growcom

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Submission to the

Senate Inquiry into climate change and the Australian agriculture sector

March 2008

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Executive Summary

Growcom is the peak representative organisation for the fruit and vegetable industry in Queensland. Growcom and horticulture industry members are actively engaged in climate change issues and interested in contributing to solutions.

Fruit and vegetable growing in Queensland is a diverse and dynamic industry with a farm gate value of $1.7 billion per annum and an overall economic contribution of around $5 billion per annum. The industry supplies one third of Australia's fresh produce. While the vast majority of produce is destined for domestic markets, largely through the major food retailers, some product is exported. 25 000 people are directly employed through the Queensland growing industry.

Projected climate changes in horticultural production zones include increases in both maximum and minimum temperatures; reduced overall rainfall though increased intensity of rainfall events; and an increase in the frequency of severe, damaging storms.

Horticultural industries are more sensitive than many other agricultural industries to climate changes, particularly changes to temperature.

Industry impacts are likely to include reduced water supply security, increased crop water needs, poorer product quality, increased pest management and biosecurity challenges, shifts in seasons that could alter the ability of growers to meet contractual requirements of supply or time production to hit the market windows that underpin the profitability of their crop. Some crop varieties may no longer be able to be grown in current production regions. Climate change is also expected to drive significant increases in input costs and transport costs, however, growers have little or no capacity to pass on these costs through the value chain.

A more complete assessment of likely climate changes and the impacts and opportunities they may pose to Queensland's intensive agricultural sector will be available in mid-2008, following the release of reports commissioned through the Queensland Farmers Federation climate change project, funded by the Department of Agriculture, Fisheries and Forestry.

While the impact of climate change on horticultural industries could be severe, there is a reasonable level of confidence amongst industry members of their capacity to adapt. There are also a number of successful, established industry support programs that can be refined to assist growers to tackle the challenges of climate change.

On-going government investment in these programs, along with research and science targeted to address critical information gaps for intensive agricultural industries is required.

A national strategy to guide action and investment for agricultural industry responses to climate change would be useful. The strategy should provide broad strategies and principles for the agricultural sector and be supported by a set of detailed commodity-based strategies, which would allow a thorough development of responses that meet the diversity of needs of the industries within the sector.

Growcom is concerned that government policies aimed at addressing climate change must be carefully designed, or run the risk of causing more significant impacts on the industry than climate change itself. Growcom, therefore, seeks the opportunity to work closely with the

Australian Government to identify critical issues for industry and develop effective policy responses to climate change and carbon emission management.

Growcom recommends that industry organisations are given responsibility and resources to work directly with their members on tackling climate change issues, as industry groups are best placed to design programs that work with the business, market and regulatory needs of producers.

It will be essential that assistance programs for drought, exceptional circumstances and natural disasters are reviewed to meet emerging industry needs driven by climate change.

Growcom is interested to discuss these matters in further detail with the Australian Government and contribute to the development of effective policies and strategies aimed at tackling the challenges a changing climate poses for the agricultural sector.

Introduction

As the peak body representing the Queensland horticulture industry, Growcom welcomes the opportunity to provide input to this inquiry into climate change and the Australian agriculture sector.

Growcom has taken an active interest in climate change issues over a number of years, including early involvement in the Greenhouse Challenge through the Australian Greenhouse Office. In 2007, the Queensland Farmers Federation along with its member industry associations including Growcom, was successful in obtaining funding to review climate science and policy developments in order to prepare climate change response strategies and build climate management into existing industry Farm Management Systems (FMS) programs. An overview of the project is provided in Attachment One.

Growcom is highly concerned about the potential impacts of climate change on horticultural industries. We are also, however, equally concerned that government policies aimed at addressing climate change must be carefully designed, or run the risk of causing more significant impacts on the industry than climate change itself. Growcom, therefore, seeks the opportunity to work closely with the Australian Government to identify critical issues for industry and develop effective policy responses to climate change and carbon emission management.

About Growcom

Growcom is the peak representative body for the fruit and vegetable growing industry in Queensland, providing a range of advocacy, research, communication and industry development services to the sector. (See www.growcom.com.au)

We are the only organisation in Australia to deliver services across the entire horticulture industry to businesses and organisations of all commodities, sizes and regions, as well as to associated industries in the supply chain. Our activities ensure we are in regular contact with horticultural business operators and are well aware of the outlook, expectations and practical needs of the industry.

The organisation was established in 1923 as a statutory body to represent and provide services to the fruit and vegetable growing industry. Now a voluntary membership and services organisation, Growcom has grower members throughout Queensland and works alongside other industry organisations, regional producer associations and corporate members. Growcom has approximately fifty staff located in offices in Brisbane, Bundaberg, Ayr, Toowoomba and Tully.

Growcom is a member of a number of state and national industry organisations and uses these networks to promote our members' interests and work on issues of common interest. We work particularly closely with the Queensland Farmers Federation, the Horticultural Australia Council and Horticulture Australia Ltd.

Growcom actively pursues issues of strategic importance to the industry. Recent initiatives include:

- the mandatory code of conduct for trade of horticultural produce between producers and wholesale traders
- monitoring of import risk assessment processes for bananas and apples
- participating in the implementation of the Emergency Plant Pest Response Deed through Plant Health Australia
- Scoping studies for industry skills development needs and labour issues
- Developing a horticulture industry workforce plan
- Development of a memorandum of understanding between the Queensland Government and the Queensland Farmers Federation regarding Farm Management Systems.
- Development of a memorandum of understanding between the Queensland Farmers Federation and the Regional Natural Resource Management (NRM) Groups Collective and strong engagement between horticulture and the regional NRM process.

Growcom has a Land & Water team that has delivered highly successful environmental and water policy and programs for over a decade. The team works to assist horticultural growers to achieve high standards of natural resource management, environmental protection and business profitability.

Growcom also employs Industry Development Officers who support specific commodity growers (currently vegetable, banana, apple, melon, pineapple and macadamia growers) or specialise in issues such as pest management for all commodities.

Current major initiatives within Growcom include:

- "The Knowledge Plant", a one-stop-shop for all horticulture growers' business development and training needs and
- the Farm Management Systems (FMS) program which provides growers with a framework and tools to assess business risks and needs and plan, implement, monitor and evaluate responses. The system enables growers to deal with all aspects of their farm and business in an integrated and efficient way.

In 2007, Growcom along with the Queensland Farmers Federation commenced work on a climate change project funded through the Australian Government Department of Agriculture Fisheries and Forestry. Though it is a preliminary and short term project, it will position the intensive agriculture sector in Queensland to identify strategic responses to climate change. It will enable the horticulture industry to begin developing climate risk management tools for incorporation in its FMS program, thoroughly analyse climate change science and policy as it relates to horticulture in Queensland, investigate industry awareness and attitudes, enhance communication and networking and prepare a strategic plan and investment program. The project will guide ongoing investment and action over the coming three to five years.

About the Queensland Horticulture Industry

Queensland is Australia's premier state for fruit and vegetable production, growing one-third of the nation's produce, including the majority of Australia's bananas, pineapples, mandarins, avocados, beetroot and fresh tomatoes. It includes emerging agricultural industries such as olives, cocoa, coffee, Asian exotic tropical fruits, culinary herbs, bush foods, functional foods and nutraceuticals. A relatively small proportion of product is exported, mostly to Asian and Middle Eastern markets, including citrus, mangoes, chillies, melons and lychees. A detailed overview of the industry is available in the report, *The economic contribution of horticulture industries to the Queensland and Australian economies* (Pinnacle, 2004).

Horticulture is Queensland's second largest primary industry, worth more than $1.7 billion per annum and employing around 25,000 people. It is an innovative and consumer-focused provider of clean and green produce for domestic and world markets.

Queensland's 2,800 farms operate in a variety of locations and climates and use a range of production methods to produce more than 120 types of fruit and vegetables. There are 16 defined horticultural regions, from Stanthorpe in the south to the Atherton Tablelands in the far north, with a total area under fruit and vegetable production of approximately 100,000 hectares. Horticulture is a high value and efficient user of water and other natural resources. Around 95% of horticultural production is irrigated.

The horticulture industry is a diverse and growing industry. It is often the principal driver of many local communities and economies in rural and regional Queensland. The industry provides employment, enhances economic diversification and adds significant value throughout the food, transport, wholesale and retail industries. Horticulture has achieved continued growth in recent years of around 5% per annum, at a time when many other agricultural industries are stagnant or declining.

Horticulture is the most labour intensive of all agricultural industries; labour represents as much as 50% of the overall operating costs of horticultural enterprises. Horticulture is strongly linked to the tourism industry, providing income for thousands of backpackers and "grey nomads" each year. See Hanson and Bell (2007) for an overview of seasonal labour and migration in the fruit and vegetable industry.

The nature of horticulture business is quite different to many other industries within the agriculture sector. The capital investment is usually relatively high, while profit margins are often tight. Growers operate in extremely competitive markets and the domestic market for fresh produce is dominated by Australia's two major supermarket chains. The significant market power of these retailers along with escalating costs of production limit the capacity of growers to absorb additional costs or manage industry impacts, such as climate change.

Growcom has worked with industry members and stakeholders to define the critical issues for the horticulture industry. These are:

- Climate risks, including climate variability, responding to droughts and natural disasters, and meeting the challenges of climate change.
- Biosecurity.
- Value chains and business development.
- Labour and human capital.
- Natural resource management.

Section 1
General Comments

Growcom and horticulture industry members are actively engaged in climate change issues and interested in contributing to solutions. Growcom is pleased to be involved in the Queensland Farmers Federation climate change project and committed to developing a Queensland horticulture climate change response strategy. Growcom believes that its FMS program will provide an effective vehicle to support growers to place an increased emphasis on climate risk management along with tools to assess risks and plan management responses.

A major barrier to the identification of likely climate changes and a thorough assessment of potential industry impacts is the lack of climate science, modelling and policy analysis specifically focussed on intensive agriculture. There is an urgent need for research targeting critical information needs for the intensive agriculture sector and its major production regions. This will be essential to underpin government's development of appropriate and well designed policies and instruments as well as the preparation of industry response strategies. One of the outcomes of the QFF climate change project will be the prioritisation of research needs relating to climate change and the intensive agriculture sector. This report will be available by mid-2008.

Growcom is particularly concerned to ensure governments recognise the significant differences between industries within the agriculture sector regarding climate change issues. There are significant variations across pastoral, broadacre cropping, intensive livestock and intensive cropping industries regarding carbon emissions, carbon offset and trading opportunities and potential climate change impacts, mitigation and adaptation strategies. These must be understood and accounted for in the development of government policies and strategies.

Section 2
Likely future climate in key horticultural production zones
Implications for farm enterprises

Initial assessments of likely future climatic conditions in key horticultural production zones exist at a broad scale. However, researchers have qualified these assessments by the limitations and inaccuracies of downscaling national climate change projections to regional scales and the paucity of research and modelling specifically aimed at the needs of the intensive agricultural sector.

The QFF climate change project has established a panel of Queensland's leading climate scientists to identify critical knowledge gaps and facilitate industry's access to and interpretation of available studies and modelling and to identify critical knowledge gaps. By mid-2008, a number of valuable reports will be available through this project including:

- an annotated bibliography of key references for climate change and the intensive agricultural sector,
- climate change projections for key intensive agriculture production regions in Queensland and
- an assessment of the impacts and opportunities of climate change for intensive agricultural industries.

Other useful information sources relating to the horticulture industry include:

- Scoping study – climate change and climate variability – risks and opportunities for horticulture (Deuter 2006)
- Current work by Dr Peter Deuter to analyse climate change projections and likely impacts in three horticultural production regions in Australia (report pending)
- Report from Growcom's first growers workshop regarding climate change and the horticulture industry (Attachment 2)

The research indicates that climate changes that have already occurred in Queensland's horticulture production zones include:

- Increases in both minimum and maximum temperatures in the majority of production regions. Night time temperatures are increasing faster than day time temperatures.
- An increased number of heat stress days (temperatures above 35°C)
- A decreasing trend in cold nights and frost occurrence.

Future climate changes in Queensland are projected to include:

- Temperature increases of 0.4°C to 2.0°C by 2030 and 4°C-6°C by 2070.
- Continued increases in the number of heat stress days.
- Rainfall reductions of 1-6%, though an increase in the intensity of rainfall events.
- Increase in extreme weather events, such as an increase in the number and severity of storms.

Horticultural industries are particularly sensitive to changes in temperature, far more so than most agricultural industries. Temperature changes, particularly in minimum temperatures, could alter growing regions and cropping times, and some crops, such as some varieties of apples, may no longer be able to be grown in Queensland at all.

Other possible implications and impacts of projected climate changes include:

- A general trend towards hotter and drier conditions in Queensland's key horticultural production regions, with flow on effects such as changes to humidity, soil temperatures, frosts, heat stress days, hydrological changes (altered ground water recharge or run off patterns).
- Alterations to season start times, season lengths or rates of fruit maturation and therefore growers' access to certain market windows.
- Changes to water harvesting and storage opportunities/success at farm and catchment scales. There is a real risk that irrigation water supplies from on-farm storages, aquifers and irrigation schemes could be significantly reduced. At the same time, crop watering needs are likely to increase.
- Changes to pollination.
- Reduced product quality.
- Reductions in the period that certain fruit crops can be "stored" on the tree and retain acceptable quality, as a result of warmer temperatures.
- In warmer environments a number of pests and diseases may be active for longer periods of the year, or extend or shift their geographical range, and the efficacy of some chemical control methods may be reduced.
- Increased risk of fruit drop, sunburn and plant heat stress.
- Climate change is likely to further increase production costs and the price of key inputs. It is well established that horticultural growers are price takers, so have little or no capacity to pass costs increases on to customers. These challenges

are compounded by the concentration of the domestic fresh food market within two major retailers. There is a clear trend of these retailers using their market power to push costs, risks and responsibilities back down the value chain, so it is likely that any emerging carbon management responsibilities will also be pushed back to growers, who have no capacity to absorb them.

- A small proportion of Queensland's horticulture product is exported, and many commodities currently, or in the future will, compete on the domestic market with imported product. The international competitiveness of Australian producers would be undermined if other countries chose climate change strategies that are less costly to producers than Australia's.

The potential impacts of climate change are significant in their own right, however, their accumulated effects are likely to cause serious challenges for the long term viability of the industry.

Horticultural industries face significant challenges in adapting to climate change, however, there are also a number of enabling trends and opportunities that can be tapped to facilitate successful adaptation.

For the industry to effectively respond to climate challenges, accurate and detailed information on regional-scale climate changes and how they will affect production and marketing is required. This information is critical to inform the development of management strategies at enterprise, regional and industry scales to effectively manage future climate change impacts.

Growcom recommends that industry organisations are given responsibility and resources to work directly with their members on tackling climate change issues, as industry groups are best placed to design programs that work with the business, market and regulatory needs of producers.

Management options for the horticulture industry include supporting industry members to assess the projected climate changes in their region, carefully analyse the implications for their business and make necessary adjustments to production or marketing or business planning (which could be significant).

Growcom believes that established industry programs can be refined to facilitate this process, particularly the Water for Profit initiative that assists growers to optimise on-farm water management and Farm Management Systems, which help growers identify and act on critical business and environmental risks, including climate changes or increasing climate variability.

It should be noted, though, that even with such support, some horticultural commodities or production regions could face the prospect of devastating, unmanageable impacts, possibly resulting in business closures or the failure of whole districts.

It must be emphasised again, that currently there is inadequate data to support the level of analysis and planning that will be required to ensure industry adjustment to climate changes. Industry requires government investment in research and modelling to meet critical information needs.

Climate science, research and modelling is required at sub-regional scales to provide information at a fine enough detail to support horticultural industry and enterprise risk assessment and decision making. Vulnerability assessments and detailed impact and opportunities assessments for specific crops and production regions are also required.

Climate and weather projection and decision support tools need to be customised to the needs of horticultural enterprises, with a greater focus on temperature variability and longer lead-times and shorter season lengths (see Deuter 2006).

Enablers and opportunities that may support and facilitate adaptation to climate change within horticultural industries include:

- A strong focus on market competitiveness and responsiveness to business threats - so growers who are aware of the risks posed by climate change to their business are likely to move quickly to respond.
- There is a general willingness amongst growers to respond to issues of national significance and a culture of innovation to develop solutions.
- There is a successful history of adapting to and managing for climatic variability within horticultural industries, and many production systems are designed to manage climate risks (eg greenhouse production and other forms of covered cropping, hydroponics, specialised irrigation systems).
- The trend within the industry to embrace a “risk management” approach to business management and a culture of meeting market requirements through smart business systems and audit and certification processes.
- The presence of a range of market and regulatory drivers for risk assessment, documentation of procedures, monitoring and record keeping – eg food safety and quality systems, biosecurity systems, the horticulture code of conduct, labour requirements
- Because industry is concurrently dealing with a number of other major environmental challenges (particularly improving water quality management and water use efficiency) there are strong opportunities to develop multi-faceted management responses and industry programs that deliver on a number of outcomes.
- The industry’s Knowledge Plant and Farm Management Systems initiatives provide effective vehicles (including delivery officers) for facilitating adaptation to a range of industry pressures and needs including climate change. The FMS program provides a framework for assessing risks, reviewing existing and alternative management practices and processes, considering industry recommended practices, planning responses to identified risks or inadequate management, identifying new/emerging management needs, finding efficient ways to meet market and regulatory requirements (such as approvals, specifications, certifications to standards), communicating efforts, measuring management performance and planning improvements.
- Industry organisations are showing strong leadership in the area of climate change. In particular, The Queensland Farmers Federation and Growcom climate change project provides preliminary resources to begin analysing issues and develop industry response strategies.

Section 3
Need for a national strategy to assist industries to adapt to climate change

Growcom believes a national strategy to guide and coordinate support for and investment in agricultural industries' responses to climate change would be useful. The strategy should build and improve upon the current National Agriculture and Climate Change Action Plan.

The national strategy should focus broadly on a range of responses and avoid a narrow focus on "climate change adaptation".

A major finding from Growcom's first growers' workshop to consider climate change issues for the Queensland horticulture industry was that the key to sustaining business success in the face of climate change will be the ability of growers and the industry to remain flexible and dynamic.

Accordingly, any national strategy for agriculture must include a core principle about seeking to ensure government policy and regulation does not constrain the ability of producers to be flexible in farm management (for example, in water access and management options).

The national strategy should set out overall direction and principles and be supported by a set of detailed commodity-based strategies. This will be essential to address the significant diversity across the industries within the agricultural sector regarding contribution to the processes driving climate change, the likely impacts of climate changes, and the needs and opportunities of the industries. Even within horticultural industries, the diversity of both crops and production systems requires that climate change impact assessments, mitigation planning and adaptation strategies are developed for specific crops and production regions.

The work underway in Queensland to prepare climate change response strategies for a number of intensive agricultural industries, including the horticulture industry, could feed into and support and be supported by a national strategy for the agriculture sector.

A national strategy could help to address issues such as:

- The need for long term investment in research and development, information management and sharing and communication regarding climate change and agriculture.
- The need for direct two-way communication of climate issues and science between growers, their industry associations, research agencies and government and conflicting information presented through the mainstream media.
- The need for relevant climate science, modelling and impact analysis at the sub-regional scales necessary for intensive agricultural industry or enterprise planning.
- The need for climate forecasting and climate risk management tools designed to meet the needs of intensive agricultural enterprises, particularly horticultural systems.
- Reviewing national and state water management systems in light of climate change. A particular issue that requires attention is that of how to continue water reforms spelt out in the National Water Initiative process while providing scope for growers to diversify their farm water sources, water harvesting opportunities or management options. Tightening regulation of water resource allocation and

management currently severely limit the capacity and flexibility of growers to adapt to changing rainfall patterns (eg there are legal constraints to increasing on-farm water harvesting or storage).

- The need for a rigorous and agreed national framework or standard to guide industry carbon footprint assessments, particularly in setting the scope or boundaries of the assessment to avoid double counting of emissions through supply chains and a consistent methodology to allow comparisons between industries.
- The need to identify and invest in key industry programs that can be refined to deliver climate change support services to agricultural businesses. For example, support is needed for the on-going development and delivery of Growcom's FMS program, and in particular the inclusion of climate risk management tools.
- The need for strategic investment in industry organisations who are well placed to work with industry members to implement climate change response strategies and effectively engage industry members in climate variability management and climate change planning at enterprise and industry scales.

While Growcom supports the need for the rapid development of government-industry strategies to address climate change issues in agriculture, we are concerned that there is insufficient understanding of the issues to make informed decisions. We believe that strategies should be made as flexible as possible to enable refinement and adaptation as the research effort generates greater knowledge.

Strategies and policies must be carefully designed to ensure there are no negative economic impacts on horticultural producers, as our sector has no capacity to pass on increased costs of production to its customers.

Section 4
Adequacy of existing drought assistance and exceptional circumstances programs to cope with long term climactic changes

Growcom has strongly advocated over many years that sweeping reforms are needed to drought assistance and exceptional circumstances programs. Current program arrangements already fail to provide real assistance to horticulture industries and enterprises; and Growcom believes that the programs will not cope with new and additional demands driven by climate changes.

While some improvements have been made to shift the emphasis of assistance programs towards risk management, major reforms are still needed. The likely implications of projected climate changes must be incorporated into future arrangements for drought, exceptional circumstances and natural disaster support programs.

To reform policies and programs in ways that future proof them in a climate change context, programs should have following elements

- A strong focus on supporting proactive risk management and advanced agricultural business planning for a drier, hotter climate.
- Innovative, government-supported insurance programs for drought and natural disaster that would enable growers to access affordable insurance cover to protect them against the impacts of an increasingly variable climate.

- Capacity to respond to an increased frequency of severe, damaging weather events.
- Greater emphasis on science and research for accurate regional climate forecasting.
- Structural adjustment for regions that become unviable to continue to produce the current agricultural production mix. Adjustment support could provide for transition into other kinds of production or possibly into non-agricultural businesses.

Drought, natural disaster and exceptional circumstances assistance programs need to be aligned with other policies such as resource security (particularly water security), sustainable farming systems, and business development.

Growcom would welcome an opportunity to discuss in more detail ways in which we believe these reforms to drought assistance could be achieved.

References

CDI Pinnacle Management and Street Ryan & Associates (2004) *Economic Contribution of Horticulture Industries to the Queensland and Australian Economies*, Horticulture Australia Ltd

Deuter, P. (2006) Final Report: Scoping study – climate change and climate variability – risks and opportunities for horticulture VG05051, Horticulture Australia Ltd

Attachments

1. Queensland Farmers Federaion / Growcom Climate Change Project Overview
2. Final report: growers workshop regarding climate change and horticultural industries January 2008

Improving climate risk management in the Queensland horticulture industry

January 2008

Background

Climate change projections for Queensland raise the urgent need for the state's intensive agricultural industries to begin planning responses.

The Queensland Farmers Federation (QFF) and its members have obtained funding from the Australian Government Department of Agriculture, Fisheries and Forestry for a climate change project.

This project aims to explore climate change mitigation and adaptation challenges and opportunities for Queensland's intensive agriculture sector, and scope practical and strategic responses.

Horticulture is one of the industries that is extremely vulnerable to changes in climate. Projected changes, such as temperature increases, more severe and frequent storms and cyclones and less frequent but more intense rainfall events, have strong potential to cause long lasting and devastating impacts on horticulture industries.

The Growcom component of the project will position horticulture to strategically respond to climate change. It will resource the horticulture industry to

- investigate industry awareness, attitudes and needs regarding climate change,
- develop climate risk management tools for incorporation into the Growcom Farm Management Systems program
- prepare a strategic plan and investment program to guide industry action on climate change following a thorough analysis of climate change science and policy as it relates to horticulture in Queensland,
- enhance industry communication and networking regarding climate change issues.

The horticulture climate change response strategy will include:

- a synthesis of the current science and policy efforts underway relevant to horticulture and identification of research/policy gaps
- communication strategy
- outline of the critical risks and opportunities
- mitigation and adaptation strategies
- potential investment portfolio
- options to define horticulture's carbon footprint

Growcom's project will complement the project activities coordinated by QFF for the whole intensive agriculture sector which include:

- An expert panel of Queensland's leading climate scientists that will guide industry's access to key research, modelling and analysis
- Preparation of risks and opportunities assessment report, following a series of industry-science panel workshops
- An investigation of opportunities to enhance energy efficiency and minimise GHG
- Detailed scan of the national and state level policy, science and institutional frameworks for climate change
- Development of communication resources to share climate change information with industry members

Growcom horticulture and climate change workshop report – 25th of January 2008

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1.0 Workshop overview and background

On 25 January 2008 a grower workshop on climate change and the horticulture industry was held at Growcom in Brisbane. The purpose of the workshop was to identify:

- how climate change is currently affecting farm businesses;
- current methods used by growers in managing existing climate variability;
- how climate change might impact on horticultural industries in the future and;
- what information growers will need to manage climate changes in coming years.

The workshop was part of Growcom's climate change project, running from January to December 2008. This project is funded by the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF) as part of the Queensland Farmers Federation (QFF) climate change project. The purpose of this project is to assess climate change issues for intensive agricultural industries in QLD and develop response strategies. An overview of the project is contained in Appendix 2.

2.0 Attendance

The workshop was attended by 12 growers from across Queensland. Growcom members were selected on the basis of capturing the diversity of regions and crops within the Queensland horticulture industry. Represented commodities included: avocado, beetroot, celery, custard apple, citrus, herbs, lettuce, macadamia, pineapple, potatoes, table grapes, tomato, strawberry, stone fruit, squash and zucchini. Represented growing areas included: Bowen Gumlu Whitsundays, Burdekin, Wide Bay-Burnett, Central Burnett, Cooloola Sunshine Coast, Brisbane, Lockyer Fassifern, West Moreton, East Darling Downs, and Granite Belt.

3.0 Agenda

The agenda of the workshop was as follows:

- welcome and introductions;
- opening presentation on the background to the workshop and the Growcom climate change project (Jane Muller, Growcom Senior Policy and Research Officer);
- presentation on climate science (Peter Deuter, Department of Primary Industries and Fisheries);
- group discussion on climate change issues and the impacts/opportunities for the horticulture industry;
- group discussion on information needs;
- summary of key points raised.

4.0 Summary of opening presentations

Two presentations were given during the workshop. The first presentation provided a general introduction to the day by summarising Growcom's interest in climate change issues. In this summary, background information was provided into Growcom's climate change project (refer Appendix 3), as part of the broader Queensland Farmers Federation Project funded by the Australian Government Department of Agriculture, Fisheries and Forestry (refer Appendix 2).

Growcom's climate change project consists of two main components. The first is to review current literature and consult with Queensland growers to establish a clearer understanding of the critical risks and opportunities, mitigation and adaptation strategies**,** investment needs and research/policy gaps relevant to horticultural production in the context of climate change. This scoping work will form the basis of a well grounded industry policy statement on climate change and a Climate Change and Horticulture Strategic Plan. The second project component will be the development of a climate change module for inclusion in the Growcom Farm Management System (FMS) program.

This introductory presentation was followed by a detailed overview of the science of climate change in Australia by Peter Deuter from Department of Primary Industries and Fisheries. Numerous issues were raises in this presentation including a broad explanation of global warming, general discussion of climate modelling and specific climate projections (temperature and rainfall) for Australia at national and regional scales. During the presentation, Peter emphasised the:

- challenge of separating climate change from climate variability;
- trend towards a hotter and dryer climate in much of Queensland;
- possible shifts in growing regions/harvest times in horticultural commodities;
- increasing pest/disease activity as a result of a warmer climate;
- potential management responses to climate change in the horticultural sector.
- Issues associated with greenhouse gas emissions and mitigation

These presentations were followed by an open workshopping session where facilitators gauged grower's reaction to the presentations and discussed further the potential impacts of climate change on horticulture in Queensland.

5.0 Summary of key points and outcomes

A large proportion of the day was devoted to workshop discussion in both large and small working groups. Discussions focused on considering the implications of the presented climate projections, pinpointing production 'pressure points', identifying existing strategies used to manage climate variability in the horticulture industry and information needs. The following is a summary of the key issues raised during workshop discussions. The full set of workshop notes can be found in Appendix 1.

5.1 Implications, impacts, risks and tipping points from climate changes

Growers discussed how climate variability over recent years has affected production and marketing and what the implications of projected climate changes in QLD could be. A number of growers indicated that climate issues had already had an effect on crops, although there was uncertainly about if this was due to normal climate variability or a broader trend towards a changed climate. Specific climate impacts already felt by growers included:

- changing planting windows for some crops and regions;
- unseasonal temperatures resulting in reduced avocado production and uneven tomato growth;
- Increased frequency of extreme temperatures resulting in increased heat damage to pineapples.

In considering how climate change could affect the industry, growers identified the following issues:

- increasing risk of pest and diseases associated with higher temperatures;
- increased risk that lower impact, more targeted pesticides may lose efficacy at higher temperatures, forcing growers back to older, harsher chemicals and limiting the application of integrated pest management / integrated crop protection systems;
- increased temperature is likely to present a more critical issue than reduced rainfall due to the sensitivity of crops to temperature change and the intensive / irrigated nature of horticulture production;
- Southern Queensland and the Lockyer Valley are particularly vulnerable regions in QLD;
- climate variability will add additional variability to business returns, increased risk, cost and increased variability in crop production will make horticultural enterprises 'less like a business and more of a gamble' (quote from participant);
- how will climate change impact on international trade opportunities for Australia horticultural growers with regard to competitors' production and emerging market opportunities?
- investment horizon in horticulture is dependant on fruit or vegetable production;
- vegetable production provides greater flexibility than tree crops because of the diversity of vegetable crops and the shorter lead time.

The workshop also discussed whether it was possible to identify particular "tipping points" for horticultural production, that is thresholds of temperature or other climatic features that would prevent the continued production of crops in a region.

Growers noted the following regarding pressure points and tipping points:

- it is very difficult to identify specific tipping points amongst growers due to the diversity of crop production in the horticulture industry;
- while tipping points of tree species (such as apples) could be defined, it was more difficult to determine the tipping points of vegetable species due to continually changing vegetable cultivars;
- considerable difference exists in tipping points of fruit versus vegetable production, the many varieties/cultivars and short maturing time of vegetable species makes vegetable production more adaptable to climate change than fruit production;
- the diversity of horticultural crops grown in Queensland combined with regional climatic variability increases the challenges of comparing specific tipping points across the state;
- although no exact temperature or rainfall tipping points were identified for the industry, it was suggested that sustained temperatures of over 32 degrees made tomato production difficult;
- there is a need to consider the 'marketable' yield tipping point and social tipping points in addition to agronomic tipping points.

5.2 Current and future management of climate variability / change

In the past, horticulture production in Queensland has prospered despite highly variable climatic conditions. On this basis, growers were cautiously confident of their ability to adapt to the challenges posed by climate change providing the information required to make farm management decisions was available and regulatory frameworks allowed for sufficient flexibility in farm management.

Current approaches to managing climate variability include:

- intensively irrigated cropping systems supported by large water reserves;
- diversification of crop production;
- use of climatic information from the internet;
- strategic planning on a 10 to 20 year planning cycle;
- spreading production across a range of growing regions or contracting other growers to help meet production requirements.

As climate change becomes an increasingly critical issue, farmers will need to develop new methods and farm management approaches. In particular, it was identified that an increased capacity to predict long term temperature variability at a regional level would provide significant benefits for growers. This is a critical adaption issue due to the sensitivity of crops to temperature change and the irrigated nature of horticulture production. Accurate temperature projections (3 months ahead of time) at a regional scale would allow growers to more effectively respond to the long lead-times (3 months) and short season length (several weeks to one month) inherent in the horticulture industry. Growers also indicated that the natural indicators of climate variability and climate change should not be over looked[1]. In cases where change is necessary, implementing actions that have significant benefits beyond climate related issues is an obvious starting point for farm scale adaptation. This was seen as a 'no regrets' strategy.

5.4 Mitigation, carbon management and carbon trading

During the workshop growers were also keenly interested in the 'carbon footprint'[2] of horticulture compared to other agricultural sectors to capitalise on future marketing and emission trading opportunities. Key mitigation issues that emerged from the workshop included the need to track emissions through the supply chain and benchmark the carbon footprint of horticulture.

It was generally felt that defining the carbon footprint of horticulture was a research priority, due in part to a fear of the publics' perception of the horticulture industry as a contributor to global warming. The need to communicate the differences between broad-acre agriculture and horticulture to relevant stakeholders was raised. Concern was also voiced over the possible imposition of Government regulations relating to on-farm emissions. A more preferable option for growers would be for growers to have input into the establishment of carbon auditing parameters and use a voluntary auditing approach rather than regulated auditing and compliance.

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[1] Natural indicators may vary from region to region and include events such as the flowering of particular species at a certain time of the year.

[2] Some participants may have used the term "life cycle analysis" and "carbon footprint" interchangeably as a discussion of each of these terms was not possible during the workshop due to time constraints.

The production of bio-fuels was also a raised as a mitigation issue. In particular questions were raised over the potential for horticulture to play a significant role in bio-fuel production. Specific issues included:

- most appropriate crop type;
- potential to convert horticultural waste into fuel;
- economic viability of bio-fuel production;
- various ethical issues surrounding converting food to fuel.

The issues surrounding mitigation and “carbon footprinting’ were of much greater concern to growers than had originally been thought and have led to a slight readjustment of project priorities.

5.5 Information needs

The need for effective communication of accurate climate change information was frequently raised by growers. One grower stated that there ‘is a pressing need to de-mystify climate change through case studies into real grower experience’. However, effective dissemination of climate change information is hindered by the diversity of regions, crops and crop varieties resulting in fragmentation of farmers’ information needs and inward looking farm management approaches.

The need for further information on the carbon footprint of horticulture and associated emission trading issues was a focus of workshop discussion. In this field, there still remains considerable uncertainly on issues such as the:

- contribution of horticultural industry in QLD to global emissions;
- most appropriate method for auditing emissions throughout the value chain;
- potential for different on-farm production systems to reduce \ sequester emissions.

During the workshop various communication approaches were considered, including:

- development of an information package for growers outlining climate change jargon, projected climate trends, mitigation and adaption options;
- design and dissemination of a horticulture specific carbon auditing tool to benchmark the carbon footprint of horticulture;

- identification of best practice adaption and mitigation responses to climate change at a farm scale;
- integration of climate change into existing farm management systems;
- identification of more regionally specific and accurate climate scenarios for temperature and rainfall;
- assessment of the impact of projected climate change on all major horticulture commodities in QLD.

5.6 Policy and communication needs

Effectively lobbying the needs of growers to inform government climate change policy is a critical communication issue. As the peak body in the horticultural industry, Growcom is well placed to fill this role. Numerous policy issues were raised during the workshop, such as the need to:

- integrate future water projections and allocations with rainfall data from climate models;
- ensure that adaption and mitigation costs are not unfairly passed down the value chain to growers;
- future government policy on agriculture and climate change considers the emissions of different agricultural industries and acknowledges the relatively low contribution of the horticultural industry;
- preserve grower flexibility and choice through the use of a market based approach to mitigation.

6.0 Summary of key workshop themes

Some common themes and grower interests clearly emerged from the workshop discussions:

- Growers showed a strong interest in carbon management issues and opportunities.
- Measuring (and marketing) carbon footprints at business, commodity and industry scales was a clear priority for growers.
- There was strong interest in pursing any opportunities to promote industries or market horticultural products as carbon neutral.

- Growers believed the industry needs to be well prepared for government intervention on carbon management and/or the introduction of emissions trading.
- There was a sense of urgency that Growcom needs to strongly promote the carbon status of the industry to government, the general public and consumers.

Regarding issues around adaptation:

- There was a general sense of confidence that growers would be able to manage climate change. Horticulture has proven to be a dynamic, adaptable industry with a good capacity to respond to changes.
- Easy access to more detailed regional-scale projections would support adaptation to climate change. The best way to provide access to climate projections is through existing websites such as Elders and BoM.
- Government approaches to water resource management and planning, at property, irrigation scheme and catchment scales is a major concern for growers.
- The key to industry's ability to adapt to climate change is to maximise the capacity of growers to be flexible. Growcom's role will be to work with state and federal governments to ensure policies and regulations that affect farm management and carbon management provide growers with plenty of scope for flexibility.

Regarding mitigation of greenhouse gases:

- Growers demonstrated a strong interest in addressing greenhouse gas emissions at a farm business level, particularly in response to potential pressure from the market or policy makers.
- If emissions can be shown to be well managed by the industry, growers are keen to build a positive public image of horticulture as a "climate change good guy".
- Growers are very interested in further information about carbon market opportunities and biofuels.

Issues that were not raised at the workshop included:

- Improved soil and farm management practices (zero-till, rotation farming, fertilizer management, optimized irrigation) to reduce on-farm emissions.

Finally, the workshop highlighted a number of connections that should be pursued by Growcom as a priority:

- SunWater and the Queensland Department of Natural Resources and Water.
- Senior management in the Queensland Department of Climate Change.
- Land and Water Australia.
- Australian Greenhouse Office and the Australian Government Department of Agriculture Forestry and Fisheries.
- Horticulture Australia Ltd.

7.0 Where to from here?

Findings from the Grower workshop have provided a valuable insight into the future of horticulture in QLD within a changing climate. In particular, grower interest in issues such as footprinting, emissions trading and water entitlements have established a much clearer direction for Growcom's work into climate change. Based on this information, Growcom will continue its research and policy work in the climate change project throughout the remainder of the year. When completed, development of a comprehensive climate change in horticulture policy document and the integration of a climate change module into the existing Farm Management Systems will provide a solid foundation for an industry based response to climate change. Additional grower workshops and information sessions will be held as an integral part of this development process. During this time, Growcom aims to continue to secure long term government and industry investment for ongoing projects and other financial assistance to growers.

Appendix 1: Workshop detailed notes

The following is a more detailed summary of the key issues raised during the workshop sessions.

1.0 Communication

- Tested and accurate information is required to overcome assumptions, bias and false information at all stakeholder levels.
- Identify industry “best practice”.
- De-mystify climate change through case studies into real grower experience.
- Distribute accurate information to the public and the Government.
- Grower concern over public perception of the horticulture as a contributor to global warming – need to communicate the differences between broad-acre agriculture and horticulture.
- Potential to use a regional road show to communicate climate change issues to growers and assess business impacts.

1.2 The horticulture industry and the Government

- Need clear long-term policy direction from state and federal and stare Government.
- Growers currently operate within a 10 to 20 years planning cycle
- Government decisions heavily impact on the viability of growers’ businesses.
- No clear policy on climate change from Government = decreased investment.
- Government assistance and incentives are needed to assist growers adapt to climate change.
- Growers need to receive a premium for compliance to any additional Government production requirements.
- Increased focus on food security in Australia would encourage local consumption, lower transportation emissions and assist in preventing future food shortages.

1.3 The horticulture industry and the public

- Grower concern over public perception of the horticulture industry as a contributor to global warming – need to communicate the differences between broad-acre agriculture and horticulture. - Best communication method?
- How willing is the public to pay a premium for carbon neutral products?

1.4 The horticulture industry and peak-body organisations (Growcom)

Potential to:

- provide and distribute information;
- undertake research and development;
- promote best practice;
- inform the public;
- communicate growers' needs to the Government.

1.5 The horticulture industry and growers

- High quality information required to assist growers adapt to changing climate.
- The internet is an effective tool for communicating climate change information to growers.
- Variability versus climate change?
- The most valuable climate information would be for growers to receive accurate temperature projections 3 months ahead of time.

1.6 Carbon emissions and horticulture (carbon farming)

- Emission trading is a major area of interests for growers.
- What contribution does agriculture make to national emissions?
- Carbon auditing methodologies need to be consistent for measuring the carbon footprint of a farm.

- Is horticulture a net emitter or a net sequester of carbon?
- Growers need to receive financial return or market advantage for compliance with any Government policy on emission reductions.
- What is the best way to reduce emissions at a farm scale (mitigation)?
- Implications for regrowth versus clearing?
- Orchards emissions versus vegetable emissions.
- What is counted in the 'scope' of carbon emissions in horticulture – supply chain?

- Need to measure the emissions associated with transporting food (food miles).
- Will measuring food miles create problems for horticulture in north QLD?.
- Will consumers pay a premium for 'carbon neutral' foods?
- What export opportunities exist for carbon neutral products?
- Opportunity to promote the value of local produce (this is an area where Growcom could be involved).
- Response must be market driven and not forced Government accreditation for which growers receive little or not benefit.
- Growers want to define the parameters of what's counted within their carbon footprint and be "ahead of the game" rather than having something imposed on them from the Government.

1.7 Research needs

- Quantify when climate variability becomes climate change at a regional scale.
- How will climate change impact on trade opportunities for Australia horticultural growers? – Competitors, market opportunities.
- Different agronomic preferences across different temperatures results in a need for accurate temperature predictions at regional level - temperature and rainfall data at a regional scale and sub-regional scale is critical.
- What are the natural indicators of climate variability and climate change at a regional and local level?
- Food for fuel versus food for food in horticulture (Are any horticultural products being used for fuel)?
- Develop auditing methodology to audit farm carbon footprint.

- What is the publics' willingness to pay for carbon neutral products?
- Need to integrate future water projections and allocations with rainfall data from climate models.
- How will humidity increases as a result of climate change impact on the horticulture industry?
- Need to define agronomic tipping points for many horticulture commodities.

2.0 Grower perception and experience of climate change and variability

2.1 General grower observations of change and associated impacts

- High climate variability already a major challenge in the vegetable industry.
- Many accounts of climate variability by farms but difficulty determining what is climate change and what is variability?
- Some shift in growing seasons reported.
- General consensus of climate change occurring.
- Horticulture is more likely to move south and not north in response to climate change.

2.2 Regional grower observations of change and associated impacts

- Lockyer/southern QLD are vulnerable regions.
- Lack of consistency in change from season to season in north Queensland.
- Frost temperatures around Anzac day have reduced.
- Cold winters in North Queensland are have reduced production and resulted in increased input costs - Is this trend climate change or climate variability and how does this fit within climate predictions?
- Changing plantings windows for some species and regions.
- Increased water requirements at higher temperature.

2.3 Commodity specific grower observations of change and associated impacts

- Pineapples have been affected by temperature extremes. Time involved in erecting sunburn protection over crops has resulted in increased labour and financial costs. 5 per cent crop sunburn loss in recent years.
- Southern Queensland lettuce production is vulnerable industry but it is difficult to determine the thresholds for different cultivars as they are always changing.
- Low chill stone fruit have experienced a reduction in chilling days. As a result growers have planted apple varieties with lower chilling requirements (movement away from Granny Smith apples).
- In many ways, table grapes are better off in QLD due to large rainfall events create runoff which can be stored and then used in irrigation.
- The season length for table grapes has changed.
- High and fluctuating temperatures have resulted in reduced fruit production (smaller fruit) from Avocado trees due to poor flowering and see death - difficult to market this produce.
- Recent temperature fluctuations also impacting custard apple and macadamia production.
- Severe frosts (worst in 20 years) have damaged 50 per cent of a grower's strawberry production.
- Estimated that the strawberry industry has experienced a 20 to 30 per cent reduction in production due to cold weather and lack of rain.
- The planting window for potatoes has increased due to a reduction in cutting frosts.
- Cooler than usual winters in the north are causing problems for the production of squash and zucchini.

3.0 Adaption

3.1 Current responses

- Examples of growers using trial and error approaches based on existing research for individual crops.
- Gradual adaption of existing systems in conjunction with long term planning to minimise risk.
- Preference for 'no regret actions' - actions that have significant benefits beyond climate related issues.
- Future on-farm energy generation options need to be capable of guaranteeing reliable energy supply.

3.2 Tipping points

- 'Marketable' yield and market tipping points need to be considered as well as agronomic tipping points.
- To identify a tipping point requires a consistent weather pattern resulting in change growth patterns.
- Considerable difference in tipping points of fruit versus vegetable production due to the many varieties/cultivars of vegetables and the short maturing time of vegetable species resulting in a different capability to respond to change.
- North Queensland not at production at tipping point but maybe in the future.
- Temperature is much more of an issue than rainfall due to the sensitivity of crops to temperature change and the intensive/irrigated nature of horticulture production.
- Need to define agronomic tipping points for many horticulture commodities.
- Pest management can't use chemicals at high temperature.
- Variety of temperature profiles for different crops.
- Diversity of regions, crops and crop varieties results in fragmentation of growers' information needs.
- Some understanding of tipping points for certain species such as apples.
- Lettuce - hard to know the tipping points for lettuce because the cultivars are always changing.
- Tomato – sustained temperature of 32 degrees makes production difficult.

3.3 Farm management in a changing climate: investment versus risk

- Investment horizon depends on fruit or vegetable production.
- Investment horizon - vegetables have more diversity and therefore flexibility then tree crops.
- Climate variability will add additional variability to business returns.
- Growers have a 10 to 20 years planning cycle.
- 'Marketable' yield and market tipping points need to be considered as well as agronomic tipping points.
- Increased climate variability results in increased risk, cost and increased variability in crop production. "Less like a business and more of a gamble".
- Increased risk = decreased investment and decreased farming of marginal land.
- Production will be affected most in marginal land.
- Need for long term planning tools required to manage risk and put in place effective risk management and strategic planning approaches.
- Considerable difference exists between fruit production and vegetable production due to the many varieties/cultivars of vegetables and the short maturing time of vegetable species. This results in a different capability to respond to change and therefore a different risk profile.
- No clear policy on climate change will result in decreased investment.
- Information required to decrease investment risk and reassure banks (finance provision).
- Diversity of regions, crops and crop varieties results in fragmentation of growers' information needs and inward looking farm management approaches.

Appendix 2: QFF climate change project outline

As part of the Australian Government's National Agriculture and Climate Change Action Plan, Queensland Farmers' Federation (QFF) is undertaking a strategic climate change project that is industry-led and focuses on the needs of Queensland's intensive agriculture.

The industries involved in the project include cropping (sugar cane and cotton), horticulture (tree, perennial and seasonal crops, nursery and flower production) and intensive livestock (dairy, aquaculture and meat chicken). The project will be conducted over the period November 2007 to June 2008.

The "Climate change risks and opportunities assessment for Queensland's intensive agriculture sector" activity is part of the overall project. QFF has invited a number of key scientists and economists to participate on an "Expert Panel" and assist QFF to conduct a Risks and Opportunities Assessment which

- Identifies regions and commodities most at risk, and what factors drive the risks
- Provides a preliminary 2nd level analysis of broader implications of identified risks (eg for supply chains, markets, regional development, banking/insurance etc)
- Identifies opportunities and possible amelioration strategies for Queensland's intensive agriculture (eg. new varieties, new crops, new practices, new locations)
- Scopes requirements and adaptation information gaps (eg. new varieties, new crops, new practices) in shorter term climate projections and regional/industry scenarios and make recommendations for future investment
- Develop a prototype action plan to guide industries in their planning roles

The Expert Panel will

- Contribute to an analysis of the current understanding of climate impacts on intensive agriculture in Queensland;
- Confirm the methodology required for the risks and opportunities assessment;
- Assist industry to refine questions and responses on the topic;

- Where appropriate be available to assist in any industry/producer workshopping sessions;
- Peer review the final report;
- “Direct traffic” for work between sessions; and
- Recommend a process to continue science input post-project.

Utilising the Project Science Advisers and Expert Panel outputs as well as existing and new resources developed through this project, each participating industry will develop an industry action plan to deal with the risks/opportunities associated with climate change including:

- The linkages as appropriate to industry Farm Management Systems programs
- Training and resource requirements for industry extension and advisory staff to assist them in their role with producers
- A feedback process for providing producers with relevant data that can be incorporated into their long term risk management decisions.

Appendix 3: Growcom climate change project outline

Climate change projections for Queensland raise the urgent need for the state's intensive agricultural industries to begin planning responses. The Queensland Farmers Federation (QFF) and its members have obtained funding from the Australian Government Department of Agriculture, Fisheries and Forestry for a climate change project.

This project aims to explore climate change mitigation and adaptation challenges and opportunities for Queensland's intensive agriculture sector, and scope practical and strategic responses. Horticulture is one of the industries that is extremely vulnerable to changes in climate. Projected changes, such as temperature increases, more severe and frequent storms and cyclones and less frequent but more intense rainfall events, have strong potential to cause long lasting and devastating impacts on horticulture industries.

The Growcom component of the project will position horticulture to strategically respond to climate change. It will resource the horticulture industry to

- investigate industry awareness, attitudes and needs regarding climate change,
- develop climate risk management tools for incorporation into the Growcom Farm Management Systems program
- prepare a strategic plan and investment program to guide industry action on climate change following a thorough analysis of climate change science and policy as it relates to horticulture in Queensland,
- enhance industry communication and networking regarding climate change issues.

The horticulture climate change response strategy will include:

- a synthesis of the current science and policy efforts underway relevant to horticulture and identification of research/policy gaps
- communication strategy
- outline of the critical risks and opportunities
- mitigation and adaptation strategies
- potential investment portfolio
- options to define horticulture's carbon footprint

Growcom's project will complement the project activities coordinated by QFF for the whole intensive agriculture sector which include:

- An expert panel of Queensland's leading climate scientists that will guide industry's access to key research, modelling and analysis
- Preparation of risks and opportunities assessment report, following a series of industry-science panel workshops
- An investigation of opportunities to enhance energy efficiency and minimise GHG
- Detailed scan of the national and state level policy, science and institutional frameworks for climate change
- Development of communication resources to share climate change information with industry members