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Standard Guide for Basic Assessment and Management of Greenhouse Gases[1]

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INTRODUCTION

This guide provides a *uniform* set of options for communicating and planning greenhouse gas (GHG) management as well as strategies for addressing GHGs associated with a facility's operations. This guide may not apply to entities where such GHG assessment and management is already widely available through standard, uniform sets of guidance (for example, the construction of green buildings; mandatory air quality rules), or other standards. This guide provides a *uniform* voluntary framework for identifying management options and steps that may be beneficial to evaluate (GHG) solutions. It provides basic management strategies for existing corporations, commercial businesses, and government facilities, even those currently outside of various voluntary and regulatory schemes. The environmental assessment and management strategies contained in this guide recognize the overall value of existing responses. This guide references and blends similar, effective programs and extends them to a consistent approach that will facilitate communication and be a basic tool for business and industry.

Background—Activities that reduce GHG emissions or limit their atmospheric releases have been initiated internationally. This guide offers a framework of initiatives for individual or local efforts in managing GHG. To facilitate best practices, most GHG management programs establish a baseline of current emissions, establish objectives for reducing or managing those emissions, monitor progress in meeting these objectives, and report (either internally or externally) the results of these efforts. This guide offers useful principles in determining options, and in the selection of prudent activities, based on various scenarios and technology improvements, to enhance preservation of life and environmental conservation.

1. Scope

1.1 *Overview*—This guide presents a generalized systematic approach to voluntary assessment and management of the causes and impacts of GHGs. It includes actions, both institutional (legal) and engineering (physical) controls for GHG reductions, impacts, and adaptations. Options for a tiered analysis provide a priority ranking system, to address the "worst first" challenges of a facility, addressing practicality and cost-benefit.

1.2 *Purpose*—The purpose of this guide is to provide a series of options consistent with basic principles and practices for GHG-related action. This guide encourages consistent and comprehensive assessment and management of GHG outcomes from facility and business operations.

1.2.1 The guide also provides some high-level options for the monitoring, tracking and performance to evaluate the effectiveness of the commercial entity's strategy to ensure that a reasonable approach is taken.

1.2.2 This standard ties into the ASTM Committee E50 standards series related to environmental risk assessment and management.

1.3 *Objectives*—The objectives of this guide are to determine the conditions of the facility and or/property with regard to the status of GHGs and actions to be taken to manage and reduce or offset those emissions.

1.3.1 The guide provides a three-tiered decision strategy that focuses on business risk, cost-effective solutions in response to greenhouse gases, and related issues such as the need for energy independence.

1.4 *Limitations of this Guide*—Given the variability of the different types of facilities that may wish to use this guide, and the existence of state and local regulations, it is not possible to address all the relevant standards that might apply to a particular facility. This guide uses generalized language and

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examples to guide the user. If it is not clear to the user how to apply standards to their specific circumstances, it is recommended that users seek assistance from qualified professionals.

1.4.1 *Insurance Industry*—The effects of GHG on insurers are not clear. The definition of an insurable occurrence and a commencement point for when insurable claims are made, along with when conditions were discovered and the actionable information leading to an insurable loss is not clear. It may be inappropriate to speculate on GHGs that are highly uncertain for purposes of insurance related to specific events.

1.4.2 This guide does not take a position on the science of climate change, its association with anthropogenic greenhouse gases, or various mathematical models generated by international bodies.

1.4.3 The guide does not address water vapor as a greenhouse gas.

1.4.4 The guide only addresses anthropogenic greenhouse gases.

1.5 The guide uses references and information on the control, management and reduction of GHGs from many cited sources such as the Intergovernmental Panel on Climate Change, ISO, the World Resources Institute, and the National Academy of Sciences.

1.6 Several U.S.-based federal regulatory agencies served as sources of information on existing and anticipated regulation and management of GHGs including the Environmental Protection Agency, the Department of Energy, and the Securities and Exchange Commission.

NOTE 1—New Source Performance Standards regulating methane emissions from natural gas wells are codified in 40 CFR 60 Subpart OOOO.

1.7 This guide relies on current regulatory information about GHGs from various state agencies, including the California Air Resources Board, the Massachusetts and Connecticut Departments of Environmental Protection, the Washington Department of Ecology, the Western Climate Initiative, and the Regional Greenhouse Gas Initiative.

1.8 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.9 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.10 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E2114 Terminology for Sustainability Relative to the Performance of Buildings

E2432 Guide for General Principles of Sustainability Relative to Buildings

2.2 *International Standards:*[3]

ISO 14001 :2015 Environmental Management Systems—Specification with Guidance for Use[4]

ISO 14064–1 :2006–03–01, Greenhouse Gases—Part 1: Specification with Guidance at the Organization Level for Quantification and Reporting of Greenhouse Gas Emissions and Removals

ISO 14064–2 Part 2: Specification with Guidance at the Project Level for Quantification, Monitoring and Reporting of Greenhouse Gas Emission Reductions or Removal Enhancements

ISO 14064–3 Part 3: Specification with Guidance for the Validation and Verification of Greenhouse Gas Assertions

ISO 14065 Greenhouse Gases—Requirements for Greenhouse Gas Validation and Verification Bodies for Use in Accreditation or Other Forms of Recognition (ISO 14065:2013 (E))

2.3 *Voluntary Registries:*

California Air Action Registry

The Climate Registry (TCR) – A non-profit corporation and collaboration of states, provinces and tribes in North America. The TRC established a voluntary infrastructure for measuring and reporting greenhouse gas emissions. Its goal is the accurate, transparent and consistent measurement for GHGs.

2.4 *Regional Initiatives:*

Midwest Greenhouse Gas Accord

Regional Greenhouse Gas Initiative

Western Climate Initiative

2.5 *National Initiatives:*

American Clean Energy and Security Act of 2009 (by Congressmen Waxman and Markey)

America's Climate Security Act of 2007 (by Senators Lieberman and Warner)

NOTE 2—These bills were not enacted.

2.6 *Government References:*

Congressional Budget Office, 2008, Policy Options for Reducing CO_2 emissions

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] Products of ISO/TC 207 for which ASTM E50 was a participant on behalf of ANSI.

National Science and Technology Council, Committee on Environment and Natural Resources, 2008, Scientific Assessment of the Effect of Global Change on the United States

United States Climate Change Science Program

US General Accountability Office (GAO) 2011, Climate Change Issues; Options for Addressing Challenging Carbon Offset Quality

US General Accountability Office (GAO) 2010, Coal Power Plants: Opportunities Exist for DOE to Provide Better Information on Maturity of Key Technologies to Reduce Carbon Dioxide Emissions

National Academy of Sciences, (NAS) 2008, Understanding and Responding to Climate Change

National Academy of Sciences (NAS) 2013, Effects of US Tax Policy on Greenhouse Gas Emissions

NOTE 3—Links to some references are provided in Appendix X3.

2.7 *Federal Standard:*[5]

40 CFR 60 Subpart OOOO Standards of Performance for Crude Oil and Natural Gas Production, Transmission and Distribution

2.8 *WRI Document:*[6]

WRI Greenhouse Gas Protocol, Scope 1, 2, and 3

3. Terminology

3.1 *Definitions:*

3.1.1 *allowance*—An authorization to emit a fixed amount of carbon dioxide. Generally one metric ton of emissions equals one allowance.

3.1.2 *baseline/credit*—A type of emissions trading scheme where firms are encouraged to reduce their greenhouse gas emissions below a projected "business as usual" path of increasing emissions. Any reductions below that future path earns credits for the difference which can be sold to other emitters struggling to contain increases to baseline levels.

3.1.3 *business risk*—The likelihood that the operation could be subjected to future government regulations, industry standards, customer demand or shareholder decisions requiring measurement, disclosures, actions and/or planning to document and reduce greenhouse gases.

3.1.4 *cap and trade*—The most popular type of emissions trading scheme where emissions are subject to a cap, permits are issued up to that cap, and a market allows those emitting less than their quota of the cap to sell their excess permits to emitters needing to buy extra to meet their quota.

3.1.5 *carbon dioxide equivalent (CO_2e)* —Schemes that measure other greenhouse gas emissions, such as methane, by computing the amount of CO_2 that would have the same effects.

3.1.6 *carbon footprint*—The impact of human activities in terms of the amount of greenhouse gases they produce. The emissions associated with the use of power, transport, food and other consumption for an individual, family or organization are added up to give one comparable measure in units of carbon dioxide equivalent.

3.1.7 *carbon tax*—One form of carbon price on greenhouse gas emissions. Set by governments, a price on emissions is fixed and emitters are allowed to emit whatever they want at that price.

3.1.8 *The Climate Registry*—A compact of 43 States, Provinces, and Tribes in the U. S., Canada, and Mexico that have agreed to recognize voluntary carbon measurements and improvements by facilities.

3.1.9 *direct greenhouse gas emission*—Air discharges from sources owned or controlled by the individual or organization.

3.1.10 *emission or removal factor*—Relating activity data to GHG discharge reductions which could include an oxidation component.

3.1.11 *energy conservation*—Performing less work, using less light, heat, and movement.

3.1.12 *energy efficiency*—Performing the same amount of work, using less light, heat, and movement.

3.1.13 *energy indirect greenhouse gas emission*—Discharges to the air from the generation of imported electricity, heat, or steam consumed by the individual or organization.

3.1.14 *Energy Star*—Appliance efficiency rating program for the U. S. Federal Government.

3.1.15 *financial statements*—Include, but are not limited to, statements associated with shareholder reporting, periodic reports, registration statements, loans, mergers, acquisitions, or divestures. Financial statements may include statements outside of SEC filings.

3.1.16 *green buildings*—As defined in Terminology E2114 and Guide E2432.

3.1.17 *greenhouse gases (GHGs)*—Vaporous constituents of the earth's atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths, including carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

3.1.18 *greenhouse gas activity data*—A quantitative measure of activity that results in an emission or removal. (Examples of activity data include the amount of energy, fuels or electricity consumed, material produced, service provided, or area of land affected.)

3.1.19 *greenhouse gas assertion*—A declaration or factual and objective statement made by the "responsible party" that may be presented at a point of time or may cover a period of time. It should be clear, identifiable, and consistent.

3.1.20 *greenhouse gas emission*—The total mass of a GHG released to the atmosphere over a specified period of time.

3.1.21 *greenhouse gas information system*—The policies, processes and procedures to establish, manage, and maintain GHG information.

[5] Available from U.S. Government Printing Office, Superintendent of Documents, 732 N. Capitol St., NW, Washington, DC 20401-0001, http://www.access.gpo.gov.

[6] Available from World Resources Institute (WRI), 10 G Street, NE, Suite 800, Washington, DC 20002, http://www.wri.org.

3.1.22 *greenhouse gas inventory*—An individual's or organization's greenhouse gas sources, greenhouse gas sinks, GHG emissions and removals.

3.1.23 *greenhouse gas programs*—Voluntary or mandatory international, national, or sub-national system or scheme that registers, accounts, or manages GHG emissions, removals, emission reductions, or removal enhancements outside the organization or GHG project.

3.1.24 *greenhouse gas project*—An activity or activities that alter the conditions identified in the baseline scenario which cause GHG emission reductions or GHG removal enhancements.

3.1.25 *greenhouse gas removal*—The total mass prevented from being emitted to the atmosphere over a specified period of time.

3.1.26 *greenhouse gas report*—A stand-alone document intended to communicate an organization's or project's GHG-related information to its intended users. (A GHG report can include a GHG assertion.)

3.1.27 *greennhouse gas source*—A physical unit or process that releases a GHG into the atmosphere.

3.1.28 *hydrogen technologies*—Generally, a Tier 3 emerging technology that substitutes H2 for liquid petroleum hydrocarbon fuels.

3.1.29 *Kyoto Protocol*—An international treaty signed by over 300 countries, with commitments to address, among other issues, greenhouse gases.

3.1.29.1 *Discussion*—The Treaty was ratified by over 180 parties.

3.1.30 *mitigation*—Attempts to lower or compensate for greenhouse gas emissions through energy conservation, alternative forms of energy generation, carbon offsets, or sequestration of carbon dioxide and other gases.

3.1.31 *NOx*—Nitrogen oxide compounds measured and regulated in air emissions.

3.1.32 *offsets*—A technique of compensating for the greenhouse gas emissions of an organization through acquisition of outside resources that reduce carbon.

3.1.33 *other indirect greenhouse gas emission*—Air discharges, other than energy indirect, which are consequences of an organization's activities, but arise from sources that are owned or controlled by other organizations.

3.1.34 *Regional Greenhouse Gas Initiative (RGGI)*—A compact among states in the northeastern United States where governments have agreed to impose mandatory cap and trading programs for power sources of over 25 MW. The original Memorandum of Understanding, dated December 20, 2005, and the corresponding Model Rule established the regional program.

3.1.35 *reporting entity*—Any business or public agency preparing a financial statement.

3.1.36 *sequestration*—Attempts to trap carbon and other greenhouse gases through techniques such as photosynthesis from tree planting or ocean seeding of algae or injection of gases into the deep bedrock.

3.1.37 *USGBC-LEED*—United States Green Building Leadership in Energy and the Environment green building-rating program.

4. Significance and Use

4.1 The use of this guide would be directed toward prudent business decision making, communications regarding GHGs emissions/control/reduction conditions, insurance, high-level analysis of potential reductions and/or remedies, budgeting, strategic planning for an entity's management of GHGs produced *in relationship to its business*.

4.2 *Example Users:*

4.2.1 Small businesses or enterprises;

4.2.2 Service industries;

4.2.3 Federal, state or municipal facilities and regulators, including departments of health and fire departments;

4.2.4 Financial and insurance institutions;

4.2.5 Waste managers, including liquid and solid waste haulers, treatment, recycling, disposal and transfer;

4.2.6 Consultants, auditors, inspectors and compliance assistance personnel;

4.2.7 Educational facilities;

4.2.8 Property, buildings and grounds management, including landscaping;

4.2.9 Non-regulatory government agencies, such as the military.

4.3 This guide is a first step in crafting simplified management goals for assessing, managing and reducing GHGs. The framework describes a process by which the user may categorize current carbon footprints and a priority approach to manage those risks. The technique classifies common responses for both mitigation and adaptation. The guide groups responses and examples into tiers based on the relative speed in responding to GHG emissions. The tier classifications found in this guide reflect the general structures of state, federal, and local response programs. These authorities generally classify groups of similar responses according to the timely availability and cost effectiveness of GHG responses.

4.3.1 This guide *presents basic principles and strategies in the U.S. for conducting baseline assessment and reasonable mitigation/adaptation strategic options on a corporate, or small business voluntary basis*. The following principals apply to this priority system:

4.3.2 Ability to set specific GHG goals for activities. These goals may include maintaining existing outputs of GHG while increasing a facility's operations, or reducing GHG through engineering changes while maintaining current operations.

4.3.3 Marketing environmental awareness and sensitivity;

4.3.4 Assessing risks from future GHG events;

4.3.5 Risk management, underwriting; loss control and history; premiums and claims;

4.3.6 Liability assessment and qualifications for loans;

4.3.7 Standardization, consistency, and certification of facility specific evaluations;

4.3.8 Educating employees, clients, and customers;

4.3.9 Generating multi media and cross medium information;

4.3.10 Evaluating vendors, and

4.3.11 Reducing costs and preventing pollution.

4.4 Users may consider various benefits of GHG assessment and response.

4.4.1 This guide is a basic primer on GHG impacts and may serve to introduce the subject for organizations unfamiliar with the principles.

4.4.2 Some government enforcement agencies, fiduciaries and business organizations publish GHG strategies. Over 400 municipalities in the United States, for example, have signed the principles of international standards to address GHGs. The public has systematic ability to access or estimate information on individual businesses. Therefore, businesses need guidance on how to assess the nature and potential risks of GHGs, and a programmatic approach for reducing or eliminating those risks through energy conservation, pollution prevention, alternative and emerging technologies and other proactive management systems.

NOTE 4—Users may wish to consider establishing data quality objectives, data management procedures, and documentation.

4.4.3 Reduced operation and maintenance costs may be realized through a tiered evaluation of GHG response opportunities.

4.4.4 Responses may be streamlined and simplified so that all levels in an organization may participate.

4.4.5 Some enterprises may be more competitive in the marketplace with improved GHG response programs.

4.4.6 Setting priorities can allow planning and evaluation of new GHG response requirements.

4.5 *Institutional Risks*—Some of the risks posed by GHG include future actions taken by the Federal Government and state government agencies. Government programs will establish responses to GHG that include mandatory assessment, reporting and mitigation for various regulated entities. Early voluntary actions, including the use of this guide, may help organizations prepare for and reduce the impacts of future government regulations. Some of the possible government programs that may be instituted to address GHG are described below.

4.5.1 The Carbon Tax.

4.5.2 Cap on greenhouse gas emissions.

4.5.2.1 Flexible versus rigid emission cap.

4.5.2.2 With and without ceilings and floors on GHG allowance prices.

4.5.2.3 Eligibility of domestic and international offsets for compliance.

4.6 *Managing Risk Uncertainty:*

4.6.1 There is little doubt at the international level that greenhouse gases will continue to be regulated. However, there are still important questions regarding how large and how fast these regulatory changes will be implemented, and what effects they will have in different regions. The ability to predict future global levels of GHGs has improved, but efforts to understand the impacts of GHGs on society and analyze mitigation and adaptation strategies are still relatively immature.

4.6.2 The tiered analysis in this guide will help support decision-making, studying regional impacts, and communicating with wider group of stakeholders in the face of uncertainty.

4.6.3 The insurance industry has always played a role by insuring against weather-related risks, promoting stronger building codes, and better land-use decision-making.

NOTE 5—Consequently, weather-related impacts are not addressed in this guide.

4.6.4 Many GHG regulatory schemes require documentation and validation of baseline greenhouse gas production. Standard techniques are contained in ISO 14064–1, ISO 14064–2, ISO 14064–3: 2006-03-01, and in ISO 14065.

5. The Tiered Approach to Risk Management

5.1 This guide establishes a framework of common GHG risk management strategies in the United States, Canada, and Mexico and will allow the user to evaluate the potential level of risk from greenhouse gas production and other GHG issues. Responses would then be evaluated for timeliness and availability in order to continually reduce the risks from GHGs.

5.2 *Tiered Management Categories:*

5.2.1 Tier 1, conventional, GHG responses represent the fastest potential risk reduction, because Tier 1 responses prevent generation of greenhouse gases through energy conservation and process efficiency improvements. These actions may prevent business risk impacts by providing immediate cost savings and lowering a facility's regulatory profile relative to the potential production of greenhouse gases. The planning horizon is current and includes actions that can be reasonably taken within two years of the beginning of a program.

5.2.2 Tier 2 responses address mid-term greenhouse gas reduction through the development and use of alternative energy such as wind, solar, and geothermal or establishment of actions to offset greenhouse gas emissions, such as carbon sequestration using reforestation or construction of green roofs. The Tier 2 planning horizon generally includes actions that can be taken within two to ten years.

5.2.3 Tier 3 responses address long-term greenhouse gas reduction by development of emerging technologies such as deep rock carbon sequestration or use of hydrogen fuel in transportation. The planning horizon includes actions that may be available through research and development programs in ten to thirty years.

5.3 *Tiered Approach to GHG Assessment and Response*—The essential principles of this guide are:

5.3.1 Environmental assessment by objective;

5.3.2 Mitigation of GHG through prevention and reduction of greenhouse gases;

5.3.3 First steps in GHG response;

5.3.4 Priority planning;

5.3.5 Measuring greenhouse gas emissions, and checking reductions of a facility;

5.3.6 Establishing a facility fence line and base year;

NOTE 6—These are user defined.

5.3.7 Greenhouse gas emissions should be considered from three major sources:

5.3.7.1 Direct on-site emissions from heating, cooling, transportation, construction and other equipment,

5.3.7.2 Indirect emissions from electricity use, and

5.3.7.3 Other indirect impacts from extraction of raw materials, water use, product use, recycling, waste disposal, and employee transportation.

5.3.8 Implementing improvements, checking greenhouse gas reductions, and acting to correct and modify the plan accordingly.

5.3.9 This guide groups GHG assessment and response into three general categories: efficiency and conservation; alternative energy technologies; and emerging energy technologies.

5.4 *Tier 1: Conservation and Efficiency:*

5.4.1 Once the facility has established a baseline year for measuring and estimating greenhouse gases and a fenceline for analysis, the facility has initiated the first step in the GHG reduction and elimination process. Generally, in this step, the user will find and use energy conservation and efficiency to reduce greenhouse gases. These are also the most cost effective first actions for the facility.

5.4.2 Tier 1 Rresponses generally govern the prevention of and response to greenhouse gas emissions through immediate, conventional technologies such as energy conservation or more efficient equipment. In addition, implementation of strategies that increase recycling of solid waste and the composting of organic waste may translate into significant indirect reductions in fuel use associated with the transportation of these materials to off-site disposal facilities.

5.4.3 For example, replacement of electrically powered appliances with Energy Star appliances provides the same function or service to the facility with increased energy efficiency and lower production of greenhouse gasses. See Appendix X1 for more specific examples.

5.4.4 In many cases the facility can formulate an energy management system with the "plan, do, check, act" approach to monitor improvements and greenhouse gas reductions.

5.4.5 During the planning stage the facility may construct a Tier I look-up table to calculate and track reductions in greenhouse gases, using certain standard assumptions. This might employ government, non-profit or international, web-based, carbon calculator tools, such as those listed in Appendix X3.

5.5 *Tier 2: Alternative Technologies:*

5.5.1 Once the facility has established and implemented energy conservation and efficiency options in Tier 1, use of alternative technologies is the second step in the GHG reduction and elimination process. Generally, in this step, the user will find and use alternative forms of energy production, whether from commercial utility sources or on the site of the facility itself, to reduce greenhouse gases. After Tier 1, these are the next most cost effective actions for the facility.

5.5.2 Tier 2 responses ensure the planning for longer-term activities involving alternative methods or technologies with lower greenhouse gas emissions. Examples include off-peak use, power storage, wind turbines, solar arrays, or geothermal energy production. They can also include purchase of alternative energy from the electric power utility or offsetting emissions by planting or restoring vegetation.

5.5.3 For example, planning and construction of green roofs for a facility provides energy conservation by lowering interior and exterior temperatures in the summer and conserving heat in the winter. Green roofs have the added benefit of directly lowering carbon dioxide emissions, and reducing storm water runoff through plant transpiration and water retention.

5.5.4 Use of Tier 2 technologies should be incorporated into the facility's overall energy management plan, using the "plan, do, check, act" approach.

5.5.5 During the planning stage, certain assumptions regarding greenhouse gas generation might be changed in order to estimate greenhouse gas reduction from alternative technologies. See Appendix X1 and Appendix X3 for more information.

5.5.6 Users should consider GHG production estimates for the manufacture of alternative energy.

5.6 *Tier 3: Emerging Technologies*—Tier 3 standards encompass the long-term investment in future, emerging technologies for later years of needed greenhouse gas reductions that may not be currently possible.

5.6.1 For example, the sequestration of carbon through underground gas injection may be a long-term option for some facilities that will still require combustion of fossil fuels such as coal or oil in the long-term planning horizon.

5.6.2 Generally, these technologies are the most expensive and least well proven GHG elimination or reduction techniques.

5.7 Facilities should focus on GHG response in a systematic way. The guiding principle for these programs is pollution prevention. By evaluating and implementing greenhouse gas reduction steps for each class of response, facilities will reduce both energy costs and ancillary impacts on the environment over time. Tier 1 and 2 responses generally show the greatest immediate GHG response opportunities.

5.8 The tiered GHG response planning analysis is shown in Fig. 1. This is an iterative process that first identifies the GHG footprint standards for mitigation and the user plans each tier of response to reduce GHG risk. The user then does selected responses, checks them against the risk reduction goals, and acts to implement improvements until goals are met. An example of this "plan, do, check, act" method is contained in ISO 14001. The user conducts the tiered evaluation in this iterative fashion until a long-term GHG response plan is formulated.

5.9 At each step in the process, the user should measure and evaluate the actions taken using a consistent, documented approach. Users should verify that GHG risk responses represent best management practices, given the circumstances of the organization, and the current status of technology.

5.10 The overall goal is for continuous improvement and reduction of GHG risks. See Appendix X1 for specific examples of this tiered analysis.

6. Keywords

6.1 air emissions; carbon dioxide; energy efficiency; environmental risk management; greenhouse gases; renewable energy