

Leveraging Carbon-14 Biogenic Content Measurement To Quantify CO₂ Capture, Utilisation and Removals (CCU)

Objectives and Scope

Determining the precise biogenic content of carbon dioxide (CO₂) is a significant challenge for professionals in emissions-intensive industries who need to quantify biogenic CO₂ emissions for their decarbonisation efforts, and to certify emissions reductions and carbon removals.

This presentation will discuss the carbon-14 testing methodology, the benefits of biogenic carbon analysis for hard-to-abate industries, and applicable regulations. It will also highlight the benefits of using Carbon-14 testing to certify final products incorporating biogenic CO₂ from carbon capture or other sources. In recent years, many industries have shifted from fossil materials in favor of biomass-derived alternatives as regulations are developed and enforced to transition to carbon-neutral energy sources. Carbon-14 analysis is an ideal third-party verification tool for validating the biogenic content of CO₂ due to its high accuracy and ability to detect the exact percentage of biomass-derived carbon in a given sample.

Methods, Procedures, Process

Biogenic carbon content testing measures Carbon-14, an isotope present in all living organisms and recently expired biomass. Carbon-14 is lost over time via the process of radioactive decay. Therefore, petrochemical-derived material no longer has any carbon-14. The carbon-14 method is standardized and internationally recognised by the International Organization for Standardization and ASTM International (ASTM D6866). At SGS Beta, analysis is conducted with an Accelerator Mass Spectrometer (AMS) instrument analyzing samples that have been converted into a solid graphite form.

Results, Observations, Conclusions

Results are calculated to identify the fraction of biomass-derived versus fossil-fuel-derived carbon in CO₂ and reported as a percentage of CO₂ produced from renewable feedstocks. It allows an accurate accounting and monitoring of the biogenic portion of the carbon emitted, captured and stored to quantify carbon removal credits.

Significance/Novelty

Emissions-intensive industries (cement, Waste to Energy) are increasingly required to test their emissions to allocate carbon credits and quantify the biogenic portion of the final product (ex., fuels made from CO₂ carbon captured from a co-firing plant).

Applicable regulatory programs that require D6866 biogenic testing include the United States Gas Reporting Program (GHGRP), Canada's Greenhouse Gas Reporting Program (GHGRP), Alberta's Technology Innovation and Emissions Reduction (TIER), Carbon Capture and Storage (CCS) protocols (Verra, Carbon Direct), the US 45Q credit for CCS, and EU Regulation 2022/996. Other programs are actively developing rules to track the biogenic content, including California's SB 905 CCS program and the UK and EU Emissions Trading System (ETS) to certify carbon removal credits.