The impacts of the proposed carbon price mechanism on Australian horticulture

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AH11019
Final report
31 May 2012

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AH11019: The impacts of the carbon price on Australian horticulture

This report provides a detailed but easy-to-comprehend summary of the Australian carbon price mechanism. It also presents the results of economic analyses of the potential impacts of the carbon price on horticultural businesses.

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Final report : HAL project #AH11019
31 May 2012

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1 Summary

Australia's carbon price mechanism will come into effect in July 2012. While agricultural industries will not be directly involved in the carbon price mechanism, it is expected that the carbon price will result in cost increases for key agricultural inputs. These price increases will be most significant for energy (i.e. electricity and fuel) and energy-intensive inputs such as fertiliser and chemicals.

This report will directly address this priority issue and will provide a detailed but easy-to-comprehend summary of the key mechanics of the carbon price mechanism. It will furthermore present the likely impacts on horticulture, in particular an analysis and discussion of the economic impacts of projected cost increases, including impacts on farm profitability.

2 The carbon price policy

The new carbon price policy – *Clean Energy Future* – is the Government's plan to reduce the emissions intensity of the Australian economy. The scheme was passed through the Senate on 8 July, 2011, and will commence on 1 July, 2012. The scheme is the result of lengthy negotiations involving the Government, the Greens and the rural independents, and has been subject to intense public debate.

There are four main elements to the scheme:

- A carbon price
- Renewable energy
- Energy efficiency
- Action on the land.

The key component is the carbon price that will be implemented in the form of an *Emissions Trading Scheme*. This policy approach is favoured over alternatives because it is believed to provide the cheapest method to reduce emissions while sustaining economic growth (International Emissions Trading Association 2012). The same approach has been adopted in many other countries, including the European Union, New Zealand and South Korea.

The scheme is mainly intended to drive:

- Reductions in emissions of greenhouse gases (GHG)
- Growth in low carbon and renewable energy supply
- Conversion of coal-fired boilers to gas-fired boilers
- Improved energy efficiency in buildings and motors
- Awareness of energy consumption
- Innovation in low carbon technology
- Installation of scrubbers at chemical plants
- Capture and flaring of emissions from mining and gas extraction.

2.1 The Clean Energy Future legislation

The *Clean Energy Legislative Package* consists of a number of acts that will provide the legal framework for the carbon price policy. The main acts are listed below.

- *Clean Energy Act 2011*- The central act which will set up the carbon price mechanism
- *Clean Energy Regulator Act 2011*
- *Climate Change Authority Act 2011*
- *Clean Energy (Consequential Amendments) Act 2011*

2.2 Greenhouse gases

The earth's surface is warmed by solar radiation from the sun. Some of this heat is reflected into the atmosphere as infrared radiation. In the atmosphere, greenhouse gasses (GHG) will absorb some of the infrared radiation and capture the heat. This process, the greenhouse effect, ensures a relatively stable temperature in the atmosphere. Increased levels of GHGs in the atmosphere amplify this effect and are leading to an increase in average global temperature (IPCC 2008).

Carbon dioxide (CO_2) is only one of the GHGs addressed by the carbon price scheme. There are six main GHGs emitted from human activities that can influence atmospheric temperature. The carbon price will be applied on four of these: CO_2, methane (CH_4), nitrous oxide (N_2O) and perfluorocarbons (PFC) (only from aluminium smelting). The rest, hydrofluorcarbons (HFC), sulphur hexafluoride (SF_6) and PFC (excluding gases produced from aluminium smelting) are already regulated by the *Ozone Protection and Synthetic Greenhouse Gas Management Act 1989* and are therefore not addressed by the carbon price mechanism (Department of Sustainability, Environment, Water, Population and Communities 2012).

Each GHG has a different *global warming potential* (GWP), which is associated with the amount of infrared radiation the gas can absorb and how long the gas will persist in the atmosphere. The effect is expressed in carbon dioxide equivalents (CO_2-e) using CO_2 as the standard unit for reference comparing other GHGs to the effect of CO_2 as seen in table 1. CO_2 is the main GHG in terms of volume, but others are much more potent in their effects.

Table 1: Global warming potentials (GWP) of the greenhouse gases covered by the carbon price (Department of Climate Change 2008)

GHG	GWP (CO2-e)	Main contributor
Carbon dioxide (CO_2)	1	Burning of fossils fuels, deforestation
Methane (CH_4)	21	Waste, coal mining, agriculture
Nitrous oxide (N_2O)	310	Fertiliser
Perfluorocarbons (PFC)	6,500-23,900	Aluminium smelting

While there are multiple GHGs that affect the atmospheric temperatures, the phrase "carbon" is conventionally used as shorthand for GHGs within the context of climate policies.

2.3 Emissions Trading Scheme

The carbon price mechanism will be implemented as an *Emissions Trading Scheme* (ETS) rather than a "carbon tax". It is based on a cap-and-trade model where a limit, or cap, is set on the available number of permits allowing emissions of GHGs. Businesses included in the scheme will have to purchase permits for each tonne of GHGs they emit.

The scheme will start out with a fixed price period for the first three years. Each tonne of carbon emitted will cost $23 in the first year, rising at 5 per cent (2.5 per cent price increase and 2.5 per cent inflation) per year to $24.15 in year 2, and $25.40 in year 3. There will be no cap in the three years fixed price period, resulting in an unlimited number of carbon credits that can be purchased. This temporary fixed price period is designed to provide an easy transition to carbon pricing and is also the part of the scheme that attracts the "tax" label. At the end of the fixed price phase, the scheme will transition to a conventional flexible price emissions trading scheme where the cap on emissions will determine the supply of permits while the market will determine demand and price. The emissions caps will be set by the Government, advised by the independent Climate Change Authority headed by former Reserve Bank Governor, Bernie Fraser.

For the first three years of the flexible period of the ETS (2015-2018), a price floor and ceiling will be in place to avoid large price fluctuations. The floor is set at $15 in 2015-2016 rising to $16 in 2016-2017 and $17.05 in 2017-2018. The price ceiling for 2015-2016 will be determined by 31 May 2014. The ceiling will be set $20 above the expected international carbon price and rise with 5 per cent in each of the two following years. The price floor and ceiling are put in place to ensure a level of

stability in the first three years with a flexible price. The price floor is also designed to avoid sharp falls in prices which can undermine confidence of investment in clean technology.

If the international carbon price falls below the Australian floor price, users of international credits will be charged the difference.

2.4 Businesses included in the carbon price scheme

The Government has identified the sectors with the largest mitigation potential and the number of businesses that need to be included in the scheme to cover the main polluters and sectors. Sectors included in the carbon price are energy generation, industrial processes, waste, fugitive emissions and some transport areas. Businesses within these sectors which emit more than 25,000 tonnes of carbon will be included in the scheme. It was expected that about 500 businesses would be required to pay a price for their carbon emissions. In May 2012, a list of 248 liable entities was released; this relatively small number of businesses is responsible for 70 per cent of the total amount of emissions which is covered under the scheme (Clean Energy Regulator 2012).

Only direct emissions are included in the scheme (i.e. those that occur on site). Businesses will not have liability for indirect emissions such as those from purchased electricity or waste disposal (Australian Food and Grocery Council 2011).

Liquid fuels are treated differently from other sources of emissions. An equivalent carbon price will be applied through reductions in the fuel tax credit rate for some sectors and /or activities. While this approach seems complicated, it provides a way for the Government to target emissions from some sectors or activities, while sparing others.

Fuel used in domestic aviation and shipping, rail transport, off-road transport and non-transport uses will be affected. The Government intends to add the carbon price on fuel used for heavy on-road transport from 1 July 2014. Fuel used off-road in agriculture, fisheries and forestry will not be affected by the carbon price; neither will fuel used in households and light commercial vehicles (4.5 tonnes or less).

Agriculture and forestry will not be included in the ETS; as a result, no agricultural businesses will be required to pay a direct carbon price by purchasing permits. The main reasons to exclude agriculture and forestry, despite being responsible for 23 per cent of national emissions, are the large number of small businesses in this sector and difficulties in accurately accounting for the emissions (Australian Government 2012; Parliamentary Library 2010). However, substantial emissions

reductions in agriculture will be necessary to achieve long term national emissions reduction targets. For this purpose, the *Carbon Farming Initiative* (CFI) has been introduced. The CFI is an agricultural offsets scheme designed to encourage voluntary emissions reductions or increase carbon sinks to gain carbon credits for the carbon market. Activities eligible under the CFI include establishment of carbon sinks, such as through soil storage and reforestation, and reductions in emissions from livestock and fertiliser use.

Because of international commitments under the Kyoto Protocol, monitoring and reporting is already required for all of the businesses included in the carbon price. Since 1 July 2008, the businesses have reported on their emissions under the National Greenhouse and Energy Reporting (NGER) Act 2007. The requirements for calculating liabilities under the ETS differ slightly from reporting requirements of NGER scheme, explaining the difference in the number of businesses involved in the two schemes (Commonwealth of Australia 2007). In most cases, emissions are not measured directly but estimated following internationally agreed rules.

2.5 Reducing emissions

After the first three years with a fixed price, the included businesses will have to ensure that they purchase permits equivalent to the amount of carbon they emit. The permits will be issued by the Government and the price will be determined by the market. To mitigate pollution, the Government will set a cap on the number of permits issued and thereby enforce a reduction in emissions. The cap will be decided with advice from the independent Climate Change Authority and will align with the emission reduction target to which the Government has committed.

The planned gradual reduction in the cap and number of permits ensures that the emissions reduction target will be met. This is another major advantage of cap-and-trade emissions trading over alternative policy approaches such as true carbon tax or regulation. It is also important to understand that the cap and demand for permits set the permit price, rather than the price determining the level of emissions reduction.

2.6 Emissions targets

Under the Kyoto Protocol, Australia is committed to limit its emissions for 2008-2012 to an 8 per cent increase from 1990 levels. In December 2011, international negotiations led to an agreement for extension of the Kyoto Protocol period until 2017.

The Government has set a national target of 5 per cent reduction from 2000 levels by 2020 and 60 per cent reduction by 2050. International agreements on climate change mitigation can influence these targets and the Government has agreed to raise the target for 2020 to 25 per cent if substantial international action is taken.

2.7 Permits

Each permit will allow the owner to emit one tonne of carbon dioxide equivalents. Businesses will be able to trade these permits on an open market and the price will be set by supply and demand. The Clean Energy Regulator will be the statutory authority facilitating all trade of carbon permits.

Businesses that emit more carbon than they hold permits for will face heavy penalties.

If a business has insufficient permits to cover its emissions, it can:

- Reduce emissions
- Buy additional permits (at auction or from other businesses that have reduced their emissions)
- Buy offsets for their emissions (eg. carbon credits from the Carbon Farming Initiative)
- Any combination of the above.

If a business has excess permits they can sell them on the open market. The decision on which is the best option for a particular business will be based on the relative costs of emissions reductions (which may require investing in new equipment or technology) and the current cost of emission permits.

Table 2: A simple example of the emissions trading scheme at work

Business A	**Business B**
Emissions: 100,000 T Permits: 95,000 t **Cost of additional permits:** $115,000 ($23 / t) **Cost to increase efficiency:** $115,000 for 10,000 t reduction ($11.50 / t) -5,000 spare permits to sell	Emissions: 100,000 t Permits: 95,000 t **Cost of additional permits:** $115,000 ($23 / t) **Cost to increase efficiency:** $150,000 for 5,000 t reduction ($30 / t) -Requires 5,000 extra permits
What should the two businesses do? For Business A, it's cheaper to cut emissions by increasing efficiency than to buy more permits. Business A should sell its spare 5,000 permits at $23 / t, fully offsetting the costs of its efficiency program. In contrast, improving efficiency is an expensive option for Business B. Business B should take the cheaper available option and buy the necessary permits. The end result? Total emissions for both businesses are reduced by 10,000t while the total cost of achieving that reduction is reduced by $115,000. In the real world ETS, the trading relationships among the 250 companies will be much more complex but the principle is exactly the same – achieving emissions reductions at least cost.	

For the scheme to be efficient in reducing emissions, the timing of the transition from the fixed price, and the number of permits issued, are important. If the price is too low because too many permits are issued relative to demand, businesses will find it cheaper to buy permits rather than cut emissions. If the price is too high because insufficient permits are issued to meet demand, businesses will struggle to buy sufficient permits and face financial difficulties. If the right numbers of permits are issued, the scheme will encourage abatement and, in the long term, steer Australia towards a low carbon economy.

3 International action

The United Nations Framework Convention on Climate Change (UNFCCC) is an international treaty consisting of 194 countries. The overall objective is to limit greenhouse gases in the atmosphere to a level which will prevent dangerous anthropogenic (i.e. human caused) climate change (UNFCCC 2011). Reports from the Intergovernmental Panel on Climate Change (IPCC) provide information and data for the UNFCCC. The IPCC is the international body for climate change assessment formed by the UNFCCC and the World Meteorological Organisation. Thousands of scientists from the 194 UNFCCC member countries volunteer to contribute to IPCC's work. The IPCC reviews and assesses worldwide scientific, technical and socio-economic information on climate change. No research or monitoring is undertaken by the IPCC itself, and all reports are political neutral and reviewed by Governments (Intergovernmental Panel on Climate Change).

3.1 Conferences of the Parties

All UNFCCC member countries meet at the annual Conference of the Parties (COP) to negotiate global agreements on climate change adaptation and mitigation issues.

In 1997, the 3rd COP meeting adopted the Kyoto Protocol; it legally binds 37 industrialised (Annex B) countries to emission reduction targets. The commitment period is 2008-2012, where Australia has agreed to limit its emissions to 108 per cent compared to 1990 levels. The protocol enforces monitoring of emissions and describes three mechanisms for mitigation; Emissions Trading, the Clean Development Mechanism and Joint Implementation. Emission trading provides the opportunity for countries to trade permits for emissions with other Annex B countries (UNFCCC 2012).

From 1997 until 2009, the annual COP meetings attracted little public attention. However, high expectations for an international agreement on climate change action raised worldwide public awareness for the 15th COP held in Copenhagen, Denmark. No agreement was reached to make a global legally binding commitment to cut GHG emissions. However, the *Copenhagen Accord* was agreed, underlining "that climate change is one of the greatest challenges of our time" and that deep cuts in emissions is required to keep average temperature increases below 2°C (UNFCCC 2010).

At the 16th COP meeting in 2010 (Cancun, Mexico), the *Cancun Agreements* were negotiated, with the main achievement being that developing countries also have to submit their actions to mitigate GHG emissions.

All national targets have later been analysed to determine if they are adequate to limit climate change to less than 2℃. Most analyses conclude that the current targets are not sufficient. Limiting global average warming to 2℃ will still be achievable but will be far more costly if ambitious action is postponed until after 2020.

In December 2011, at the 17th COP in Durban, South Africa, three key agreements were achieved:

- Extension of the Kyoto Protocol until 2017
- Implementation measures for the Green Climate Fund
- Durban Platform for Enhanced Mitigation.

The Durban Platform for Enhanced Mitigation is the most significant outcome from COP17. It is a commitment by all countries to produce a global legally binding agreement on emission reductions. The agreement has to be in place by 2015 and implemented by 2020. This agreement will include all major emitting countries and, for the first time, include major economies such as China and the United States.

In the context of the Durban agreements, it is important that the Government maintains its commitment to introduce a 25 per cent reduction target by 2020 if global agreements are made. The Coalition also supports this target; however, its current policy will have to be revised to meet this level of commitment. Under the Clean Energy Future Act, Australia must commit to a 2020 target by 2014; however, international targets built on the Durban Platform for Enhanced Mitigation are set to be agreed upon in 2015. Before setting a target for 2020, the Government will have to consider international obligations.

3.2 The international carbon market

Despite the fact that no binding global agreement is currently in place, all major economies have implemented some policies to limit emissions and increase low pollution technologies. New Zealand, 10 US states and 31 European countries have already implemented emissions trading schemes. South Korea has legislated to establish an emissions trading scheme in 2015 and other countries are actively considering implementing one. Current carbon prices range from about $9-133, but comparison with other countries is difficult because of the differences in the schemes and the implementation levels of other complementary measures (Climate Institute 2011; Reuters 2012).

From July 2015, the Australian carbon price mechanism will enter its flexible phase and be linked to the international carbon market. When the Australian scheme

becomes a part of the international carbon market, Australia's carbon price is likely to follow the global price.

3.2.1 The European Union

The European Union's Emission Trading Scheme (EUETS) has been operating since 2005 and is currently the largest carbon market internationally. In many ways, the constant process of refinement in the EUETS has made it a trial for similar schemes to be introduced elsewhere.

The EUETS is currently operating with a much lower price than the floor price for the Australian scheme. One reason is macroeconomic circumstances due to the global financial crisis which has reduced production significantly and thereby lowered carbon emissions. However, a high cap and over-allocation of permits is also a major contributor to the low price. Similar to the Australian carbon price mechanism, some European businesses have also received free credits in order to support and maintain their international competitiveness. Lower than expected prices for mitigation measures and an increase in renewable energy has also resulted in less demand for carbon credits.

The EUETS is an evolving system; it has progressed through several stages where additional sectors have been added and the cap has been tightened. The European Commission is currently working hard on regulatory solutions to increase the carbon price and has brought forward a review of the EUETS by a year to consider methods to optimise the carbon market.

In 2013, the EUETS will go into its third stage which will see a significant decrease in the number of allocated free permits, with a total exclusion of free allocations for the power sector. Further, the European Commission is currently considering introducing a floor price similar to that used in Australia (European Commission 2012; ENDS Europe 2012). As a result, the EU carbon price will increase over the next couple of years before Australia ETS enters its flexible phase. It is believed that a cut in supplies of credits may triple the current price by 2020 to about $23.80 (Szabo 2012).

4 Assistance packages

The Government has designed programs to assist households and support jobs in various sectors to minimise the impacts of the carbon price. The programs are designed to help households and businesses with the economic impacts of the carbon price, while encouraging carbon abatements to reach the overall goal of cutting Australia's GHG emissions.

4.1 Assistance and compensation

4.1.1 Household assistance

The businesses which will have to pay the carbon price will pass on their increased costs to the consumers. The Treasury has modelled the impact and found that the average household will experience cost increases of $9.90 per week (The Treasury 2011). However, recent analyses by independent price regulators in several states indicate that the cost increases will be limited to around $3 per week (Australian Government 2012).

In response, the Government has set up a household assistance package designed to lower the impact on Australian households. More than half of the revenue from the carbon price will be used to ensure that middle and low income households are compensated. Tax cuts, higher Family Tax Benefit, rebates, increased pensions and higher allowances have been introduced with the aim of ensuring that these households will be able to manage the increased costs. Another part of the program will assist households in implementing energy and cost saving measures.

4.1.2 Industry assistance

Part of the revenue from the carbon price will be put into programs to support industries and maintain employment. The programs are designed to support businesses which will be highly impacted by the carbon price, while simultaneously encouraging them to mitigate carbon pollution.

4.1.3 Jobs and Competitiveness Program

To assist the businesses with the most emissions intensive activities and which face international competition, the Government will provide $9.2 billion over the period to 2014-2015. These funds will be assigned to support local jobs, encourage

investment in clean technologies and avoid carbon leakage. The “emissions-intensive trade-exposed” businesses will initially receive support covering 94.5 per cent or 66 per cent of the impact from the carbon price. The support will be determined by level of emissions compared to revenue and the risk of carbon leakage.

Food processors, steel industries and metal foundries in regional communities will receive support through special tailored programs worth $500 million. A $1.3 billion Coal Sector Jobs Package will support workers and local communities relying on jobs in mines with high levels of fugitive emissions.

4.1.4 The Clean Technology Program

The Clean Technology Program offers $1.2 billion to improve energy efficiency in manufacturing industries and to support R&D in low-pollution technologies. In this program, $200 million is allocated to food processing, metal forging and foundry industries. The Clean Technology Program will cover food production, transport equipment and machinery. The Program may therefore support industries important to horticulture and lower the overall impact of the carbon price.

4.1.5 Assistance for small businesses

There will also be assistance for small businesses to improve energy efficiency and thereby reduce energy costs. Part of the program is to deliver information about the impacts of the carbon price and steps to manage the impacts. The other key measure is to support small businesses with less than a $2 million turnover per year by increasing the instant asset write-off threshold to $6500 from 2012-13. This will increase the capacity of small businesses to invest in new assets including more energy efficient equipment.

4.1.6 Helping communities and regions

The Government will provide support to communities and regions should they be strongly affected by the carbon price. $200 million is set aside to aid rural areas with support for displaced workers, affected small businesses, community development programs and economic diversification.

4.1.7 Low Carbon Australia

Low Carbon Australia is an independent company initially funded by the Government to provide financial solutions and advice to businesses on energy efficiency, cost effective carbon reductions and accreditation for carbon neutral products, with the overall goal of progressing into a low carbon economy.

4.2 Renewable energy

The second element in the Clean Energy Future policy is renewable energy, including low-pollution technologies. There are five measures in the program encouraging innovation in renewable energy:

- Clean Energy Finance Corporation
- Australian Renewable Energy Agency
- Clean Technology Innovation Program
- Renewable Energy Target
- Continuing existing support.

4.2.1 The Clean Energy Finance Corporation

The Clean Energy Finance Corporation will be an independent body, with $10 billion (over five years) to invest in innovative clean energy proposals and technologies. It aims to ensure commercialisation and deployment of renewable energy, energy efficiency and low-pollution technologies.

4.2.2 The Australian Renewable Energy Agency

A number of current renewable energy programs will be merged into the Australian Renewable Energy Agency (ARENA) to provide more streamlined, efficient and independent funding. ARENA will provide grants and financial assistance ($3.2 billion) for projects with a focus on strengthening renewable energy, energy efficiency and cost competitiveness in the clean technology industry.

4.2.3 The Clean Technology Innovation Program

The Clean Technology Innovation Program is part of the Clean Technology Program (one of the industry assistance programs), set up to support R&D, proof-of concept and early-stage commercialisation.

4.2.4 The Renewable Energy Target

The Government has set a Renewable Energy Target (RET) of 20 per cent by 2020. The program aims to support the adoption of renewable energy technologies, so that by 2020 at least 20 per cent of Australia's energy is generated by renewable sources. The RET is divided into two parts, the small-scale RET ensuring continuing support to small scale solar energy for households, small businesses and community groups. The large-scale RET will deliver the main part of the target of 20 per cent in form of commercial solar, wind farms and geothermal projects (DCCEE 2011).

4.2.5 Continuing existing support

Some current clean energy programs will continue with committed funding of over $2 billion, including carbon capture and storage technologies.

4.3 Energy efficiency

The third element of the Government's Clean Energy Future plan is Energy Efficiency. In mid 2010, the Prime Minister's Task Group on Energy Efficiency stated that Australia can improve its energy efficiency by 30 per cent and that a price on carbon is the most important step to encourage this transformation.

By increasing energy efficiency, households and businesses can reduce their carbon pollution, lower their electricity needs, help to improve energy security and reduce their costs.

The Government is working towards a national energy savings initiative which will place a responsibility on energy retailers to support their customers in identifying and implementing energy efficiency measures. The implementation of such a scheme is subject to economic modelling and regulatory impact analysis, which will support the Government in taking the final decision on adopting a national energy savings initiative.

A number of programs and initiatives have been designed to encourage and support improved energy efficiency in communities, households, transport, businesses, buildings and Government.

4.3.1 The Low Carbon Communities program

The Low Carbon Communities program will provide $330 million to support low-income households, councils and community organisations in the transition to higher energy efficiency.

4.3.2 Remote Indigenous Energy Program

The Remote Indigenous Energy Program will provide $40 million to remote indigenous communities. The program will help to ensure clean, affordable and reliable energy supply and higher energy efficiency.

4.3.3 Energy efficiency at home

Inside the home, the largest energy consumers are household appliances. A joint initiative of state, federal and New Zealand governments has been the implementation of policy tools to increase energy efficiency in household appliances and provide labelling with energy ratings.

4.3.4 More fuel efficient cars

The Green Vehicle Guide and the Fuel Consumption Label initiative provide advice about fuel efficiency in vehicles to help motorists choose high efficiency or alternative fuelled cars. The government has set mandatory carbon dioxide emissions standards for all new light vehicles sold in Australia. This standard will set a target for carbon emissions per kilometre and all vehicle companies will be required to contribute to this target.

4.3.5 Energy efficiency in businesses

Many businesses will be able to manage some of the impact of the carbon price by improving their energy efficiency and thereby lower their energy consumption while maintaining production levels.

Energy Information Grants will provide $40 million over four years to industry associations and non-governmental organisations (NGOs) with established relationships with small businesses and community organisations. The industry associations and NGOs will develop and deliver information about the consequences of the carbon price and practical steps to best manage the impacts for small businesses and community organisations.

The Clean Technology Program will provide up to $800 million to manufacturers for investment in energy efficiency equipment and low pollution technologies, processes and products.

In 2010 the Energy Efficiency Opportunities program identified opportunities for energy savings of $1.2 billion a year. The program requires the biggest energy consumers to identify and report energy efficiency opportunities. The program will continue and funding has been extended until 2017 to further identify and implement energy efficiency opportunities.

4.3.6 Energy efficiency in buildings

Buildings are responsible for up to 20 per cent of all energy use. To improve energy efficiency in buildings, the Commercial Buildings Disclosure program provides energy efficiency ratings which help to identify buildings that cost less to run. From 1 July, 2012, businesses that invest in energy efficiency measures in offices (more than 2,000 m^2), hotels and shopping centres can apply for tax concessions through the Tax Breaks for Green Buildings Program.

4.3.7 Energy efficiency in Government

Energy Efficiency in Government Operations has already improved energy efficiency in Government offices by 30 per cent since 2000. The Green Lease Schedule further helps landlords and tenants agree on steps to improve energy performance.

4.4 Creating opportunities on the land

Even though the carbon price will not apply to the agricultural sector, the industry has an opportunity to be part of the future carbon market. The *Carbon Farming Initiative* (CFI) will offer economic rewards for agricultural businesses and land managers who reduce emissions or store carbon in the land. By reducing emissions or storing carbon, farmers can generate credits, which can be sold on the carbon market that will be established with the implementation of the ETS.

Credits may be earned from activities including:

- Reforestation and revegetation
- Reduced methane emissions from livestock
- Reduced emissions from fertilisers
- Manure management
- Reduced emissions from, or increased carbon storage in soils
- Savanna fire management
- Native forest protection
- Forest management
- Reduced emissions from burning of stubble and crop residue
- Reduced emissions from rice cultivation
- Reduced emissions from legacy landfill waste

Two types of credits, compliance or voluntary, will be available depending on the type of project undertaken.

Activities that will meet the requirements under the Kyoto Protocol will acquire compliance *Australian Carbon Credit Units* (ACCU) and be eligible for the Australian carbon price scheme. These activities include reforestation, fire management and reductions in pollution from livestock and fertiliser. The price of compliance ACCUs will follow the market price under carbon price scheme. ACCUs will be eligible for both the national and international compliance market as well as the voluntary market.

Voluntary ACCUs will be acquired through activities such as carbon soil sequestration and revegetation of land areas cleared after 1989. These credits can only be sold on the voluntary markets. The price for voluntary credits is likely to be considerably lower in value than compliance ACCUs. However, the ongoing Carbon Farming Initiative non-Kyoto Carbon Fund is set up to increase incentive for non-Kyoto activities by purchasing voluntary credits (DCCEE 2012).

4.4.1 Funding

To encourage farmers and landholders to participate in the CFI, the Government will introduce measures to make it easier to manage carbon in the landscape.

The *Carbon Farming Futures* initiative will provide ongoing funding for research in opportunities for storage of carbon in the environment.

The *Filling the Research Gap* program ($201 million) will support research into activities that reduce emissions of greenhouse gases from the land sector, including emerging abatement technologies and innovative management practices. These research outcomes will facilitate the development of new CFI activities and increase the opportunities under the CFI scheme.

The *Action on the Ground* program ($99 million) will fund projects that trial and demonstrate practices and technologies which reduce emissions or increase carbon stored in soil. These projects will ensure that the practices and technologies can be applied practically on-farm, and aim to increase the adoption of improved practices by farmers and landowners.

The Biodiversity fund is an ongoing initiative that aims to support restoration and management of carbon storage in areas with high conservation value, rich biodiverse areas and action to prevent the spread of invasive species. In doing so, the fund seeks to deliver mitigation of carbon emissions while also supporting increased protection of Australia's unique native ecosystems.

4.4.2 Economic opportunities

The CFI legislation will allow landholders to generate credits through a number of carbon sequestration or emissions reduction activities and then sell these credits on the carbon market. The Government appears to be relying on the CFI to be the primary mechanism for delivering assistance to rural industries. However, many of the eligible activities for generating offsets may not be compatible with horticultural practices which rely heavily on intensive production on relatively small areas of high quality farm land.

The costs of implementing a CFI project will be dependent on the methodology used and there is currently little information available on these costs. The only approved methodology that can be compatible on land currently under horticultural production is environmental plantings (i.e. forestry).

A thorough audit of the land and current practices is required before starting an environmental plantings CFI project. A number of companies offer support for this

process including planning, regulatory and on-site activities. To our knowledge, no CFI project has been initiated on horticultural farms at this time, so the costs related to the preliminary assessments are not known.

However, a number of projects are already running on land areas significantly larger than a typical horticultural farm. The size, location and complexity of the project are all factors which influence the final price for the preliminary assessment. One company which assists landowners with the procedure of registering and auditing projects based on environmental plantings estimates that the costs around $20,000 for each property. However, these properties are mostly several thousand hectares in area. The cost for smaller land areas should be somewhat lower, but fixed costs related to the preliminary assessment and project management could be expected to be the same regardless of project size.

The carbon sequestration potential is important in estimating the likely return rate from an environmental plantings project. Current environmental plantings projects sequester between 7-15 t/ha/yr depending on species and location. Until July 2015, each tonne of carbon will generate a credit worth $23 (increasing with 2.5 per cent each year). At this carbon price, the potential return from a project based on this methodology ranges between approximately $160 and $345/ha/yr. With this income potential, it is unlikely that the CFI scheme will be widely adopted within the horticultural sector. However, environmental plantings can also be designed to function as windbreaks, borders, pest management or habitats for pollinators and in that way provide other positive benefits for the farm (SARDI 2008).

At this time, all figures are only estimates which make it very difficult to develop a reliable budget for a CFI project on horticultural land.

A more detailed review of the CFI and its implications for the horticultural industry is provided in the final report for HAL project AH11020.

4.5 Assistance for the horticultural sector

Most of the compensation packages and assistance measures within the *Clean Energy Future* package are directed towards households or those industries directly affected by the carbon price. However, a few of the measures may be of assistance to some horticultural businesses.

- An increase in the instant asset write-off threshold to $6,500 to increase the capacity of small businesses to invest in new equipment or technology
- A support package for communities and regions significantly affected by the carbon price
- Support for research and development of low emission practices and technologies
- A number of programs to encourage energy efficiency by supporting investment or providing information on minimising energy costs
- Carbon Farming Initiative.

5 Economic impacts on horticulture

Preliminary analyses on the potential impact of the carbon price suggest that the costs of farm inputs such as energy, fertilisers, freight charges, packaging and chemicals are likely to increase. However, these basic analyses have been unable to determine the level of cost increases with a high level of accuracy, nor the impact on a farm's profitability. This project was designed to determine the likely impacts of these cost increases on horticultural production. Economic analyses have been performed on seven case study businesses based on different crops in several regions.

5.1 Methodology for economic analysis

The methodology was based on an assessment of the financial details of six horticulture farms and a processing business in three different production regions in Queensland. The farm businesses assessed were reasonably large production enterprises. Due to confidentiality requirements, specific details of the businesses assessed will not be disclosed in this report. The impacts will be expressed both in dollar terms and also in terms of a percentage change from each farm's financial status prior to the introduction of the carbon price; i.e. a comparison of each business's financial status without a carbon price with the financial status with a carbon price.

These analyses were performed using the Farm Economic Analysis Tool (FEAT) developed by the Queensland Department of Employment, Economic Development and Innovation (DEEDI) to test the sensitivity of farm profitability to variations in costs and provide a risk assessment given a distribution of likely input prices.

5.2 Carbon price effect on farm input

The effect of the carbon price on farm input costs was made using a starting carbon price of $23 dollars per tonne of CO_2-e introduced on July 1, 2012, increasing at 5 per cent (2.5 per cent price increase, 2.5 per cent inflation) per year from 2015 until 2020.

Table 3: Carbon price estimates from 2012-2020

Carbon price 5% annual increase starting 2015						
2012	2015	2016	2017	2018	2019	2020
$23.00	$24.15	$25.36	$26.63	27.96	$29.35	$30.82

Further assessment beyond 2020 was not attempted as the carbon price trajectory beyond that point is entirely speculative at this time.

To determine the likely impacts of the carbon price on farm input costs, the following cost items were assessed with the listed assumptions made to determine the impact:

- **Fuel** cost increases for non-agricultural sectors will flow through to other farm inputs. At a price of $23 per tonne for CO_2-e, the price of fuel will increase by 5.4 per cent and rises to 7.3 per cent at a carbon price of $30.82 in 2020.
- **Freight cost**, for goods to and from the farm, consists on average of 20 per cent fuel costs. Therefore, the impact of the carbon price will affect 20 per cent of the freight cost via the increase in fuel costs. However, an increase in the cost of heavy road freight will be delayed until July 2014. From 2014 the cost of road freight is expected to increase by 1.1 per cent at a carbon price of $23 and by 1.5 per cent at a carbon price of $30.82 in 2020.
- **Fertiliser** prices are heavily influenced by World prices. As a result, the carbon price will not affect the actual fertiliser price but will affect the transport costs involved. On average, transport costs make up 10 per cent of fertiliser costs; therefore, the fuel price increase was applied to 10 per cent of the expenditure on fertiliser. The increase in fertiliser cost is expected to be 0.54 per cent at a carbon price of $23 and 0.73 per cent at a carbon price of $30.82 in 2020.
- **Chemical** costs are also determined by World prices and therefore will only be affected by the transport costs which contribute on average 10 per cent to the cost of chemicals. Chemical costs are expected to increase by 0.54 per cent at a carbon price of $23 and by 0.73 per cent at a carbon price of $30.82 in 2020.
- **Electricity** cost increases are determined by a function of the price of electricity, the electricity usage, the carbon released, and the carbon price. Electricity costs will increase by 9.8 per cent at a carbon price of $23 and by 13.1 per cent at a carbon price of $30.82 in 2020.
- **Packaging** cost increases will be affected by transport (10 per cent of cost) and electricity (10 per cent of cost). As a result, packaging costs will increase by 1.5 per cent at a carbon price of $23 and by 2.0 per cent at a carbon price of $30.82 in 2020.

The percentage cost increases were applied to the assessed business's costs of production to determine total input cost increases and impacts on profitability.

5.3 Impact on farm profit

The results have been determined by increasing the input items by the percentages as outlined in the methodology above. Table 4 compares current costs (without carbon price) with the costs associated with the carbon price at $23 in 2012. Costs include all variable and fixed costs including depreciation and interest.

Table 4: Current costs and increased costs with a $23 carbon price (CP)

	Current Costs $	Costs with CP 2012 $	Cost Increase $
Farm 1	1,611,129	1,618,526	7,397
Farm 2	1,766,296	1,778,183	11,887
Farm 3	968,719	973,821	5,102
Farm 4	3,051,202	3,059,320	8,118
Farm 5	1,620,000	1,626,501	6,501
Farm 6	4,894,905	4,936,764	41,859
Processing	9,430,000	9,504,345	74,345

Table 5: Percentage cost increases as a result of the carbon price (CP)

	Cost increase %						
Year	**2012**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
CP $	**23.00**	**24.15**	**25.36**	**26.63**	**27.96**	**29.35**	**30.82**
Farm 1	0.46	0.48	0.51	0.53	0.56	0.59	0.62
Farm 2	0.67	0.71	0.74	0.78	0.82	0.86	0.90
Farm 3	0.53	0.55	0.58	0.61	0.64	0.67	0.71
Farm 4	0.27	0.28	0.29	0.31	0.32	0.34	0.36
Farm 5	0.40	0.42	0.44	0.46	0.49	0.51	0.54
Farm 6	0.79	0.81	0.84	0.86	0.89	0.91	0.94
Processing	0.86	0.90	0.94	0.99	1.04	1.09	1.15

It can be seen that, at a carbon price of $23 in 2012, the percentage cost increases range from 0.27 per cent to 0.86 per cent. When the carbon price is increased to $30.82 in 2020, the cost increases range from 0.36 per cent to 1.15 per cent. In dollar terms, the six farms will experience increases in costs between $5,102 and $41,859 in 2012, increasing to between $6,837 and $56,091 in 2020. The processing firm will experience a cost increase of $74,345 in 2012, increasing to $88,912 in 2020 (table 6).

Table 6: Farm cost increases in dollars under the projected carbon price (CP)

	Cost increase $						
Year	**2012**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
CP $	**23.00**	**24.15**	**25.36**	**26.63**	**27.96**	**29.35**	**30.82**
Farm 1	7,397	7,767	8,156	8,565	8,993	9,440	9,913
Farm 2	11,887	12,481	13,106	13,763	14,450	15,168	15,928
Farm 3	5,102	5,357	5,626	5,907	6,202	6,511	6,837
Farm 4	8,118	8,524	8,951	9,400	9,869	10,360	10,879
Farm 5	6,501	6,826	7,168	7,527	7,903	8,296	8,711
Farm 6	41,859	43,952	46,154	48,466	50,886	53,416	56,091
Processing	74,345	76,487	78,741	81,107	83,585	86,174	88,912

The impact of the cost increases depends on the size and scale of the farm and where significant costs occur. For example, a farm or processing facility with large electricity costs will incur a greater impact than a farm with lower electricity usage because the carbon price has the greatest impact on electricity costs.

Naturally, higher input costs have a negative impact on profit. Table 7 illustrates the impact of the carbon price on current profit, where profits are expressed as a percentage of the gross income of the business. More specific dollar values are not included because of confidentiality requirements. Note that three out of six farms make a loss over the period of analysis.

Table 7: Percentage change in profit relative to total income

Profit expressed in percentage of total Income %			
	Current	**With CP**	**Profit difference**
Farm 1	10.8	10.4	-0.4
Farm 2	-9.9	-10.6	-0.7
Farm 3	11.4	11.0	-0.5
Farm 4	12.0	11.8	-0.2
Farm 5	-1.3	-1.7	-0.4
Farm 6	-11.9	-12.8	-1.0
Processing	1.8	1.0	-0.8

Given the typically low profit margins of most horticultural producers, these cost increases represent a significant reduction in farm profits.

5.4 Limitations to the methodology

There are, of course, a number of limitations to this methodology that must be considered when interpreting the results of these analyses. Firstly, the methodology assumes that the businesses have taken no management actions to minimise exposure to the carbon price. These actions may include improvements in energy

efficiency and selecting suppliers that have minimised cost increases through their own efforts to minimise exposure (see section 7).

Secondly, the actual trajectory of the carbon price may differ from that described here. There is some speculation that the carbon price may actually decrease when the carbon price scheme enters the flexible trading period in 2015. The global carbon price (as determined by the European Union's emissions trading scheme) is currently significantly below the Australian starting price of $23 per tonne of CO_2-e (section 4). However, planned adjustments to the EUETS are likely to result in a significant increase in the price from current levels.

6 Options to minimise the impact

The single biggest impact of the carbon price is through the increase in the cost of electricity. As a result, the best opportunity to reduce the impact of the carbon price will be through improvements in energy efficiency.

On farm, a number of measures can be put in place to increase energy efficiency and thereby lower overall electricity needs. Simple measures, such as minimising unnecessary consumption and waste, save money. More complex measures, such as those listed below, may require significant capital investment.

Irrigation: Investigate options for replacing existing pumps or motors with more energy efficient models. Optimise the irrigation system to improve water use efficiency and use less energy.

Refrigeration: Investigate modern and more efficient refrigeration systems, eliminate leakage and minimise chilled volume.

Renewable energy: On-farm renewable energy can reduce consumption of grid electricity, or businesses may be able to sell excess electricity back to the grid.

Packing and processing: Streamline processes within the packing shed and minimise running time.

Refining systems: Consider ways to minimise the time produce stays on farm post-harvest, in order to minimise the refrigeration requirements. Investigate options to reduce on-farm processing.

Supply chain: Source products from companies making an effort to cut their emissions and lower the impact of the carbon price on their products.

Business practices: Reverse auctions and collective bargaining may help businesses achieve better deal from electricity suppliers.

7 Implications

The introduction of the carbon price mechanism presents clear challenges to the Australian horticulture industry.

The primary challenge arises from increases in costs for a range of important farm inputs. Energy, fertiliser, chemicals, packaging and freight are examples of inputs that will increase in cost from 1 July 2012.

For most farms, the increase in the cost of electricity will have the largest proportional impact on profitability. As a result, increasing the efficiency of electricity use through new technologies and practices will be an important response to minimise the negative impacts.

Increased input costs resulting from the carbon price will exert strong selection pressure for more efficient, adaptive and innovative businesses. Producers currently operating on very slim margins are likely to struggle, as will those that currently lack the necessary capital, skills or knowledge required to transform their businesses.

While there are a number of Federal Government programs designed to provide funding and information to assist growers in making the necessary adaptive changes, there will be a gap between the introduction of the carbon price and the provision of this assistance. In the interim, growers will need to take advantage of information on minimising exposure to the carbon price provided by state governments and industry bodies.

8 Conclusions

The Australian Government will introduce a carbon price in July 2012. The price mechanism is based on a cap-and-trade emissions trading scheme. For the first three years of the scheme, there will be a fixed price and no cap on emissions. From July 2015, the scheme will enter a flexible phase where carbon emissions will be limited by a cap and businesses will be able to buy and sell permits to emit on an open market where the price will be determined by supply and demand.

Businesses within the agriculture sector will not be involved in the trading scheme and will not be required to buy or sell emissions permits. However, the costs of many essential farm inputs will increase as suppliers pass on their carbon price liabilities.

The analyses presented in this report provide an insight into the likely impacts of the carbon price on the cost of inputs and profitability of horticultural businesses.

For example, the starting price of $23 per tonne of carbon dioxide equivalent is expected to result in the following cost increases:

Table 8: A summary of the estimated cost increases for major inputs at the starting carbon price of $23 per tonne

Input	Change in costs
Fuel	Fuel for on-farm use will not be affected by the carbon price
Freight	Road freight costs will not be affected until July 2014 when they will increase by approx. 1.1%
Fertiliser	Increase by approx. 0.54%
Chemicals	Increase by approx. 0.54%
Electricity	Increase by approx. 9.8%
Packaging	Increase by approx. 1.5%

The scale of the impact will vary with the nature of the business and particularly on the level of dependence on electrical energy.

Economic modelling has been used to estimate the effect these cost increases will have on total farm costs and farm profits. This modelling was based on the analysis of six farms producing different crops in several regions. The increase in all input costs will range from 0.27 per cent to 0.86 per cent when the carbon price is introduced in 2012, and rise to 0.36 per cent to 1.15 per cent in 2020 at a carbon price of about $31. For production farms only (i.e. excluding the processing business), the average increase in input costs will rise from 0.52 per cent in 2012 to 0.68 per cent in 2020. This increase in input costs will result in profit reductions in 2012 between 0.2 per cent and 1.0 per cent of gross income, with a farm average of 0.53 per cent of gross income.

Given the typical low profit margins of most horticultural producers, these cost increases represent a significant reduction in farm profits. However, it is important to note that these projections assume that the growers have made no changes to reduce the impact.

The single biggest impact of the carbon price is through the increase in the cost of electricity. As a result, the best opportunity to reduce the impact of the carbon price will be through improvements in energy efficiency. Growers will need to investigate ways to reduce electricity consumption through minimising waste, investing in more efficient equipment, using renewable energy and developing more streamlined systems.

Many of the more complex strategies may require substantial capital investment. Furthermore, there is no one-size-fits-all solution; each farm is different, and growers will need to assess the cost-effectiveness of potential solutions within the context of their own businesses.

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10 Appendix A: Factsheets

One of the deliverables for this project was to produce the content for information packs or factsheets to explain the carbon pricing mechanism, the potential impacts on fruit and vegetable growers, and methods to minimise the negative effects of the carbon price.

The following sections include content for two factsheets that can be modified easily to suit the formatting and branding requirements of HAL.

10.1 Factsheet 1: The carbon price mechanism

A new carbon price mechanism came into effect on 1 July, 2012. The carbon price is part of the *Clean Energy Future* policy, the Australian Government's plan to reduce the emissions intensity of the Australian economy.

There are four main elements to the scheme:

- The carbon price mechanism
- Renewable energy
- Energy efficiency
- Carbon farming.

The key component is the carbon price that will be implemented in the form of an *Emissions Trading Scheme*. While it is commonly referred to as a “carbon tax”, it is really a charge on greenhouse pollution. The same policy approach has been adopted in many other countries (e.g. the European Union, New Zealand and South Korea) because it is believed to provide the cheapest and most flexible method to reduce emissions while sustaining economic growth.

The scheme is intended to drive a transition to a low carbon economy by encouraging growth in renewable energy, switching to lower emission fuels for electricity generation, improved energy efficiency and greater innovation in low carbon technology.

The Government has set a national target of a 5 per cent reduction in emissions from 2000 levels by 2020, and a 60 per cent reduction by 2050. International agreements on climate change mitigation can influence these targets and the Government and federal opposition have indicated they would raise the target for 2020 to 25 per cent if substantial international action is taken.

Emissions Trading Scheme

The *Emissions Trading Scheme* (ETS) that forms the basis of the carbon price is based on a cap-and-trade model. A limit, or cap, is set on the available number of permits allowing carbon emissions each year. Businesses included in the scheme

will have to purchase permits for each tonne of carbon they emit, either from the Government or via trade with other participating businesses.

The scheme will start out with a three year period with a fixed price and no cap. This temporary fixed price period is designed to provide an easy transition to carbon pricing and is also the part of the scheme that attracts the "tax" label. Each tonne of carbon emitted will cost $23 in the first year, rising at 5 per cent (2.5 per cent price increase and 2.5 per cent inflation) per year.

At the end of the fixed price phase, the scheme will transition to a conventional flexible price emissions trading scheme where the cap on emissions will determine the supply of permits while the market will determine demand and price.

The Government will set the emissions caps on the advice of an independent *Climate Change Authority*. Caps will be set several years in advance to provide a degree of predictability and certainty to business.

Greenhouse gases

Carbon dioxide (CO_2) is only one of the greenhouse gases (GHG) addressed by the carbon price scheme. While there are multiple greenhouse gases, the term "carbon" is conventionally used as shorthand for "greenhouse gas" within the context of climate change policies.

There are six main GHGs emitted from human activities that can influence atmospheric temperature. The carbon price will be applied on four of these: CO_2, methane (CH_4), nitrous oxide (N_2O) and perfluorocarbons (PFC) (but only from aluminium smelting). The remainder, hydrofluorcarbons (HFC), sulphur hexafluoride (SF_6) and PFC (excluding gases produced from aluminium smelting) are already addressed by other regulations and are therefore not targeted by the carbon price mechanism.

Each GHG has a different *global warming potential* (GWP) which describes the strength of its effect on atmospheric temperatures. The effect is expressed in carbon dioxide equivalents (CO_2-e) using CO_2 as the standard unit for reference.

Global warming potentials (GWP) of the greenhouse gases covered by the Australian carbon price mechanism

Greenhouse gas	GWP (CO_2-e)	Main contributor
Carbon dioxide (CO_2)	1	Burning of fossils fuels, deforestation
Methane (CH_4)	21	Waste, coal mining, agriculture
Nitrous oxide (N_2O)	310	Fertiliser
Perfluorocarbons (PFC)	6,500-23,900	Aluminium smelting

Who needs to buy emissions permits?

The carbon price mechanism only directly involves a selection of sectors and a relatively small number of businesses. Sectors targeted include energy generation, industrial processes, waste, fugitive emissions (mining) and some transport areas. Businesses within these sectors that emit more than 25,000 tonnes of carbon per year will be required to take part in the emissions trading scheme. In May 2012, a list of 248 businesses expected to be required to buy and sell permits was released.

Agriculture is not included in the scheme and no agricultural businesses are required to pay a direct carbon price by purchasing permits. However, the carbon price will cause the price of many farm inputs to increase (e.g. electricity, fertiliser and chemicals) leading to some negative indirect effects (see factsheet # 2).

Liquid fuels are treated differently – an effective carbon price will be applied to some sectors via a reduction in the fuel tax credit rate. However, the rate will remain unchanged for on-farm use in the agriculture sector.

How does an ETS work?

Each emissions permit will allow the owner to emit one tonne of carbon. Businesses will be able to trade these permits on an open market and the price will be set by supply and demand. The *Clean Energy Regulator* will be the statutory authority facilitating all trade of carbon permits.

Businesses that emit more carbon than they hold permits for will face heavy penalties.

If a business has insufficient permits to cover its emissions, it can:

- Reduce emissions to match the number of permits
- Buy additional permits (at auction or from other businesses that have reduced their emissions)
- Buy offsets for their emissions (eg. carbon credits from the Carbon Farming Initiative)
- Any combination of the above.

A simple hypothetical example of an emissions trading scheme at work

Business A	Business B
Emissions: 100,000 t *Permits*: 95,000 t *Cost of additional permits*: $115,000 ($23 / t) *Cost to increase efficiency*: $115,000 for 10,000 t reduction ($11.50 / t)	*Emissions*: 100,000 t *Permits*: 95,000 t *Cost of additional permits*: $115,000 ($23 / t) *Cost to increase efficiency*: $150,000 for 5,000 t reduction ($30 / t)

What should the two businesses do? For Business A, it's cheaper to cut emissions by increasing efficiency than to buy more permits. Business A should sell its spare 5,000 permits at $23 / t, fully offsetting the costs of its efficiency program. In contrast, improving efficiency is an expensive option for Business B. Business B should take the cheaper available option and buy the necessary permits. The end result? Total emissions for both businesses are reduced by 10,000t while the total cost of achieving that reduction is reduced by $115,000. In the real world ETS, the trading relationships among the 250 companies will be much more complex but the principle is exactly the same – achieving emissions reductions at least cost.

Assistance for horticulture

The *Clean Energy Future* package includes a raft of compensation packages and assistance measures. Most of these measures are directed towards households or to those industries directly affected by the carbon price. A few of these measures may be of assistance to some horticultural businesses.

- An increase in the instant asset write-off threshold to $6,500 to increase the capacity of small businesses to invest in new equipment or technology
- A support package for communities and regions strongly affected by the carbon price
- Support for research and development of low emission practices and technologies that can be applied on farms
- A number of programs to encourage energy efficiency by supporting investment or providing information on minimising energy costs
- The *Carbon Farming Initiative* (more below).

The *Carbon Farming Initiative*

The *Carbon Farming Initiative* (CFI) is an agricultural offset scheme that aims to provide financial rewards to landholders that reduce emissions or increase the amount of carbon stored in the landscape. The CFI provides a framework that allows landholders to generate carbon credits by conducting emissions reduction or sequestration projects, generate carbon credits, and then sell these credits on either voluntary or regulated carbon markets.

The CFI is based around a set of methodologies that provide detailed descriptions of eligible activities, estimates of baseline emissions (i.e. business as usual), and rules for the implementation, assessment and monitoring of the abatement activities.

Methodologies can be developed around a number of activities, including reforestation, revegetation, forest protection, fertiliser management, reduced methane emissions from livestock, carbon sequestration in soils and fire management (among others).

At this point, only one methodology has been developed that can be broadly applied on grazing and cropping land. The “environmental plantings” methodology involves the establishment of permanent environmental plantings of native species for carbon sequestration.

The potential for the horticultural sector to generate carbon credits and therefore realise financial benefits in the CFI is considered to be considerably lower than that for other agricultural businesses. Horticulture is characterised by intensive production of high value products on small land areas compared to other agricultural businesses and projects based on environmental plantings are not suitable for most farms. The most promising type of CFI project for fruit and vegetable growers seems to be mitigation of nitrous oxide emissions from improved fertiliser management. However, current information suggests that these projects are unlikely to be cost-effective. Additional R&D is required to identify potential activities and to develop appropriate methodologies that can be applied on horticultural farms.

More information

Department of Climate Change and Energy Efficiency
http://www.climatechange.gov.au/

Department of Agriculture Fisheries and Forestry
http://www.daff.gov.au/climatechange

Horticulture Australia Limited
http://www.horticulture.com.au/areas_of_Investment/Environment/Climate/climate_home.asp

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10.2 Factsheet 2: What the carbon price means for horticulture growers

The carbon price was introduced on July 1, 2012. Factsheet #1 provides an overview of the emissions trading scheme that powers the carbon price.

While no farm businesses are required to pay a direct carbon price by purchasing permits in the emissions trading scheme, the carbon price will cause the price of many farm inputs to increase (e.g. electricity, fertiliser and chemicals) leading to some negative indirect effects.

Impacts of the carbon price for fruit and vegetable growers

It is possible to estimate the effect of the carbon price on most farm inputs based on the energy intensity of the product. For example, the starting price of $23 per tonne of carbon dioxide equivalent is expected to result in the following cost increases:

Input	Change in costs
Fuel	Fuel for on-farm use will not be affected by the carbon price
Freight	Road freight cost will not be affected until July 2014 when it will increase by approx. 1.1%
Fertiliser	Increase by approx. 0.54%
Chemicals	Increase by approx. 0.54%
Electricity	Increase by approx. 9.8%
Packaging	Increase by approx. 1.5%

Impacts on farm profit

Economic modelling has been used to estimate the effect these cost increases will have on total farm costs and farm profits. This modelling was based on the analysis of horticultural farms producing different crops in several regions. The following table shows the estimated costs in dollar terms and as a percentage of gross income for 2012 and for 2020 (with a projected carbon price of about $31 per tonne).

The projected increases in farm costs and reductions in gross income resulting from the introduction of the carbon price for six case study farms

	2012 ($23 per tonne)		2020 ($31 per tonne)	
Farm	$	%	$	%
1	$7,397	-0.46	$9,913	-0.62
2	$11,887	-0.67	$15,928	-0.90
3	$5,102	-0.53	$6,837	-0.71
4	$8,118	-0.27	$10,879	-0.36
5	$6,501	-0.40	$8,711	-0.54
6	$41,859	-0.79	$56,091	-0.94

Given the typically low profit margins of most horticultural businesses, these cost increases represent a significant reduction in farm profits. However, it is important to note that these projections assume that the growers have made no changes to reduce the impact.

Avoiding the impacts of the carbon price

The single biggest impact of the carbon price is through the increase in the cost of electricity. As a result, the best opportunity to reduce the impact of the carbon price will be through improvements in energy efficiency. A number of measures increase energy efficiency and thereby lower the overall electricity needs. Simple measures, such as minimising unnecessary consumption and waste, save money. More complex measures, such as those listed below, may require significant capital investment.

Irrigation: Investigate options for replacing existing pumps or motors with more energy efficient models. Optimising your irrigation system to use less water will also use less energy.
Refrigeration: Investigate modern and more efficient refrigeration systems, eliminate leakage and minimise chilled volume.
Renewable energy: On-farm renewable energy can reduce consumption of grid electricity, or you may even be able to sell excess back to the grid.
Packing and processing: Streamline processes within the packing shed and minimise running time.
Refining systems: Can you minimise the time produce stays on farm post-harvest, minimising the refrigeration required? Can you reduce the amount of on-farm processing?
Supply chain: Source products from companies making an effort to cut their emissions and lower the impact of the carbon price on their products.
Business practices: Reverse auctions and collective bargaining may help you get a better deal from your electricity supplier.

The Clean Energy Future policy (factsheet #1) includes a number of programs designed to support research and development of innovative practices and technologies that can increase energy efficiency and reduce the impacts of the

carbon price. Information on these new practices will be distributed as it becomes available.

More information

Department of Climate Change and Energy Efficiency
http://www.climatechange.gov.au/

Department of Agriculture Fisheries and Forestry
http://www.daff.gov.au/climatechange

Horticulture Australia Limited
http://www.horticulture.com.au/areas_of_Investment/Environment/Climate/climate_home.asp

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11 Appendix B: The carbon price calculator

Another key deliverable for this project is a spreadsheet calculator that will enable further analyses of carbon price impacts for farm businesses.

The carbon price farm calculator enables industry representatives or individual growers to assess the impact of the carbon price on their business. Users of the calculator can adjust the carbon price used and enter relevant business data to explore various scenarios. The calculator will assist growers to assess the level of impact and identify areas that have the greatest contribution to the carbon price exposure.

The calculator is provided in the form of an electronic spreadsheet (Microsoft Excel™ .xls format). Users enter data into the cells with yellow backgrounds and the effect of the carbon price is provided in the cells with orange backgrounds. The spreadsheet can be edited easily to suit the formatting and branding requirements of HAL.

Figure B1: A screenshot of the Carbon Price Farm Calculator (v 1.0)

Carbon Price Farm Calculator				
		Current	With carbon price	Percentage change
Farm business				
Total farm income		**$1,500,000**	**$1,500,000**	
Total farm business costs		**$1,400,000**	**$1,407,999**	0.57%
Include:				
Farm variable costs				
Farm fixed costs				
Depreciation				
Profit		$100,000	$92,001	**-8.0%**
Profit as a percentage of gross income		**6.67%**	**6.13%**	-0.53%
Carbon Price	**$23.00**			
Farm expenses affected by carbon price				
Fertiliser		$52,000	$52,283	0.5%
Freight		$5,000	$5,054	1.1%
Chemicals		$20,000	$20,109	0.5%
Fuel & oil		$60,000	$63,268	5.4%
Travel mileage		$10,000	$10,545	5.4%
Electricity - farm		$8,000	$8,783	9.8%
Electricity - shed		$20,000	$21,957	9.8%
Gas		$4,000	$4,391	9.8%
Packing charges		$40,000	$40,609	1.5%
		$219,000	**$226,999**	
Extra costs as a result of the carbon price				**$7,999**