



GHG schemes addressing
climate change

How ISO standards help





ISO in brief

ISO has a membership of 163* national standards bodies from countries large and small, industrialized, developing and in transition, in all regions of the world.

ISO's portfolio of over 18500* standards provides business, government and society with practical tools for all three dimensions of sustainable development: economic, environmental and social.

ISO standards make a positive contribution to the world we live in. They facilitate trade, spread knowledge, disseminate innovative advances in technology, and share good management and conformity assessment practices.

ISO standards provide solutions and achieve benefits for almost all sectors of activity, including agriculture, construction, mechanical engineering, manufacturing, distribution, transport, medical devices, information and

communication technologies, the environment, energy, quality management, conformity assessment and services.

ISO only develops standards for which there is a clear market requirement. The work is carried out by experts in the subject drawn directly from the industrial, technical and business sectors that have identified the need for the standard, and which subsequently put the standard to use. These experts may be joined by others with relevant knowledge, such as representatives of government agencies, testing laboratories, consumer associations and academia, and by international governmental and nongovernmental organizations.

An ISO International Standard represents a global consensus on the state of the art in the subject of that standard.

* In November 2010.



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1 - Introduction

The environmental reality of climate change is fast becoming an economic reality. As companies confront the demands of a low-carbon future, they face new choices, new challenges, new competitors, and – ultimately – new opportunities to reshape industries and markets around the globe.

– The McKinsey Quarterly.

The magnitude of the changes required to mitigate and adapt to climate change is unprecedented. All countries will need to implement changes that dramatically reduce greenhouse gas (GHG) emissions from fossil fuel consumption, and from land-use changes such as deforestation. In developed countries all levels of society are faced with the responsibility to make changes to lifestyle choices – from the products they consume such as cars and food, to where they spend their vacation, to the buildings in which they live and work. Developing countries need to ensure the right to development while at the same time minimizing the rise in GHG emissions. All nations will have to build low-carbon infrastructures that ensure healthy economies, stable governments and a protected climate. GHG standards will play a vital role in this transition. They will provide the transparency and assurances needed for product labelling, purchasing of carbon offsets, regulating business

emissions, and certifying the GHG practitioners that help provide the services and manage our companies and public programmes.

Vast new business opportunities will emerge to create low-carbon economies that are more energy efficient and profitable. It is time to prepare for this transition and take advantage of the new markets and industries that will shape the global economy in the coming decades.

Standards will play an increasingly important role in moving societies and economies to a more climate-safe development path. Standards can provide clear guidelines, help structure processes and set quality norms for the rapidly developing field of GHG management. In doing so they help facilitate new green technology markets and more energy-efficient and profitable business practices. ISO developed this publication to raise awareness and demonstrate the benefits of pro-active business and

other stakeholder engagements in climate mitigation. ISO GHG standards have been given wide coverage by international climate organizations, such as the International Emissions Trading Association (IETA) and the United Nations Framework Convention on Climate Change (UNFCCC), as potential foundational standards for harmonising other standards and programmes. Additionally, in the next few years there is the growing prospect for ISO GHG standards to be developed into a management system standard (MSS) for measurement, reporting and verification of the GHG emissions.

This publication provides information to potential users of GHG standards and programmes. It gives a brief

overview of the climate change context and provides a map of available GHG standards, as well as those currently in development. It provides information on how GHG standards, such as ISO 14064, can provide the tools for implementing climate mitigation and adaptation strategies, and looks at the future of GHG standards and how they can promote a faster up-take of new green technologies and low-emission practices. It points out opportunities to enhance current GHG standards and standards development, and proposes changes that would address challenges and help maximize the effectiveness of GHG standards in moving us to a more sustainable future.



2 - Climate change update

Climate change is a reality and will remain the greatest challenge of the 21st century. We are already seeing the profound impacts human-induced climate change has on the Earth's physical and biological systems. The scale of changes and the severity of impacts on human societies will depend in large part on our ability to dramatically and quickly reduce GHG emissions and adapt to the unavoidable changes. The latest report of the Intergovernmental Panel on Climate Change (IPCC) was released in 2007 and states: *Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level*¹⁾.

Numerous new scientific findings have been published since the release of the IPCC report. Many of them point to emissions and warming trends that are growing at a rate faster than the

scientific community projected just a few years ago :

*Recent observations confirm that, given high rates of observed emissions, the worst-case IPCC scenario trajectories (or even worse) are being realised. For many key parameters, the climate system is already moving beyond the patterns of natural variability within which our society and economy have developed and thrived. These parameters include global mean surface temperature, sea-level rise, ocean and ice sheet dynamics, ocean acidification, and extreme climatic events. There is a significant risk that many of the trends will accelerate, leading to an increasing risk of abrupt or irreversible climatic shifts*²⁾.

Between 2000 and mid-2008, anthropogenic CO₂ emissions have been growing about four times faster than during the previous decade. Until late 2008, estimated emissions were tracking above the most intense fossil

1) IPCC, 2007 : Summary for Policymakers. In : Climate Change 2007 : The Physical Science Basis..., etc. www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-spm.pdf

2) Synthesis Report from *Climate Change : Global Risks, Challenges & Decisions*, Copenhagen, 10-12 March 2009, <http://climatecongress.ku.dk/pdf/synthesisreport>

Greenhouse Gases

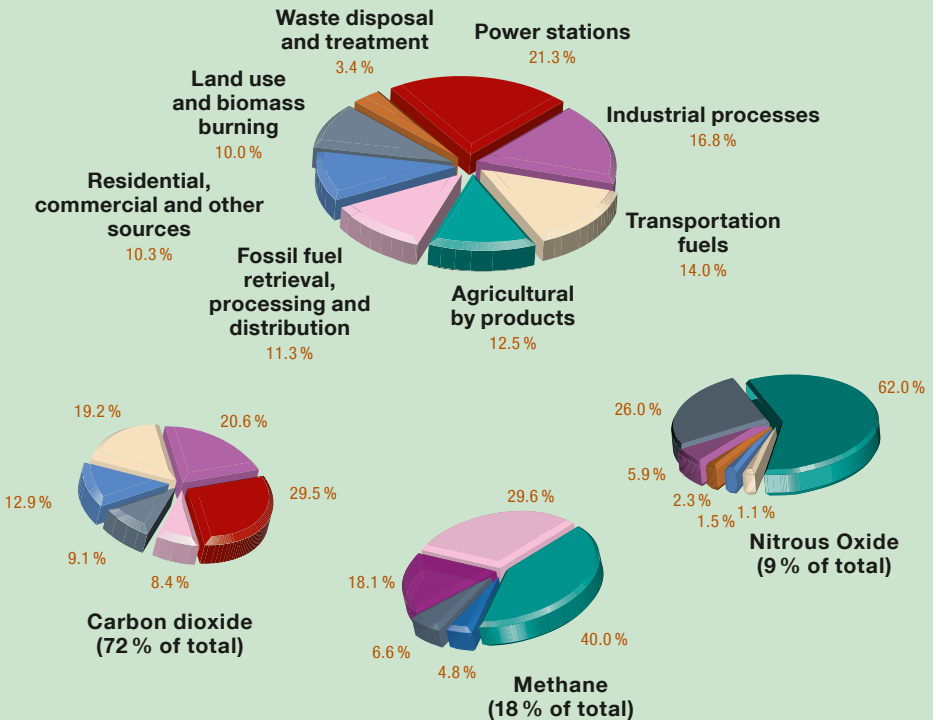
Anthropogenic greenhouse gases (GHGs) are substances emitted by humans that cause the atmosphere to warm up beyond its natural state, thus causing climate change. The most common greenhouse gas is carbon dioxide (CO₂) which is produced by burning organic material, such as fossil fuels and forests.

The Kyoto Protocol covers the following GHGs: carbon dioxide, methane, nitrous oxide, sulphur hexafluoride, hydrofluorocarbons and perfluorocarbons. These gases have differing lifetimes and strengths (warming potential).

Methane, for example, has a much shorter lifetime (about 12 years) than CO₂ (up to thousands of years) but has a greater warming potential. It is 25 times stronger over a 100 year time frame than CO₂. Atmospheric concentrations of CO₂ have increased by over 31 % since pre-industrial levels. Methane has increased by 67 %.

Figure 1 shows global GHG emissions by sector based on emissions from 2000. More information on GHGs and climate change can be found at www.ipcc.ch

Figure 1 : Annual greenhouse gas emissions by sector



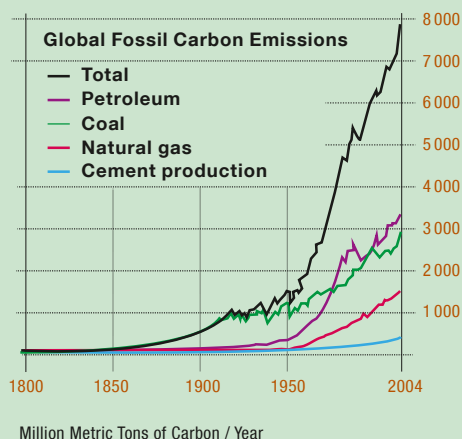
Source : Robert A. Rohde http://en.wikipedia.org/wiki/File:Greenhouse_Gas_by_Sector.png

fuel emission scenario established by the IPCC³⁾. If we continue on this trend and do not act to reduce emissions rapidly, we may be unable to achieve the low stabilization scenarios that would give us a reasonable chance to adapt to climate change and avoid catastrophic changes. **Figure 2** shows CO₂ emissions growth from different sources.

There is strong agreement among most nations that the rise in global temperatures should be kept at a maximum of 2°C above pre-industrial levels. But even a temperature rise of “only” 2°C will likely lead to significant impacts such as decreases in agricultural yields, fresh water scarcity and species extinction. The hope is that with a concerted effort, human societies would be able to adapt to these inevitable changes. Beyond a 2°C warming, the ability of society and the ecosystems to adapt rapidly declines. For example, the IPCC notes that as global average temperature increase exceeds about 3.5°C, “model projections suggest significant extinctions (40-70 % of species assessed) around the globe”⁴⁾.

We already have the capacity to reduce emissions quickly and economically. Many economic studies show that reducing emissions through energy-efficiency upgrades and renewable

Figure 2: Global CO₂ emissions from different sources



Source: Mak Thorpe (2008)
http://en.wikipedia.org/wiki/File:Global_Carbon_Emission_by_Type_to_Y2004.png

energy production can be achieved at low cost. More importantly, inaction harbours much larger and more dangerous costs than economic cost models are usually able to portray. Climate stabilisation is technologically and economically feasible. The financial crisis triggered in 2008 has had a considerable impact on the energy sector worldwide. The International Energy Agency (IEA) estimated that in 2009, CO₂ emissions fell by 3% – steeper than at any time in the last 40 years⁵⁾. This would lead to emissions

3) The Global Carbon Project, www.globalcarbonproject.org

4) IPCC 2007 Summary for Policy Makers, www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

5) International Energy Agency: World Energy Outlook 2009

in 2020 being 5 % lower – even in the absence of additional policies – than the IEA estimated just a year ago. The economic downturn has thereby created an opportunity to put the global energy system on a trajectory to stabilise GHG emissions at safer levels.

The climate imperative is clear: global action is needed to swiftly and decisively reduce GHG emissions and develop strategies to adapt to changes that cannot be avoided. Stakeholders from all sectors have to step up to the challenge: governments, businesses, organizations and citizens have to collaborate to address the emerging

climate crisis in a positive and constructive way.

Climate change does not exist in a vacuum. It is only one of a multitude of global challenges that need to be addressed to ensure the well being of future generations. Moving towards a more sustainable global future requires that climate change is addressed without exacerbating other global issues such as poverty and inequity and the loss of biodiversity. The task at hand is clear: our economies have to move to a low-carbon future in which the climate is protected and human societies and natural resources remain intact.



A short overview of global climate change policy

In 1992, the 154 signatory nations to the UNFCCC declared to aim “to achieve stabilization of GHG concentrations in the atmosphere at a low enough level to prevent dangerous anthropogenic interference with the climate system”. The treaty has since been ratified and signed by 192 nations. Yet the treaty’s aim was voluntary and non-binding and did not set compliance limits on GHG emissions.

Compliance reductions were not established until five years later in 1997, when the Kyoto Protocol was adopted. Most industrialized nations agreed to legally binding GHG emissions reductions of 6% to 8% below 1990 levels between the years 2008-2012. The Kyoto Protocol was ratified by 184 nations and came into force in 2005. It established a cap-and-trade system that imposes national caps on the GHG emissions of developed countries that ratified the Protocol (Annex 1 Parties). These countries must meet their targets by reducing their own emissions, trading emissions allowances with countries that have a surplus of allowances, and/or meeting their targets by purchasing carbon credits. This ensures that the overall

costs of reducing emissions are kept as low as possible. To further increase the cost-effectiveness of emissions reductions, the Kyoto Protocol established so-called Flexible Mechanisms: the Clean Development Mechanism (CDM) and Joint Implementation (JI) and emissions trading.

The Kyoto Protocol enabled a group of Annex I countries to join together and form a so-called “bubble” that is given an overall emissions cap and is treated as a single entity for compliance purposes. The 15 member states of the EU in 1997 formed such a bubble and created the EU Emissions Trading Scheme (EU ETS). The EU ETS is an installation-based cap-and-trade system for the now 27 EU member states which came into force in 2005. Under this cap-and-trade scheme, emissions are capped for installations and allowances (EUAs) may be traded among industries with an account in one of the registries.

Many countries have enacted GHG reduction policies and some have successfully reduced their total emissions. Despite the recent economic crisis, most nations still show growing emissions trends and it is highly unlikely that any country thus far is on an emissions path that would, if achieved globally, ensure that global temperatures do not rise beyond 2° Celsius.



3 - Addressing climate change – Role of GHG standards

The need for GHG standards is a recognized priority for business and government leaders. This publication is a timely addition to the discussions of policy makers and other stakeholders on climate change and the impacts of trade, technologies, investment, government regulations and programmes such as cap-and-trade, offsets, incentives, and taxes, as well as consumer behaviour. Acknowledging the work of ISO and other leading organizations working on GHG management and standardization, the World Economic Forum Task Force Working Group on Universal Standards and Metrics recently recommended:

“prioritization of a global standard for the assessment and reporting of product carbon footprints to enable better transparency of emissions associated with their production and consumption.”

This publication reviews the GHG standards currently in play, the emerging demand and efforts for more GHG standards, and ways to improve GHG standardization so that they play an even greater role supporting an integrated solution to climate change.

Chapter 5 gives an overview of different GHG standards and their uses, followed by chapters describing the need for more and innovative GHG standards to support technologies and professionals that in turn reinforce the role GHG standards already play in GHG markets. There is a symbiosis between standards and the strategies and policies that use them. Standards are not only tools to help implement strategies and policies – standards and the tools that incorporate standards, such as software for quantifying the life cycle emissions of new technologies, can help in the design of new policies and business strategies.

Role of GHG standards for government policies and programmes

GHG standards are used to support many types of mandatory and voluntary government programmes, including:

- Incorporation into legislation and regulations such as regional GHG emission cap-and-trade agreements, as well as international trade agreements

- Incentives to support new industries and technologies, such as production subsidies, tax and other business incentives
- Technology research and development (R&D) and other support funding.

For governments to create and effectively regulate GHG markets and achieve fungible commodities that can achieve the benefits of emissions trading and core policy objectives such as reducing national emissions, GHG standards help policy makers receive credible information, calculate emissions and set targets using common tools. However, GHG standards do not set targets. They provide a common approach to assessment, measurement and reporting, among other uses.

Role of GHG standards for business, technologies and products

In addition to being essential to the GHG markets for cap-and-trade as well as offset credits, GHG standards are used to support a range of important business functions including:

- Carbon labelling of products and events for consumer and stakeholder communications, to enable effective purchasing decisions and avoid “greenwashing”
- Technology innovation to support decisions on product development and market assessment taking into account potential GHG revenues

- Supply chain GHG management – since this is a serious business issue, standardized GHG quantification and reporting for companies and their products are being developed to help reduce GHG emissions throughout the value chain.

Businesses also report to non-governmental GHG registries such as The Climate Registry, using recognized GHG standards. From international trade to avoiding “greenwashing” of product claims, GHG standards help businesses take advantage of new opportunities.

Role of GHG standards for the financial industry

GHG standards are being developed to serve the specific needs of the financial community such as:

- Carbon disclosure and valuation
- New financial products, and climate-related insurance covering physical property, or liability insurance covering GHG practitioner errors and omissions coverage, for example.

Many GHG standards are used by businesses to provide a complete and accurate disclosure of GHG emissions, and communicate market risks and opportunities for their products and services. GHG standards will help to link monetary value with GHG emissions, asset portfolios, technologies, products, risks and much more – thereby enabling more efficient allocation of capital.

Role of GHG standards for capacity building

Building capacity and certifying the competence of GHG practitioners would not be possible without GHG standards for quantification, auditing, reporting, labelling, communications, and so on. GHG standards form an essential part of:

- Training courses in industry associations and guidelines, as well as academic research and training providers
- Professional certification and organization services
- Tools of the trade, e.g. GHG software for emissions reporting and life cycle software models for technology funding.





4 - ISO's contribution to environmental and climate change standards

4.1 - Development of ISO standards

ISO develops new standards in response to sectors and stakeholders that express a clearly established need for them. ISO standards are developed by technical committees, comprising experts from the industrial, technical and business sectors as well as representatives of government agencies, testing laboratories, consumer associations, non-governmental organizations and academia.

To be accepted for development, a proposed new standard must receive the majority support of the participating members of the ISO technical committee which, among other criteria, verifies the global relevance of the proposed item. This means that it indeed responds to an international need and will eventually be suitable for implementation worldwide.

ISO standards are voluntary, and based on a solid consensus of international expert opinion. Consensus, which requires the resolution of substantial objections, is an essential procedural principle. Although it is necessary for the technical work to

progress speedily, sufficient time is required before the approval stage for the discussion, negotiation and resolution of significant technical disagreements. ISO standards are developed on a consensus basis, non-aligned to any regime i.e. regime neutral, represented geographically in developed and developing countries, and have technical rigour and speed to market.

For a document to be accepted as an ISO International Standard, it must be approved by at least two-thirds of the ISO national members that participated in its development and not be disapproved by more than a quarter of all ISO members who vote on it. An International Standard is the result of an agreement between the member bodies of ISO. It may be used as such, or may be implemented through incorporation in national standards of different countries.

4.2 ISO's environmental standards

ISO standards are among the leading objective tools that assist policymakers in decisions related to public incentives, regulations, and use of

standards to foster energy-efficiency and new green technologies. Out of a total of over 18500 ISO standards and related documents, over 570 are directly related to environmental subjects, including environmental management systems, climate change, energy management, and many more that can help in reducing environmental impacts.

Offering business, government and society a complete portfolio of practical tools for tackling environmental challenges, they range from standards for sampling, testing and analytical methods, through environmental management and environmental aspects of product design, to new work on ship recycling.



The ISO 14000 family of standards for environmental management is firmly established as the global benchmark for good practice in this area :

- **ISO 14001:2004**, *Environmental management systems – Requirements with guidance for use*, provides the requirements for environmental management systems (EMS) and contributes to an organization’s objectives to operate in an environmentally sustainable manner. As one indicator of the use of ISO 14000, up to the end of December 2009, more than 223 149 ISO 14001 certificates of conformity had been issued to private and public sector organizations in 159 countries and economies.

The ISO 14000 family of standards also includes supporting tools for environmental management and designing environmentally friendly products and services :

- **ISO 14004:2004**, *Environmental management systems – General guidelines on principles, systems and support techniques*
- **ISO 14040:2000**, *Environmental management – Life cycle assessment – Principles and framework for life cycle analysis*
- **ISO Guide 64:2008**, *Guide for addressing environmental issues in product standards*.

The ISO 14000 family furthermore includes a number of standards to ensure good practice in environmental claims and communications :

- **ISO 14020:2000**, *Environmental labels and declarations*
- **ISO 14063:2006**, *Environmental communication*.

ISO has also developed sustainability standards for other sections such as ISO 21930:2007, *Sustainability in building construction – Environmental declaration of building products*.

4.3 ISO's contribution to addressing climate change

ISO has been a leader in developing climate change relevant standards that help streamline procedures and unify definitions and requirements for the climate mitigation and related actions of corporations, organizations and governments.

Achieving international agreement on the quantification and verification of GHG emissions for purposes of emissions trading is key to supporting the development, networking and consistency of emissions credit trading schemes.

ISO 14064, ISO 14065, ISO 14066, ISO 14067 and ISO 14069 provide an internationally agreed framework for measuring GHG emissions, verifying claims made about them, and accrediting the bodies which carry out such activities. All these ISO GHG standards are described in more detail in the following section.

ISO not only helps streamline GHG accounting with its policy-neutral tools, but it also develops climate

change monitoring tools. For example, ISO develops standards on geographic information and geomatics which help to measure the extent of the effects of climate change, and is also collaborating with the Food and Agriculture Organization of the United Nations (FAO) and the World Meteorological Organization (WMO), under a United Nations/ISO partnership to develop further standards for gauging essential climate variables under the UN's Global Terrestrial Observation System.

ISO International Standards can also make essential contributions to realizing the full potential of energy efficiency measures based on existing technology and good practice, as well as to disseminating innovative technologies – particularly for renewable and carbon-neutral energy sources. In the case of innovative technologies, standards can reduce the time to market of products and services based on them, create global interest and develop a critical mass of support to ensure the economic success of such technologies.

ISO has already developed standards with an impact on climate change for areas such as building environment design, energy efficiency of buildings and sustainability in building construction, intelligent transport systems, solar energy, wind turbines, nuclear energy and hydrogen technologies.

ISO's proactive stance on energy and climate change matters has resulted in the initiation of ISO work on energy

management systems (ISO 50001) and the examination of new opportunities in energy efficiency and renewable energy sources.

4.4 ISO's GHG management standards

The ISO series of GHG standards, which continues to expand, addresses the need for a unified framework for GHG quantification, monitoring, reporting and verification, and provides a set of auditable requirements or specifications, and in some cases recommendations, to support various stakeholder groups such as organizations, proponents of GHG emission reduction projects, and auditors.

- **ISO 14064: Parts 1 and 2** are specifications for the quantification, monitoring and reporting of GHG emissions and emission reductions (as well as removal enhancements), respectively, and Part 3 is a specification for the validation or verification of GHG assertions
- **ISO 14065** is a standard that specifies principles and requirements for bodies that undertake validation or verification of GHG assertions for use in accreditation or other forms of recognition
- **ISO 14066** is a standard (currently under development) that specifies the competence requirements for GHG validation teams and verification teams with guidance for evaluation
- **ISO 14067** is a product standard (currently under development) and will provide a framework for measuring the carbon footprint of products
- **ISO 14069** is a guidance document (currently under development) for the quantification and reporting of GHG emissions for organizations.

These ISO standards are designed to be policy-neutral which provides the flexibility that has made it possible for ISO GHG standards to be applied to many different GHG programmes around the world. ISO 14064, for example, is consistent and compatible with the GHG Protocol, published by the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD). Also, a leading offset standard for the voluntary market, the Voluntary Carbon Standard, is based on ISO 14064 Parts 2 and 3, and ISO 14065. The growing use of ISO GHG standards for both regulated and voluntary purposes is a testament to their versatility and their contribution to linking GHG markets around the world.

ISO 14064

ISO 14064 is comprised of three parts, respectively detailing specifications and guidance at the organizational and project levels, and for GHG quantification, monitoring, reporting, validation and verification. Because the standard is programme-neutral, it



All ISO GHG standards are policy neutral. If an ISO GHG standard is used under a specific GHG programme, requirements of that GHG programme are additional to the requirements of ISO GHG standards.

is not prescriptive about elements that apply to the policies of a particular GHG programme (e.g. specific additionality criteria for offset projects). These decisions are required to be made by the user of the standard (e.g. the GHG programme administrator or regulator) when applying the standard. ISO 14064 objectives are to :

- Enhance environmental integrity by promoting consistency, transparency and credibility in GHG quantification, monitoring, reporting and verification
- Enable organizations to identify and manage GHG-related liabilities, assets and risks
- Facilitate the trade of GHG allowances or credits
- Support the design, development and implementation of comparable and consistent GHG schemes or programmes.

► ISO 14064-1:2006

**Greenhouse gases – Part 1 :
Specification with guidance at the
organization level for quantifica-
tion and reporting of greenhouse
gas emissions and removals**

[www.iso.org/iso/
catalogue_detail?csnumber=38381](http://www.iso.org/iso/catalogue_detail?csnumber=38381)

ISO 14064-1 provides guidance on the elements needed to implement an auditable GHG inventory. It offers a framework for designing, developing, managing and reporting organizational or company-level GHG inventories. It includes requirements for determining organizational boundaries, GHG emission boundaries, quantifying an organization's GHG emissions and removals, and identifying specific company actions or activities aimed at improving GHG management. It also includes requirements and guidance on inventory quality management, reporting, internal auditing and the organization's responsibilities in verification activities. ISO 14064 Parts 2 and 3 are described in more detail below.

► ISO 14064-2:2006

**Greenhouse gases – Part 2:
Specification with guidance at the
project level for quantification,
monitoring and reporting of green-
house gas emission reductions or
removal enhancements**

[http://www.iso.org/iso/
catalogue_detail?csnumber=38382](http://www.iso.org/iso/catalogue_detail?csnumber=38382)

ISO 14064-2 specifies principles and requirements for determining project baseline scenarios and for monitoring, quantifying and reporting project performance relative to the baseline scenario and provides the basis for GHG projects to be validated and verified. ISO 14064-2 is a comprehensive framework of “what to do”. Because the standard is a programme-neutral process, it is not prescriptive about elements that apply to the policies of a particular GHG programme (e.g. specific additionality criteria, project eligibility dates or co-benefits). These decisions are required to be made by the user of the standard (e.g. the GHG programme administrator or regulator) when applying the standard. ISO 14064-2 has been incorporated into numerous programmes including the Voluntary Carbon Standard and the Chicago Climate Exchange, as well as compliance programmes such as those of the Government of Alberta and the Government of British Columbia, both in Canada.

► ISO 14064-3:2006

Greenhouse gases – Part 3: Specification with guidance for the validation and verification of greenhouse gas assertions

http://www.iso.org/iso/catalogue_detail?csnumber=38700

ISO 14064-3 details principles and requirements for verifying GHG inventories, and validating or verifying GHG projects. It can be applied to entity-wide and offset project GHG

quantifications. It provides requirements and guidance for those conducting GHG validations and verifications. It specifies the general requirements for selecting GHG audit team members, establishing the level of assurance, objectives, criteria and scope, determining the auditing approach, assessing GHG data, information, information systems and controls, evaluating GHG assertions, and preparing audit statements.

► ISO 14065:2007

Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition

http://www.iso.org/iso/catalogue_detail?csnumber=40685

ISO 14065 specifies principles and requirements for bodies that undertake validation or verification of GHG assertions. It requires that a validation and verification body establishes and maintains a procedure to manage the competence of its auditing personnel. GHG validation and verification bodies must ensure that auditing teams have the necessary competence to effectively complete the validation or verification process. Supporting these principles are general requirements based on the tasks that the validation or verification teams must be able to perform, and the competence required to do so.

► ISO/DIS 14066

Greenhouse gases – Competence requirements for greenhouse gas validation teams and verification teams

http://www.iso.org/iso/catalogue_detail.htm?csnumber=43277

ISO 14066, currently under development, spells out the competence requirements for GHG validation teams and verification teams with guidance for evaluation. To achieve consistency in the international marketplace and maintain public confidence in GHG reporting and other communications, there is a need to define competence requirements for GHG auditing teams. ISO 14066 will be used in conjunction with ISO 14065.

► ISO/CD 14067

Carbon footprint of products

http://www.iso.org/iso/catalogue_detail.htm?csnumber=43278

ISO 14067 is a new International Standard, currently under development, for product carbon footprinting and communication, including labelling. It is being developed by international technical groups working concurrently on two parts: Quantification (Part 1) and Communication (Part 2). ISO 14067 is due for completion in 2012.

► ISO/WD 14069 GHG

Quantification and reporting of GHG emissions for organizations (Carbon footprint of organization) – Guidance for the application of ISO 14064-1

http://www.iso.org/iso/catalogue_detail.htm?csnumber=43280

ISO 14069 is a new guidance document currently under development to support the application of the ISO 14064-1 International Standard for organizational GHG inventory quantification and reporting, in particular in relation to scope 3 emissions or other indirect emissions related to the organization for which the GHG inventory is established.





5 - Overview of GHG standards and programmes

As climate change mitigation has gained prominence in the public and private sectors, numerous GHG standards and programmes, including protocols, methodologies and guidelines, have been developed for the management of GHG emissions⁶⁾. This chapter introduces a number of important standards and programmes currently available or under development, including linkages to ISO standards (explained in the previous chapter). The various GHG standards and programmes have been categorized as follows:

1. **National GHG emissions**
2. **Organization/ entity-wide GHG emissions**
3. **Corporate disclosure on climate change**
4. **GHG offset projects**
5. **Product-specific/ supply-chain GHG emissions**

6. **Validation and verification (auditing) of GHG emissions and reduction claims.**

Table 1 gives an overview of some major GHG standards and programmes described in this chapter.

Programmes are here defined as GHG schemes, including compliance and voluntary programmes, under which GHG emissions or emissions reductions can be certified by third-parties, and in some cases traded. Programmes therefore usually have bodies that certify projects, verifiers, and specific protocols and/or programmes that are accredited under that programme. Under a compliance market, entities are required by law to report and/or reduce their GHG emissions. Such compliance regimes include, but are not limited to, cap-and-trade systems, such as the Kyoto Protocol and the European Union Emissions Trading System (EU ETS).

⁶⁾ This publication does not address climate adaptation and the need for standards in that area. Adaptation to climate change and the role of standards in that process is a large and important subject. Yet it would go beyond the scope of this publication which focuses on GHG accounting and management.

Table 1: Overview of standards and programmes

Standards/programmes and their scope	Type	Compliance	Voluntary	Geographic scope
National GHG emissions				
UNFCCC	programme	x		international
Organization/entity-wide GHG emissions				
EU ETS	programme	x		European
ISO 14064-Part 1	standard		x	international
WBCSD/WRI GHG Protocol for Corporate Accounting	standard		x	international
Chicago Climate Exchange	programme		x	mostly US
Corporate disclosure on climate change				
Climate Disclosure Standards Board	standard		x	international
Carbon Disclosure Project Questionnaire	guidelines		x	international
PAS 2060 Carbon Neutrality	guidelines		x	UK, international
GHG offset projects				
Clean Development Mechanism	programme	x		Non-Annex 1
Joint Implementation	programme	x		Annex 1
Regional Greenhouse Gas Initiative	programme	x		North-east US
ISO 14064-Part 2	standard		x	international
WBCSD/WRI GHG Protocol for Project Accounting	standard		x	international
Climate Action Reserve	programme		x	mostly US
Voluntary Carbon Standard	programme		x	international
Gold Standard	programme		x	international
Chicago Climate Exchange	programme		x	mostly US

Standards/Programmes and their scope	Type	Compliance	Voluntary	Geographic scope
Climate Community and Biodiversity Standards	co-benefit add-on		x	international
Social Carbon	co-benefit add-on		x	Non-Annex 1
American Carbon Registry	programme		x	Mostly US
Alberta Offsets System	programme		x	Alberta, Canada
Pacific Carbon Trust	programme	x		British Columbia, Canada
Product-specific/ supply-chain GHG emissions				
PAS 2050	standard		x	UK, international
ISO 14067	standard		x	international
WBCSD/WRI GHG Protocols for Products and for Scope 3	standard		x	international
Validation and verification (auditing) of GHG emissions and reduction claims				
ISO 14064-Part 3	standard		x	international
ISO 14065	standard		x	international
ISO 14066	standard		x	international
ISAE 3000	standard		x	international
ISAE 3410	standard		x	international
Validation and Verification Manual CDM	guidance document	x		Non-Annex 1
Validation and Verification Manual IETA	guidance document		x	Non-Annex 1

Voluntary standards and programmes are used by companies and institutions on a purely voluntary basis. The motivation for reporting GHG emissions and purchasing carbon offsets varies and includes corporate public relations and code of ethics, a desire to go beyond what is mandated in terms of emission reductions, and

to prepare for expected compliance action, e.g. the introduction of a cap-and-trade system. Because demand is driven by purely voluntary action, the voluntary markets for carbon offsets are much smaller than the compliance markets, such as the CDM. The distinction between programmes and standards can be confusing, since

several of the discussed programmes call themselves “standards”, such as the Voluntary Carbon Standard or the Gold Standard.

Standards in the context of this publication include protocols, methodologies and guidance, and provide guidance and/or specifications on GHG quantification, monitoring, reporting and assurance. “International Standards” are those produced by ISO following specific principles and procedures (see the ISO publication on *International standards and “private standards”*⁷⁾). Most standards typically stand alone and do not have a body directly associated with them that accredits projects, protocols and/or verifiers. Standards themselves do not typically have registration and enforcement systems to track and ensure legal ownership as is necessary, for example, in the case of emissions reductions from offset projects. The choice of a standard is typically voluntary, as long as it is not part of a compliance programme. That means an organization can decide which standard to use for its GHG emissions inventory or to implement an offset project, if it is not under a mandatory scheme of a compliance programme. Nevertheless, if a company chooses a particular standard under which to implement its GHG management

system, that standard may state the requirements in a legally binding way (e.g. “the project proponent “shall” use a third-party auditor”) or as a recommendation or guideline (e.g. “the project proponent “should” use a third party auditor”).

Co-benefits refer to environmental and social benefits that can be achieved in addition to carbon reductions. Standards that ensure such co-benefits are used in offset markets and are described in more detail in the section on GHG offset projects.

Guidance documents provide specific process guidelines on how to apply a standard or a protocol. The use itself of such guidance documents can be voluntary or mandatory. For example, the CDM provides numerous mandatory guidance “methodological tools” such as the “Tool for the assessment and demonstration of additionality”.

Geographic scope refers to situations where activities are implemented under that programme or standard. For example, CDM activities and approved methodologies for offset projects are applied in Non-Annex 1 Countries unless adopted by the Voluntary Carbon Standard (VCS) programme for application in other jurisdictions.

7) www.iso.org/iso/private_standards.pdf

5.1 Programmes for nation-wide GHG emission reporting

United Nations Framework Convention on Climate Change (UNFCCC)

<http://www.ipcc-nggip.iges.or.jp/public/2006gl>

Under the UNFCCC Annex 1 Countries have to annually report their national GHG emissions in a formalized reporting format. Non-Annex 1 countries do not have to submit annual GHG inventories but instead have to submit their “National Communications” which usually contain information on national circumstances, vulnerability assessment, financial resources, technology transfer and capacity building. The **1996 and 2006 IPCC Guidelines for National Greenhouse Gas Inventories** assist countries in compiling their national GHG inventories. They supply default values of the various parameters and emission factors required for all sectors. In addition the **Intergovernmental Panel on Climate Change (IPCC) Methodology Reports** describe methodologies and practices for national GHG inventories. These documents provide additional guidance for national and corporate emissions accounting, and are used worldwide.

They include:

- Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories (2000)
- Good Practice Guidance for Land Use, Land-Use Change and Forestry (2003)
- Definitions and Methodological Options related to Inventory Emissions from Direct Human-Induced “Degradation” of Forests and “Devegetation” of other Vegetation Types (2003).

5.2 Organization-/entity-wide GHG emissions standards

Entity-wide GHG emissions calculations are used to determine an organization’s carbon footprint⁸⁾. Such entity-wide GHG emissions calculations have been widely used by businesses, institutions, and governmental as well as non-governmental organizations. Entity-wide emissions calculations are usually divided into three sections:

- **Scope 1** calculations include emissions from direct fuel use such as gasoline for vehicles and oil and natural gas for heating. These calculations are usually straightforward and require the use of generally well-established emissions factors

⁸⁾ Strictly speaking a “carbon footprint” only includes CO₂ emissions whereas a “GHG footprint” includes emissions of other greenhouse gases as well. For consistency, the term “carbon footprint” is used throughout this document.

- **Scope 2** calculations include emissions from indirect sources, such as electricity, heat (e.g. from district heating) and steam. These are called indirect emissions because GHG emissions from electricity, for example, occur at the power plant and not at the point of use. The emissions depend on the fuel mix. Electricity produced from fossil fuel has higher GHG emissions per kWh than renewable electricity from wind or hydro
- **Scope 3** calculations include indirect emissions not included in scope 2. These include emissions associated with the embodied energy in materials (e.g. paper, office equipment, food). Scope 3 emissions are the most difficult to estimate and most GHG emissions inventories therefore exclude, or only partially include, these emissions.

WBCSD/WRI corporate accounting and reporting standards

www.ghgprotocol.org/standards/corporate-standard

The GHG Protocol Corporate Standard was developed jointly by the World Business Council for Sustainable Development (WBCSD), a global association of some 200 companies committed to sustainable development, and the World Resources Institute (WRI), an environmental think

tank, in partnership with a coalition of businesses, NGOs and governmental and inter-governmental organizations. It provides requirements and extensive guidance for businesses, organizations and institutions preparing GHG emissions inventories. The GHG Protocol Corporate Standard has been designed to be policy-neutral and focuses only on the accounting and reporting of emissions, and is therefore not a programme, i.e. it does not provide a standard for how the verification process should be conducted or require that inventory data be reported. The cooperation between the GHG Protocol Initiative and ISO has enhanced the consistency of principles and requirements between the GHG Protocol for Corporate Accounting and ISO 14064 Part 1.

European Union Greenhouse Gas Emission Trading System (EU ETS)

http://ec.europa.eu/environment/climat/emission/index_en.htm

The EU ETS is a European cap-and-trade programme in which GHG emissions from facilities are calculated according to GHG methodologies defined at the national level.

ISO 14064 - Part 1

Refer to Chapter 4.4 for a description.

ISO 14069

Refer to Chapter 4.4 for a description.

5.3 Corporate disclosure standards

Corporate disclosure standards (CDSs) go further than company-wide carbon footprint calculations. They include entity-wide GHG calculations as well as risk assessments, and give a more complete overview on how a company deals with the threats and opportunities of climate change and its GHG emissions. There are several organizations that are working towards mainstreaming the reporting of such GHG inventories.

Climate Disclosure Standards Board Climate Change Reporting Framework

www.cdsb-global.org

The Climate Disclosure Standards Board (CDSB), formed in 2007, is an international organization committed to the integration of climate change-related information into annual reports, alongside their audited financial results. In 2009, the CDSB published a draft of its Climate Change Reporting Framework. The first edition of the framework is designed to be used for disclosure of climate change-related information in, or linked to, mainstream financial reports. The framework is being developed to build on, and support the work of, its Board members, the Carbon Disclosure Project, Ceres, the Climate Group, The Climate Registry, the International Emissions Trading Association, the World Economic Forum and the World Resources

Institute, and to reflect relevant principles from established financial and business reporting models.

The framework references ISO 14064 and recommends its use for entity-wide emissions calculations (ISO 14065) and for verification (ISO 14064-3).

PAS 2060:2010

<http://shop.bsigroup.com/en/ProductDetail/?pid=000000000030198309>

PAS 2060, a publicly available specification (PAS) for the demonstration of carbon neutrality, provides guidance to quantify, reduce and offset GHG emissions from an organization, activities, products, services, projects, events, etc.

5.4 GHG offset project programmes and standards

GHG offsets are gaining prominence as a tool to compensate for emissions in the compliance and voluntary markets. By paying someone else to reduce, remove or avoid the release of GHGs elsewhere, the purchaser of GHG offsets can aim to compensate for, or in principle “offset”, their own emissions. This is possible because climate change is a non-localized problem; CO₂ emissions mix throughout the atmosphere, so reducing them anywhere reduces overall GHG concentration.

Offset project GHG calculations are used to determine the amount of

Carbon neutrality

In recent years, some large companies and organizations have made headlines by announcing that they are “going carbon neutral” or offering carbon neutral services or products. In 2006, “carbon neutrality” was the New Oxford American Dictionary’s Word Of The Year. Being carbon neutral refers to achieving net zero carbon emissions. This can be achieved by reducing consumption, increasing efficiency, purchasing zero-carbon fuels and electricity, and by buying carbon offsets. The concept of carbon neutrality has been loosely defined and has met with equal measures of enthusiasm and scepticism. The key questions that frame the debate are :

1. Which emissions should an organization avoid or offset (see scope 1, 2, 3 discussion above) in order to claim carbon neutrality?
2. How should carbon neutrality be achieved? For example, is it legitimate for a company to claim carbon neutrality by purchasing green electricity certificates and carbon offsets?

These issues have not been resolved and the debate over the legitimacy of the value of a carbon neutral claim continues.

reduced/destroyed, avoided or sequestered GHGs of offset projects.

Offset projects then sell the generated GHG offsets or credits to entities in the compliance or voluntary market. The buyer can then in turn claim the emissions reductions that have been achieved by the offset project. Offset programmes usually develop specific protocols (also called “methodologies”) for each project type (e.g. methane capture and destruction or utilization from landfills). These protocols spell out in detail the parameters that have to be used in order to calculate the emissions reductions from a specific project. Project-level standards and programmes have been developed for the compliance as well as the voluntary markets.

Offset programmes must have three core components⁹⁾ whereas offset standards usually only define or give guidelines for the first two :

1. Accounting and quantification procedures aim to ensure that offsets are “real, additional, and permanent” and provide the methods for quantifying the number of offsets a project can generate (project specific “protocols” or “methodologies”)
2. Monitoring, verification and certification procedures aim to ensure that offset projects perform as

9) Adapted from : Broekhoff, D. (2007). *Voluntary Carbon Offsets: Getting What You Pay For*. Testimony before the House Select Committee on Energy Independence and Global Warming, July 18, 2007. http://pdf.wri.org/20070718_broekhoff_testimony.pdf

Validation is a process where an auditor assesses a project's GHG project plan against defined validation criteria. Validation is usually done before project implementation, and deals with the assessment of potential future outcomes.

Verification is a process where an auditor assesses an organization's or project's GHG assertions. For offset projects, verification ensures that the number of offsets received is equal to the number of emissions reductions achieved. This process is done after project implementation and is usually repeated.

Ex-ante versus ex-post credits.

Ex-ante refers to offsets that are credited and sold before the actual emissions reductions have occurred. The exact quantities of the reductions are therefore uncertain. Ex-ante credits usually come from sequestration (forestry) projects that can take a long time to reach their full sequestration potential. As opposed to ex-ante offsets, ex-post reductions have already occurred when the offsets are sold and their quantities are certain. Most standards require the verification of emissions reductions before they can be registered and sold. Yet there are a few voluntary offset programmes that market ex-ante offsets, examples include Plan Vivo and Carbon Fix.

reported. Verification and certification rules are used to quantify the actual carbon savings that can enter the market once the project is up and running

3. Registration and enforcement systems aim to ensure ownership of the emission reductions, define who bears the risk in case of project failure, and protect against double counting of offsets. Registries are vital in creating a credible, fungible offset commodity.

5.4.1 Compliance project programmes

Clean Development Mechanism (CDM)

<http://cdm.unfccc.int>

The CDM is a project-based GHG offset mechanism under the Kyoto Protocol of the UNFCCC. It aims to assist Annex 1 Parties (industrialized countries with binding emission reduction targets) to cut global GHG emissions in a more cost-effective manner by allowing them to invest in offset projects in non-Annex 1 parties (developing countries without binding targets). Certified Emissions Reductions (CERs) are verified and certified by authorized third parties (Designated Operational Entities). The CDM Executive Board gives final approval to new projects and project methodologies (protocols). The CDM has very clear and detailed rules and protocols, and high transaction costs, so that usually only large projects are

registered. To date it is the largest offset mechanism with over 2526 projects registered and 453 Million CERs issued as of November 2010¹⁰.

Joint Implementation (JI)

<http://ji.unfccc.int/index.html>

JI, like the CDM, is a project-based mechanism under the Kyoto Protocol. It is limited to transactions between industrialized countries and countries with economies in transition that have commitments to limit or reduce their GHG emissions under the Kyoto Protocol (Annex 1 Countries). The goal of the programme is to increase market efficiency by allowing industrialized countries to meet a part of their obligation by investing in GHG abatement projects in another industrialized country or economy in transition if the cost of abatement is lower in the other country. JI is much smaller than CDM. As of November 2010, there were 353 projects registered and 20.7 million credits issued (United Nations Environment Programme Risoe Centre).

The Regional Greenhouse Gas Initiative (RGGI)

<http://www.rggi.org>

The RGGI is a multi-state US compliance cap-and-trade programme to reduce CO₂ emissions from electricity generation. It was established in 2005

by governors of seven US states in the Northeast and Mid-Atlantic regions and has since expanded to include 10 states. The programme applies to fossil fuel-fired electric generating units of 25 megawatts and larger. RGGI went into effect on January 1, 2009, as the first compliance cap-and-trade programme to regulate GHGs in the US. Its objective is to reduce CO₂



¹⁰ Up-to-date figures on the CDM and JI are available on the UNEP Risoe Centre website: <http://cdmpipeline.org/>

emissions in the electricity generation sector by 10 % from 2009 to 2018.

Offsets can be used by covered entities as a limited compliance flexibility mechanism. RGGI uses a top-down model for assessing the eligibility of offset projects. Currently, five offset project type protocols have been developed under RGGI. Eligible offset projects must be located within a RGGI participating state, or any other state or US jurisdiction where a cooperating regulatory agency has entered into a memorandum of understanding (MoU). As of November 2010, no offset credits had been traded under the RGGI programme.

5.4.2 Voluntary project standards

WBCSD/WRI GHG Protocol For Project Accounting (GHG Protocol)

www.ghgprotocol.org

The GHG Protocol is a “de facto” standard for offset project accounting including both requirements and guidance. As such, it is a tool for quantifying and reporting GHG emissions reductions from GHG mitigation projects and does not focus on verification, enforcement or co-benefits. It is detailed and prescriptive and includes over 100 pages of guidance on “how to do” GHG project accounting. The protocol was developed by the GHG Protocol Initiative, which was launched in 1998 (for collaborators see the WBCSD/WRI Corporate Accounting and Reporting Standards

above). The cooperation between the GHG Protocol Initiative and ISO has enhanced the consistency of principles and requirements between the GHG Protocol for Project Accounting and ISO 14064 Part 2.

In 2007, ISO, WRI and the WBCSD signed a MoU under which they agreed to jointly promote the ISO 14064 standards and the WRI and WBCSD GHG Protocol standards. The MoU emphasizes that for corporate accounting, requirements and guidance contained in ISO and GHG Protocol standards are consistent, and they are designed so that they can be used in a complementary manner.

ISO 14064-2

Refer to Chapter 4.4 for a description.

5.4.3 Voluntary offset project programmes

Voluntary markets can serve as a testing field for new procedures, methodologies and technologies that may later be included in regulatory schemes. Voluntary offset projects can often be implemented with fewer transaction costs than CDM or other compliance market projects. Voluntary markets serve as a niche for micro projects that are too small to warrant the administrative burden of CDM, or for projects currently not covered under compliance schemes. The lack of quality control in the early years of the voluntary offset market has led to the production of some low quality verified or voluntary emission

reductions (VERs), such as those generated from projects that appear likely to have happened anyway. To address these quality concerns, several voluntary offset programmes and standards have been developed.

Climate Action Reserve

www.climateactionreserve.org

The Climate Action Reserve (formerly the California Climate Action Registry) was launched in 2008. It is a voluntary offset programme focused on the US carbon market. It has established protocols for quantifying and verifying GHG emissions reduction projects, provides oversight to independent third-party verification bodies, and issues and tracks carbon credits called Climate Reserve Tonnes (CRTs). As of November 2010, the Reserve had 243 GHG emissions offset projects, including 66 registered (completed verification) and 177 listed (accepted by the Reserve as eligible). Over 8,4 million credits (CRTs) have been issued.

The Climate Action Reserve has partnered with the American National Standards Institute (ANSI) to accredit independent third party validation and verification bodies under ISO14065: 2007, ISO 14064-3:2006 and the International Accreditation Forum (IAF) Mandatory Document for the application of ISO 14065:2007. This coordinated effort will help streamline the accreditation process for GHG verification bodies in North America and create consistency with international practice in relation to GHG emissions

verification. (Below is more information on these validation and verification standards)

Gold Standard (GS)

www.cdmgoldstandard.org

The GS is a voluntary carbon offset programme for renewable energy and energy efficiency projects. It was launched in 2003 under the leadership of the World Wildlife Fund (WWF), with a focus on offset projects that provide lasting social, economic and environmental benefits. The GS can be applied to voluntary offset projects and to CDM or JI projects. It is presently endorsed by over 60 environmental and development NGOs. As of November 2010, the GS pipeline had 228 VER projects and 175 CDM/JI projects listed in varying stages of the certification process. Over 1.9 million VERs and 0.6 million CERs and ERUs have been retired.

Voluntary Carbon Standard 2007 (VCS)

www.v-c-s.org

The VCS 2007 is a voluntary carbon offset programme developed by the Climate Group (TCG), the International Emissions Trading Association (IETA), the World Economic Forum (WEF) Global Greenhouse Register and the World Business Council for Sustainable Development (WBCSD). In November 2008, VCS 2007.1 was launched with newly incorporated guidelines for the development of projects in the agriculture, forestry and other land use

(AFOLU) sectors. As of November 2010, there were 489 projects registered under the VCS.

The Voluntary Carbon Standard is based on ISO 14064 Parts 2 and 3, and ISO 14065. The VCS also adopts CDM approved methodologies.

Chicago Climate Exchange (CCX)

www.chicagoclimatex.com

The CCX was launched in 2002 as a voluntary GHG emission cap-and-trade scheme located in North America. Participation in the CCX scheme is voluntary, but once entities elect to participate and commit to emissions reduction targets, compliance is legally binding. Members can comply by cutting their emissions internally, trading emissions allowances with other CCX members, or purchasing offsets generated under the CCX offset programme. CCX has its own offset programme under which CCX offset projects can be implemented. As of November 2010, the CCX had registered approximately 83 million metric tCO₂e in offsets and allowances. The CCX has terminated their programs in 2010.

In June 2009, CCX announced that all CCX Offset Project Protocols had been restructured to incorporate principles according to ISO 14064-2. Furthermore, the CCX accreditation programme would assess verifiers against ISO 14065 standards and CCX rules. CCX-Approved Verifiers were required to become

accredited by ANSI no later than August 1, 2010.

5.4.4 Add-on standards for co-benefits

Co-benefits are social and environmental benefits that enhance the quality of a GHG offset project. Such co-benefits include the protection of biodiversity, watersheds and human health, the reduction of local air and water pollution, and the creation of employment opportunities and increased community cohesion. Although many of the offset programmes and standards welcome co-benefits, most have only very general requirements for establishing such co-benefits. Several standards have been developed to fill this gap. Most of them are not programmes (the Gold Standard is a notable exception) but add-on standards that do not include the verification of carbon emissions and therefore must be used in conjunction with another programme.

The Climate, Community and Biodiversity Standards (CCBS)

www.climate-standards.org

The CCBS focus exclusively on land-based bio-sequestration and mitigation projects and require social and environmental benefits from such projects. The CCBS is an add-on standard that offers rules and guidance for project design and development. It is intended to be applied early on during a project's design phase to ensure robust project design and local community and

biodiversity benefits. It does not verify quantified carbon offsets nor does it provide a registry and should therefore be used in conjunction with another offset programme (e.g. the VCS or CDM). The CCB Standards were developed by the Climate, Community and Biodiversity Alliance (CCBA). CCBA is a partnership of non-governmental organizations, corporations and research institutes. The first edition was released in May 2005. As of May 2010, the CCBS pipeline listed 45 projects in varying states of the certification process and around 100 projects indicated intent to use the CCB Standards.

Social Carbon

www.socialcarbon.org

The Social Carbon Methodology (SCM) focuses on co-benefits such as biodiversity and active participation of local communities. It was developed by the Ecológica Institute (Brazil) in 1998. Initially designed to evaluate the condition of communities involved in forestry projects, SCM was adapted for use by other types of offset projects. It uses a set of analytical tools that assesses the social, environmental and economic conditions of communities affected by the projects, while demonstrating the project's contribution to sustainable development through continuous monitoring. It is an add-on standard that should be used in conjunction with another offset programme (e.g. the VCS or CDM).

5.5 Product-specific and supply chain GHG programmes and standards

Product-specific and supply chain GHG calculations are used to determine the GHG emissions associated with a specific product. This involves a life cycle analysis of the GHG emissions of a product. Several supermarket chains have started to label some of their products to educate consumers about the GHG emissions associated with different consumer goods.

PAS 2050

<http://shop.bsigroup.com/en/Browse-by-Sector/Energy--Utilities/PAS-2050/>

Publicly Available Specification (PAS) 2050 was developed by the British Standards Institution (BSI) at the request of the UK Department for Environment, Food and Rural Affairs (Defra) and the Carbon Trust for the assessment of GHG emissions of goods and services. PAS 2050 builds on the existing ISO environmental management/life cycle assessment standards ISO 14040 and ISO 14044 by specifying requirements for the assessment of the life cycle GHG emissions of products.

Alongside PAS 2050, a Code of Good Practice for the communication of product carbon footprint information was also published by the Carbon

Trust, together with guidance on using the PAS (Carbon Trust, Defra and British Standards). PAS 2050 provides a method for assessing the GHG emissions associated with products across their life cycle. In addition to PAS 2050, the Carbon Trust has sponsored the development of an accreditation programme by the UK Accreditation Service (UKAS). Accredited verification of results under PAS 2050 is available from certification companies that have completed the UKAS accreditation programme; currently, four companies are accredited by UKAS to verify PAS 2050 results.

WBCSD/WRI GHG Protocol for Products and for Scope 3

www.ghgprotocol.org/standards/product-and-supply-chain-standard

The WRI/WBCSD GHG Protocol is currently developing two new standards for product and supply chain GHG accounting and reporting. The new GHG Protocol standards will provide a standardized method to inventory the emissions associated with individual products across their full life cycles and of corporate value chains, taking into account impacts both upstream and downstream of the company's operations. The new standards are being developed through a multi-stakeholder process, with participation from businesses, policymakers, NGOs, academics and other experts and stakeholders from around the world.

ISO 14067

Refer to Chapter 4.4 for a description.

5.6 Standards for validation and verification of GHG emissions and reduction assertions

The assessment of GHG emissions claims can be complicated and require specialized knowledge. The expertise requirements vary depending on the type and scope of the audit. Validation and verification standards spell out the necessary requirements for third-party auditors who ensure the accuracy of GHG claims.

IAF (International Accreditation Forum) Compliance Document for the Application of ISO 14065

<http://www.iaf.nu>

The IAF Compliance Document provides additional guidance to ensure that ISO 14065 is interpreted in a consistent way by IAF members. The IAF ensures that its accreditation body members only accredit bodies that are competent to do the work they undertake and are not subject to conflicts of interest. The IAF notes: "ISO 14065 is not, as yet, included within the IAF Multilateral Recognition Arrangement Framework documents, however if validation or verification bodies are to be accredited worldwide in a harmonized manner as complying with ISO 14065, additional application

guidance is necessary to limit variations in interpreting the standard.”

International Standard on Assurance Engagements (ISAE) 3000

www.accountability21.net/uploaded-Files/Issues/ISAE_3000.pdf

ISAE provides a basic framework for large scale audits of non-financial data process monitoring. These types of audits include, among others, environmental, social and sustainability reports. ISAE 3000 was released in 2003 to further address ethical requirements and quality control. It gives auditors guidance for addressing and illustrating findings of compliance and sustainability reporting processes of their clients. ISAE was developed by the International Auditing and Assurance Standards Board a subsidiary of the International Federation of Accountants. ISAE 3410 Assurance on Greenhouse Gas Statements is currently in development.

Validation and Verification Manuals (VVM): CDM and IETA

The Executive Board of the Clean Development Mechanism (CDM EB) developed this compliance guidance document for the validation and verification work of CDM auditors (designated operational entities – DOEs).

Its use is mandatory for all DOEs. In addition to providing guidance, the document also aims to promote quality and consistency in validation and verification reports by the DOEs.

The CDM VVM can be downloaded at : <http://cdm.unfccc.int/EB/039/eb39annagan1.pdf>

Prior to the CDM VVM, the International Emissions Trading Association (IETA) and the World Bank Carbon Finance Group / Prototype Carbon Fund (WB PCF) published a VVM in 2003. It was developed by one of the leading DOEs. The purpose of the IETA VVM is to be an independent state-of-the-art manual owned jointly by DOEs. The IETA VVM builds on existing UNFCCC requirements, and tries to bridge ISO 14064 and the GHG Protocol in a process oriented manner.

The IETA VVM is available at : www.ieta.org/ieta/www/pages/index.php?IdSitePage=200

ISO 14064-3

Refer to chapter 4.4 for a description.

ISO 14065

Refer to chapter 4.4 for a description.

ISO 14066

Refer to chapter 4.4 for a description.



6 - Standards and GHG practitioners

Standards have an essential role to play in clarifying competencies and expectations in GHG practitioners. Apart from the academic credentials of climate scientists, most of the attention on GHG professionals has been on accrediting GHG auditors, mainly for the UNFCCC CDM and for the EU ETS, although these programmes accredit audit organizations rather than individual GHG auditors. In particular, these accreditations have not specified rigorous requirements for GHG training and competency standards for the individual GHG auditors.

In 2007, ISO published [ISO 14065](#), *Greenhouse gases – Requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition*. This document has since been augmented with the IAF Mandatory Document for the Application of ISO 14065. ISO 14064 has since been adopted in various international, national and local programmes. To complement ISO 14065, ISO is

developing ISO 14066 which is nearing publication.

ISO 14065 and 14066 have been designed primarily for auditing GHG inventories and GHG project emission reduction claims. However, demand for GHG auditing expertise is expanding into more and more areas such as corporate climate disclosure and product-level carbon labelling, which involve new expertise with financial audit and life cycle assessment.

GHG personnel certification programmes based on [ISO 17024:2003](#) *Conformity assessment – General requirements for bodies operating certification of persons* focus on competency requirements and link to specific occupational standards for different sectors, for example, technical experts are qualified based on sectoral competencies and specific job types. These certifications are in development and should acknowledge that international recognition of the certifications is needed for international programmes and trade, and to support labour mobility.



7 - Experiences with the use of ISO GHG standards

Even before publication of the ISO 14064 series of GHG standards in 2006, they were being road-tested via the quantification and auditing of projects and technologies, as well as in combination with other standards including the WRI/WBCSD GHG Protocol for Project Accounting. From these early days, the ISO GHG standards have been incorporated into a range of GHG initiatives. The essential design principles of compatibility inherent in ISO 14064 are evidenced by its versatility with leading GHG initiatives, such as the GHG Protocols for Corporate Accounting and Project Accounting, as well as the UNFCCC CDM and JI programmes.

The flexibility of ISO 14064 continues to contribute to its growing adoption. ISO 14064-1 and ISO 14064-3 are being used by The Climate Registry (an international inventory reporting programme based in the US). The Voluntary Carbon Standard (VCS) and the Climate Action Reserve (CAR) are compatible with, and make strong reference to, the ISO 14064 series of standards. ISO 14064-2 and ISO 14064-3 are incorporated into offset systems of the governments of Alberta, Saskatchewan and British Columbia

in Canada. Various national standards bodies, including the American National Standards Institute and the Standards Council of Canada are running ISO 14065 programmes and have accredited many GHG auditing organizations. Several training organizations use ISO GHG standards in training programmes and practical case studies.

ISO 14064 used for transnational accounting

The GN3 project (Multi-Gigabit European Research and Education Network and Associated Services) is a large European project involving Information and Communication Technologies (ICT) services for researchers, teachers and students in Europe. The effects of ICT and the environment, specifically GHG emissions, were calculated according to ISO 14064 across several countries.

ISO 14064-3 leads for GHG auditing

ISO 14064-3 is probably the most widely used of the ISO GHG standards, with widespread international adoption and a dominant market position in Canada and the United States.

Although ISO 14064-3 was designed specifically to complement ISO 14064-1 and ISO 14064-2 for auditing organizational and project-level GHG assertions, ISO 14064-3 is applicable to other GHG standards, such as the GHG Protocols which are used internationally. As the nascent GHG markets evolve, ISO 14064-3 has proved a useful tool for companies to build more rigorous GHG management systems to provide a range of stakeholders with more confidence to proceed with GHG activities, such as technology investments and public statements about GHG performance.

Green technology advances with ISO GHG standards

A primary seed document used in the development of ISO 14064-2 is the Government of Canada's System of Measurement And Reporting for Technologies (SMART). The documents are very similar, although SMART includes additional requirements for technology test plans and project reporting. The consistency of GHG quantification requirements between the technology level and project level enable new technologies to "re-use" GHG reporting and for project-level assertions – providing a time and cost saving to the user of ISO 14064-2. It has been applied to well over 500 projects and technologies in Canada, and approximately 50 protocols have been developed on the basis of the standard. Three of these protocols have been accepted as references for GHG standards in development by the Institute for

Electrical and Electronic Engineers. Other protocols have become references for offset protocols adopted by the Government of Alberta Offset System.

Example of an ISO-based offset system – Government of Alberta

The Government of Alberta, Canada was the first jurisdiction in North America to enact GHG regulations. Alberta regulates large emitters who are required to comply with an emission reductions cap, or requires emitters to purchase offsets or contribute to a clean technology fund to meet the cap. Alberta makes significant use of ISO 14064-2 in project offset protocols, with over 20 protocols approved to date and another 20 in development.

Institute of Electrical and Electronics Engineers (IEEE)

The IEEE is the largest technical society in the world with over 400,000 members. IEEE has initiated development of GHG standards for wind power, small hydro power and the electricity grid using protocols that are based on ISO 14064-2.

ISO 14064 in the developing world

Although the authors are not aware of any major GHG programmes or initiatives based on ISO 14064 in the developing world, more and more companies and projects located in developing countries have chosen to use the standard for their corporate activities.



8 - Meeting the demand for other GHG management standards

Introduction :

The quest for more efficient and more effective GHG standards

It is remarkable to witness the increasing interest in GHG standards over the last 10 years – dozens of GHG standards have been developed covering projects, inventories, sectors, sources, technologies and products, personnel, and assurance. As described in Chapter 3, there are many different types of GHG standards and these are often referred to by different names such as protocols, methodologies, and guidelines. Standards support an array of user needs such as technology innovation, support, investment and purchase decisions and transactions. While recognizing that there has been significant effort and progress in the development of GHG standards, there are challenges that need to be addressed to ensure the successful move to a low carbon economy, fostered by green technology innovation and efficient and effective international GHG markets. GHG standards development processes and GHG standards that do not work together can be a major challenge to

green technology innovation and the development of efficient and effective international GHG markets.

On the one hand the market needs more GHG standards, particularly to support new green technologies, and on the other, existing GHG standards should be more compatible with each other. Many GHG standards are not aligned with one another and can be inconsistent in basic terminology. This can present real challenges to stakeholders and participants. Where different GHG standards exist for the same use, this can cause uncertainty, increase costs and form barriers to trade. For example, if different GHG standards for the same project type generate different types and amounts of GHG commodities (i.e. tonnes of credits), then the GHG commodities are not fungible and can inhibit market liquidity. Therefore streamlining standards should be a key priority.

Much technical know-how and many technical experts are required to develop and implement new standards successfully. Professional standards for the new and extensive field of climate mitigation expertise will

help ensure the competence of such experts and the work they perform.

Streamlined and integrated GHG standards will help facilitate faster, better and cheaper ways to implement climate mitigation technologies and policies. Some of the proposed changes include :

1. Improving the form of GHG standards, for example, modular structures to more easily accommodate expansion of a GHG standard and enable consolidation of similar GHG standards into one
2. Improving the framework in developing and organizing GHG standards to enhance compatibility within specific types of GHG standards – e.g. organization-level standards and protocols, and across different types of GHG standards – e.g. between product-level, project-level, and organizational-level
3. Improving the GHG standards development process – e.g. consolidating similar GHG standards development efforts, coordinating GHG standards development processes that link different levels of standards (e.g. a technology standard within a project standard), and leveraging standards development tools/resources, such as online wikis and databases, enabling more and cost effective participation.

The international recognition, neutrality and compatibility of GHG policies and GHG programmes, as well as auditability of ISO GHG standards, makes a

major contribution to GHG standardization. ISO GHG standards and ISO's network with other standards development initiatives is the key to meeting the demand for more GHG standards.

Options to improve the structure of GHG standards and consolidate existing GHG standards

A GHG quantification standard – e.g. a sector standard for a specific industry or project type – often includes the following sections :

- Programme rules, such as applicability or eligibility criteria, technology types, and regulations
- General requirements, such as boundary setting or baseline determination
- Specific requirements on how to quantify each GHG emission source, and for monitoring and data management of the specific technology or parameters.

Each GHG standard may vary in these sections, for example by specifying different start dates or including different technologies and requirements for quantification, monitoring and data management. Often, several GHG standards from various GHG programmes can be applied to the same situation, such as a landfill project. Because each GHG standard specifies different rules such as eligible start dates and applicable regulations, some projects may be eligible as GHG offset projects under one standard but not under another.

Furthermore, each GHG standard will have different protocols that define the technical requirements for quantification, monitoring, data management, etc. These determine how many of the emissions reductions of an offset project can become certified emissions reductions. These differences mean that applying different GHG standards to the same project can result in significantly different GHG credit claims – one in-depth road test of several offset standard protocols showed that the amount of offsets credited to a given project can vary by a factor of two or greater. This underscores the importance of improving and standardizing project protocols so that for offset programmes and a given project type, “a tonne, is a tonne, is a tonne”. This would avoid reducing market liquidity and compromising integrity and quality.

Options to improve the framework for GHG standards

Whereas ISO has been a leader in developing a policy-neutral standard framework for the general requirements standards ISO 14064, ISO 14065, ISO 14066 and ISO 14067, a more detailed framework may be needed in the development of the hundreds of future GHG standards for products, technologies, projects, organizations and sectors. The IPCC and CDM have developed broad frameworks to help organize guidelines and methodologies. These could be good starting points for developing a comprehensive framework for all GHG standards. Developing such

a framework now could benefit the design and compatibility of new GHG standards.

GHG standards should not only be compatible among different standards of the same category (i.e. offset project standards) but also among different types of standards. For example, a green technology developer would save time if the GHG quantification requirements were the same or similar for GHG product and project standards so that the following claims could be based on essentially the same GHG calculations:

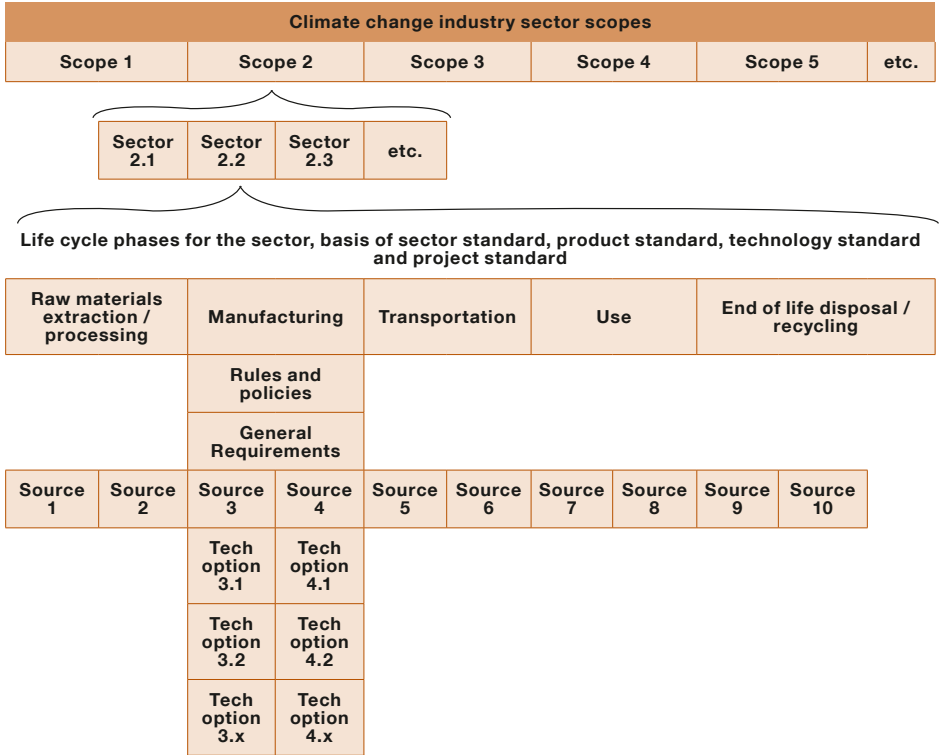
- A product label or assertion that could be “the GHG intensity or the GHG content of my green technology (or product) is X”
- A project assertion could be “emission reduction credits from using my green technology at your facility would be Y”.

To the extent practicable, compatibility in technology, product, project, organizational, sectoral or national levels should be achieved across different types of GHG standards. The following figure presents a conceptual illustration for organizing the different levels of GHG standards based on a modular structure.

Using the **Figure 3** (overleaf), a manufacturing company could quantify:

- Its GHG emissions inventory and the change in GHG emissions resulting from the installation of a different technology option as an internal project, or as an external/offset project

Figure 3: GHG standards based on a modular structure



- The GHG emissions associated with each stage in the life cycle of a product, as well as GHG emissions from a full LCA, to compare with other products.

Also based on the same figure, governments could quantify sectoral GHG emissions and track the GHG benefits from the funding and support of a new green technology. Generally, government technology R&D funding programmes are challenged to determine the GHG efficacy of their spending. A series of GHG standards and a framework could make it easier to provide

this valuable information, and enable these programmes to direct their funding more wisely on the basis of GHG returns per dollar spent. Governments could also coordinate discussions on setting sectoral targets within the international context of climate negotiations. In addition, a green technology entrepreneur could more credibly explain to an investor the GHG benefits of a green technology for a particular buyer (e.g. the manufacturing company), and also quantify the potential improvements to the GHG content for a GHG product label.

Options to improve the GHG standards development process

There are many processes in the development of GHG standards, protocols and methodologies. They can be grouped according to the different types of GHG standards, including:

- *Organizational level standards* published by ISO, plus the WBCSD WRI GHG Protocol Initiative, The Climate Registry, and governments specifying facility level requirements
- *Product level standards* published by ISO, plus the GHG Protocol Initiative and the UK Carbon Trust/BSI
- *Project level standards* published by ISO, the CDM, the GHG Protocol Initiative, Climate Action Reserve (CAR), Voluntary Carbon Standard (VCS), and many governments
- *Carbon disclosure standards*, e.g. the Climate Disclosure Standards Board and the Climate Change Reporting Framework for corporate climate disclosure
- *Sectoral level standards* such as the International Performance for Measurement and Verification Protocol (for energy efficiency), the Institute of Electrical and Electronic Engineers (IEEE), and the Founders Societies Carbon Management Initiative (including AIChE, ASCE, ASME, AIME, and IEEE)
- *Technology level standards* such as the US EPA's GHG Technology Verification Center.

Table 2 (page 47) summarizes the GHG standards development processes related to GHG projects, indicates who develops and reviews them, identifies opportunities for public comment, and lists standards lifetimes. Often, more than one standards development team can be involved in developing similar standards – and there are many of the same type of GHG standard on the market.

Coordination of GHG standards development efforts can avoid the production of multiple conflicting standards – especially as there are limited resources (e.g. experts, funds, time) to develop them. It is an inefficient use of such resources when so many processes work in parallel on essentially the same product.

In addition to consolidating (as appropriate) GHG standards development to ensure efficient use of limited resources, coordinating standards development processes across related standards can improve their effectiveness in the best interest of users. For example, a sector specific GHG standard that accounts GHG emissions for specific technologies is linked to the standards for the technology – e.g. metering, calibration, maintenance, data processing, etc. The development of a standard for a new green technology could be coordinated with that of the higher level standard within which the technology standard is a “module”. This coordination helps ensure the standards work together and could help speed to market the standards, the green technologies and the GHG commodities thus created.

Access to, and participation in, the standards development process is often hindered by lack of funding, inability to take time away from work, and limited access to resources and experts. Some processes may not be transparent to some stakeholder groups, which in turn limits understanding and acceptance. To overcome these limitations, the standards development effort could be improved by use of online wikis, databases and other information and communication technologies.

Formal international standards, at the national, regional and international levels, are an established and proven approach to address technological and emerging global challenges. Private standards, such as those from the ICT, retail and agri-food sectors, and those dealing with social and environmental issues, can successfully address a multitude of stakeholder-driven priorities. Any organization may claim to have developed a “standard” and may subsequently establish a certification/marketing/labelling scheme that demonstrates conformance to such a “standard.” However, not all standards are created equal.

World Trade Organization (WTO) disciplines for the use of standards as the basis for regulatory measures demand that “international standards” be developed by designated organizations in the case of the Sanitary and Phytosanitary (SPS) Agreement or according to principles for international

standards development – as in the case of the Technical Barriers to Trade (TBT) Agreement. Formal international standards, such as those from ISO and the International Electrotechnical Commission (IEC), follow such principles and are conventionally not considered “private standards”. It is therefore urged that a distinction be made between international standards which use principles for international standards set out in the WTO agreements and disciplines established through acceptance of the Code of Good Practice, and other standards that may be described as private standards, not having adhered to these WTO principles and disciplines.

The existence of a growing number of private standards in such fields as ICT, agri-food and on social and environmental issues, may ultimately confuse users and consumers, thereby diminishing their important market, safety, social or environmental effect. In addition, claims of conformity, using potentially inconsistent methodologies for their assessment, may also undermine the intended impacts of such private standards. In the end, coherence, harmonization and a closer level of cooperation between the developers of private standards and the formal international standards system needs to occur. Ultimately, the goal of “one international standard, one test, and one certificate” should be pursued in these domains in order to achieve global acceptance, as well as their intended impacts.

Table 2: Summary of GHG standards development processes

Programme	Developed by	Expert review	Public Input	Lifetime	Key resource
Canada's Offset System	External protocol developer	Average 3-6 experts for technical review	Posted online for 30 days for review/ commenting	No expiration	www.ec.gc.ca/creditscompensatoires-offsets/default.asp?lang=En&n=7CAD67C6-0
Climate Action Reserve (CAR)	CAR or external protocol/project developer, CAR working group	Multistakeholder experts included in working group	Posted online for public review/ commenting	No expiration	www.climateactionreserve.org/how/program/program-manual
Government of Alberta	External protocol/project developer (facilitated through Climate Change Central)	Multistakeholder expert technical review prior to stakeholder and public review	Posted online for public review/ commenting	No expiration	www.carbonoffsetsolutions.ca
Institute of Electrical and Electronics Engineers (IEEE)	IEEE working group	IEEE members in working group	Working group open to public for development process, open process allows for public comment at all times	5 years (2 years for trial)	http://standards.ieee.org/resources/development/index.html
ISO	ISO working group and technical committee	ISO members in working group and reviewed by all ISO member bodies	Public input from stakeholders through member bodies	No expiration	www.iso.org/iso/standards_development/processes_and_procedures/how_are_standards_developed.htm
UNFCCC Clean Development Mechanism (CDM)	External methodology/project developer, CDM working group	2 experts from roster for large scale and A/R projects, 1 expert for small scale projects	Posted online for public review/ commenting	No expiration	http://cdm.unfccc.int/Projects/pac/howto/CDMProjectActivity/NewMethodology/index.html
Voluntary Carbon Standard (VCS)	Accepts CDM approved methodologies, or by external methodology developer	Double validation process by an accredited validation body (must be accredited in the specific sector and at least one of the validators must have completed a minimum of 10 validations/ assessments)	Posted online for 30 days for review/ commenting	No expiration	www.v-c-s.org/docs/VCS%20Program%20Normative%20Document%20-%20Double%20Approval%20Process.pdf?3671243264



9 - The road ahead for GHG standards

The demand for GHG standards will continue to increase as more governments, businesses, and citizens take action to protect the global climate. Many different types of standards, such as quantification, auditing, disclosure, labelling, training, and professional certification will be needed to support a transition to a low carbon world. The ISO GHG standards series is internationally recognized for its programme neutrality, compatibility and auditability. These key features build a foundation for the continued development of GHG standardization. ISO's GHG standards and its collaboration with other standards development initiatives serve as a vital network to help meet the demand for new GHG standards.

Emerging GHG standards

As the response to climate change evolves beyond the more traditional areas of GHG inventory and offset project verification, there will be a growing focus on developing GHG standards to address new areas, such as:

1. Product-level and supply chain accounting, for example, ISO 14067, WRI/WBCSD GHG

Protocol for Product/Supply Chain Accounting.

2. Corporate disclosure, for example, the Carbon Disclosure Standards Board Reporting Framework in response to the needs of investors and the financial industry.
3. Professional and personnel standards, for example, ISO 14066, supplemented by additional competency requirements for practitioners in specific sectors (e.g. agriculture, energy efficiency) and function (e.g. accounting, auditing, management). Professional codes of conduct and supporting policies and requirements are also being developed by, for example, the Greenhouse Gas Management Institute.
4. Verification standards, for example, sector-specific verification standards to improve verification while reducing costs, and at the general level by the accounting profession.

Improving GHG standards

Although considerable progress has been made in the area of GHG standardization, several challenges remain. New GHG standards should focus on quality, compatibility, efficiency and

minimizing costs to meet the needs of markets, policy makers and regulators. The following reforms will be needed to meet the demand for robust new GHG standards:

1. Improving the structure of GHG standards: modular structures make a standard more flexible and enable easier expansion when new technologies or policies become available. A modular structure also allows for easier consolidation with similar GHG standards
2. Improving the framework in which GHG standards are organized and developed to enable greater compatibility both within specific categories of GHG standards, e.g. organization-level standards, and across different categories of GHG standards, e.g. product-level standards
3. Improving the GHG standards development processes by coordinating and linking different levels of standard, consolidating similar GHG standards development efforts, (e.g. a technology standard within a project standard), and leveraging standards development tools and resources, such as online wikis and databases, to enable broader and cost-effective participation.

Linking green technologies to GHG markets

Green technologies are poised to become the basis of the new economy,

saving energy, reducing local air pollution, creating new jobs and enabling companies to become more competitive. Standards will play a vital role in quantifying and communicating the benefits of these new technologies. However, many new green technologies have not been integrated with existing GHG standards. New technology developers therefore often lack the tools to effectively promote the climate benefits of their new products. Recognizing the important role green technologies play in creating a climate safe world, new GHG standards are needed to help advance new green technologies and enable their fast and efficient uptake.

Supporting the professionalization of GHG practitioners

As GHG markets continue to evolve and expand, the demand for well trained professionals will also continue to grow. There is a profound need to develop training and other forms of capacity building, e.g. apprenticeships, to meet this demand in areas such as GHG auditing offset project implementation and technology development. Emerging GHG training organizations and programmes should be accredited by a recognized standardization organization so that students can graduate with officially recognized degrees or certificates. Some training organizations, such as the Greenhouse Gas Management Institute, already exist, however many more training programmes that teach

the “tools of the trade” need to be developed. Also, such training programmes should be available on all continents, tailored to the specific needs of each geographic region. Within the currently limited GHG training sector, there is a need for “train the trainer” programmes to elevate the quality and expand the accessibility of experts. Investing in an accredited and well-linked training and professional infrastructure for GHG management practitioners will not only offer many new job opportunities, but also help foster a smooth transition to a low carbon economy.

Facing the climate challenge

The climate crisis is an urgent call to action on a global scale. Human societies must learn to live within the boundaries of the Earth’s resources.

Current climate science suggests that global GHG emissions must decline by as much as 80% by 2050 to avoid unacceptably high risks of significant impacts from climate change. To achieve this goal, we must dramatically transform how we produce and use energy, manage land, and value the climate in our economic system. As climate change is linked to many issues, GHG management standards should be linked with other programmes and standards that address issues such as water management and social governance. Such a transition will require far-reaching local, national and international policies, with support and participation by businesses and communities. Standards will play an important part in helping to ensure a fast and efficient transition to a climate safe and sustainable world.



10 - Glossary

Additionality

The principle that only those projects that would not have happened anyway should be counted for carbon credits.

Annex 1 Countries

The 36 industrialized countries and economies in transition listed in Annex 1 of the UNFCCC. Their responsibilities under the Convention are various, and include a non-binding commitment to reducing their GHG emissions to 1990 levels by the year 2000. See also non-Annex 1 Countries.

Annex B Countries

The 39 emissions-capped industrialized countries and economies in transition listed in Annex B of the Kyoto Protocol. Legally-binding emissions reduction obligations for Annex B Countries range from an 8% decrease to a 10% increase (Iceland) on 1990 levels by the first commitment period of the Protocol, 2008 to 2012.

Annex 1 or Annex B ?

In practice, Annex 1 of the Convention and Annex B of the Protocol are used almost interchangeably. However, strictly speaking, it is the Annex 1 Countries that can invest in JI / CDM projects as well as host JI projects, and non-Annex 1 Countries that can host CDM projects, even though it is the Annex B Countries that have the emission reduction obligations under the

Protocol. Note that Belarus and Turkey are listed in Annex 1 but not Annex B; and that Croatia, Liechtenstein, Monaco and Slovenia are listed in Annex B but not Annex 1. (Source : www.cdmcapacity.org/glossary.html)

Anthropogenic greenhouse gas emissions

Humans emit greenhouse gases (GHGs) and other warming agents into the atmosphere through burning of fossil fuels, industrial and agricultural processes, and deforestation. These anthropogenic emissions raise the concentrations of these gases in the atmosphere, contributing to climate change.

Assigned Amount Unit (AAU)

A tradable unit, equivalent to one metric tonne of CO₂ emissions, based on an Annex 1 Country's assigned carbon emissions goal under the Kyoto Protocol. AAUs are used to quantify emissions reductions for the purpose of buying and selling credits between Annex 1 Countries.

Atmospheric greenhouse gas concentrations

Atmospheric concentrations of GHGs are usually expressed in parts per million (ppm) or parts per billion (ppb). For example, atmospheric CO₂ emissions have risen

from approximately 280ppm to 385ppm in the last 250 years. To ascertain the atmospheric concentration of a particular GHG, we can either directly measure it by taking air samples, or use a model to calculate it.

Baseline scenario

A hypothetical description of what would have most likely occurred in the absence of a proposed offset project.

Boundary (for GHG assessment)

Encompasses all the primary emissions and sinks, and significant secondary emissions and sinks, associated with the GHG project.

Cap-and-trade

A cap-and-trade system involves trading of emission allowances, where the total number of allowances is strictly limited or “capped”. Trading occurs when an entity has excess allowances, either through improvements made, and sells them to an entity requiring allowances because of growth in emissions or an inability to make cost-effective reductions.

Carbon dioxide equivalent (CO₂e)

A measure of the global warming potential of a particular GHG compared to that of carbon dioxide. One unit of a gas with a CO₂e rating of 21, for example, would have the global warming effect of 21 units of carbon dioxide emissions (over a time frame of 100 years).

Carbon credit

Used interchangeably with the term carbon offset.

Carbon offset

A credit for negating or diminishing the impact of emitting a tonne of carbon dioxide by paying someone else to absorb or avoid the release of a tonne of CO₂ elsewhere.

Certified Emissions Reductions (CERs)

Tradable units issued by the UN through the Clean Development Mechanism for emission reduction projects in developing countries. Each CER represents one metric tonne of carbon emissions reduction. CERs are categorized by the year, or vintage, in which they are generated. CERs can be used by Annex 1 Countries to meet their emissions goals under the Kyoto Protocol.

Compliance market

The regulated market for carbon credits (specifically CERs, EUAs, AAUs, and ERUs) used to reach emissions targets under the Kyoto Protocol or the EU ETS. Also called the regulated or mandatory market.

Conference of Parties (COP)

The meeting of parties to the United Nations Framework Convention on Climate Change.

Crediting period

The period during which a mitigation project can generate offsets.

Designated Operational Entity (DOE)

An independent auditor, accredited by the CDM Executive Board, which validates CDM project activities, and verifies and certifies emission reductions generated by such projects.

Emission Reduction Units (ERUs)

A tradable unit, equivalent to one metric tonne of CO₂ emissions, generated by a Joint Implementation (JI) project and used to quantify emissions reductions for the purpose of buying and selling credits between Annex 1 Countries under the Kyoto Protocol.

Emissions trading

A provision of the Kyoto Protocol that allows Annex 1 Countries to trade emission reduction credits in order to comply with their Kyoto-assigned reduction targets. This system allows countries to pay and take credit for emissions reduction projects in developing countries, where the cost of these projects may be lower, thus ensuring that overall emissions are lessened in the most cost-effective manner.

Environmental integrity

Environmental integrity is used to express the fact that offsets need to be real, not double-counted, and additional in order to deliver the desired GHG benefits. The term should not be confused with “secondary environmental benefits” which is used to describe the added benefits an offset projects can offer (e.g. air pollution reduction and protection of biodiversity) in addition to emissions reductions.

European Union Allowance (EUA)

Tradable emission credits from the European Union Emissions Trading Scheme. Each allowance carries the right for the holder to emit one tonne of carbon dioxide.

Ex-ante

Ex-ante refers to offsets that are sold before the emissions reductions have occurred.

The exact quantities of the reductions are therefore uncertain.

Ex-post

As opposed to ex-ante offsets, ex-post reductions have already occurred when the offsets are sold and their quantities are certain.

Greenhouse gases (GHGs)

Gases that contribute to climate change. Those named in the Kyoto Protocol include carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆). Not all global warming causing molecules are gases (e.g. soot and other particulates). Usually these are referred to as warming agents. For the sake of simplicity, we use the term greenhouse gases (GHGs) to refer to all warming agents.

Issuance

Issuance of CERs refers to the instruction by the Executive Board to the CDM registry administrator to issue a specified quantity of CERs for a project activity into a pending account in the CDM registry.

Kyoto Mechanisms

The three flexibility mechanisms that may be used by Annex I Parties to the Kyoto Protocol to fulfill their commitments through emissions trading (Art. 17). They include the Joint Implementation (JI, Art. 6), Clean Development Mechanism (CDM, Art. 12) and trading of Assigned Amount Units (AAUs).

Kyoto Protocol

An international treaty that requires participating countries to reduce their

emissions by 5% below 1990 levels by 2012. The protocol, developed in 1997, is administered by the Secretariat of the UN Framework Convention on Climate Change. Learn more at <http://unfccc.int>.

Leakage

Leakage occurs when activities that reduce GHG emissions (or increase carbon in plants and soils) in one place and time result in increases in emissions (or loss of soil or plant carbon) elsewhere or at a later date. For example, a steel firm in a country covered by the Kyoto Protocol makes reductions by closing one facility and replacing its output with production from a steel plant operating in another country that does not have a GHG constraint. Similarly, a forest can be protected in one location and cause harvesting of forests elsewhere.

Monitoring

Project developers are required to maintain records measuring the emission reduction achieved during the operation phase. Emission reductions are issued based on the monitoring report.

National communications

Parties to the UNFCCC Convention must submit national reports on implementation of their climate change measures. The core elements of the national communications for both Annex I and non-Annex I Parties are information on emissions and removals of GHGs, and details of the activities a party has undertaken to implement the Convention. National communications usually contain information on national circumstances, vulnerability assessment, financial resources and transfer of technology, and

education, training and public awareness; but those from Annex I Parties additionally contain information on policies and measures. Annex I Parties that have ratified the Kyoto Protocol must include supplementary information in their national communications, and their annual inventories of emissions and removals of GHGs, to demonstrate compliance with the Protocol's commitments. Annex I Parties are required to submit information on their national inventories annually, and to submit national communications periodically, according to dates set by the COP. There are no fixed dates for the submission of national communications of non-Annex I Parties.

Non-Annex 1 Countries

A group of mostly developing countries which have not been assigned emissions targets under the Kyoto Protocol and which are recognized by the UNFCCC as being especially vulnerable to the effects of climate change. See also **Annex 1 Countries**. Learn more at: http://unfccc.int/parties_and_observers/items/2704.php.

Non-Regulated Market

See **Voluntary Market**.

Offsets

Offsets designate the emission reductions or removal enhancements from project-based activities that can be used to meet compliance – or corporate citizenship – objectives vis-à-vis GHG mitigation targets.

Permanence

The longevity of a carbon pool and the stability of its carbon stocks within its management and disturbance environment.

Primary market

The exchange of emission reductions, off-sets, or allowances between buyer and seller, where the seller is the originator of the supply, and where the product has not been traded more than once.

Project boundary

The project boundary encompasses all anthropogenic emissions from sources of GHG under the control of the project participants that are significant and reasonably attributable to the project activity.

Registration

The formal acceptance by an offset programme authority of a validated project activity as an offset project activity.

Renewable Energy Certificates (RECs)

A Renewable Energy Certificate represents a unit of electricity generated from renewable energy with low net GHG emissions. One REC represents 1 megawatt-hour.

Retirement

Retirement of offset refers to offsets that are taken out of the market. Retired offsets can no longer be traded.

Secondary market

The exchange of emission reductions, off-sets, or allowances between buyer and seller where the seller is not the originator of the supply and the transaction

represents a secondary trade in the particular product.

Start date

For a CDM project, the start date of a CDM project activity is the earliest date at which either the implementation or construction or real action of a project activity begins (UNFCCC, 2007).

Validation

The assessment of an offset project's Project Design Document, which describes its design, including its baseline and monitoring plan, by an independent third-party against the requirements of a specific standard, before the implementation of the project.

Verification

The act of checking or testing by an independent and certified party to ensure that an offset project actually achieves emission reductions commensurate with the credits it receives.

Verified or Voluntary Emission Reductions (VERs)

Reductions that, unlike CERs, are sold on the voluntary market. VERs are linked neither to the Kyoto Protocol nor to the EU ETS. VERs are sometimes referred to as Voluntary Emissions Reductions.

Voluntary Market

The non-regulated market for carbon credits (especially VERs) that operates independently from Kyoto and the EU ETS. Also called the Non-Regulated Market.



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