



CCRSPI

CLIMATE CHANGE RESEARCH STRATEGY FOR PRIMARY INDUSTRIES



The Australian pork industry: Understanding climate change impacts

What is climate change?

The term 'climate change' refers to changes in long-term trends of environmental factors such as temperature and rainfall. These changes can be due to natural variability, or can be as a result of human activity from increased levels of greenhouse gas (GHG) emissions in the atmosphere, such as carbon dioxide (CO₂), nitrous oxide (N₂O) and methane (CH₄).

Climate change poses specific challenges for Australia's primary industries, with mounting public concern and media scrutiny about the way food is grown and distributed through markets, increasing domestic and international legal and regulatory pressures to reduce GHG emissions, and natural changes affecting biophysical conditions. The social consequences of these challenges are also significant, and directly affect growers, farming families, local businesses and regional communities.





Are pork producers affected by climate change?

Pork farmers have been experiencing the impacts of climate change over a long period, primarily through drought and climate variability. Long-term drought conditions have caused feed shortages, reduced water availability and affected the costs of other farm inputs such as bedding material. Climate change is projected to extend the duration of 'dry periods', and further exacerbate the effects of drought, while also increasing the variability of rainfall patterns and the frequency of severe weather events.

These factors mean that climate change will continue to influence the way pigs are farmed in Australia, with specific impacts reflecting local conditions. Integrated producers and processors may face new compliance costs, including:

- reporting requirements for electricity and water consumption,
- carbon labelling,
- marketing requirements and labelling standards in export destinations.

The pork industry has identified several key issues on its transitional pathway to becoming a 'climate wise' primary industry.

- Increased climate variability will further increase volatility of the feed grain market, reducing available supplies in Australia and lifting average prices.
- Ongoing government assistance for the Australian biofuel industry may continue to artificially inflate demand for already reduced grain supplies.
- Rising grain prices will eventually lead to increasing food prices for consumers.
- Rising fuel and energy costs that could result from emissions trading will, if passed up the supply chain, further increase cost of production and reduce profit margins.
- From the commencement of the Carbon Pollution Reduction Scheme (CPRS) in 2011, abattoirs and processing facilities, which are not eligible for government financial assistance and are affected by the Scheme, may pass their increased cost of production to primary producers in the form of lower farm gate prices for pigs. In combination with rising cost of production, this drop in farm gate prices may further reduce profit margins for pork farmers.



- Shrinking profit margins may reduce competitiveness in the domestic and international market. Other than New Zealand and Australia, no other country has proposed including agriculture in an emissions trading scheme. This means the competitiveness of Australian pork in relation to imports and international markets may be further reduced.

What are the sources of emissions from pork production?

Most of the GHG emissions associated with pork production relate to on-farm emissions of CH₄ from effluent lagoons and NO₂ following land application of waste products. In the Australian Government Department of Climate Change's CPRS Green Paper⁽¹⁾, the Australian pork industry is cited as the seventh biggest GHG emitter per unit of revenue.

1. www.climatechange.gov.au/greenpaper/report/pubs/greenpaper-appendixd.pdf

However, the relative share of national GHG emissions (excluding deforestation) produced by the pork industry is significantly smaller than other agricultural sectors — sheep (3.4%), dairy cattle (2.7%), beef cattle (11.2%) and (0.4%).

If it is decided that agriculture is covered under the CPRS (or the 'Scheme') from 2015, additional costs for pork farmers could arise from measuring and reporting on-farm emissions, as well as complying with the regulatory and administrative processes required to manage Scheme obligations within the supply chain. There will also be direct costs from purchasing emission permits. The price for permits will depend on a number of factors, including the national emission trajectory, Scheme coverage and international linking, and the costs of emission reduction opportunities. The exact costs will depend on future policy decisions, and which producers are 'covered' under the Scheme (based on their total emission levels and the emissions threshold set by government).

Photos from left: APL (pig), LWA's National Program for Sustainable Irrigation (sheep) and Alison Pouliot (cattle).



Will the CPRS affect pork production?

The CPRS is considered by the Australian Government to be the best way to limit carbon pollution. It will be introduced in Australia from 1 July 2011. Under the proposed Scheme, an Emissions Intensive Trade Exposed industry is eligible for 60% of its initial carbon permits for activities that are moderately emissions intensive. However, the decision to include agriculture as a sector in the CPRS will not be known until 2013, and there will be no obligations for agriculture (and the pig industry) until 2015.⁽²⁾ In the short term, the effects of the National Greenhouse Energy Reporting System and the introduction of the CPRS in 2011 will put significant pressure on pork farming due to its dependence on fuel and energy, both factors that are affected by emissions trading.

2. For more information on industry assistance and the CPRS go to the Department of Climate Change website — www.climatechange.gov.au/whitepaper/measures/pubs/factsheet_support.pdf or go to www.australianpork.com.au

Which greenhouse gas emissions will be measurable?

Methane (CH₄) and nitrous oxide (N₂O) are the two gases that may need to be measurable for the pig industry under the CPRS. The Scheme will include all GHGs identified in the Kyoto Protocol including carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), sulphur hexafluoride (SF₆), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs). Actual emissions of different gases are multiplied by their global warming potential to give a value for the mass of emissions in carbon dioxide equivalent (CO₂-e). Current policy discussions are trying to establish where emissions should be measured in the value chain (that is, where the 'point of obligation' for measurement and reporting falls).

Concern has been expressed at the potential cost of measurement on-farm. Other possible options include using 'proxies' that are given a set emissions level (for example, assuming a set amount of emissions for a set area of land), rather than actually measuring the emissions themselves. Identifying a cost effective and efficient measurement regime remains an ongoing challenge.



What impact will a CPRS have on Australian pig production if agriculture is covered?

The Australian Farm Institute has modelled direct and indirect impacts of the CPRS on the pork industry.

Direct impacts

- By 2030, emissions permit costs are projected to account for 5.5% of the farm gate price for pork. These costs could not be easily passed on to consumers and so would be borne by the producer.
- By 2030, the farm gate price for pork is projected to rise by 1.7%, while the farm gate price of permit costs is projected to fall by 3.9% relative to business as usual. At a commodity level, the consequence of this is reduced production and income.
- By 2030, pork production is projected to fall from its business as usual scenario level by 4.5%.
- By 2030, the gross value of pork production is projected to fall by 10.44% or \$318.2 million. This will be as a result of the combined impact of falling net prices (farm gate prices net of permit costs) and production.

The Australian Bureau of Agricultural and Resource Economics, the Centre for International Economics and the Rural Industries Research and Development Corporation have also published modelling of the impact of the CPRS on Australian agriculture and this can be accessed from Australian Pork Limited's website at www.australianpork.com.au

Indirect impacts

- By 2050, electricity prices are projected to be 28 to 32% above baseline level in 2030, and 45 to 51% above baseline level.
- By 2050, the price of petroleum and coal products is projected to increase by 20 to 22%, while the gas price will be 4 to 5% above business as usual.
- By 2050, fertiliser prices are projected to increase 7.6 to 8.5% above baseline level in 2030, and 18.7 to 20.8% above baseline level.
- By 2050, transportation prices are projected to increase by 4.6 to 5.3% from business as usual levels in 2030. Transportation prices are projected to rise 8.7 and 9.9% respectively from the business as usual level.

(SOURCE: AUSTRALIAN FARM INSTITUTE, FEBRUARY 2009)



How can the pork industry adapt to climate change?

Accepting that climate change is real, and that the pork industry must mitigate impacts and adapt to new operational environments, is driving investment in knowledge, research and skills development. The pork industry through Australian Pork Limited (APL) and the Pork Cooperative Research Centre, has a history of such investment, particularly in reducing GHG emissions from pig production.

Available on-farm technologies and industry best management practices (BMPs) enable pork farmers to proactively manage and reduce GHG emissions from their farming operations. Some examples of the existing mitigation and adaptation techniques being used by pork producers are:

3. See *Climate Change Update: On-farm bioenergy in the pork industry* — www.australianpork.com.au

- Advanced manure management that results in generation of methane gas, which can be captured and used for steam and/or electricity generation.⁽³⁾
- Pollution prevention through improved pig diet formulation to minimise nutrient content in manure.
- Uptake of on-farm environmental risk management including a holistic approach to efficient use of farm inputs, waste minimisation and beneficial reuse of wastes.
- Application of industry BMPs to minimise nitrous oxide emissions from application of manure and effluent on agricultural soils.
- Soil carbon storage and reduced methane emissions from stubble burning.
- Advanced building designs (for example, solar cooling and modular pig shelters) and pig transportation systems.
- Implementation of environmental management systems and on-farm audit tools.



APL is also funding other research projects to analyse how Australian pork producers can further minimise the impact of production on the environment. Some of these projects include:

- Developing an understanding of the sources of GHGs in the pork life cycle. This project is investigating how emissions vary depending on the production system, the effects of different climatic conditions and how emissions reduction measures, such as improved waste management and bioenergy production, can reduce emissions.



- Understanding the effects of loading rate and spatial variability on pond odour emissions.
- Evaluating of piggery effluent solids separation methods.
- Composting of piggery manure and mortalities.
- Investigating anaerobic digestion of spent bedding from deep litter housing.⁽⁴⁾

4. The detail of these research reports are available from the APL website — www.australianpork.com.au/pages/page31.asp

Successful adoption of these technologies and the resulting reduction of GHG emissions at pork farming businesses can result in improved energy efficiency, lower cost of production and improved profitability. Overall, these activities will focus on increasing pork producers' efficiency and economic competitiveness.

Case study: Rivalea Australia

Rivalea Australia (formerly QAF Meat Industries) is Australia's largest pork producer operating in New South Wales and Victoria, and has been producing pigs for more than 30 years. Rivalea Australia supplies 20% of pork to the domestic market and accounts for up to 40% of all farmed pork exports from Australia. Rivalea Australia is continuously improving its operations to ensure it will be operating effectively and efficiently in the proposed carbon constrained world. This includes:



- undertaking energy efficiency audits to identify opportunities to improve resource efficiency within all aspects of the business,
- growing a feed efficient animal,
- providing feed that meets the nutritional needs of the animal,
- ensuring purchasing decisions consider the resource efficiency of the life of the product, and
- reviewing effluent management systems to minimise methane emissions.



Australian Pork Limited's National Environmental Guidelines for Piggeries

APL's *National Environmental Guidelines for Piggeries 2009* will incorporate the most up-to-date scientific information for managing the environmental impacts of pork production. It will outline BMPs as determined by industry stakeholders, and will facilitate a consistent environmental regulatory approach for producers throughout Australia. The Guidelines will build on the earlier *National Environmental Guidance for Piggeries 2004*, and provide direction about environmental assessments for developing piggeries, as well as options for existing piggeries to achieve positive environmental outcomes (for example, facility upgrades and compliance with license and approval conditions). The *National Environmental Guidelines for Piggeries 2009* will form the basis of a nationally consistent, co-regulatory approach with government, that is appropriate for Australian pork production and mindful of environmental needs.

The *National Environmental Guidelines for Piggeries 2009* will complement the National Environmental Sustainability Strategy for the Australian pork industry, which is also under development by APL. This national strategy will guide the pork industry in its on-farm efforts to manage and minimise environmental or ecological sustainability challenges, whilst creating and taking advantage of growth opportunities.



This anaerobic pond has an impermeable cover which greatly reduces odour emissions.

The design standards for effluent lagoons that minimise the risks of overtopping, catastrophic lagoon failure, and odour nuisance will be included in the *National Environmental Guidelines for Piggeries 2009*. This follows recently commissioned work to develop new lagoon designs that can be more readily retrofitted with GHG capture and mitigation technology. This lagoon will incorporate improved sludge harvesting for recycling nutrients into agriculture.



Next steps

The Australian pork industry will be impacted by the introduction of the CPRS, particularly in the cost of inputs such as grain, electricity and water. However, producers can successfully manage the challenge of a carbon-constrained business environment by adopting new technologies and management systems that can improve business viability in the long term. These technologies and management systems can also have a significant positive impact on the business bottom line, and attract financial grants to enhance their profitability.

Who is Australian Pork Limited?

Australian Pork Limited (APL) is the national representative body for Australian pork farmers and works with the broader pork industry. It is a producer-owned, not-for-profit company combining marketing, export development, research and innovation, and policy development to assist in securing a profitable and sustainable future for the Australian pork industry.

Additional information, fact sheets and consumer information on various pork related issues can be accessed through APL's website www.australianpork.com.au, or contact APL on freecall 1800 789 099 or email apl@australianpork.com.au

What is the Climate Change Research Strategy for Primary Industries (CCRSPI)?

CCRSPI is a collaborative partnership between all state and territory governments; the rural research and development corporations; experts from the university sector and the Federal Government (through the Department of Agriculture, Forestry and Fisheries and the CSIRO). CCRSPI was set up in recognition of the need for a national response to the challenges of climate change, and the reality that research dollars are better invested when duplication is avoided and knowledge is shared.

APL is a partner of CCRSPI and has been a strong supporter of the need for coordinated research and sharing of knowledge between primary industries in this important topic.

For more information www.lwa.gov.au



*CCRSPI
works through
collaboration,
coordination and
communication.*



Climate change glossary

Abatement is the reduction of greenhouse gas (GHG) emissions or enhancement of GHG removal from the atmosphere by sinks such as forest planting or carbon storage in agricultural soils.

Adaptation to climate change is a response to the impacts of changing environmental factors such as temperature and rainfall on production systems. Adaptation can occur in a planned manner in response to known changes, or in an autonomous manner as farming systems change gradually over time.

Bioresequestration is the removal from the atmosphere and storage of GHG through biological processes, such as growing trees and practices that enhance soil carbon in agriculture. The Garnaut Climate Change (2008) review found Australia in an excellent position for carbon storage in agricultural soil, however, Australia has ruled out this option because of the high risk of carbon loss during drought or bushfire. These emissions would contribute to Australia's total emissions and could significantly threaten the overall emission reduction target.

Cap and emissions trading schemes. The Carbon Pollution Reduction Scheme (CPRS) has two distinct elements — the cap on GHG emissions and the ability to trade. The cap achieves the environmental outcome of regulating GHG emissions to meet the government's target to reduce GHG emissions by 60% on 2000 levels by 2050. The ability to trade ensures GHG emissions are mitigated at the lowest possible cost. The Scheme creates a market for emission rights by limiting the total amount of emissions. Market participants then buy and sell rights to emit GHG (i.e. carbon pollution permits).

Carbon accounting is the accounting undertaken to measure the amount of carbon dioxide equivalents (CO₂-e) that will not be released into the atmosphere as a result of a defined activity or process or at the whole of enterprise level. Carbon accounting can focus solely on carbon, or can convert all GHG into a carbon equivalency figure. Australia has a National Carbon Accounting System, details of which can be found at www.climatechange.gov.au/ncas/index.html

Carbon footprint is the total amount of GHG produced to directly and indirectly support human activities. It is usually expressed in equivalent tons of carbon dioxide equivalent (CO₂-e).



Carbon labelling shows the life cycle carbon emissions or carbon footprint embodied in a product in bringing it to the shelf. Carbon labelling was first introduced in the United Kingdom in March 2007 by the Carbon Trust. The label is closely linked to a collaboration between the Carbon Trust and the British Standards Institute. The label is being actively piloted by the Carbon Trust and various industrial partners. Recent press reports have indicated that carbon labels may be introduced into Australia through a joint initiative involving the Carbon Trust and Planet Ark.

Carbon leakage is the effect when a firm facing increased costs in one country due to an emissions price chooses to relocate production to a country with less stringent climate change policies.

Carbon neutral is when an activity, event, household, business or organisation can voluntarily declare carbon neutrality by reducing GHG emissions, and purchasing offsets such as 'green' energy for any residual emissions in order to achieve zero net emissions.

Carbon offsets represent reductions in GHGs relative to a business-as-usual baseline. These reductions or removals of GHG emissions can be used to counterbalance emissions elsewhere in the economy. Offsets are tradable and often used to negate (or offset) all or part of another organisation's emissions.

Carbon pollution permits give the owner the right to release a specified quantity of GHG under an emissions trading scheme. One permit is necessary per tonne of CO₂-eq released per year.

Carbon sequestration is the long-term storage of carbon from the atmosphere. Trees (and all plants) sequester CO₂ from the atmosphere through the process of photosynthesis. CO₂ can also be sequestered in soils.

Carbon sinks are processes that remove more CO₂ from the atmosphere than they release. Trees, soils and oceans are important carbon sinks.

Climate change is the term used to refer to changes in long-term trends of environmental factors such as temperature and rainfall. These changes can be due to natural variability or as a result of human activity.



Direct and indirect emissions are GHG emissions from production that can be categorised into direct and indirect emissions.

- *Direct GHG emissions* are emissions from sources that are owned or controlled by the reporting entity (e.g. emissions from shed heating).
- *Indirect GHG emissions* are emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity (e.g. emissions from slaughtering pigs at an abattoir).

Emissions Intensive Trade Exposed (EITE) industries are those that are either exporters, or compete against imports (trade exposed) and produce significant emissions in their production of goods (emissions intensive). The pork industry was identified as an EITE industry and is presently eligible for receiving 60% EITE assistance in the form of free carbon pollution permits.

Food miles is a term that refers to the distance food is transported from the time of its production until it reaches the consumer. It is one dimension used in assessing the environmental impact of food and the sustainability of food production systems.

Fugitive emissions are those emissions that are released in the course of product processing or resource extraction, e.g. leaks from gas pipelines and as waste methane from black coal mining.

Greenhouse gas (GHG) emissions refer to the six gases recognised under the Kyoto Agreement that cause global warming. These are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF₆). These gases are measured as carbon dioxide equivalent (CO₂-eq). This measure is used to compare the emissions from various GHGs based upon their global warming potential. For example, the global warming potential for methane over 100 years is 21. This means that emissions of 1 million tonnes of methane are equivalent to emissions of 21 million tonnes of carbon dioxide over a 100 year period.



Intergovernmental Panel on Climate Change (IPCC) was established jointly by the United Nations Environment Programme and the World Meteorological Organization in 1988. The purpose of the IPCC is to assess information in the scientific and technical literature related to all significant components of the issue of climate change. The IPCC draws upon hundreds of the world's expert scientists as authors, and thousands as expert reviewers.

Kyoto Protocol is an international agreement adopted in December 1997 in Kyoto, Japan. The Protocol sets binding emission targets for developed countries that would reduce their emissions on average 5.2% below 1990 levels.

Life cycle assessment (LCA) determines the environmental impacts of products, processes or services, through production, usage, and disposal. There are many different methodological approaches to undertaking life cycle assessments. The first Pork LCA was developed for Australia by Australian Pork Limited and the Rural Industries Research and Development Corporation, and released in 2009. It involved scientific research into a total life cycle assessment to measure energy efficiency, energy inputs and wastage. This information was used to create an emissions profile of the industry using data gathered on deep litter housing and conventional housing production systems, and the GHG emissions impact of each.

Mitigation is a human intervention to reduce the sources of, or enhance the sinks for greenhouse gases, e.g. biodigestion of farm manure for electricity generation, methane capture and flaring, or planting trees on farmland.

Point of obligation is the point in the supply chain where CPRS obligations are applied to buy carbon pollution permits, and annually submit them to the government. The point of obligation could be the facility that directly emits GHG or be another point along the supply chain, upstream or downstream from the point of emissions. If agriculture was covered from 2015 and the point of obligation was on-farm, an additional 149,000 individual farms would be required to report emissions and buy carbon pollution permits. This would create significant compliance cost for each and every farm, and is one key reason why agriculture has not been included in the CPRS from its commencement.



Scope of GHG emissions is based on the internationally accredited GHG Protocol developed by the World Resources Institute and the World Business Council on Sustainable Development, GHG emissions can be categorised into three broad 'scopes':

- **Scope 1:** All direct GHG emissions (covered under the CPRS from 2015 if agriculture becomes a covered sector).
- **Scope 2:** Indirect GHG emissions from consumption of purchased energy e.g. fuel, electricity or gas (coverage of these sources under the CPRS will lead to increased energy costs for producers).
- **Scope 3:** Other indirect emissions, including anything from employee travel, to 'upstream' emissions embedded in products purchased or processed by the business, to 'downstream' emissions associated with transporting and disposing of products sold by the firm.

United Nations Framework Convention on Climate Change (UNFCCC) was established in 1992 at the Rio Earth Summit and currently has 189 signatories. An international framework was agreed that aimed at stabilising atmospheric concentrations of GHGs. The UNFCCC agreed to the Kyoto Protocol in 1997 to implement emission reductions in industrialised countries.

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