

Greenhouse gases: The measurement challenge

August 17 2011, By Michael Baum

The continuing increase in the level of carbon dioxide and other "greenhouse gases" in the Earth's atmosphere has been identified as a cause for serious concern because it may radically accelerate changes in the Earth's climate. Developing an effective strategy for managing the planet's greenhouse gases is complicated by the many and varied sources of such gases, some natural, some man-made, as well as the mechanisms that capture and "sequester" the gases. A new report sponsored by the National Institute of Standards and Technology (NIST) focuses on one of the key challenges: defining and developing the technology needed to better quantify greenhouse gas emissions.

The new report, "Advancing Technologies and Strategies for Greenhouse Gas Emissions Quantification," is the result of a special workshop in the NIST Foundations for Innovation series, convened in June 2010, to bring together greenhouse gas experts from government, industry, academia and the scientific community to address the technology and measurement science challenges in monitoring [greenhouse gases](#).

A wide variety of techniques are used for measuring greenhouse gas emissions and, to a lesser extent, the effectiveness of "sinks"—things like the ocean and forests that absorb greenhouse gases and sequester the carbon. The problem is that developing an effective global strategy for managing greenhouse gases requires a breadth of measurement technologies and standards covering not only complex chemical and physical phenomena, but also huge differences in scale. These range from point sources at electric power plants to distributed sources, such as

large agricultural and ranching concerns, to large-scale sinks such as forests and seas. Satellite-based systems, useful for atmospheric monitoring, must be reconciled with ground-based measurements. Reliable, accepted international standards are necessary so governments can compare data with confidence, requiring a lot of individual links to forge an open and verifiable chain of measurement results accepted by all.

The report identifies and discusses, in detail, four broad areas of opportunity for technology development and improvement:

- Advanced science and technology for reliably quantifying greenhouse gas emissions, regardless of geography, sector or source;
- Accurate and reliable quantification of distributed carbon sources and sinks;
- Consistent, standardized methods for measurable, reportable and verifiable [greenhouse gas emissions](#) data; and
- Integration of ground-based (bottom-up) and remote atmospheric observation (top-down) methods.

More information: Copies of the new report are available at the Website for the 2010 June meeting, "[Greenhouse Gas Emissions Quantification and Verification Strategies Workshop](#)" at events.energetics.com/NISTScripts2010/downloads.html, along with additional materials from the workshop.

Provided by National Institute of Standards and Technology

Citation: Greenhouse gases: The measurement challenge (2011, August 17) retrieved 27 April 2024 from <https://phys.org/news/2011-08-greenhouse-gases.html>

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