO<sub>2</sub> for a more efficient capture leading to far better economics for the whole process.

That will be fundamental for projects to gain traction and achieve the scale of emissions Humankind demands in the future.

We are proud to be part of this process.

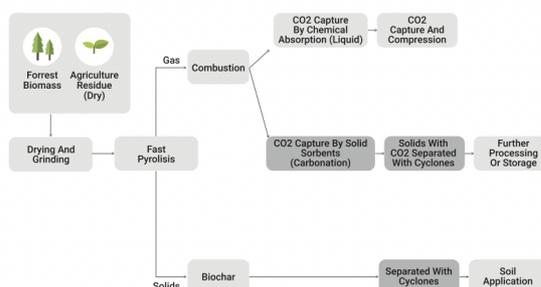


Figure 1 – Fast Pyrolysis to produce biochar and generate thermal energy with CO<sub>2</sub> capture

Pedro Ribas Araújo CEO

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## Projects



The 4 Hurricane RE cyclone system is ready to ship and install at the client's plant. This is planned for next month. The cyclone set will control emissions and recover product in a Norwegian plant that manufactures fish and seafood flavors.

"Firmenich is not just the largest privately-owned perfume and taste business in its industry. It is also the name of a Family that has been personally committed to its Colleagues, Customers, Communities & Creativity for more than 125 years. "

**FIRMENICH | Alesund, Norway | 2021**

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**Hurricane EX** cyclone systems ( 12EX x ø900mm ) to reduce particulate matter from combustion of biomass (woodchips) in a boiler at Columbia Forest Products.

**AFS / Columbia Forest Products. | Newport, Vermont, USA | 2021**

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ACS started a front end engineering study for Luebbers for the supply of a **Hurricane AT** cyclone system ( 4AT x ø1900 ) optimised to increase infant nutrition dairy ( dairy ingredients ou whey powder ) ingredients in a spray drying process.

**LUEBBERS | Dresden, Germany | 2021**

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Pre-engineering study for the supply of a **Hurricane Cyclone System** for dust separation

from the exhaust of a rotating cooler of diatomaceous earth. As the dust is very erosive, the design included the specification of the inner lining, with corundum ceramic material, for wear protection.

[Chemviron | Riomes Montagnes, France | 2021](#)



**Hurricane HR** cyclone system ( 8HR x ø850mm ) optimised to reduce particulate matter from biomass boiler operating with a multicyclone.

[KMW Energy | Quebec, Canada | 2021](#)



One of our most faithful clients has come to ACS once again for a high efficiency system used for pharmaceutical ingredients capture in spray drying.

**Hurricane HR** cyclone system ( 1HR x ø260 )

[HOVIONE | Lisboa, Portugal | 2021](#)

## UPCOMING EXHIBITIONS IN 2021



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