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Celanese & Mitsui CCU Project Low Carbon MeOH from Captured CO2

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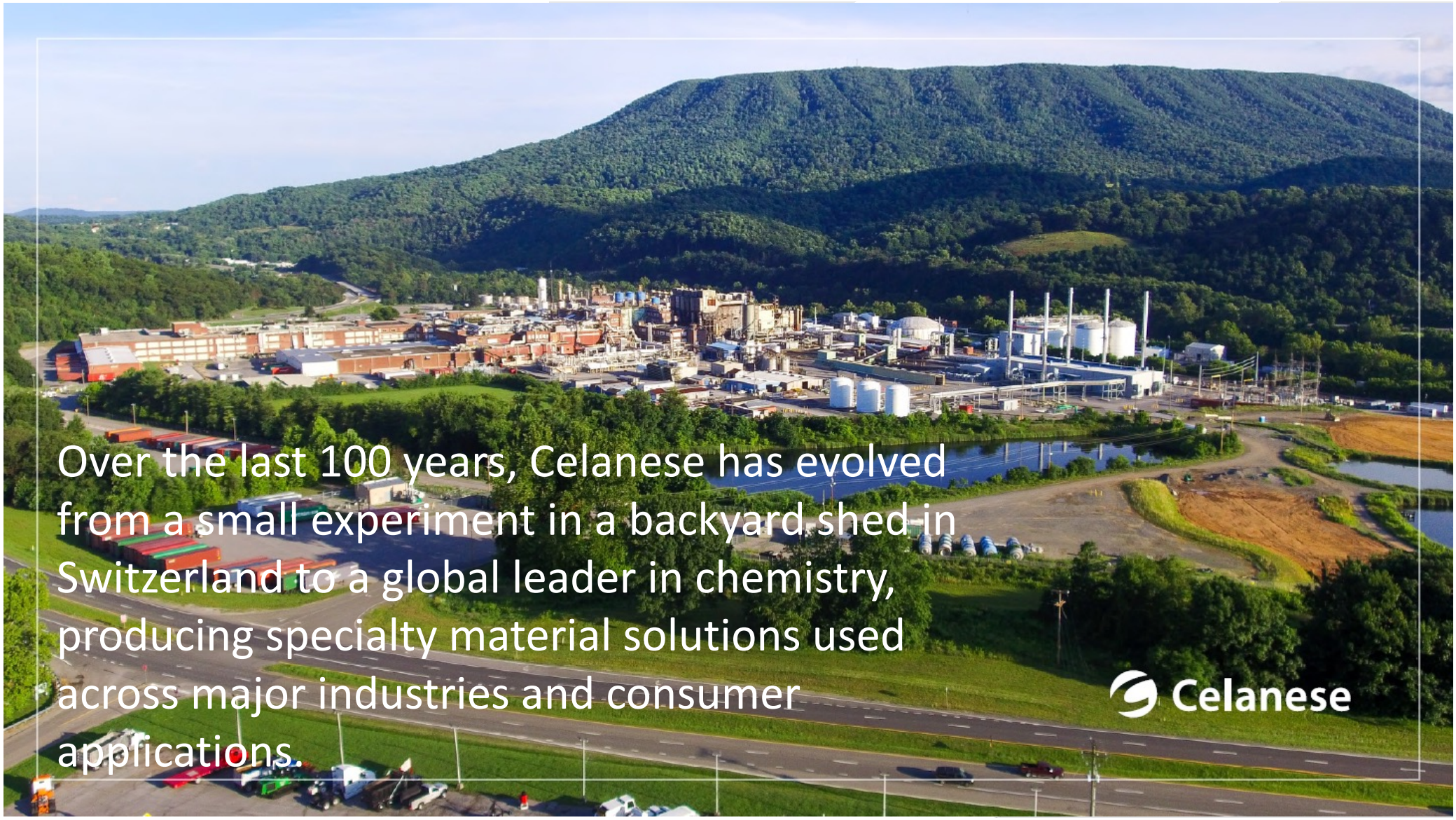
GSTC 2024, San Diego California


Over the last 100 years, Celanese has evolved from a small experiment in a backyard shed in Switzerland to a global leader in chemistry, producing specialty material solutions used across major industries and consumer applications.
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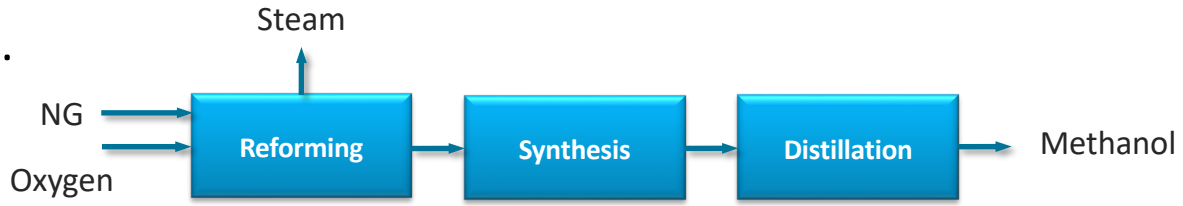
Celanese Corporation Overview

We are a global chemical and specialty materials company that engineers and manufactures a variety of products essential to everyday living.

- Global headquarters in Dallas, Texas, USA
- ~ $11 billion in net sales
- 369 FORTUNE 500 ranking for 2024
- Approximately 12,400 employees globally
- 50 owned and operated manufacturing locations; operations in 27 countries worldwide
- Two leading businesses: Engineered Materials and Acetyl Chain
- Innovation is at the core of our differentiated business model

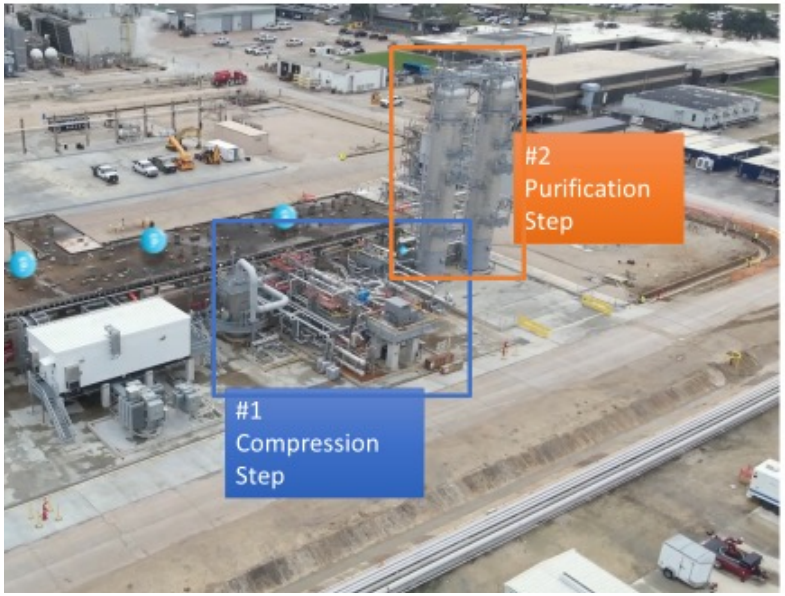
Fairway Methanol Unit

- Fairway Joint Venture 50% Celanese, 50% Mitsui
- Started up in October 2015 for 1.3 MMTA
- Synthesis Section: Syngas is converted into methanol in reactor, followed by cooling down to separate liquid from unreacted gas.
- Main reactions are:
  - $CO + 2H_2$ -> Methanol
  - $CO_2 + 3H_2$ -> Methanol + H_2O
- Including CCU, 1.62 MMTA for 2024.



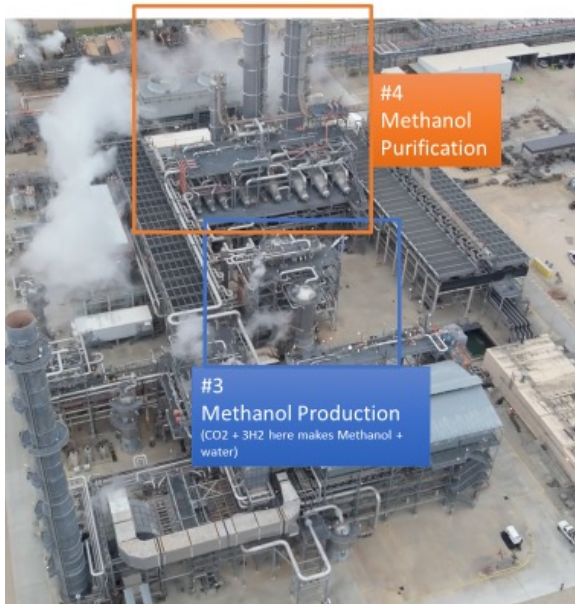
Fairway CCU Overview

- One of the largest active Carbon Capture and Utilization projects in the world
- Located at Clear Lake, Texas facility as part of Fairway Methanol joint venture with Mitsui & Co.
- 180 KT/yr of CO_2 emissions → 130 KT/yr of methanol → Wide range of products

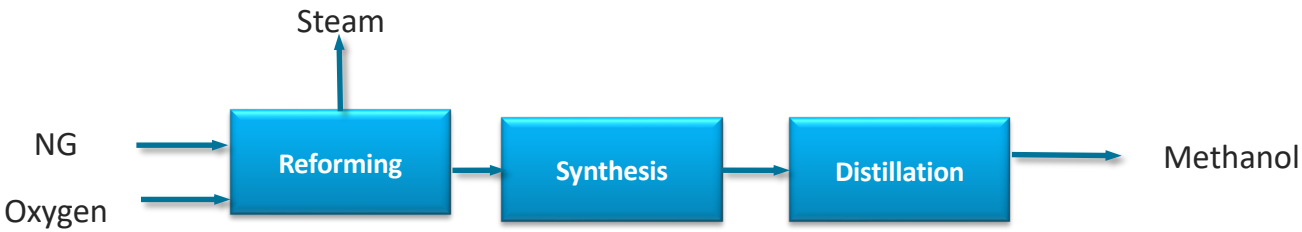


Capital investment to install equipment to compress and purify CO_2 ←

CO_2 + hydrogen injected into existing reactor to make CCU methanol →



Technology at service of sustainability.



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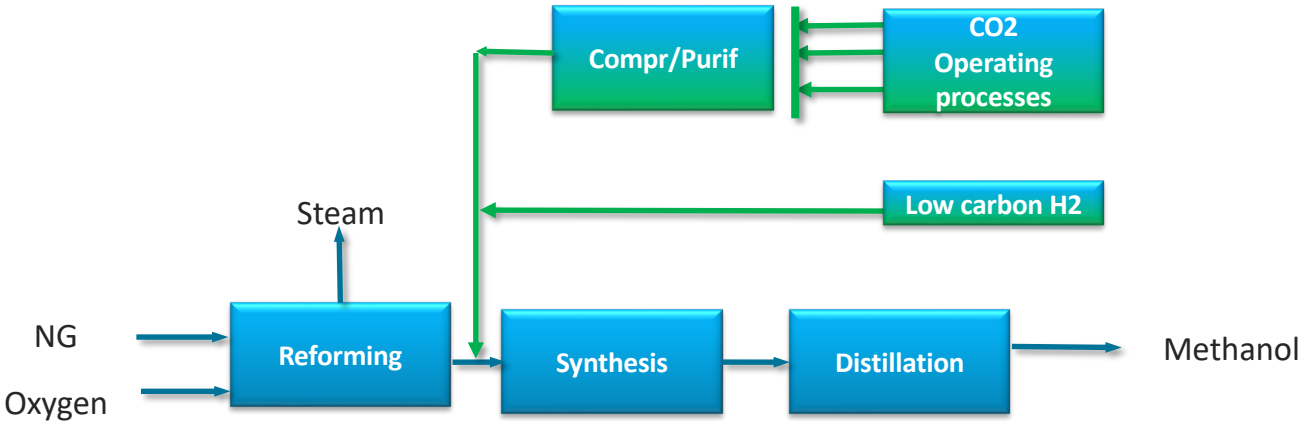
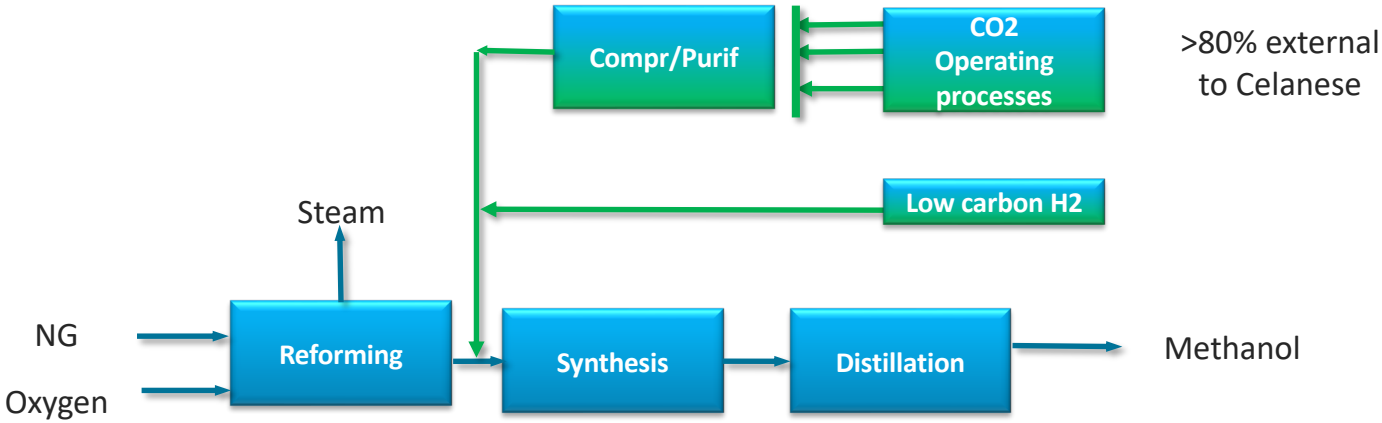


Technology at service of sustainability.
Right partners, Right Design



- CO2 and H2 from operating units. Coordination and design.
- Meoh Synthesis catalyst-kinetics and CO2 purification from licensor.

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Life Cycle Analysis & Certifications

Types of Carbon Capture

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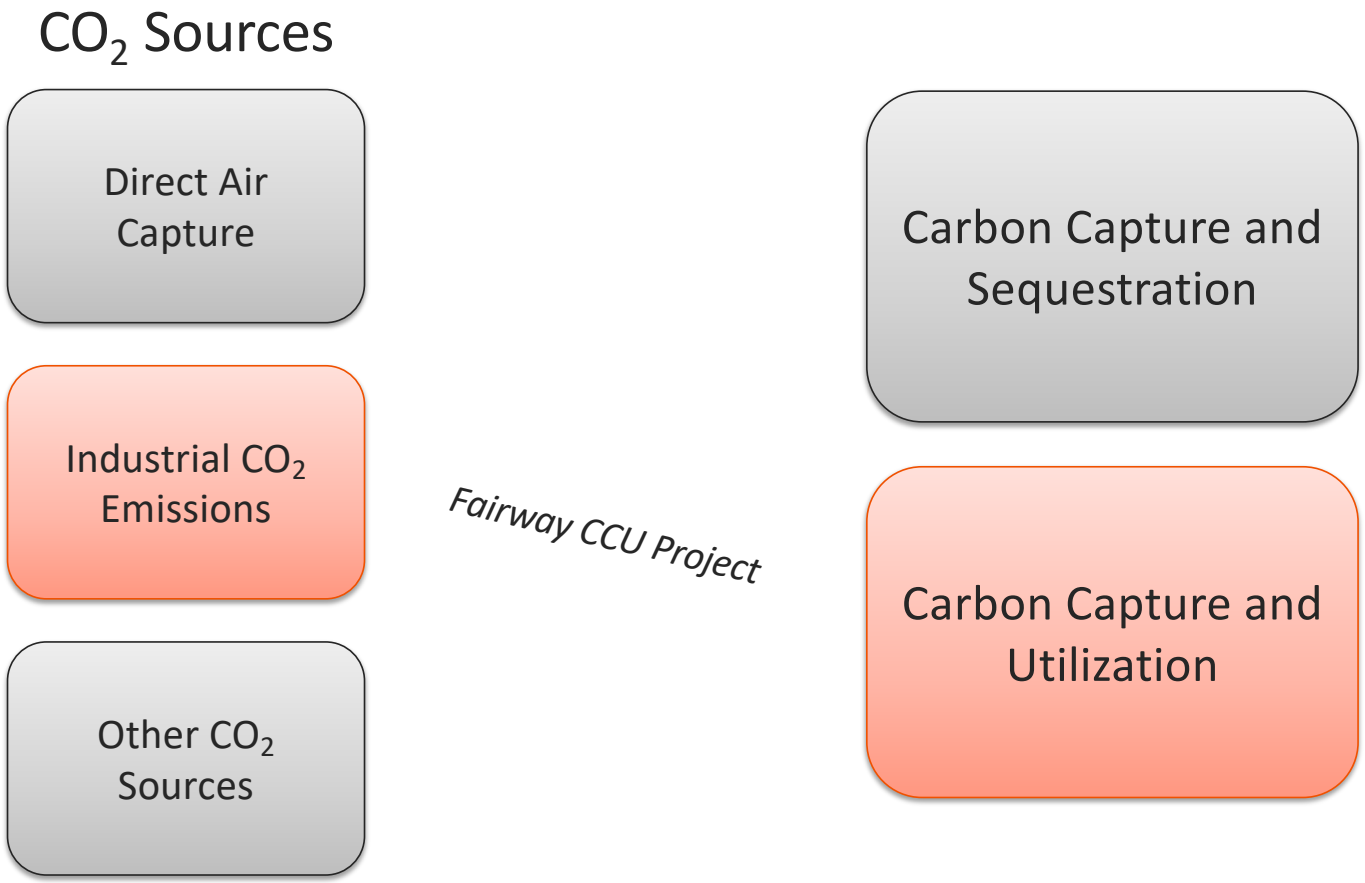

Carbon Capture and Utilization

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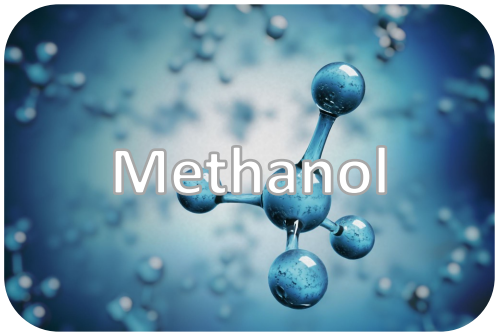
Main chemical pathways for CCU

Mostly used as nitrogen-release fertilizer



Wide range of chemicals and fuels applications

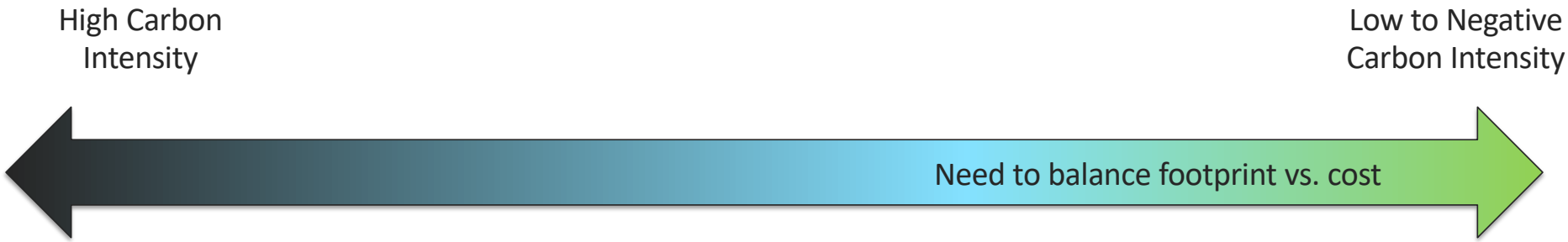
Fairway CCU Project

- Minimum 0.14 mT Hydrogen (H_2) needed per 1 mT CO_2 utilized
- Critical to ensure that CO_2 utilization benefit not offset by CO_2 emissions from hydrogen production

Hydrogen

- Rainbow of hydrogen options can be confusing
- Cost, availability and carbon footprint of options can vary widely

Life Cycle Analysis (LCA) critical to demonstrate meaningful net benefit



Celanese Carbon Capture and Utilization

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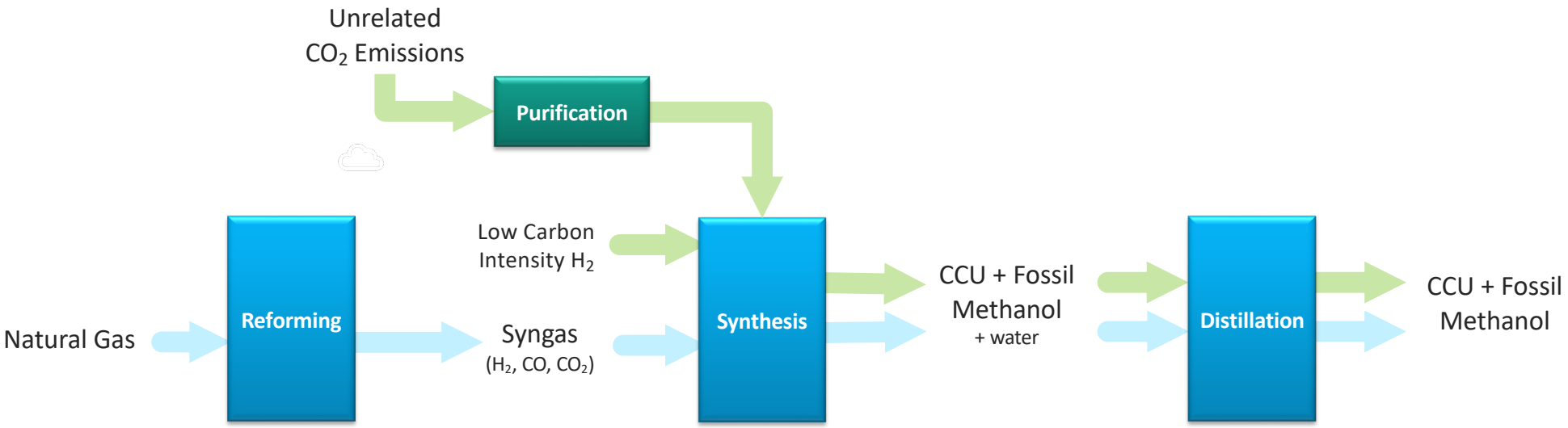
Carbon Capture Methanol Production

- Production commingled with conventional methanol
- Mass-Balance used to separately track product made from different feedstocks



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CHEMICAL MARKETING & ECONOMICS HONORS CELANESE CHAIRMAN, CEO AND PRESIDENT LORI J. RYERKERK WITH STEM LEADERSHIP AWARD FOR CORPORATE REINVENTION

Tue, April 16 2024

--(BUSINESS WIRE)-- Celanese Corporation (NYSE: CE) and Chemical Marketing & Economics, Inc. (CME)

CELANESE RECEIVES AMERICAN CHEMISTRY COUNCIL'S 2024 SUSTAINABILITY LEADERSHIP AWARD FOR ACHIEVEMENTS IN CIRCULARITY

Thu, May 9 2024

Celanese achieves ISCC CFC certification for low-carbon CCU methanol

Published by Poppy Clements, Assistant Editor
Hydrocarbon Engineering, Monday, 25 March 2024 10:00

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As part of its Fairway Methanol JV with Mitsui & Co., Ltd., Celanese Corp., a global specialty materials and chemical company, has announced that the International Sustainability and Carbon Certification (ISCC) has certified its low-carbon CCU (carbon capture and utilisation) methanol under the ISCC Carbon Footprint Certification (CFC) system. The newly certified low-carbon CCU methanol demonstrates a greater than 70% reduction in carbon footprint relative to a global average benchmark for fossil-based methanol production, as included in EU legislation.

Celanese began operating one of the largest active CCU facilities in the world at its Clear Lake, Texas, US, site in January 2024. By leveraging CCU, Celanese now offers customers low-carbon options across its Acetyl Chain and Engineered Materials products under the ECO-CC name. CCU takes CO_2 industrial emissions that would otherwise be emitted into the atmosphere and applies reduced-carbon-intensity hydrogen to chemically convert the captured CO_2 into a methanol building block used for downstream production.

"We're proud to be the first to receive ISCC CFC certification for CCU materials, which allows us to strengthen our ability to offer customers a wider range of lower-carbon footprint products," said Kevin Norfleet, global sustainability director, Acetyls at Celanese. "This is another industry-leading step Celanese has taken to provide third-party validation of sustainable product benefits while helping our customers to meet the growing demand for more sustainable solutions."

Carbon Capture MAGAZINE

Celanese Low-Carbon ECO-CC Products Available Through U.S. DOE Procurement Grant Program

FEBRUARY 15, 2024 BY CELANESE

Celanese Corporation (NYSE: CE), a global specialty materials and chemical company, announced it has been approved by the U.S. Department of Energy (DOE)'s Office of Fossil Energy and Carbon Management as a Utilization Procurement Grants (UPGrants) vendor. Celanese is now the only producer offering low-carbon acetic acid under the ECO-CC product name, which positions the company to help municipalities meet the growing demand for more sustainable and circular solutions.

As the U.S. economy moves toward a lower carbon future, the DOE is seeking to support states, local governments, public utilities and agencies to procure commercial or industrial products derived from anthropogenic carbon emissions. This includes Celanese low carbon acetic acid, which uses the ECO-CC product name because it is manufactured using carbon capture and utilization (CCU) technology. These product offerings have demonstrated significant net reductions in life cycle greenhouse gas emissions and passed a critical DOE review of the product's life cycle analysis. As an UPGrants vendor, Celanese has already begun working with our value-chain partners to extend product usage opportunities to eligible U.S. government entities nationwide.

"By using recycled CO2 as a raw material, we unlock the potential to offer lower carbon footprint options with carbon capture content across more than 90 percent of our Acetyl Chain product offerings," said Kevin Norfleet, global sustainability director, Acetyls at Celanese. "Our ECO-CC solutions are uniquely positioned to help UPGrants eligible entities reduce their carbon footprint in applications including waste-water treatment, de-icing, fertilization, interior painting and more."

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Our journey continues…