

**DETERMINE YOUR BIOGENIC CO<sub>2</sub> EMISSIONS THROUGH RADIOCARBON DATING**

SGS can offer an approved, fast and reliable method to measure the amount of biogenic CO<sub>2</sub> present in exhaust gas from combustion sources. This method involves the analysis of flue gas through radiocarbon dating (ASTM D6866). Samples can be taken from the exhaust of an existing Continuous Emissions Monitoring (CEM) System or by an automated sampler over extended periods of time.

Radiocarbon dating is a highly reliable analytical tool that uses the carbon-14 isotope to determine the age of carbon-based materials.

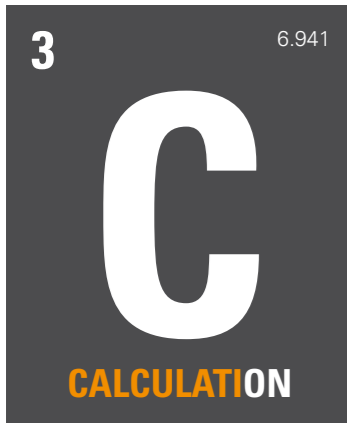
Since fossil fuels do not have any carbon-14 isotopes, this technique provides the most accurate and cost-effective way for quantifying fossil and biogenic CO<sub>2</sub> emissions.

With our solution, there is no more need for labour intensive, expensive and complicated physical characterization of mixed-fuels. Instead, our qualified technicians will collect samples of flue gas at the emission source or at the exhaust of CEM Systems and determine the ratio of fossil and biogenic CO<sub>2</sub> through radiocarbon dating analysis.

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**CALCULATING BIOGENIC CO<sub>2</sub> EMISSIONS – BIOGENIC RADIOCARBON TESTING FROM SGS**



# ALCULATE

## YOUR GHG INVENTORY WITH BIOGENIC CO<sub>2</sub> DETERMINATION

### WHAT'S THE DIFFERENCE BETWEEN FOSSIL AND BIOGENIC CO<sub>2</sub> EMISSIONS?

It comes as no surprise today that the fuels we burn release enormous amounts of CO<sub>2</sub> emissions into our atmosphere and that these emissions have been shown to alter the natural carbon cycle and contribute to global warming. What few people realise is that a significant part of these emissions come from the combustion of biomass and result in biogenic CO<sub>2</sub> emissions, or in other words, carbon neutral emissions.

Unlike fossil fuels, burning biomass is part of the natural carbon cycle. When biomass is used as a fuel, carbon stored in renewable organic material is released into the atmosphere. It is captured back into the natural carbon cycle as the biomass regrows. As a result, using biomass as a fuel helps maintain a constant level of carbon in the environment and plays an important role in balancing Earth's natural carbon cycle.

Burning a mixture of biomass and fossil fuel can significantly reduce fossil fuel consumption and lower the total carbon footprint. Under the 2006 IPCC Guidelines, the emission factor for CO<sub>2</sub> released from combustion of biogenic carbon fuels is zero. This is recognized in a number of regulatory or voluntary greenhouse gas (GHG) emissions

programs, such as the European Union's Greenhouse Gas Emission Trading Scheme (EU ETS) and the Kyoto Project Mechanism CDM and JI projects as well as under programs established by the California Air Resources Board, the US/Canadian Western Climate Initiative (WCI) and the Australian National Greenhouse and Energy Reporting (NGER) Program.

When the two fuels are burned together, an accurate breakdown of what fraction of the emissions are biogenic CO<sub>2</sub> can be achieved using the process of radiocarbon dating. This is possible because biogenic CO<sub>2</sub> emissions contain carbon-14 isotopes and fossil fuel CO<sub>2</sub> emissions do not.



### WHY CHOOSE BIOGENIC RADIOCARBON TESTING?

Due to the many uncertainty factors associated with mixed-fuel sampling and analysis, radiocarbon dating is recognised as a much more accurate and cost-effective way to determine biogenic CO<sub>2</sub>. It also:

- Provides low uncertainty levels (less than ±3% for mixed fuels), compared to the combined uncertainty of 25-100% for fuel sampling and analysis;
- Reduces labour, liabilities and safety hazards associated with handling (manual sorting, cutting, sectioning, and weighing) of heterogeneous fuels;
- Allows for fast and easy sample extraction or installation of monitoring equipment on existing CEM systems;
- Turns around results quickly;
- Can also be conducted as per standardised methods (ASTM method D7459 for collection/sampling or D6866 for analysis); and is
- Accepted under EU Emissions Trading Scheme (ETS), California Air Resources Board (CARB), the US/ Canadian Western Climate Initiative (WCI) and the Australian National Greenhouse and Energy Reporting (NGER) Program.

In addition, we have developed a sampling mechanism that allows an accurate representative sample to be collected over time and also allows for the safe transport of the sample to the analytical facility for testing.

### BENEFITS UNDER GHG INVENTORY PROGRAMS

Companies with large amounts of emissions arising from partly biogenic materials can greatly benefit by differentiating the fraction that is attributable to biogenic versus fossil CO<sub>2</sub>. The benefits include:

- Capitalising on potential surplus allowances gained from more precise quantification of fossil CO<sub>2</sub>;
- Subtracting biogenic emissions results in lower annual emissions for reporting and potentially generates surplus allowances for trading;
- Separate determination of biogenic and fossil CO<sub>2</sub> emissions helps organisations quantify their true GHG inventory; and
- Accurate accounting of fossil CO<sub>2</sub> emissions means that organisations know the correct amount of credits needed to offset their carbon footprint over a certain period.

### BENEFITS FOR GHG EMISSION REDUCTION PROJECTS

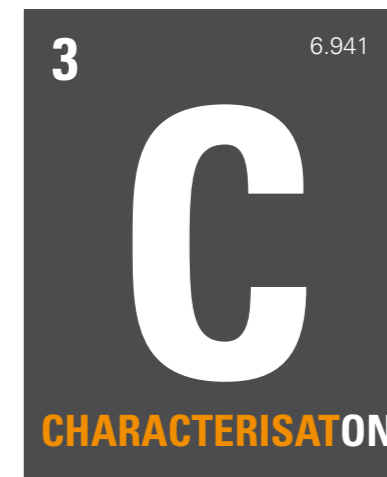
Under Kyoto Protocol (CDM, JI) and voluntary market project mechanisms, emission reductions can be achieved by utilizing biomass and biomass by-products as alternative fuels. Biomass projects applying under regulatory and/or voluntary Emission Reduction Programs can effectively demonstrate the ratio of biomass utilization by performing direct measurement of biogenic CO<sub>2</sub>. In addition, this technique can replace the measurement of other parameters such as biomass weight, moisture and net calorific value (NCV), which must be continuously monitored by project developers resulting in labour intensive, complicated and expensive activities.

Some of these emission reductions activities may include:

ACTIVITIES	APPLICABLE CDM METHODOLOGY
Avoiding methane emissions from biomass decomposition by controlled combustion technologies	To be developed
Displacing power generation (thermal or electric) from fossil fuels	ACM0006 / ACM0003 / AMS I-C AMS I-D / AM0036
Substituting fossil fuel combustion in carbon dioxide production, used as raw material for industrial processes	AM0027 / AMS III-J / AMS III-T

Project developers can greatly benefit from:

- Asserting that electricity or thermal energy is produced exclusively from biogenic sources;
- Monitoring or verifying the fraction of CO<sub>2</sub> emissions originating from a biogenic source when co-firing biomass with fossil fuels;
- Determining NCV from exhaust gas analysis, rather than through complicated raw-fuel sampling; and
- Quantifying combusted biomass by mass balance based on precise determination of carbon in exhaust gases.



### WHY SGS?

Through its emission monitoring services, SGS offers semi-continuous determination of your biogenic CO<sub>2</sub> emissions over the short or long-term. A team of qualified SGS technicians can set-up sampling equipment on site and perform routine sample collection and maintenance of the sampling apparatus (in compliance with ASTM D7459).

In addition, customised sampling programmes for trial batches of mixed-fuels as well as individual performance tests are also available. CO<sub>2</sub> samples are very stable and can be handled and shipped without any specific health or safety requirements. Samples are analysed by ASTM D6866 method at an accredited laboratory with extensive experience in radiocarbon dating.

SGS is the world's leading inspection, verification, testing and certification company. Recognised as the global benchmark for quality and integrity, we employ over 55 000 people and operate a network of more than 1 000 offices and laboratories around the world. We are constantly looking beyond customers' and society's expectations in order to deliver market leading services wherever they are needed.

SGS Environmental Services provides state-of-the-art laboratory and monitoring facilities, combined with experienced and knowledgeable consultants, and a comprehensive range of specialised environmental services.

By developing sustainable solutions that allow an increased focus on their core business, our customers rely on us for guidance and assistance in complying with environmental regulations and in assessing their environmental performance.

**TO FIND OUT HOW SGS CAN HELP YOU DETERMINE YOUR BIOGENIC CO<sub>2</sub> EMISSIONS, CONTACT ENVI@SGS.COM OR VISIT WWW.SGS.COM/CLIMATECHANGE FOR MORE INFORMATION.**