Australian Government
Department of Climate Change and Energy Efficiency

NATIONAL INVENTORY SYSTEMS OVERVIEW

Australian National Greenhouse Accounts

National Inventory

The Australian National Greenhouse Accounts — a series of four reports which together form a comprehensive inventory of the nation's greenhouse gas emissions — are published annually by the Department of Climate Change and Energy Efficiency. ***The national inventory forms the foundation for Australia's efforts to address climate change.*** By identifying and reporting emissions sources and sinks, and changes in these over time, the inventory provides information fundamental to the development of domestic mitigation policies and programmes, while also tracking Australia's progress towards meeting international obligations.

International Framework

The national inventory is prepared according to the framework of rules supporting the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. All parties to these agreements must use the UNFCCC *Reporting Guidelines on Annual Inventories* and the supplementary reporting requirements under the Kyoto Protocol to prepare their national inventories. These guidelines establish standardised reporting formats and require detailed information on all aspects of each party's National Inventory System, including measurement systems, data collection systems, estimation methodologies, reporting and data management.

To ensure consistency and comparability between the inventories of different countries, emissions must be estimated using the methods described by the Intergovernmental Panel on Climate Change (IPCC). Currently parties must implement the *IPCC Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories* (2000) and *Good Practice Guidance on Land Use, Land Use Change and Forestry* (2003). Parties may also use country-specific methodologies where these are consistent with the IPCC guidelines and improve the accuracy of emissions estimates. Australia predominantly uses country-specific methodologies and emissions factors, described in detail in the *National Inventory Report.*

The Australian National Greenhouse Accounts

The four reports comprising the Australian National Greenhouse Accounts are:

- The *National Greenhouse Gas Inventory — Accounting for the Kyoto Protocol*
- *The National Inventory Report, Volumes 1-3 — The Australian Government Submission to the UNFCCC*
- *State and Territory Greenhouse Gas Inventories*
- *National Inventory by Economic Sector*

The National Greenhouse Accounts are produced within a national framework designed to create a ***nested set of integrated accounts — facility-level, company, industry, State and Territory and national.*** Estimation methodologies are consistent across each of these dimensions to ensure that changes in emissions at each level are captured efficiently and accurately across the accounts.

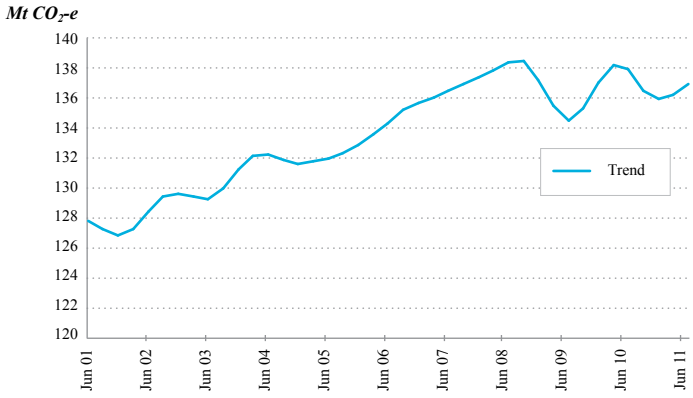
Figure 1:

Integrated greenhouse gas accounting — emissions estimations at each level must be in aggregate, equal to the level above

Quarterly updates of the inventory are released to ensure timely information for policy makers and markets. The most recent release, 1 November 2011, indicated that emissions have been largely unchanged over the last twelve months due to a coincidence of climatic conditions (high rainfall increasing hydroelectricity generation, cool summer and floods in coal mining basins).

Figure 2:

National Inventory, quarterly seasonally adjusted trend emission estimates



Gases

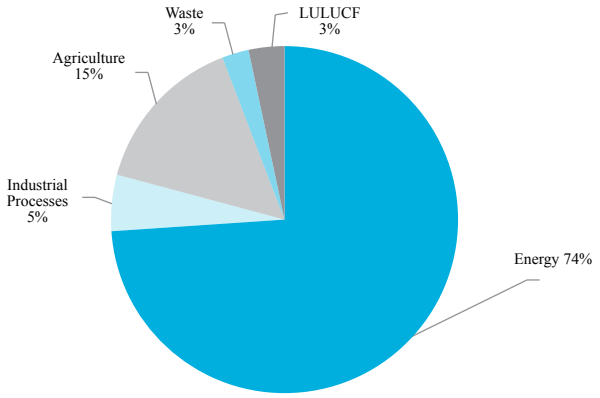
In accordance with the Kyoto Protocol the National Inventory reports cover sources of greenhouse gas emissions and removals by sinks resulting from human activities for the major greenhouse gases — carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6).

Sources

Emissions and removals are reported under six sectors defined by the IPCC. These represent the main human activities that contribute to the release or capture of greenhouse gases into or from the atmosphere — energy use and extraction of fossil fuels, industrial processes, solvent and other product use, waste, agriculture and land use, land use change and forestry (LULUCF). The relative contributions of each of these sectors to Australia's total emissions in 2009 is summarised in Figure 3.

Figure 3:

Australia's 2009 emissions profile as reported under the Kyoto Protocol



Data Sources

A broad range of independent public and private institutions contribute data to DCCEE to aid in the estimation of national emissions. The *National Greenhouse and Energy Reporting Act 2007* requires companies to report facility-level emissions data if their energy production, energy use, or greenhouse gas emissions are above certain thresholds. Rules for the estimation of emissions by companies are specified by the *National Greenhouse and Energy Reporting (Measurement) Determination 2008.* This data was first used to inform the 2009 national inventory (published in 2011). Data reported under NGERs will also be used as the basis for the estimation of the obligations of companies under a new, broadly based carbon price to be introduced from 1 July 2012.

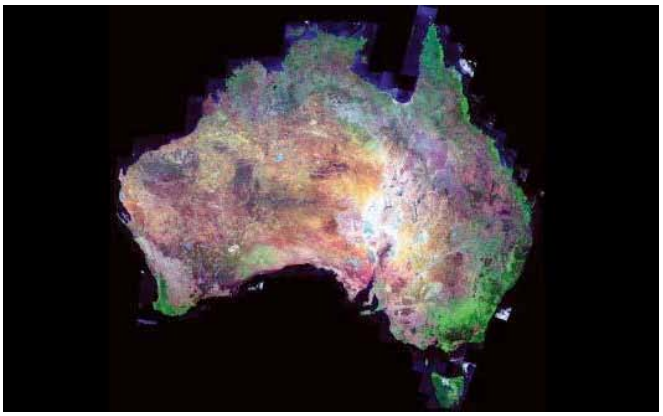
For the *energy, industrial processes* and *waste* sectors, company NGERs reports are supplemented by data from Australia's principal statistics agencies: the Australian Bureau of Statistics (ABS) and the Bureau of Resources and Energy Economics (BREE). State and Territory agencies supply solid waste collection data and estimates of HFCs use are sourced under compulsory reporting rules established by the *Ozone Protection and Synthetic Greenhouse Management Act 2003.*

ABS also provides data on livestock numbers and crop production for the *agriculture* sector.

Extensive remote sensing data coupled with information on land management, climate and soil type provide the initial inputs for emissions estimation from the *land use, land use change and forestry* sector. Satellite data comes from the Landsat Program, a series of Earth-observing satellite missions, jointly managed by NASA and the U.S. Geological Survey. Landsat satellite data is obtained from Geoscience Australia and processed by private companies using methods developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO). CSIRO also provides comprehensive data on land management practises. Monthly climate maps at 1 km resolution are provided by the Bureau of Meteorology and data on soil type comes from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) and from State agencies.

Figure 4:

Satellite images are used to monitor changes in forest cover



Software Systems

Australian Greenhouse Emissions Information System (AGEIS) and the Full Carbon Accounting Model (FullCAM)

Underpinning preparation of the national inventory are two software systems for centralising data management, emissions estimation and reporting — the Australian Greenhouse Emissions Information System (AGEIS) for the *energy, industrial processes, waste* and *agriculture* sectors, and the Full Carbon Accounting Model (*FullCAM*) for *Land Use, land use change and forestry.*

FullCAM utilises the data processed from satellite imagery, in combination with the other input data on land management, climate and soil, and applies ecosystem models to estimate the flow of carbon dioxide between the atmosphere and the different carbon pools of the land sector. The results of *FullCAM* are added to the AGEIS to produce annual totals for emissions and removals for the national inventory reports.

The AGEIS applies Australia's estimation methodologies to input data to produce emissions estimates, integrates quality control procedures into the compilation process, archives final estimates and transmits data to the UNFCCC through the UNFCCC Common Reporting Format (CRF) Reporter software.

Inventory Review and Improvement

The Australian inventory is supported by a set of institutional arrangements designed to ensure transparency, accuracy and timely improvement of all systems in response to new policy, research or technical advances.

All methods and data used in preparation of the inventory are described in detail in the *National Inventory Report* and published on the Department of Climate Change and Energy Efficiency (DCCEE) website. Detailed emissions estimates are accessible via the online version of the AGEIS, an interactive emissions database www.ageis.climatechange.gov.au.

Prior to its release the inventory is reviewed by the *National Greenhouse Gas Inventory Committee*, which includes representatives of the Australian, State and Territory governments and CSIRO. DCCEE seeks independent expert advice on the national inventory through the *National Inventory User Reference Group,* comprised of representatives of stakeholder groups who review the national inventory report prior to its release and provide ongoing advice on inventory improvement. Beginning in 2012 the inventory will also be published for public comment prior to submission.

After submission to the UNFCCC, the ***inventory is reviewed annually by a panel of independent international experts.*** The review report is published on the UNFCCC website.

In order to improve the accuracy and reduce uncertainties associated with inventory estimates, all aspects of the national inventory systems are subject to a process of continual review and update as outlined in the *National Inventory Systems Improvement Plan.* Each year, DCCEE reviews the inventory's selection of methods, all model parameters and emissions factors, and model structures to determine whether any of these should be updated to improve inventory accuracy. The key drivers of improvement include newly available empirical literature, changes in international guidelines or practice, changes in domestic policy and the findings of quality control and assurance reviews.

Need more information? ***http://www.climatechange.gov.au/emissions***