

Vegetable Industry Carbon Footprint Scoping Study

Discussion Paper 5

Who will use the vegetable carbon tool?

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Know-how for Horticulture™

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Discussion Paper - **Who will use the vegetable carbon tool?**

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Purpose of the Report –

A Carbon Footprinting Workshop for the Vegetable industry will be held October 2008 (VG08107: Vegetable Industry Carbon Footprint Scoping Study - Discussion Papers and Workshop). To ensure the carbon workshop is successful in gaining agreement on the industry needs and future investment priorities for carbon footprinting, six (6) discussion papers have been commissioned by HAL to address a number of key questions that will be the focus of debate at the workshop. This report is one of these Discussion Papers, which will be distributed prior to the workshop.

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Summary

A Carbon Footprinting Workshop for the Vegetable industry will be held in October 2008.

To ensure the carbon workshop is successful in gaining agreement on the industry needs and future investment priorities for carbon footprinting, six (6) discussion papers have been commissioned by HAL to address a number of key questions that will be the focus of debate at the workshop. Once the workshop has been held there will be recommendations on the approach for the development of a carbon footprinting tool for vegetables.

This report is one of the Discussion Papers, which will be distributed prior to the workshop.

Understanding greenhouse gas (GHG) emissions from production systems, including supply and demand chains, is becoming an important issue for agriculture and for the horticultural industry. This is particularly the case as Government's concerns and actions in relation to climate change, including mitigation and emissions trading has significantly increased over the past 12 months. This has subsequently increased the interest by the community on the impacts of GHG emissions from all sources, including agriculture. It could therefore be expected that interest in the level of emissions from horticulture (and the vegetable industry), will increase.

The question, "Who will use the vegetable carbon tool?" will only be properly answered after a better understanding of all the discussion papers is also available. This is because there are many "levels" at which a carbon footprint can be measured.

- At the **national** level, the National Greenhouse Gas Inventory is available, which provides an estimate of GHG emissions for Australian agriculture, but does not specifically estimate the GHG emissions from horticulture.
- At the **farm** level, there are no calculators available which can be used to estimate the carbon footprint of all horticultural activities which emit GHG within the boundaries of the production unit. Calculators have been produced which can estimate some of the GHG emissions from some sectors of agriculture. These calculators will be identified in the discussion paper 'What carbon footprinting tools are currently available?'
- At the **product** level, there are a number of calculators being developed overseas to enable businesses to estimate the carbon footprint of an individual product. Companies using this methodology can display a carbon label on products, providing consumers with additional information to use in purchase decisions.

Any business or industry that has a requirement (legal or otherwise), to measure or account for GHG emissions, will require access to a mechanism or a tool to measure or estimate, their GHG emissions.

i.e. have available benchmarks for individuals and/or industry; measure current and future performance against competitors; provide information to make business and production decisions; and to have an informed debate and negotiate where necessary with stakeholders, policy-makers and the supply-chain, through the development of standardised measurement, reporting and comparison of on-farm and industry GHG emissions.

Introduction

Understanding GHG emissions from production systems, including supply and demand chains, is becoming an important issue for agriculture and for the horticultural industry. This is particularly the case as Government's concerns and actions in relation to climate change, including mitigation and emissions trading have significantly increased over the past 12 months. This has subsequently increased community interest in the impacts of GHG emissions from all sources, including agriculture and horticulture.

Agriculture contributed approximately 16 per cent of total GHG emissions in Australia in 2005, the second largest emitting sector after energy (50 per cent), and closely followed by transport (14 per cent), (AGO, 2007) – see Appendix 1.

It could therefore be expected that interest in the level of emissions from all sectors, including horticulture (and the vegetable industry), will increase.

For the Australian vegetable industry and individual growers to be able to respond to this increasing interest from Governments and the community, information will be needed about :-

- the level of GHG's emitted by the sector;
- any market impacts associated with this level of GHG emissions;
- how to reduce these emissions; and subsequently
- how to demonstrate environmental responsibility to the community.

As one of the steps in the work program associated with the project – “VG08107: Vegetable Industry Carbon Footprint Scoping Study - Discussion Papers and Workshop”, the production of the six discussion papers will provide some of the information for the industry to decide whether to, and potentially how to, move forward to deal with each of these issues.

Purpose of the Discussion Papers

A Carbon Footprinting Workshop for the Vegetable industry will be held in October 2008 (VG08107: Vegetable Industry Carbon Footprint Scoping Study - Discussion Papers and Workshop). To ensure the carbon workshop is successful in gaining agreement on the industry needs and future investment priorities for carbon footprinting, six (6) discussion papers have been commissioned by Horticulture Australia Limited (HAL) to address a number of key questions that will be the focus of debate at the workshop. This report is one of these discussion papers, which will be distributed prior to the workshop.

Purpose of the Workshop - Once the workshop has been held there will be recommendations on the approach for the development of a carbon footprinting tool for vegetables. i.e. this could include the need for an urgent project to develop a national industry tool rather than an on-farm decision making tool. Once the recommendations have been recorded HAL and industry will work together with the national coordinator to develop a brief and/or project proposal.

The **discussion papers** are titled :-

1. What is a carbon footprint?
2. How will carbon footprinting address the issues of mitigation, emissions trading, and/or marketing?
3. What carbon footprinting tools are currently available?
4. What is the GHG contribution of horticulture/vegetable industries compared to other agriculture industries?
5. Who will use the vegetable carbon tool?
6. What are some of the practices that can be implemented following an improved understanding of the carbon footprint of the vegetable industry and/or individual production systems (businesses)?

This Discussion Paper is concerned with – “Who will use the vegetable carbon tool?”.

Who will use the Vegetable Carbon Tool?

This question will only be properly answered after a better understanding of most of the other questions is also available. This is particularly the case for the following :-

“What is the GHG contribution of horticulture/vegetable industries compared to other agriculture industries?”. Agriculture as a sector is the second largest GHG emitter in Australia (AGO, 2007), at 87.9MtCO₂-e in 2005, but the level of GHG emissions from horticulture, and the vegetable sub-sector, is not well understood.

An estimate of the GHG contribution to this National Inventory of 87.9MtCO₂-e, from all of Australian Horticulture in 2005, is approximately 1MtCO₂-e (approximately 1.1 per cent of all agriculture). If this estimate is confirmed by separate calculations and/or measurements, then the vegetable industries' GHG emissions are likely to have been approximately 0.6MtCO₂-e (approximately 0.7 per cent of all agriculture) in 2005.

“What is a carbon footprint?”. The 87.9MtCO₂-e, reported in the National Greenhouse Gas Inventory (AGO, 2007), are from a range of on-farm sources, but do not account for the use of electricity and fuel used on farm (Appendices 1 & 2).

If electricity, fuel and fertiliser used on-farm to grow horticultural crops in 2005 are taken into account, then the estimate for Australian Horticulture is approximately 5MtCO₂-e (and the Vegetable Industry is approximately 3MtCO₂-e). This does not account for all GHG emissions from horticultural production, although electricity, fuel and fertiliser are considered to be the major contributors to GHG emissions from intensive irrigated farming enterprises. From this it can be seen that the National Greenhouse Inventory does not provide sufficient information for an on-farm 'carbon footprint' to be calculated, although a rough estimate is possible.

“How will carbon footprinting address the issues of mitigation, emissions trading, and/or marketing?”. As we can see from the issues presented above, the National Inventory does not provide sufficient information for individual growers, or the vegetable industry, to fully understand their level of GHG emissions. Without a better understanding of these emissions, the issues of mitigation, trading and marketing will not be able to be properly addressed.

Even if the estimates for the vegetable sector are shown to be incorrect by a factor of two or three, the level of emissions which can be attributed to the vegetable industry will be very low (approximately 1.4 per cent to 2.1 per cent) in comparison to most other agricultural sub-sectors, and mitigation and marketing may well be intimately connected, no matter what the level of emissions are from the vegetable sector.

The supply and demand chain (including consumers), may not be convinced by the actual low levels of emissions, and they may perceive all horticulture as an intensive production system, to which is attributed the high level of GHG emissions which all of agriculture needs to address.

An appropriate carbon footprint tool which calculates the GHG emissions of individual enterprises, and subsequently the whole of the vegetable industry, may go some way (or all of the way) to demonstrating firstly, the current low level of emissions produced by intensive horticulture enterprises, and secondly provide ongoing evidence of GHG reductions, as mitigation processes are adopted by individuals and industries.

There are many “levels” at which a carbon footprint can be measured. – The Scope.

At the **National level**, “The National Greenhouse Gas Inventory has been prepared in accordance with the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories and the principles of the Intergovernmental Panel on Climate Change (IPCC) 2000 Good Practice Guidance and Uncertainty Management in National Greenhouse Gas Inventories and the IPCC Good Practice Guidance for Land Use, Land Use Change and Forestry. Where appropriate, elements of the 2006 IPCC Guidelines for National Greenhouse Gas Inventories are being progressively implemented. The national inventory undergoes annual independent international review” (AGO, 2008).

The emissions factors and the methods to estimate annual emissions used in this national inventory, are provided in detail in “Australian Methodology for the Estimation of Greenhouse Gas Emissions and Sinks”, 2006 Agriculture National Greenhouse Gas Inventory Committee. <http://www.climatechange.gov.au/inventory> (viewed 26th Sept 2008).

This provides an estimate for Australian agriculture, but does not specifically estimate the GHG emissions from Australian horticulture.

This inventory uses the Kyoto accounting rules, and the GHG emissions attributable to the Agriculture sector are listed in Appendix 1.

The 87.9MtCO₂-e, reported in the National Greenhouse Gas Inventory (AGO, 2007), are from a range of on-farm sources, but do not account for the use of electricity and fuel used on farm. These are reported in the stationary energy and transport sectors (Appendices 1 & 2).

If electricity, fuel and fertiliser used on-farm to grow horticultural crops are taken into account, then the estimate for Australian horticulture is approximately 5MtCO₂-e (and the vegetable industry is approximately 3MtCO₂-e).

From this it can be seen that the National Greenhouse Inventory does not provide sufficient information for an on-farm ‘carbon footprint’ to be calculated, although an estimate is possible.

At the **Farm level**, there are no calculators available which can be used to estimate the carbon footprint of all horticultural activities which emit GHG from within the boundaries of the production unit. Calculators are available which can estimate some of the GHG emissions from some sectors of agriculture (Cotton Greenhouse Gas Calculator - <http://www.isr.qut.edu.au/tools/> - viewed 26th Sept 2008). Other calculators will be reported in the discussion paper ‘What carbon footprinting tools are currently available?’.

At the **Product level**, there are a number of calculators being developed. The Carbon Trust (UK) footprint measurement methodology has been developed to enable businesses to estimate the carbon footprint of an individual product. http://www.carbontrust.co.uk/carbon/briefing/carbon_label.htm (viewed 26th Sept 2008).

Companies using this methodology can display a carbon label on products. Consumers are then able to use this information in purchase decisions. “As an additional commitment, companies displaying the label will have not only measured the carbon footprint of their product, but also pledged to reduce that footprint over two years. If this does not happen, they will lose the label.” (The Carbon Trust, 2008).

There are many Reasons for Estimating a Carbon Footprint.

The need for estimating (or measuring) a carbon footprint, will also have a large bearing on ‘who will use a carbon footprint tool’.

Two reasons for measuring a carbon footprint are to :-

- **Report** or account for the level of GHG emissions to a third party, and
- **Reduce** the level of GHG emissions

Reporting on GHG emissions in Australia is a requirement for those corporations which are above the threshold of emissions, currently at 25kilotonnesCO₂-e/year (NGER, 2008). Although this threshold will reduce over time, so that more corporations will fall within the threshold, very few vegetable businesses are likely to be required to report under the NGER requirements.

To get to the 25,000tCO₂-e threshold, a vegetable farming business will need to be in the order of 3,000ha of vegetables. There are currently no vegetable farms of this size in Australia, but there are between 0 and 49 grape production businesses in this category, out of a total of 20,996 horticulture establishments in Australia (ABS, 2007).

Accounting for the level of GHG emissions on a product or farm basis, may become a necessity in Australia, if the intentions of retailers such as Tesco in the UK (Tesco, 2008), are repeated in Australia. If this occurs, consumers will be presented with some form of ‘carbon footprint’ information, either on product labels or at the point of sale, which may influence purchasing decisions.

There is much evidence that in the future some form of ‘carbon footprinting’ of products or businesses will be part of a marketing strategy, especially in the food arena. This is already occurring in other countries, so Australia’s vegetable industry will need to see this as an issue to which it will have to respond in the near future.

Until a reporting or accounting requirement exists in Australia, an important reason to measure a carbon footprint, will be to **reduce** GHG emissions. A number of drivers exist,

which will cause industries and managers of businesses to consider their level of GHG emissions, and if/how this might be reduced. Padgett, et. al. (2008a), state “Carbon dioxide (CO₂) calculators are important tools for estimating CO₂ emissions and for providing information that can lead to behavioural and policy changes.”

Commonwealth Government Policy changes have been presented in the recent Green Paper (Anon, 2008b). These policy decisions will result in the eventual implementation of the Carbon Pollution Reduction Scheme (CPRS), the Australian Government’s emissions trading scheme, in 2010.

Vegetable growers and the Australian vegetable industry will need to respond to the requirements of the CPRS (although agriculture is not expected to be a covered sector until 2015).

The reasons for Reporting and/or Reducing GHG Emissions will be many and varied for Horticulture businesses in Australia.

Managing Risk

Climate risks may be similar in many respects to those already being addressed by successful vegetable production businesses, because they are global, long-term and irreversible (Lash and Wellington, 2007).

In attempting to answer the question – “Who will use the vegetable carbon tool?”, other questions may need to be asked – ‘Do I need to manage risk?’ , “What are the risks associated with climate change and an emissions trading scheme?”, and “Will a Carbon Tool provide some of the answers to these questions?”.

All successful businesses manage risk. Lash and Wellington (2007) list some of the risks associated with a low carbon economy (a descriptor of the Australian economy under an effective emissions trading scheme). They suggest that climate risks are different from those already being addressed by successful businesses, because they are global, long-term and irreversible :-

- Regulatory risks - emissions trading scheme
- Supply chain risks - suppliers’ passing on higher carbon-related costs
- Products and technology – cost and availability of products which may assist reducing GHG emissions
- Legal risks - lawsuits associated with environmental damage
- Reputation risks - consumer backlash because of real or perceived issues
- Physical risks - damage to assets through drought, floods, heat stress and storms

South Africa’s fruit and wine industries have considered these risks and are proactively addressing them in a project, “Confronting Climate Change: Developing a comprehensive response to climate change for the South African fruit and wine industries” (Anon, 2008a). The project is designed to address business impacts through :-

1. Confronting the realities of climate change
2. Developing an industry wide response
3. Responding from a position of knowledge
4. Building a consistent and comparable information base

The project will provide a benchmark for the industry and assess current and future performance against its competitors. The information developed will also enable the industry to make appropriate changes and to have an informed debate and negotiate where necessary with stakeholders, policy-makers and the supply-chain, through the development of standardised measurement, reporting and comparison of on-farm and industry GHG emissions.

Managing Profitability

In attempting to answer the question – “Who will use the vegetable carbon tool?”, other questions may need to be asked – “Do I need to manage profitability?”, and “What are the costs associated with climate change and an emissions trading scheme?”.

Additionally, the following questions will require answers. This will be very important once an emissions trading scheme has been enacted in 2010, and especially as agriculture is likely to become a covered sector under such a scheme after 2015. The information derived from the use of carbon footprint tool could be used to analyse some aspects of future profitability :-

Effects on Income –

- Will demand from consumers change and will this affect returns for products?
- Will producers be able to influence and increase returns as a consequence of climate-related cost increases?
- Will there be an opportunity for additional income from carbon credits, new climate related or “low-carbon” products?
- Will incomes be affected by “low-carbon” imports?
- Will incomes become more variable because of changing weather patterns?

Effects on Costs –

- Will new emissions trading regulations add new costs to the business?
- Will permits be required? At what cost?
- Will input costs, especially fertiliser, fuel and electricity, rise?
- Will individual and industry risk profiles affect insurance premiums?

The Riverina Food Group (RFG), which represents a group of growers and processors of fresh and beverage products in the Riverina region of New South Wales, recognised the business advantages in implementing programs to reduce greenhouse gas emissions (Polkinghorne, et. al., 2004). Through the Greenhouse Challenge program, they have assessed production efficiencies, implemented the recommendations that will increase their efficiency and subsequently reduce greenhouse gas emissions.

Managing Market Access

Peters and Edgar (2008) report that “Almost one-quarter of CO₂ released to the atmosphere is emitted in the production of internationally traded goods and services. Trade therefore represents an unrivalled, and unused, tool for reducing greenhouse gas emissions.” What does this mean for the Australian Vegetable Industry, which through its Vegvision 2020 has a vision to double the value of vegetables in real terms in domestic and global markets?

The Vegvision2020 document was developed with a focus "... firmly on consumers and markets, and the process that brings products to consumers in Australia and around the world." (AVIDG, 2006). With international markets clearly in the industries' sights ("If we can't get 20 million international consumers regularly eating Australian vegetable products, then we're simply not trying"), a knowledge of the increased levels of GHG emissions, as well as the emissions effects of exporting, will have to be factored into marketing plans.

<http://www.horticulture.com.au/librarymanager/libs/45/Vegvision2020.pdf> (viewed 26th Sept 2008).

Environmental Management

A report to the Ministry of Agriculture - New Zealand, O'Hara, et. al. (2003) recommended that both sources and sinks be included in strategies for managing GHG emissions, and that the objective of doing this is to integrate GHG mitigation with environmental management objectives.

Horticultural industries in Australia are already embracing and managing the issues associated with environmental management, so an extension of this process to mitigate greenhouse gasses will not be difficult for most production managers. The costs and benefits will be the deciding factors in implementation.

Conclusion

The question of 'Who will use the vegetable carbon tool?' will only be properly answered after a better understanding of all the discussion papers is also available. This is because there are many "levels" at which a carbon footprint can be measured.

Although the reasons for reporting, accounting or reducing GHG emissions will vary considerably from individual growers through to Industries and industry sectors, any business or industry that has a requirement (legal or otherwise), to report or account for GHG emissions, will require access to a mechanism or a tool to estimate or measure, their GHG emissions.

Recommendations

1. At a national level, the vegetable industry will need to engage with the Department of Climate Change to be able to obtain an estimate of the GHG contribution which the whole of the vegetable industry is making to the Australian greenhouse accounts.
2. At a business level, the vegetable industry will need to assess the requirement for a better understanding of the level of GHG emissions from individual farms and/or from individual products.

The need for any or all of these will be dependant on the requirements placed on the industry and on individual businesses in the Australian vegetable industry, by the Commonwealth Government, retailers and consumers.

Using the South African project (Anon, 2008a) as an example, the Australian Vegetable Industry could plan to obtain the same benefits :-

i.e. "... provide a benchmark for the industry and assess current and future performance against its competitors provide information to enable the industry to make appropriate changes, and to have an informed debate and negotiate where necessary with stakeholders, policy-makers and the supply-chain, through the development of standardised measurement, reporting and comparison of on-farm and industry GHG emissions".

Bibliography

- ABS (2007).** Agricultural Commodities, Australia, 2006-07. Australian Bureau of Statistics, Canberra, Australia.
[http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/77D2A05B9A642337CA2574560014AA2A/\\$File/71210do001_200607.xls](http://www.ausstats.abs.gov.au/Ausstats/subscriber.nsf/0/77D2A05B9A642337CA2574560014AA2A/$File/71210do001_200607.xls) (viewed 26th Sept 2008).
- AGO (2007).** National Greenhouse Gas Inventory – Accounting for the 108 per cent Target. Australian Greenhouse Office, Commonwealth of Australia, 2007.
<http://www.greenhouse.gov.au/inventory> (viewed 26th Sept 2008).
- AGO (2008).** National Greenhouse Inventory 2006. Accounting for the Kyoto Target. Australian Greenhouse Office, Commonwealth of Australia, 2008.
<http://www.climatechange.gov.au/inventory/2006/pubs/inventory2006.pdf> (viewed 26th Sept 2008).
- Anon (2008a).** Fresh Notes (1) July 2008 – a technical Update. Published by Deciduous Fruit Producers' Trust (DFPT) Research, South Africa.
http://www.satgi.co.za/export/sites/sati/galleries/pdf_downloads/Carbon_Footprint_Industry_Initiative.pdf (viewed 26th Sept 2008).
- Anon (2008b).** Carbon Pollution Reduction Scheme - Green Paper - Published by the Department of Climate Change, July 2008.
<http://www.climatechange.gov.au/greenpaper/index.html> (viewed 26th Sept 2008).
- AVIDG (2006).** Vegvision Strategic Plan 2020. Australian Vegetable Industry Development Group, Canberra.
www.avidgroup.net.au and
<http://www.horticulture.com.au/librarymanager/libs/45/Vegvision2020.pdf> (viewed 26th Sept 2008)
- Lash, J. and Wellington, F. (2007).** Competitive Advantage on a Warming Planet. Harvard Business Review, March, 2007.
<http://harvardbusinessonline.hbsp.harvard.edu/b02/en/common/viewFileNavBean.jhtml;jsessionid=3RH3L0PRB0WRAAKRGWDR5VQBKE0YIISW?requestid=339808> (viewed 26th Sept 2008).
- NGER (2008).** National Greenhouse and Energy Reporting Guidelines. Department of Climate Change, Canberra, Australia.
<http://www.climatechange.gov.au/reporting/guidelines/pubs/nger-reporting-guidelines-aug08.pdf> (viewed 26th Sept 2008).
- O'Hara, P., Freney, J. and Ulyatt, M. (2003).** Abatement of Agricultural Non-Carbon Dioxide Greenhouse Gas Emissions. Report prepared for the Ministry of Agriculture and Forestry, on behalf of the Convenor, Ministerial Group on Climate Change, the Minister of Agriculture and the Primary Industries Council - <http://www.maf.govt.nz/mafnet/rural-nz/sustainable-resource-use/climate/abatement-of-agricultural-greenhouse-gas-emissions/greenhouse-gas-emissions.pdf> (viewed 26th Sept 2008).

Padgett, J., Steinemann, A., Clarke, J. and Vandenberg, M. (2008). A Comparison of Carbon Calculators. Environmental Impact Assessment Review 28:106–115.
<http://www.climatebiz.com/files/document/EIARVol28Issue2-3pgs106-115.pdf>
(viewed 26th Sept 2008).

Peters, G. and Hertwich, E. (2008). Trading Kyoto. Nature reports climate change. Vol. 2; April 2008. (published online 20 March 2008).
<http://www.nature.com/climate/2008/0804/full/climate.2008.25.html>
(viewed 26th Sept 2008).

Polkinghorne, J., Clark, B., Kaebernick, M., White, B., Russell, K., Slattery, W. and Ugaldete, D. (2004). Riverina Food Group: Meeting the Greenhouse Challenge. Published by the Australian Greenhouse Office, Commonwealth of Australia 2004.
<http://www.climatechange.gov.au/agriculture/publications/riverina.html> (viewed 26th Sept 2008).

Tesco (2008). Carbon Labelling and Tesco.
http://www.tesco.com/greenerliving/cutting_carbon_footprints/carbon_labelling.page.
(viewed 26th Sept 2008).

The Carbon Trust (2008) - Footprint Measurement Methodology.
http://www.carbontrust.co.uk/NR/rdonlyres/6DEA1490-254B-434F-B2B2-21D93F0B0C98/0/Methodology_summary.pdf (viewed 26th Sept 2008).

Appendix 1.

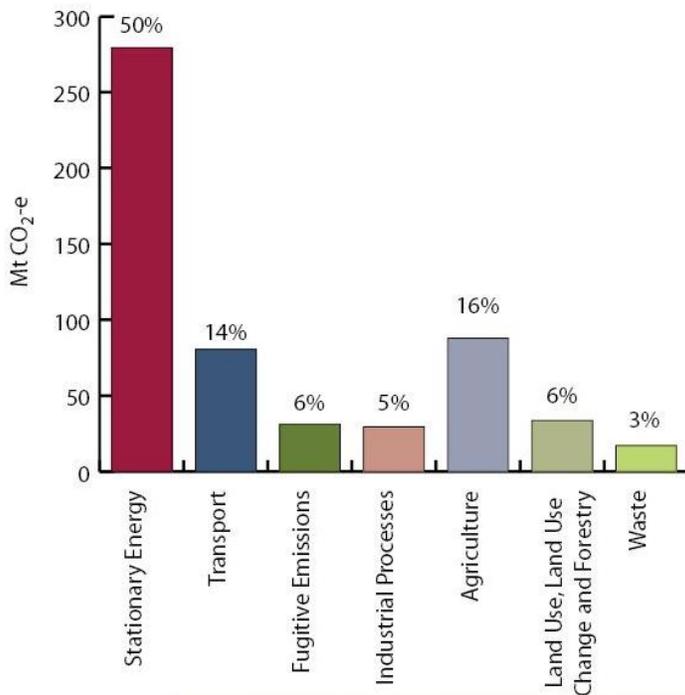
Agriculture sector CO₂-e emissions, 2005

Greenhouse gas source and sink categories	CO ₂ -e emissions (Gg)				% Total net national emissions
	CO ₂	CH ₄	N ₂ O	Total	
4 AGRICULTURE	NA	67,155	20,734	87,889	15.7
A Enteric fermentation	NA	58,678	NA	58,678	10.5
B Manure management	NA	1,939	1,495	3,434	0.6
C Rice cultivation	NA	216	NA	216	0.0
D Agricultural soils	NA	NA	16,558	16,558	3.0
E Prescribed burning of savannas	NA	6,077	2,574	8,650	1.5
F Field burning of agricultural residues	NA	245	107	352	0.1

Source - AGO (2007). National Greenhouse Gas Inventory – Accounting for the 108 per cent Target. Australian Greenhouse Office, Commonwealth of Australia, 2007.
<http://www.greenhouse.gov.au/inventory>.

Appendix 2.

Australia's greenhouse gas emissions by sector in 2005



Source - AGO (2007). National Greenhouse Gas Inventory – Accounting for the 108 per cent Target. Australian Greenhouse Office, Commonwealth of Australia, 2007.
<http://www.greenhouse.gov.au/inventory>.