

# Low Carbon Growth Plan for **Gippsland**

October 2011



# About this Plan

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ClimateWorks Australia (ClimateWorks) was founded in 2009 through a partnership between the Myer Foundation and Monash University, with a mission to substantially reduce Australia's greenhouse gas emissions over the next five years. Funded through philanthropy, ClimateWorks is unaligned with commercial, political or NGO interests and acts as an 'honest broker' in enabling collaborative action.

In March 2010, ClimateWorks released the *Low Carbon Growth Plan for Australia*, which presents a range of actions to reduce emissions at lowest cost across the Australian economy. In May 2011, the *Low Carbon Growth Plan for Greater Geelong* was released and work has begun in the city to implement opportunities identified in the report.

This report, the *Low Carbon Growth Plan for Gippsland* is the first region-wide plan in the series. It identifies a range of emission reduction opportunities that can be achieved for the lowest cost within the municipal boundaries of the Bass Coast, Baw Baw, East Gippsland, Latrobe City, South Gippsland and Wellington shires. This Plan explores opportunities in the Manufacturing, Mining and Freight sectors (page 7), in Commercial and Services sectors (page 12), in Households (page 18) and On the Land (page 23).

The *Low Carbon Growth Plan for Gippsland* has been developed with the participation of members of Gippsland's business, industry and government community who have provided data, identified additional locally relevant actions for inclusion and reviewed the Plan's findings.

There are a range of programs and studies being undertaken by numerous local, state and federal government initiatives to look at the challenges posed by the transition to a low carbon economy for the Gippsland region. It is our expectation that this Plan can provide a valuable input into the work of these groups, by assisting them in prioritising opportunities on which to focus their efforts, and highlighting opportunities for increased partnerships across the region. It may also provide a common thread that links these existing yet dispersed streams of work.

To further assist in this process, ClimateWorks has prepared a list of Funding Programs and Policies<sup>1</sup> that businesses and organisations can use to facilitate the capture of emissions reduction opportunities. This document aligns the opportunities identified in this Plan with appropriate funding and programs and will be updated regularly.

Considering how to reduce emissions is not the only challenge Gippsland is facing. The region must also grapple with the implications this has for its economy, in particular for quality jobs for skilled workers. While this Plan is not an analysis of these impacts, other work is underway that will specifically focus on the jobs impact of the transition to a low carbon economy (Regional Development Victoria's *Latrobe Valley Industry and Employment Roadmap*) and the skills that will be needed in a low carbon future (RMIT and Swinburne are both undertaking research into future skills needs). Thought must also be given to how best to equip Gippsland's businesses to attract the investment required to fund the opportunities that are central to the region's transition.

A successful transition must consider all of these elements. Gippsland would best balance these sometimes competing priorities by dedicating resources to coordinate and steer the region through these challenging times.

ClimateWorks hopes readers find this Plan a useful tool in Gippsland's transition to a low carbon economy.

## METHODOLOGY

The *Low Carbon Growth Plan for Gippsland* is based on the methodology used for the *Low Carbon Growth Plan for Australia*, and has been refined with local inputs drawn from a range of credible published sources and local expert input.

The low carbon growth plan methodology focuses on existing technology or best practice solutions, rather than lifestyle adjustments or changing the business mix of the regional economy (although some lifestyle or behaviour changes that can play a part in a community's transition have been highlighted on page 28). Only those opportunities that are controlled within the municipal boundaries of the six shires have been included.

All costs are expressed in 2010 real dollars and include the private cost of capital for each sector (between 8% and 14%), and energy taxes, retail margins and subsidies. Project transaction costs (e.g. management time, project research or policy implementation costs) can vary substantially depending on the how the opportunity is captured, and have therefore been excluded.

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<sup>1</sup> Available at [www.climateworksaustralia.org](http://www.climateworksaustralia.org)

# About Gippsland and its emissions

The region's abundant natural resources drive its economy. Its dairy and livestock farming and horticulture benefit from plentiful water and fertile soil. Food and fibre processing are situated in proximity to key agricultural and forestry inputs. Oil and natural gas extracted from Bass Strait are refined and distributed across Australia. A rapidly expanding tourism industry benefits from Gippsland's superb natural beauty. And considerable brown coal reserves drive the supply of cheap electricity to Victoria and beyond. Many of these sectors are expected to continue to expand over time, and by 2020 Gippsland's population will increase by 11% from today to reach 288,000<sup>2</sup>.

## Under business-as-usual, Gippsland's emissions are expected to rise by 9% above 2000 levels by 2020.

Gippsland faces a unique challenge in transitioning to a low carbon future. Under business-as-usual the region's emissions are expected to rise from 7.6 to 8.3 million tonnes per year by 2020 or 9% above 2000 levels<sup>3</sup>. This includes emissions from industry, energy consumed in buildings and homes, fuel used in transport, and emissions from agricultural activity and waste disposal. Exhibit 1 illustrates the contribution each of these sectors is expected to make to business-as-usual emissions by 2020.

Emissions from electricity generated in Gippsland but consumed elsewhere in Victoria has been excluded from business-as-usual emissions projections.

Exhibit 2 illustrates the expected growth in Gippsland's emissions between 2000 and 2020 under business-as-usual (7.6 million tonnes in 2000 to 8.3 million tonnes in 2020). It also highlights that by implementing the opportunities identified in this Plan, the region could achieve a reduction in emissions of 18% compared to business-as-usual, equivalent to achieving an emissions reduction of 10% below 2000 levels.

## By implementing the opportunities identified in this Plan, Gippsland could reduce its emissions by 10% below 2000 levels by 2020.

<sup>2</sup> Gippsland Regional Plan, 2010

<sup>3</sup>Business-as-usual' takes account of all federal and state government policies and programs in place in October 2011, and therefore excludes the carbon price package. The impact of the carbon price package has been modelled separately on page 6. Gippsland's emissions are estimated based on outputs from ClimateWorks' 2020 modelling, with emissions for 2000 calculated using the Victorian rate of growth in emissions between 2000 and 2020, as identified in the Victorian Greenhouse Inventory.

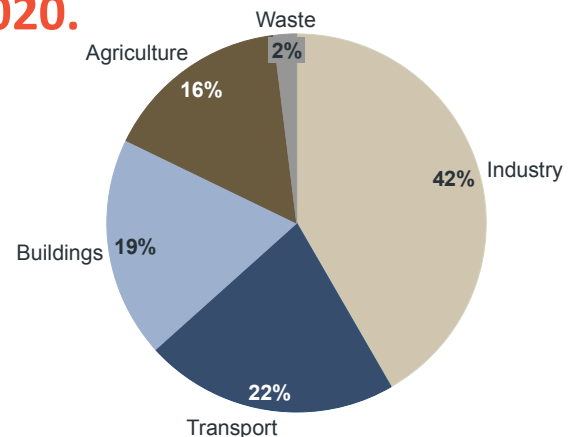


Exhibit 1: 2020 business-as-usual emissions by sector (excl. power generation)

### Reducing Gippsland's emissions by 1.5 million tonnes achieves an 18% reduction compared to BAU, or 10% below 2000 levels

Million tCO<sub>2</sub>e

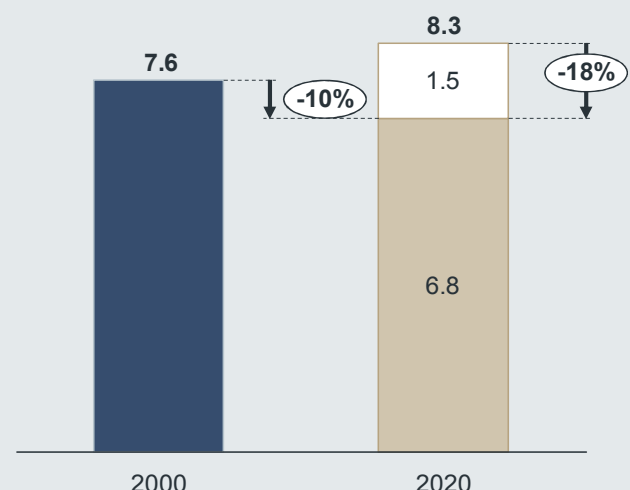


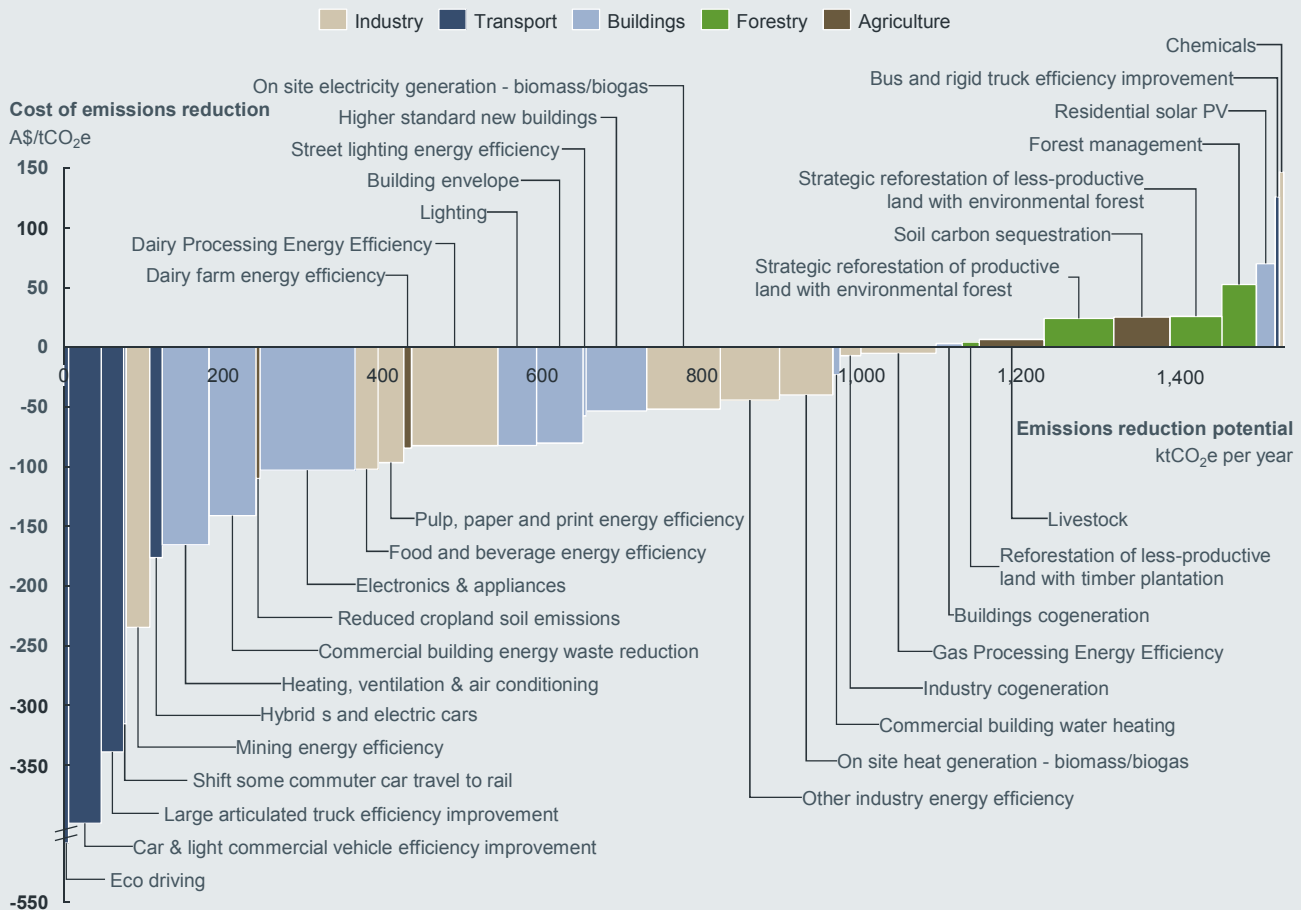
Exhibit 2: Gippsland's potential emissions reductions compared to business-as-usual (excl. Power generation)

# By 2020, Gippsland can reduce its emissions by 1.5 million tonnes per year while saving almost \$100 million annually.

While much of the focus on reducing emissions in Gippsland rests on the power sector, all sectors have a role to play in the transition to a low carbon economy. This Plan demonstrates that reducing emissions can also benefit households, businesses and landowners.

- 70% of all opportunities identified in this Plan (excluding the Power sector) are already profitable yet are not being taken up, indicating that a range of barriers exist.
- The manufacturing, mining and freight sectors control 38% of potential emissions reductions. By improving energy efficiency, reducing fuel use and investing in distributed energy, businesses in these sectors could save \$44.4 million each year.
- The Commercial and Services sector can reduce energy use in existing buildings by an average of 37%. Capturing these energy savings alone would save \$27.7 million each year, with the upfront cost of retrofits recouped in less than four years for most types of buildings.
- Gippsland’s households could save \$22.9 million each year by retrofitting their homes to improving energy efficiency, building more efficient new homes or choosing new cars that consume less fuel.
- Land-based activities that increase the carbon stored in soils and vegetation and reduce emissions from livestock contribute 26% of the region’s potential to reduce emissions. While these activities have productivity benefits, they come at a net cost and programs such as the Carbon Farming Initiative will be critical to see them implemented.

**Exhibit 1: 2020 Gippsland greenhouse gas emissions reduction cost curve (excluding Power generation)**



See page 30 for details on how to read an emissions reduction cost curve

# The Action Plan

## Short term

### Partnerships and projects

- Identify SME project partners for industry energy efficiency upgrades, facilitate access to funding, and share learnings of costs and benefits
- Aggregate access to consultancy services for large industry energy users to identify opportunities for emissions reductions, and develop a rationale for funding support
- Secure funding for the Centre for Sustainable Technologies to develop local capability, new technologies and attract investment for emissions reduction projects
- Develop centralised facilitation capability to coordinate emissions reduction projects and funding bids across region

### Facilitation and funding

- Encourage service providers to develop financing products for energy efficiency upgrades for regional SMEs
- Apply to Low Carbon Australia and Greener Government Buildings for funding to retrofit commercial buildings and install cogeneration
- Build local skills to audit and implement opportunities for energy efficiency in industry and buildings
- Introduce 'pay-as-you-save' funding for building retrofits, to unlock investment and recoup over the asset life.

### Awareness raising

- Work with local land and farmers groups to highlight opportunities to earn carbon credits via reforestation, reducing livestock emissions and improved land management
- Work with community groups to encourage uptake of solar PVs in homes

## Medium term

### Partnerships and projects

- Facilitate partnerships between industry, biomass owners and distributed energy service providers for the deployment of distributed energy solutions (e.g. cogen, bioenergy)
- Upgrade street lighting

### Facilitation and funding

- Develop appropriate planning mechanisms that encourage above standard new housing developments, in line with sustainable development principles
- Energy Service Companies (ESCOs) can help businesses to identify energy efficiency opportunities and find solution providers. Working with ESCOs to coordinate energy efficiency upgrades across a number of businesses within a commercial centre can reduce transaction costs and improve buying power for smaller businesses
- Work with state government and rail service providers to increase passenger and freight access to rail services

### Awareness raising

- Raise awareness amongst farmers of financial savings that can be captured through improving energy efficiency and on-farm energy generation from waste
- Work with community organisations to highlight benefits of retrofitting homes, and funding available to assist low income households
- Highlight the benefits of higher efficiency standards for new builds to developers and owners, and support regulatory reform to mandate higher standards
- Facilitate information sharing among freight movers to promote benefits of improved freight operational efficiency, choosing high-efficient trucks and eco-driving

## Long term

### Partnerships and projects

- Undertake improved forest management practices on areas of failed regeneration, dieback and multiple bush fires, to improve biodiversity and carbon storage outcomes, while also increasing the amenity of these areas for nature based tourism

### Awareness raising

- Encourage fleet owners to consider lower emissions vehicle technologies, including hybrids and electric vehicles

### THE CHALLENGE FOR SMEs

There are about 23,000 SMEs (small to medium sized enterprises) in Gippsland<sup>4</sup>. The SME sector faces additional challenges in capturing abatement opportunities:

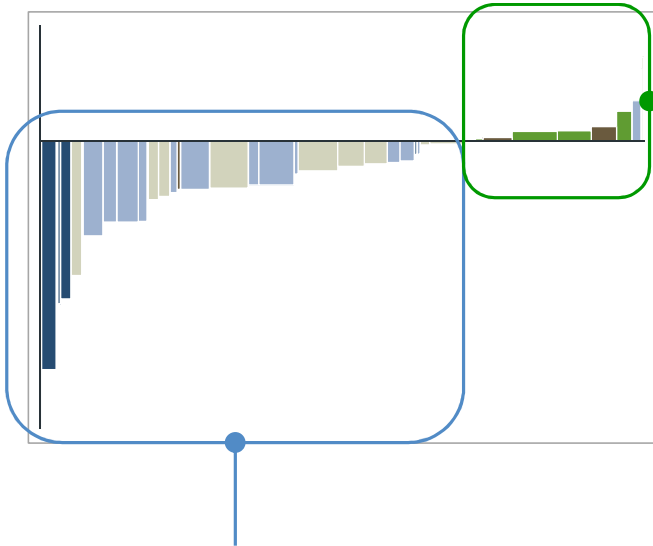
- SMEs face higher borrowing rates than large businesses, reducing the financial benefits of energy efficiency.
- SMEs incur higher transaction costs relative to the size of a project than large organisations.
- It is more difficult for SMEs to balance pursuing energy efficiency opportunities with core business, and energy efficiency can be a low priority.

The Gippsland Regional Plan (2010) highlights the need for increased access to information and technology for SMEs, and implementing strategies to address this need can also facilitate the dissemination of information about the substantial savings available to SMEs through improved energy efficiency.

<sup>4</sup> Australian Bureau of Statistics, *Counts of Australian Businesses*, 2007

# Barriers to reducing emissions

For opportunities that do not offer the potential for profit (in the diagram below, these opportunities sit above the \$0 horizontal axis, indicating they come at a net cost), the price of capturing emissions reductions is a key barrier to their implementation. Yet 70% of emissions reduction opportunities identified in this Plan (excluding the Power sector) are already profitable for Gippsland’s businesses and households but are not being captured. This indicates that non-price barriers exist that need to be overcome.



Opportunities that come at a net cost, focused on agriculture and forestry, can be captured for an average of \$26/tonne

Gippsland’s households and businesses could save \$110 million each year through improved energy efficiency

**Opportunities to reduce emissions are often hindered by a combination of price and non-price barriers.**

Barrier type	Example barriers
<b>Investor profitability</b> <i>Is the opportunity profitable?</i>	<ul style="list-style-type: none"> <li>• Even factoring in any additional savings from efficiencies, there is still a net cost associated with capturing the opportunity</li> </ul>
<b>Capital constraints and investment priorities</b> <i>How hard is it to access the capital needed?</i>	<ul style="list-style-type: none"> <li>• Finite access to capital means emissions reduction projects are low priority</li> <li>• It is difficult to access loans for energy efficiency projects or projects with higher risk</li> <li>• The payback period on investment is too long to attract investment</li> <li>• The return on capital does not meet the internal hurdle rate</li> </ul>
<b>Information gaps and decision process</b> <i>Is the opportunity poorly understood?</i>	<ul style="list-style-type: none"> <li>• Access to information on emissions reduction opportunities is limited</li> <li>• There is a lack of awareness of the potential financial or productivity benefits</li> <li>• Emissions reduction projects are not core business and staff don’t have required skills</li> <li>• Scientific or technical uncertainty about an opportunity is preventing its uptake</li> </ul>
<b>Market structure/supply</b> <i>Does the structure of the market prevent the opportunity from being captured?</i>	<ul style="list-style-type: none"> <li>• Electricity pricing has been negotiated at non-market rates, reducing the attractiveness of energy efficiency projects</li> <li>• Split incentives exist that see someone other than the investor benefit from financial savings (e.g. owner/tenant, current/future)</li> <li>• Without aggregation, the project is too small for an individual business (high transaction costs, limited profitability)</li> <li>• It is difficult to access energy efficient equipment through existing supply channels</li> <li>• The market is too small or immature to guarantee reliability/quality of supply</li> <li>• There are not enough workers with the skills to make large-scale deployment possible</li> </ul>

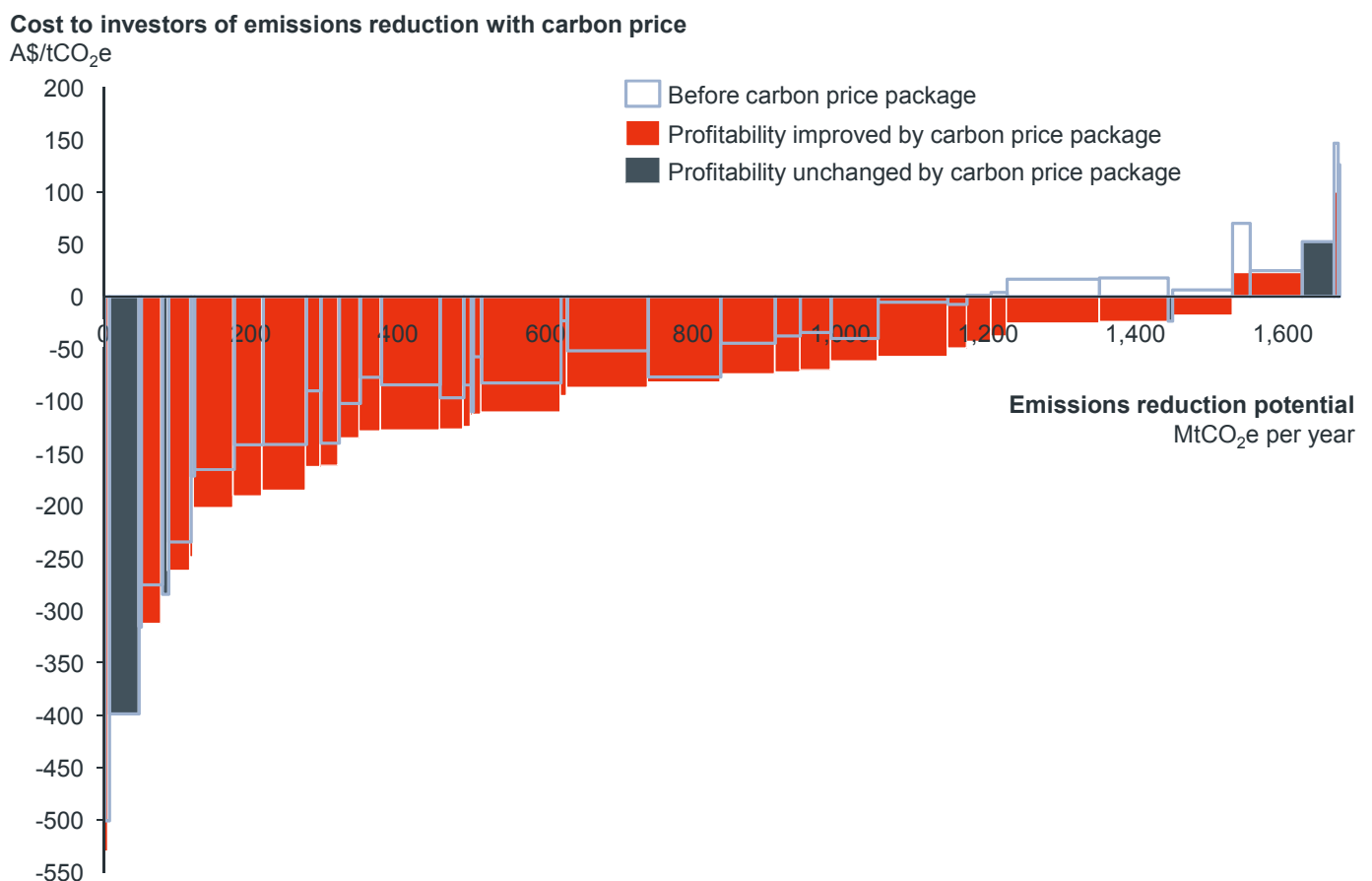
## A carbon price improves the profitability of 21% of emissions reduction opportunities for households and businesses.

Where there is a net cost associated with reducing greenhouse gas emissions, it can be difficult to build a compelling case for action by businesses and households. A carbon price can help to transform opportunities that are currently costly into profitable ones, and also raise the profile of emissions reduction activities for businesses and households.

This is illustrated in Exhibit 2 which models the impact of the Australian Government’s carbon price package, *Securing a Clean Energy Future*, on the cost of emissions reduction opportunities in Gippsland. The carbon price package will attach a cost to the emission of carbon pollution as well as provide a range of other support mechanisms such as funding, information and governance or regulatory adjustments. Combined, these measures aim to encourage investment in technologies and solutions that will steer the Australian economy towards a lower emissions future.

As illustrated in Exhibit 2, a 2020 carbon price associated with a 5% emissions reduction target makes some opportunities that would otherwise come at a cost profitable. This would increase the volume of abatement that is financially attractive from 70% to 91%.

**Exhibit 2: 2020 Gippsland emissions cost curve with impact of carbon price package (excluding Power generation)**



See the *Impact of the Carbon Price Package* report released by ClimateWorks in August 2011 for further details on the analysis behind this modelling ([www.climateworksaustralia.org](http://www.climateworksaustralia.org)).

# Fact sheet: Manufacturing, Mining and Freight

## KEY FINDINGS

- The manufacturing, mining<sup>5</sup> and freight sectors employ 12% of the regional workforce, yet generate 33% of regional output, illustrating their strategic importance to Gippsland's economy<sup>6</sup>.
- By improving energy efficiency, reducing fuel use and investing in distributed energy, businesses in these sectors could save \$44.4 million each year.
- Capturing these financial savings would also reduce the region's emissions by 574,500 tonnes per year.



Gippsland's manufacturing and mining sector employs just over one tenth of the regional workforce yet generates one third of regional economic output<sup>7</sup>. It illustrates the key role these sectors play in the economic wellbeing of the region. Much of this manufacturing is focused on the processing of meat, dairy and other food products produced on Gippsland's fertile agricultural land, and the manufacture of paper products from timber harvested in Gippsland's extensive forests. Mining (including oil and gas extraction) is the second smallest sector in terms of employment numbers, yet is the third largest sector in comparative regional output<sup>8</sup>. Natural gas is extracted offshore from extensive reserves in the Bass Strait (where one-fifth of Australia's crude oil is also extracted) and is then processed and distributed to Melbourne, NSW, South Australia, Tasmania and the Australian Capital Territory<sup>9</sup>.

Gippsland can reduce emissions from Manufacturing, Mining and Freight by 573,500 tonnes per year by 2020. Capturing these emissions reductions would save businesses \$44.4 million each year across the regional economy through improved energy efficiency, reduced fuel use in freight, or through distributed energy solutions that improve the efficiency of how energy is used.

<sup>5</sup> Includes coal mining

<sup>6</sup> Gippsland Regional Plan, 2010

<sup>7</sup> Gippsland Regional Plan

<sup>8</sup> Gippsland Regional Plan

<sup>9</sup> Gippsland Regional Plan



## OPPORTUNITIES FOR EMISSIONS REDUCTION IN MANUFACTURING, MINING & FREIGHT

Exhibit 3 outlines the range of opportunities to reduce emissions available to the manufacturing, mining and freight sectors. 99% of this potential is profitable, even after factoring in the upfront costs of capturing these opportunities.

### Energy Efficiency

Energy is a key input to all manufacturing and mining processes, and much has been done in the region over recent years to improve energy efficiency. Exhibit 3 illustrates that substantial opportunity still exists to improve energy efficiency. Gippsland's manufacturing and mining sectors could reduce energy use by 280 GWh (373,300 tonnes CO<sub>2</sub>e) each year by implementing the opportunities identified in this Plan.

Relatively low energy prices have reduced the attractiveness of some energy efficiency opportunities, meaning that an average of 10% in energy savings can potentially be achieved across the sector. In manufacturing, these improvements are typically captured through improving control systems and processes, reducing duplicated or oversized equipment, upgrading motor systems, decreasing energy losses in boilers and steam distribution systems, waste heat recovery for pre-heating or other uses, and improving building utilities. In mining (including brown coal), operational and equipment improvements should also contribute to energy efficiency by 2020. The value to Gippsland of capturing these energy savings is more than \$25 million per year through reduced energy bills.

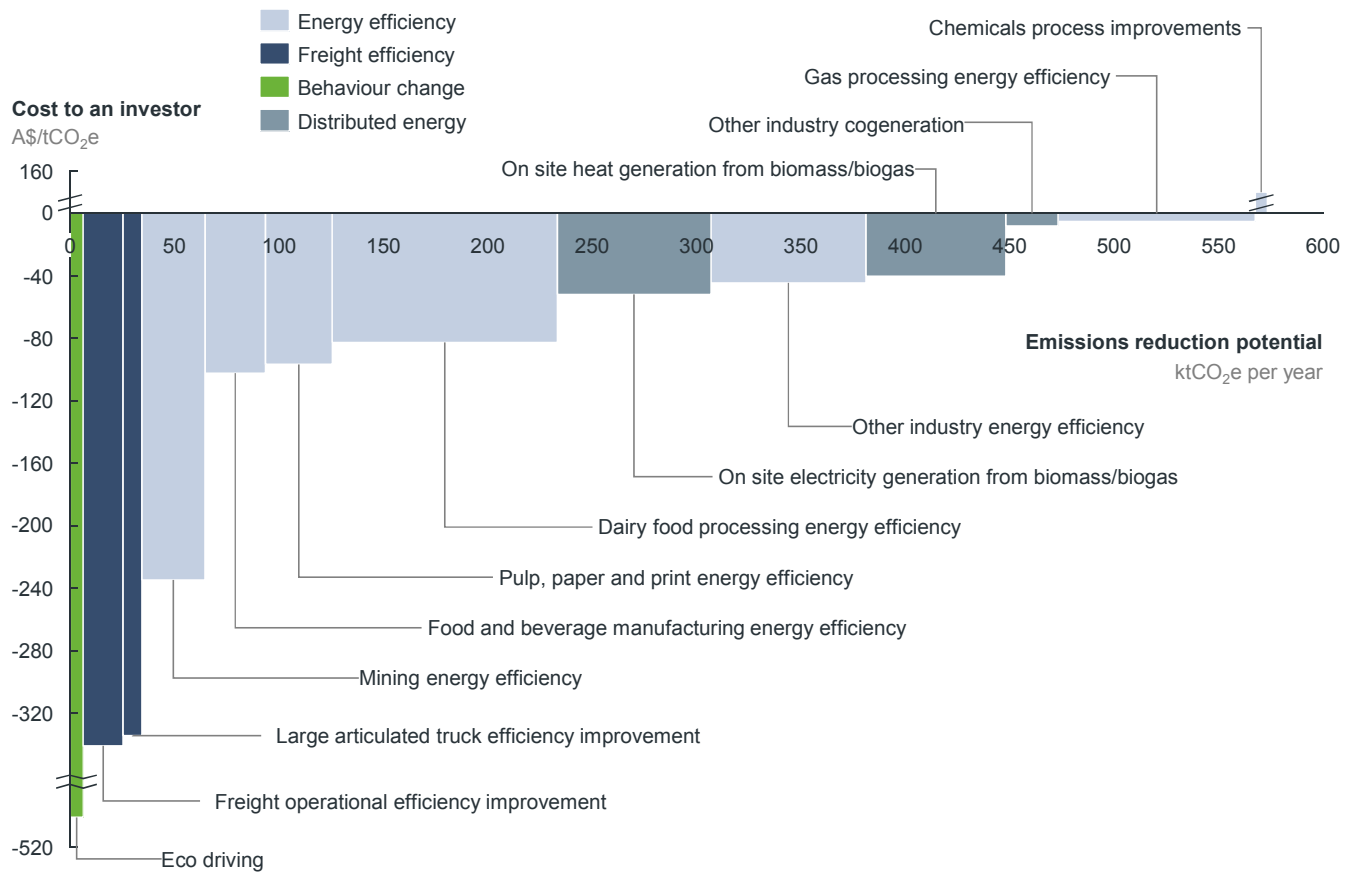
### Distributed Energy

Distributed energy opportunities - such as cogeneration and utilising waste to create energy (bioenergy) - also provide excellent regional opportunities to reduce emissions and improve long term energy security. Cogeneration provides energy savings by creating heat and electricity from the same fuel source. Because natural gas is used, it also produces less greenhouse gas emissions than electricity sourced from the grid. Bioenergy opportunities use biological waste to either generate electricity, heat or both, often turning a liability (waste) into a resource. Implementing distributed energy could reduce emissions by 165,700 tonnes a year and save \$6.7 million in reduced energy costs.

### Freight

Gippsland's growing manufacturing sector is driving an increase in road freight, and this trend will continue in the future. By 2020, the large, articulated trucks that are used for most freight haulage are expected to consume 130 million litres of fuel per year, generating 382,000 tonnes of greenhouse gas emissions each year, or 37% of emissions from all road vehicles. There are some key opportunities to reduce emissions from road freight that are available to the region. This Plan has looked at three options in particular that combined could save \$12.7 million each year and reduce annual emissions by 34,500 tonnes:

1. **Choosing more efficient new trucks** – efficiency improvements to diesel articulated trucks above those achieved under business-as-usual offer substantial fuel savings for freight movers. This is even after factoring in the cost premium associated with more efficient vehicles, which could be recouped in just over 3 years (using simple payback). These improvements are achieved through reducing rolling resistance, improved aerodynamics, and other conventional improvements to internal combustion engines.
2. **Freight optimisation** – experience shows that improving operational efficiencies through the use of route optimisation or 'intelligent transport' systems can reduce fuel consumption by at least 10% and may also achieve more efficient use of labour and a reduction in the number of vehicles required.
3. **Eco-driving** – training truck drivers in eco-driving practices can reduce fuel consumption by an average of 10%, as well as reducing general vehicle wear and tear by decreasing gear changes and braking. Eco-driving may also enhance safe driving practices.



A full description of each opportunity can be found in the Low Carbon Growth Plan for Gippsland – Key assumptions, available online at [www.climateworksaustralia.org](http://www.climateworksaustralia.org)

### CAPTURING ENERGY EFFICIENCY



When Saurin purchased its Longwarry dairy plant in 2001, it focused on transforming it into a modern energy-efficient plant, winning an Environmental Solution of the Year award for its efforts. Since then the plant has increased production by 300%, while also reducing greenhouse gases by 25% on a unit consumption basis. This has led to a 25% reduction in the cost of electricity per unit of production, despite significant increases in cost of energy over the same period<sup>9</sup>.

### MAKING ENERGY FROM WASTE



Some of Gippsland’s larger manufacturers, such as Australian Paper, Murray Goulburn and Burra Foods have already invested in distributed energy solutions and are reaping the benefits.

In particular, turning waste into energy offers significant potential for the region and can provide part of the solution to the municipal waste challenges facing many shires, while also generating cleaner, renewable energy.

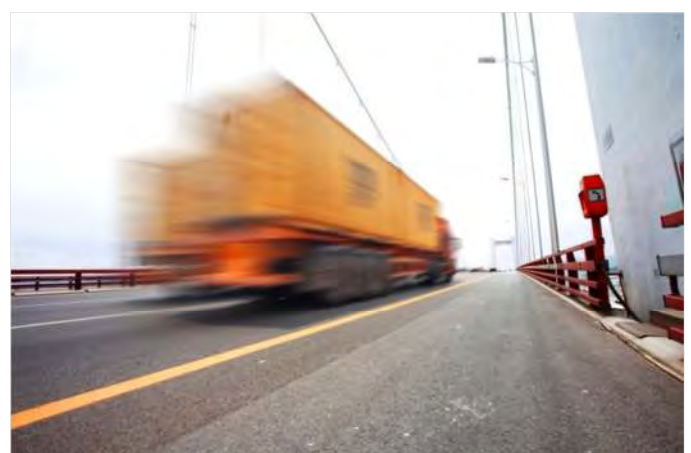
Detailed case studies can be found at [www.climateworksaustralia.org](http://www.climateworksaustralia.org)

<sup>10</sup> Manufacturer’s Monthly, Sick plant finds energy efficient cure, 2011

## Additional potential to reduce greenhouse gas emissions through freight

Additional opportunities are available to the region to reduce emissions from freight transport. These have not been included in the modelling for this Plan however, due to high costs, uncertainty of timing for infrastructure upgrades that would be required to make them viable by 2020, or community concerns given existing infrastructure constraints. These opportunities include:

- **Shifting some road freight to rail** –the Gippsland region has the potential to substantially increase rail freight if infrastructure upgrades such as the addition of sidings are undertaken. Transport is the second largest source of emissions for Gippsland (see Exhibit 1) and much of the region’s freight task could be undertaken by rail. Shifting from road to rail results in an overall decrease in greenhouse gas emissions and traffic congestion, but faces some key barriers such as competing demands on rail services from increasing passenger and freight demand<sup>11</sup>, restricted access to Melbourne rail networks due to line congestion, and the need for rail access door-to-door to make it sufficiently cost comparative to road freight. However, increased rail freight offers long-term potential for low emissions transportation to support increasing regional production, in particular for timber, mineral sands and coal products<sup>12</sup>. This potential will be amplified by an equivalent carbon price applied to freight fuel in 2015, which will further improve the cost comparativeness of rail freight. Latrobe City Council’s proposed freight hub would also facilitate an increased utilisation of rail freight for the region.
- **Shifting road freight to B-doubles** – a move from single articulated trucks to B-doubles<sup>13</sup> could achieve in a 38% reduction in trips, and substantial resultant fuel savings<sup>14</sup>. There is a predominance of single lane roads in need of significant investment to improve safety, however, which is a substantial constraint to achieving this. There is also strong community resistance to an increase in B-doubles on Gippsland’s highways, given these safety concerns. While a shift to B-doubles offers long-term potential for the region, major investment in the region’s roads is needed to make this opportunity attractive.
- **Converting trucks to LPG** – Murray Goulburn have converted 54 of their prime movers to Liquefied Natural Gas, reducing diesel consumption by about 80% for converted trucks. Converting to LPG reduces greenhouse gas emissions, sulphur dioxide and particulate emissions and noise emissions<sup>15</sup>.



<sup>11</sup> Gippsland Transport Strategy 2008-2020

<sup>12</sup> Gippsland Regional Plan, 2010

<sup>13</sup> A ‘B-double’ is an articulated truck combination consisting of a prime mover towing two semitrailers

<sup>14</sup> Australian Trucking Association, Environmental Credentials of the Trucking Industry, 2011

<sup>15</sup> Dairy Australia, 2009, Australian Dairy Industry 2007/09 Sustainability Plan

## BARRIERS TO EMISSIONS REDUCTION IN MANUFACTURING, MINING & FREIGHT

Barrier	Response
<p><b>Contract structures</b></p> <p>Some large energy users pay low wholesale rates for their variable electricity use and a relatively large fixed charge to access the network, decreasing the profitability of energy efficiency measures. Other businesses may also be reluctant to implement costly upgrades to aging plants when facing low cost future.</p>	<p>Large businesses can negotiate Power Purchasing Agreements that stipulate a percentage of energy that is supplied from gas or renewable sources.</p>
<p><b>Market or supply barriers</b></p> <p>Low demand for energy efficient equipment has led to a gap or lack of variety in the equipment offered in some sectors. Moreover, equipment replacement often follows a breakdown and needs to be completed in a short timeframe to prevent operational disruptions. Replacements are therefore mostly taken from available inventory, made up of the most standard products which are not always the most energy efficient.</p> <p>Access to alternative fuels or ingredients, such as biomass or industrial waste material, is often limited and profitability decreases if they have to be transported from a distant location.</p>	<p>Working with local trade organisations to ensure their members are familiar with energy efficient equipment and benefits available to end users is critical to ensure broad uptake of these technologies.</p> <p>Improved coordination of waste streams between industrial and commercial sites can reduce the supply constraint on alternative energy sources.</p>
<p><b>Information gaps</b></p> <p>Limited sub-metering and benchmarking, particularly in SMEs, makes it difficult to quantify the value of improved energy efficiency. The risk of operational disruption and production quality involved in setting up new equipment or suppressing some back-up systems can be overestimated compared to energy savings potential.</p>	<p>Industry bodies can play a role in facilitating knowledge sharing about government programs and services that can provide support to businesses to implement upgrades.</p>
<p><b>Capital constraints and investment decisions</b></p> <p>Implementing energy efficiency or distributed energy solutions can come at a high upfront cost. Competition for capital is intense for most manufacturing businesses. Energy efficiency improvements or emissions reductions are often a low priority as they are not core business activities, offer lower rates of return and are perceived as riskier than other potential investments.</p>	<p>Government can play a key role in helping businesses overcome capital constraints by providing grants, low-interest loans or loan guarantees that can reduce the cost of finance from the private sector.</p>

*ClimateWorks has prepared a list of Funding Programs and Policies that businesses can use to facilitate the capture of emissions reduction opportunities. This document aligns the opportunities identified in this Plan with appropriate funding and programs. It is available at [www.climateworksaustralia.org](http://www.climateworksaustralia.org) and will be updated regularly.*

### KEY ACTIONS AND NEXT STEPS

- Develop centralised facilitation capability to coordinate emissions reduction projects and funding bids across region
- Identify SME project partners for industry energy efficiency upgrades, facilitate access to funding, and share learnings of costs and benefits
- Aggregate access to consultancy services for large industry energy users to identify opportunities for emissions reductions, and develop a rationale for funding support
- Build local skills to audit and implement energy efficiency opportunities in industry
- Facilitate partnerships between industry, biomass owners and distributed energy service providers for the deployment of distributed energy solutions (e.g. cogen, bioenergy)
- Facilitate information sharing among freight movers to promote benefits of improved freight operational efficiency, choosing high-efficient trucks and eco-driving

# Fact sheet: Commercial and Services

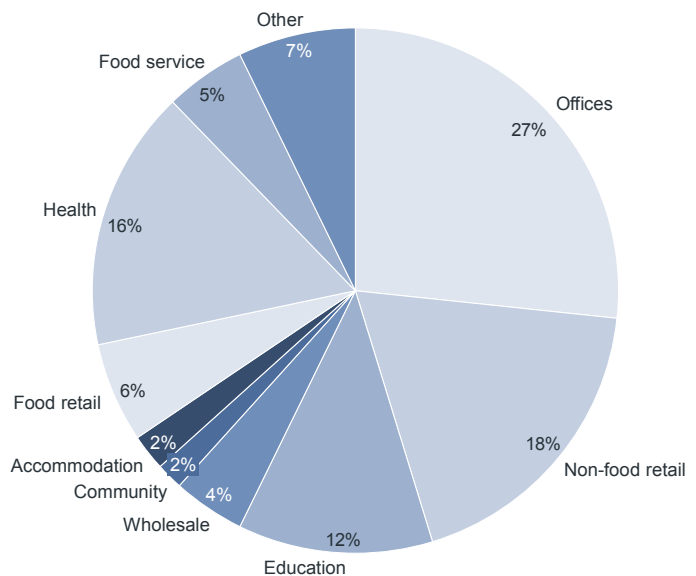
## KEY FINDINGS

- The commercial and services sector could save \$38.3 million each year by improving the energy efficiency of the buildings in which it works, and the fuel efficiency of the vehicles it operates.
- Capturing these savings would reduce the region’s emissions by 370,700 tonnes each year.
- Improving the energy efficiency of Gippsland’s existing commercial buildings can save \$27.7 million, with the upfront costs recouped in less than four years for most types of buildings.
- Choosing cars and light commercial vehicles with high fuel efficiency or alternative fuel technology can save a further \$9.1 million, and the additional upfront cost would be recovered through fuel savings in 3.6 years.



Almost two-thirds of Gippsland’s working population work in the commercial and services sector. Exhibit 4 illustrates that the largest employing sectors are office-based businesses, non-food retail, health and education.

Many commercial and services businesses in Gippsland are SMEs, who typically lack the resources to identify and invest in energy efficiency retrofits or the most fuel-efficient vehicles in class. The region’s buildings were constructed at a time before we had building efficiency standards, and many have not been substantially upgraded to improve energy efficiency since then. Work vehicles are often selected for reasons other than fuel efficiency, such as safety and a preference for vehicles with parts that are inexpensive and readily available. Gippsland’s dispersed population also means that opportunities are highly fragmented, and can therefore be harder to capture.



**Exhibit 4: Gippsland’s commercial and services sectors – share of employment by sector**

## OPPORTUNITIES FOR REDUCING EMISSIONS IN COMMERCIAL AND SERVICES

Exhibit 5 outlines the range of opportunities to reduce emissions available to the Commercial and Services sector. 91% of this potential is already profitable, even factoring in the upfront cost of capturing each opportunity.

### Reducing energy consumption in buildings

1. **Retrofitting existing buildings** – improving the energy efficiency of Gippsland’s existing commercial buildings can save \$27.7 million and reduce the region’s greenhouse gas emissions by 266,500 tonnes each year. This is achieved by replacing inefficient light bulbs; improving the energy efficiency of appliances and equipment; decreasing energy losses from open refrigeration, insufficiently insulated ovens or water mains; upgrading control systems for lighting and HVAC (heating, ventilation and air-conditioning) systems; improving building insulation; and replacing electric water heaters with gas or solar powered systems.

The cheapest opportunity to reduce emissions comes from reducing energy waste, which could deliver an average of 10% energy savings with very little capital expenditure. Energy waste can be reduced by reducing oversized and unnecessary equipment, better management of existing control systems and other similar actions. This opportunity alone could save \$8.3 million across Gippsland per year by 2020. Even factoring in the upfront cost of capturing these savings, this opportunity would pay for itself through reduced energy bills in less than one year.

Exhibit 6 shows the potential for energy savings by sector and technology solution. It demonstrates that while the largest overall energy savings can be found in the non-food retail sector, all sectors can achieve substantial energy savings compared to business-as-usual – an average of 37%. About half of all opportunities (electronics and appliances, energy waste reduction and lighting) can be captured by tenants without requiring landlord involvement, and the upfront investment required could be recouped in less than 4 years for most sectors.



2. **More efficient new buildings** – as the number of businesses in Gippsland continues to grow, new buildings will need to be constructed to accommodate them. Increasing the energy efficiency of these new commercial buildings above current standards (by the equivalent of one star for office buildings in the NABERS<sup>16</sup> rating system) could deliver energy savings of around 40% compared to business-as-usual and reduce Gippsland’s emissions by 41,500 tonnes per year by 2020. These improvements can be achieved through improved building design and orientation, improved insulation and air tightness, usage of materials that deliver increased thermal efficiency, and more efficient HVAC and water heating systems. The additional cost of achieving a higher star rating could be recouped in approximately 6 years (using simple payback), and also increases the resale value of the property. While higher efficiency in new buildings can be achieved voluntarily, broad uptake of this opportunity is best achieved through higher mandatory building standards.

<sup>16</sup> NABERS (the National Australian Built Environment Rating System) is a performance-based rating system for existing buildings, which rates a building on the basis of its measured operational impacts on the environment.



3. **Cogeneration** – cogeneration provides energy savings by creating heat and electricity from the same fuel source, and because cogeneration in Gippsland could be powered by natural gas or biofuels<sup>17</sup> it also produces less greenhouse gas emissions than electricity sourced from the grid. Cogeneration is particularly relevant to community buildings such as aquatic centres, where heat can be used to maintain comfortable water and ambient temperatures. It is also appropriate for consideration in greenfields developments, where a cogeneration plant can provide heating, cooling and cleaner electricity to a number of buildings. Cogeneration in Gippsland’s commercial buildings could generate over 22,000 MWh of energy per year, reducing greenhouse gas emissions by 32,600 tonnes.
4. **Streetlight efficiency** – upgrading Gippsland’s mercury vapour street lighting to utilise more efficient fixtures and bulbs can reduce the region’s emissions by 2,300 tonnes and save 1,500 MWh of electricity each year.

## Reducing fuel consumption in vehicles

1. **Choosing more fuel efficient new vehicles** – when purchasing new vehicles, the total cost of ownership over the vehicle’s life can be significantly reduced by choosing a more fuel efficient car or light commercial vehicle. Gippsland’s businesses have the potential to save over \$8 million each year in reduced fuel costs, whilst also reducing emissions by 20,300 tonnes per year.

Improved fuel efficiency also offers potential for Gippsland’s bus and rigid truck fleet, although this opportunity comes at a higher net cost. Choosing new buses or rigid trucks that are among the most fuel efficient in their class would save a further 2,000 tonnes of emissions each year, at a cost of \$126 per tonne of emissions reduced.

2. **Choosing alternate fuel vehicles** – for fleets in particular, choosing hybrid or electric vehicles over traditional vehicles will be a viable option by 2020. As the cost of these technologies comes down and fuel prices continue to rise, hybrids and electric vehicles will become increasingly cost-comparable to traditional technology. These alternate fuel technologies could save businesses \$1.3 million even after factoring in the additional upfront cost, and could reduce Gippsland’s emissions by 7,600 tonnes per year.



<sup>17</sup> Depending on the specific biofuel used for individual projects, this may deliver different abatement potential than cogeneration from natural gas.



## BARRIERS TO EMISSIONS REDUCTION IN COMMERCIAL AND SERVICES

### Barrier

#### High transaction costs

For SMEs, the transaction costs of pursuing energy efficiency – acquiring information, setting up financing and finding equipment or contractors to install it – are disproportionately high as a share of savings compared to larger businesses.

### Response

From 1 January 2012, energy service companies (ESCOs) will be able to earn Victorian Energy Efficiency Credits by assisting businesses to make energy efficiency improvements. This will help to reduce the cost to SMEs of identifying and implementing some energy efficiency retrofits.

#### Split incentives

In commercial buildings, split incentives can be particularly problematic in capturing energy efficiency opportunities, as they affect all tenanted premises. Some opportunities for improving energy efficiency require capital investment by the building owner, where the energy and financial savings benefit the tenant.

ESCOs and finance providers can offer innovative forms of ‘pay as you save’ financing which allow landlord’s loan repayments to be collected through tenant’s utility bills or leasing contracts, while also allowing them to experience some of the financial benefit of improved energy efficiency. In addition, tenants control about half of all energy efficiency opportunities in commercial buildings and can negotiate ‘pay as you save’ financing directly with ESCOs and finance providers.

#### Supply constraints

Although electric vehicles offer great promise, they will require recharging infrastructure and local mechanical expertise to attract sufficient uptake in regional areas.

Businesses with offices in multiple locations can install recharging facilities on-site and negotiate with their local car dealership to develop the expertise needed to service electric vehicles.

#### Information gaps

Businesses often don’t closely follow how much energy they use or the savings that could be achieved through improved energy efficiency. The equipment needed to estimate and verify energy savings comes at a cost, making it more difficult to build traction on energy efficiency measures.

Business groups and professional associations can share case studies of energy efficiency retrofits with members to encourage role-modelling and highlight savings captured in similar businesses.

#### Access to capital

Banks are often reluctant to offer loans to energy efficiency projects at reasonable rates due to the lack of collateral and already high level of property exposure.

The City of Melbourne has secured an amendment to Victorian legislation that allows financial institutions to advance funds to building owners for environmental retrofits, which can be recovered by the City of Melbourne through the rates collection process. The NSW Government has also introduced a similar scheme for all municipalities within the state. Gippsland municipal councils could seek a similar legislative exemption to enable ‘pay-as-you-save’ energy efficiency investments in Gippsland’s ageing building stock, providing an opportunity to revitalise buildings while improving energy efficiency.

## Barrier

## Response

### Decision process

The decision process of smaller businesses is often delegated to suppliers, who can be motivated by competing incentives. For example, plumbers play a decisive role in the choice of hot water heaters, and tend to prioritise the equipment they are most familiar with, or can achieve the highest return, which is often not the most efficient choice.

The high upfront cost of new vehicles and relatively low fuel excise reduces the importance of fuel efficiency in the decision making process. Even fleet cars can be chosen on factors such as a preference for local manufacture or size requirements, rather than consideration of the total cost of ownership.

Working with local trade organisations and training providers to ensure trades people are familiar with energy efficient equipment and its benefits to end users is critical to ensure broad uptake of these technologies.

Fleet owners can set voluntary fuel efficiency standards that surpass the average fuel efficiency of new cars. Eco driving training for staff can reduce fuel consumption by a further 10 -20% for a low upfront cost

### Long payback periods

Measures such as insulation, switching to solar-powered equipment or whole systems upgrades are capital intensive, offer long payback periods and are usually perceived as non-critical to the business.

Energy service companies or leasing companies can offer financing solutions to their capital-constrained customers, setting up reimbursement through savings schemes or leasing arrangements that can overcome payback hurdles.

### Investment priorities

Profitable emissions reduction opportunities may also be missed when their internal rate of return is less than alternative investments, or where the emissions reduction activity is not considered core business (e.g. in hospitals, where limited capital is focused on improving patient care, or high growth industries where increasing market share may be prioritised over cost reduction opportunities).

Government funding programs are often critical in overcoming investment priority issues.

*ClimateWorks has prepared a list of Funding Programs and Policies that businesses can use to facilitate the capture of emissions reduction opportunities. This document aligns the opportunities identified in this Plan with appropriate funding and programs. It is available at [www.climateworksaustralia.org](http://www.climateworksaustralia.org) and will be updated regularly.*

## KEY ACTIONS AND NEXT STEPS

- Encourage service providers to develop financing products for energy efficiency upgrades for regional SMEs
- Apply to Low Carbon Australia and Greener Government Buildings for funding to retrofit commercial buildings and install cogeneration
- Build local skills to undertake retrofits of commercial and residential buildings, and to audit and implement energy efficiency opportunities in industry
- Introduce 'pay-as-you-save' funding of building retrofits, to unlock investment and recoup through council rates.
- ESCOs can help businesses to identify energy efficiency opportunities and find solution providers. Working with ESCOs to coordinate energy efficiency upgrades across a number of businesses within a commercial centre can reduce transaction costs and improve buying power for smaller businesses
- Upgrade street lighting
- Highlight the benefits of higher efficiency standards for new builds to all developers and owners, and support regulatory reform to mandate higher standards
- Encourage fleet owners to consider lower emissions vehicle technologies, including hybrids and electric vehicles

# Fact sheet: Households

## KEY FINDINGS

- The total number of households in Gippsland is expected to increase by 16% between 2010 and 2020, which will see 15,000 new homes built to accommodate this growth.
- Gippsland's households could save \$22.9 million each year by retrofitting their homes to improve energy efficiency, building more efficient new homes or choosing new cars that consume less fuel.
- Capturing these savings would reduce the region's greenhouse gas emissions by 177,600 tonnes each year.
- While all households can benefit, for low income households where energy costs represent a large proportion of household outgoings, capturing energy efficiency savings can benefit day-to-day life.



By 2020 it is estimated that there will be 110,000 households in Gippsland, an increase of 16% over this decade. Most of this population growth is expected around the key regional centres of Warragul, Wonthaggi, Latrobe Valley, Sale, Bairnsdale, Leongatha and Cowes<sup>18</sup>. This will also see 15,000 new homes built over this period to accommodate the growing population. Most Gippslanders live in houses, with just 9% of the population living in units, townhouses or apartments.

People in Gippsland also own more cars than average, and own their vehicles for longer, due to limited access to public transport across the region and the need therefore to keep more cars in the family to service the needs of everyone in the household.

Gippsland's households have the potential to reduce the energy used in their homes and the fuel used in their cars, which could reduce the region's greenhouse gas emissions by 177,600 million tonnes per year.

<sup>18</sup> Gippsland Regional Plan 2010

## OPPORTUNITIES FOR EMISSIONS REDUCTION IN HOUSEHOLDS

Exhibit 7 illustrates the range of opportunities available to households to reduce greenhouse gas emissions. 85% of this potential is already profitable, even factoring in the upfront cost of capturing each opportunity.

### Improving energy efficiency in homes

In residential buildings, much is already being done to reduce emissions, including increasing insulation, replacing electric water heaters with solar or gas water heaters, and improving the energy efficiency of new homes, and these improvements have been accounted for in business-as-usual. Yet householders in Gippsland can further reduce energy consumption (and therefore emissions) and save money by additional energy efficiency improvements to their homes.

1. **Retrofitting existing homes to improve energy efficiency** – choosing appliances and electronics with above-standard efficiency at time of natural replacement, and upgrading lighting to LEDs can significantly reduce energy usage in existing homes, providing a further 59,200 tonnes of potential emissions reduction, at an average savings of \$124 per tonne, with upfront costs recouped in less than 2 years. Improving the building envelope of existing homes (by improving wall and attic insulation<sup>19</sup>, reducing air leakage, and implementing basic solar principles) reduces the energy required for heating and cooling, and could reduce Gippsland’s emissions by 24,300 tonnes per year. This would save households an average of \$139 per tonne of emissions reduced, and the upfront costs could be recouped in less than 6 years. Choosing air-conditioners and space heaters that are top performers in their category when old systems expire and ensuring heating and cooling systems are regularly maintained can reduce emissions by a further 4,500 tonnes per year while saving an average of \$171 per tonne. The upfront costs would be repaid in less than 4 years.
2. **Building new homes to a higher efficiency standard** – improving the efficiency of new homes built from 2015 from 6 stars to at least 7 stars (in the HERS rating system<sup>20</sup>) will save 30% more energy, reducing energy bills by \$2.6 million and region’s greenhouse gas emissions by 34,600 tonnes per year. The higher upfront cost can be recouped through energy savings in less than 5 years, and also increases the resale value of the property. As electricity prices increase, even higher efficiency standards (8 or even 9 stars) are expected to become cost effective in Victoria. While higher efficiency can be achieved voluntarily, broad uptake of this opportunity is best achieved through higher mandatory building standards.
3. **Solar panels for Gippsland’s homes** – solar photovoltaics (PV) generate electricity by converting solar radiation into electricity via solar panels typically installed on the roof of homes. Solar PV is the highest cost opportunity for households (in terms of cost per tonne of emissions reduced), but provides homeowners with long term security against rising electricity prices. Renewable Energy Certificates (RECs) have been excluded from the modelling for solar PV, as it is expected that by 2020 the market for RECs will be saturated. However, households that choose to capture this opportunity in the short to medium term could be eligible for RECs, which would reduce the higher upfront cost over the next few years. Government subsidies can also make solar PV more attractive by providing revenue from excess electricity fed into the grid during the day, although this has also been excluded from the modelling as it is assumed households will consume all electricity generated.

<sup>19</sup> It is assumed that basic ceiling insulation is captured under business-as-usual.

<sup>20</sup> House Energy Rating Schemes, such as the National House Energy Rating Scheme (NatHERS), used to assess the thermal performance of residential buildings.

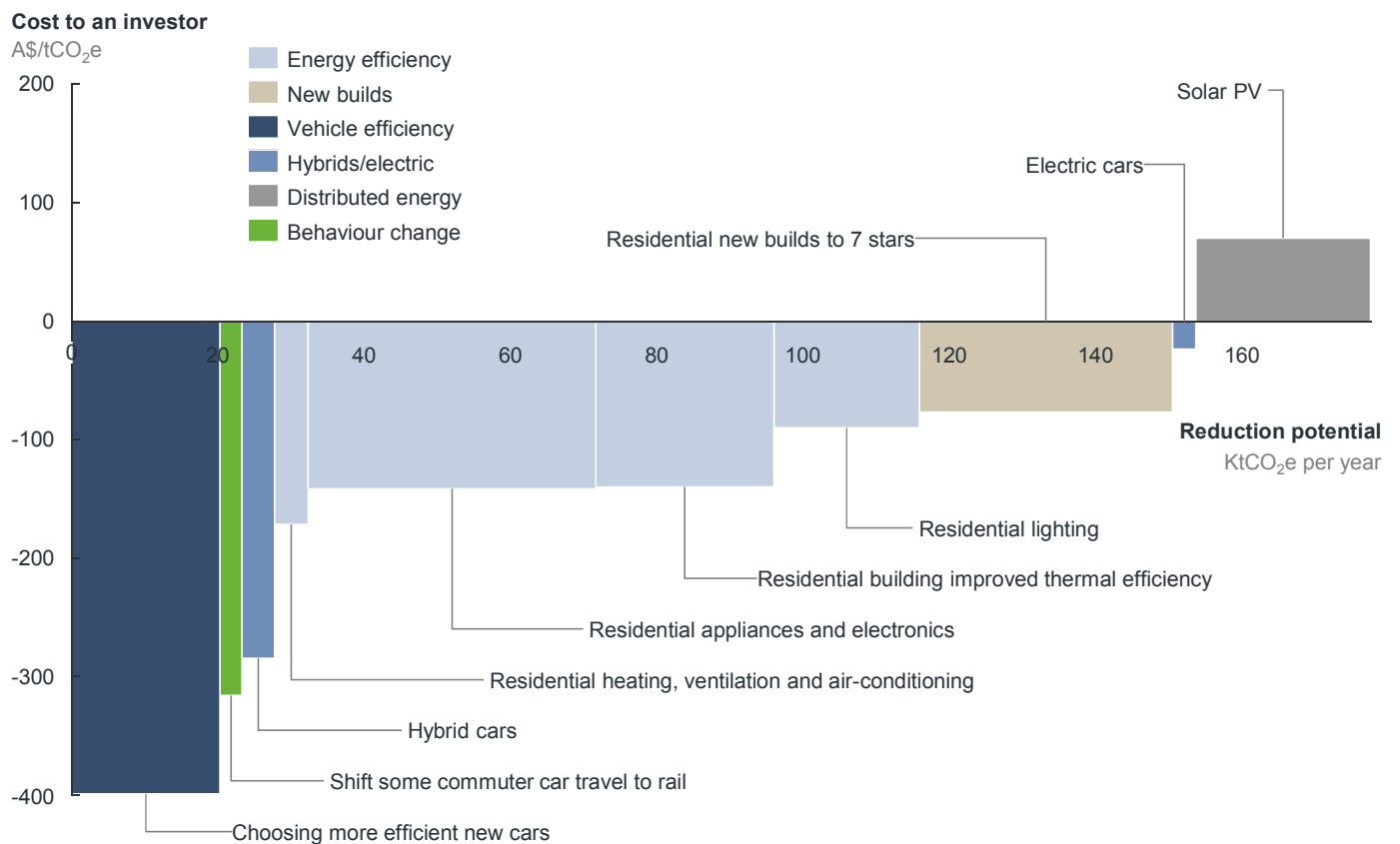
## Reducing fuel consumption in cars

1. **Choosing more efficient new vehicles** – purchasing a more fuel efficient vehicle can significantly reduce the total cost of ownership over its life. Gippsland’s households could save an average of \$398 per tonne of emissions reduced whilst also reducing emissions in the region by 20,200 tonnes per year.

Hybrid or electric cars may also be a viable option for Gippsland’s urban households by 2020. As the cost of these technologies comes down and fuel prices continue to rise, these technologies will become increasingly competitive when looking at total cost of ownership. These technologies could reduce household emissions by 7,600 tonnes per year, and also offer a savings of \$176 per tonne, although they come at a cost premium of between \$4,800 and \$9000 per vehicle.









2. **Shifting some commuting from car to rail** – access to public transport in the region is limited, and this drives greater car dependency than metropolitan regions experience. However, even a 10% shift in commuting from car to rail can reduce the region’s greenhouse gas emissions by 2,995 tonnes each year, whilst also saving households about \$9 per trip. Significantly more potential exists in the region from increase utilisation of public transport, but would require a large expansion of existing public transport services.

Exhibit 7: 2020 Gippsland households greenhouse gas emissions reduction cost curve



A full description of each opportunity can be found in the Low Carbon Growth Plan for Gippsland – Key assumptions, available online at [www.climateworksaustralia.org](http://www.climateworksaustralia.org).

## BARRIERS TO EMISSIONS REDUCTION IN HOUSEHOLDS

Barrier	Response
<p><b>High transaction costs</b> Individual households need to invest significant time to acquire the information, set up the financing and find the equipment or installation contractors to capture energy and emissions savings.</p>	 <p>Energy service companies (ESCOs) can aggregate small scale projects across a number of households, therefore lowering the cost of assessment, planning and implementation of energy efficiency retrofits.</p>
<p><b>Split incentives</b> Split incentives affect many energy efficiency upgrades to residential buildings. In tenanted homes, energy efficiency investments benefit the tenant while the owner is often responsible for the investment. For home owners, some energy efficiency investments will not be recouped before the house is sold, benefitting subsequent owners.</p>	 <p>Some real estate companies have begun to subsidise energy efficiency upgrades of their tenants' properties, recognising that demand for energy efficient buildings will increase in the future as energy prices rise.</p>
<p><b>Supply constraints</b> Access to mechanical expertise and parts for hybrids and electric vehicles is a key deterrent to their uptake in regional areas. In addition, these vehicle types can be perceived as 'city cars' that are unsuited to regional driving.</p>	 <p>Households are unlikely to drive the widespread uptake of hybrids and electric vehicles in regional areas. Rather, as they are taken up by businesses, and local expertise and availability of parts and infrastructure becomes more widespread, households will follow the trend.</p>
<p><b>Information gaps</b> Homeowners often don't closely follow their energy use and may be unaware of potential savings. The equipment needed to estimate energy savings comes at a cost, making it more difficult to build traction on energy efficiency measures.</p> <p>New home builders are often capital constrained, and a lack of information about the lifecycle savings available from potential energy efficiency measures means these choices are not prioritised.</p> <p>Vehicle owners consider many criteria when choosing a new car – safety, comfort, aesthetics, price – and fuel efficiency is only a small part of the decision process.</p>	 <p>Community groups, local councils and ESCOs can play a role in disseminating information that allows households to benchmark their energy use.</p>  <p>In areas expected to experience large population growth, providing information about whole of life cost implications can help new home builders make informed choices that can dramatically reduce the energy demand of their new home.</p>  <p>Mandatory efficiency standards, such as those proposed by the Australian Government in the <i>Securing a Clean Energy Future</i> package, are key to widespread uptake of more fuel efficient vehicles.</p>
<p><b>Decision process</b> Decision-making in households is often delegated to suppliers, who can be motivated by competing incentives. For example, plumbers play a decisive role in the choice of hot water heaters, but they may prioritise equipment they are familiar with or that achieves the highest return, over a more efficient alternative.</p>	 <p>Working with local trade organisations to ensure their members are familiar with energy efficient equipment and its benefits to end users is critical to ensure broad uptake of these technologies.</p>
<p><b>Access to capital</b> Car purchases are financed either through savings or personal loans, which come at a high cost of capital. This restricts uptake of more efficient cars, which offer lower lifetime cost but higher upfront costs.</p>	 <p>State registration charges or stamp duties that reflect the emissions performance of the vehicle improves the economic attractiveness of more efficient cars.</p>

*ClimateWorks has prepared a list of Funding Programs and Policies that businesses and households can use to facilitate the capture of emissions reduction opportunities. This document aligns the opportunities identified in this Plan with appropriate funding and programs. It is available at [www.climateworksaustralia.org](http://www.climateworksaustralia.org) and will be updated regularly.*

## Additional potential to reduce greenhouse gas emissions through community energy generation

Generating electricity from community-owned cogeneration (natural gas or biomass), micro hydro or small-scale wind also offers potential for Gippsland, enabling communities to generate low emissions and cost effective electricity. While these opportunities have not been modelled specifically for Households, reference can be drawn for cogeneration from other sections of this report (see cogeneration page 15 and Distributed energy page 8).

### LOW INCOME HOUSEHOLDS



For low income households, energy costs represent a large proportion of household outgoings. Capturing energy efficiency savings can therefore make a difference to day-to-day life. But access to the upfront capital required to capture these savings can present a real challenge. Local council and community groups can help to facilitate access to grants programs that provide support for energy efficiency for low income households.

### SOUTHERN SOLAR HUB



By September 2011, the Southern Solar Hub's target to install at least 500 kilowatts of solar capacity across 170 homes, 20 farms, and 20 community buildings and halls across western Gippsland, had already been exceeded. The project bulk purchases solar panels, providing them to participants at a reduced cost, and is also assisting households to reduce energy consumption through energy efficiency. The project's original estimate that it will reduce the region's greenhouse gas emissions by 15,000 tonnes per year may now double.

## KEY ACTIONS AND NEXT STEPS

- Work with community groups and ESCOs to encourage uptake of solar PVs in homes
- Work with state government and rail service providers to increase passenger access to rail services
- Work with building and community organisations to highlight benefits of residential building retrofits, and funding available to assist low income households
- Develop appropriate planning mechanisms that encourage above standard new housing developments, in line with sustainable development principles
- Highlight the benefits of higher efficiency standards for new builds to all developers and owners

# Fact sheet: On the Land

## KEY FINDINGS

- Land-based activities have a significant role to play in reducing the region's emissions, with potential to reduce emissions by 400,300 tonnes per year.
- The key opportunities to reduce emissions in the land sector come from increasing the carbon stored in soils and vegetation, improving energy conversion in livestock and improving energy efficiency in dairies, all of which have productivity benefits.
- Most of these opportunities currently come at a cost to landowners, but the ability to earn carbon credits will make some activities profitable.



Land-based activities are a key economic driver in Gippsland. Agriculture, Forestry and Fishing is the fourth largest sector in terms of regional output and the third largest in terms of employment, providing jobs for almost 10,000 Gippslanders<sup>21</sup>. This also ensures it is a significant contributor to the region's greenhouse gas emissions, with land based activities contributing 1.3 million tonnes of emissions each year.

The region has over one million hectares of agricultural land<sup>22</sup>, and extensively forested public land. Parts of Gippsland – particularly around the Macalister Irrigation District – are prime dairy land, producing 22% of Australia's milk<sup>23</sup>. The region also produces excellent pasture for beef and lamb, and reliable water resources are attracting a growing horticulture industry. Despite some climate and soil quality variability across the region, Gippsland's fertile soils and water security are expected to see an intensification of agricultural activity in the future, and the region is positioning itself as a future food bowl for Victoria and Australia<sup>24</sup>. Gippsland has also developed extensive local expertise in reducing emissions from land based activities, which has provided a valuable resource in the development of this Plan.

<sup>21</sup> Gippsland Regional Plan, 2010

<sup>22</sup> ABS, Agricultural Commodities, 2008-09

<sup>23</sup> GippsDairy 2008/09

<sup>24</sup> Agribusiness Gippsland; Gippsland Area Consultative Committee Strategic Plan to 2017; Latrobe 2026: The community vision for the Latrobe Valley



## OPPORTUNITIES FOR EMISSIONS REDUCTION ON THE LAND

Exhibit 8 illustrates the range of opportunities available to landowners. Most of these opportunities come at a net cost, but a market for carbon credits will improve the profitability of some activities.

### Increasing carbon stored in soils

1. **Reducing cropland soil emissions** – reducing cropland soil emissions through reduced tillage and improved nutrient management can save farmers money by reducing labour and fertiliser costs. This opportunity can save farmers an average of \$110 per tonne whilst reducing the region’s emissions by 2,900 tonnes per year.
2. **Improved pasture and grassland management** – improving pasture management practices involves optimising grazing intensity and timing to increase productivity and carbon sequestration, increasing the use of deep rooted perennial grass species and increasing fertiliser use. This has the potential to increase soil carbon in Gippsland’s pastures and grasslands by 52,700 tonnes per year, at an estimated cost of \$6 per tonne of emissions reduced.
3. **Restoring less-productive pastures and grasslands** – restoring the productivity of less-productive pastures and grasslands can increase soil carbon in Gippsland by 18,000 tonnes per year, at an average cost of \$82 per tonne. This is achieved by revegetation, destocking, improving fertility via nutrient application and applying organic substrates to increase the soil’s ability to support vegetation and store carbon.

### Reforestation

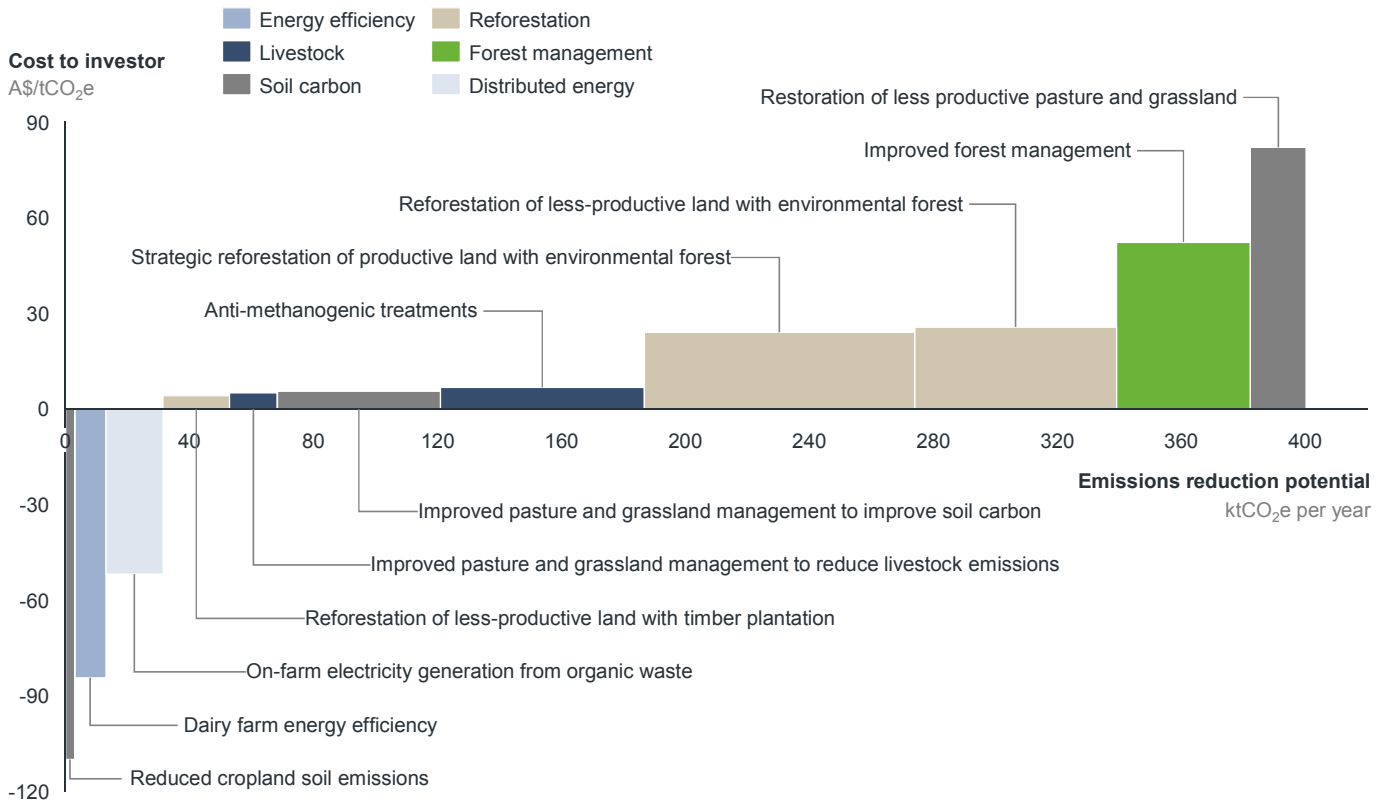
While much of Gippsland’s forestry activity currently occurs on public land, there is an increase in forestry activity on privately owned land. The opportunities modelled in this Plan are focused mostly on private land, and are weighted towards environmental plantings over timber plantation (see Exhibit 9).

On-farm forestry activities must be balanced with the high value of land to long-term food security. As illustrated in Exhibit 9, forestry activities are only assumed to happen on 4% of all agricultural land. Much of the potential for reforestation in Gippsland is assumed to be eligible for the Carbon Farming Initiative, which can make these opportunities profitable for landowners.

1. **Environmental plantings on less-productive land** – agricultural land is planted with native forest not for harvest, providing aesthetic and biodiversity benefits. This opportunity can reduce Gippsland’s emissions by 65,000 tonnes per year and comes at a cost of \$26 per tonne.
2. **Timber plantation on less-productive land** – timber is planted for eventual harvest on land that is less suitable for other purposes. The timber provides a source of revenue for farmers, reducing the total cost of capturing this opportunity to \$4 per tonne of emissions reduced. This opportunity has the potential to reduce Gippsland’s emissions by 21,400 tonnes each year.
3. **Strategic reforestation of productive land with environmental forest** – 2% of productive farm land is planted with trees in the form of windbreaks, plantings along waterways and tree islands to shade livestock. This is consistent with best practice farm management and is likely to increase the long term productivity and sustainability of farming enterprises. This opportunity would come at cost of \$24 per tonne of CO<sub>2</sub>e and reduce the region’s emissions by 87,400 tonnes per year.
4. **Forest management** – improving the management of existing forests provides a potential emissions reduction of 43,200 tonnes per year at an average cost of \$52 per tonne. Improved forest management includes practices such as removal of weeds like lantana and blackberries that limit woody growth, control of feral animals, insects and pests to promote tree growth and fire management. These practices increase forest growth and therefore the quantity of carbon stored in forests.

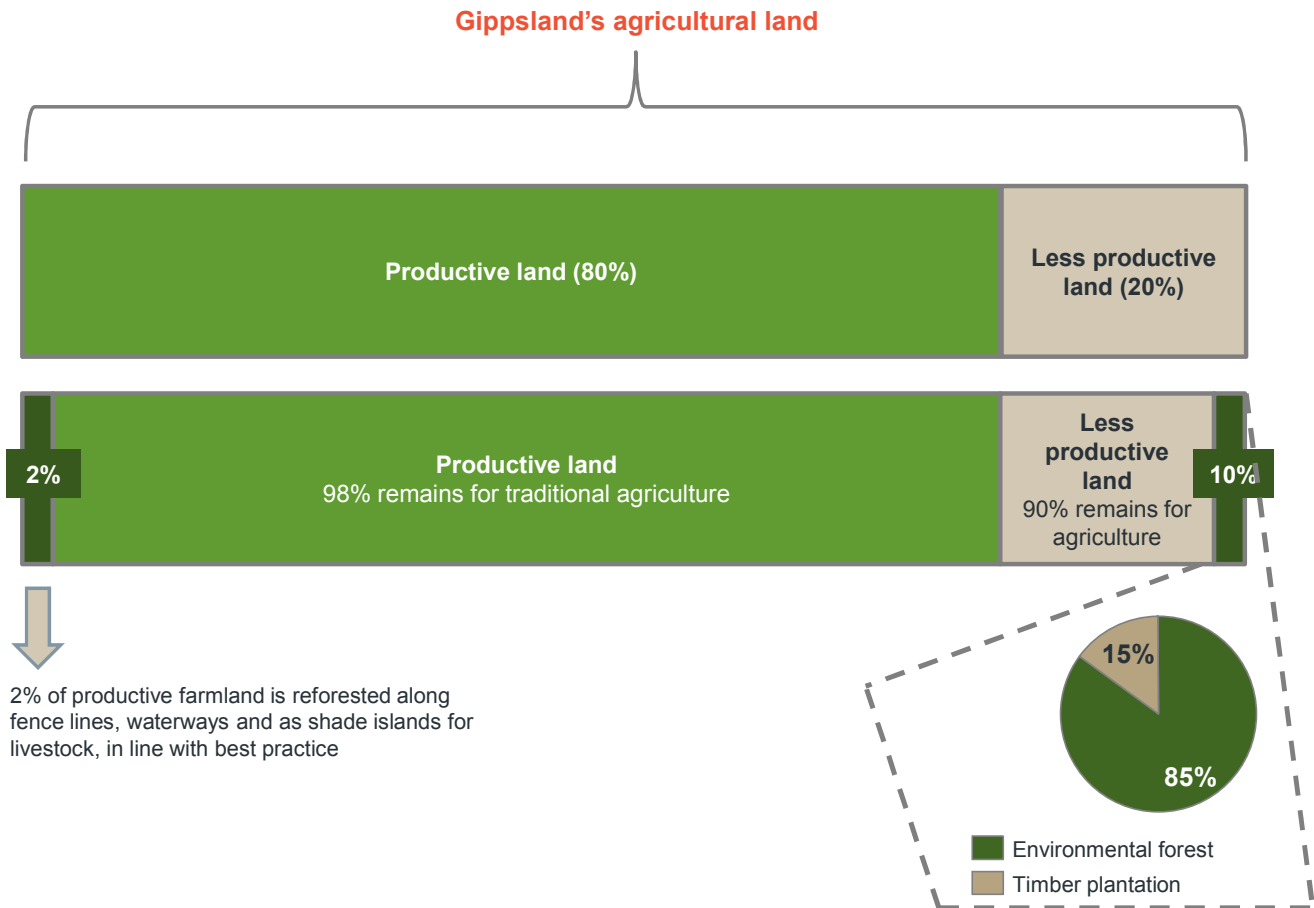
All of these costs take account of the opportunity cost of reforesting the land, plus planting and monitoring costs.

**Exhibit 8: 2020 Gippsland land sector greenhouse gas emissions reduction cost curve**



A full description of each opportunity can be found in the *Low Carbon Growth Plan for Gippsland – Key assumptions*, available online at [www.climateworksaustralia.org](http://www.climateworksaustralia.org).

**Exhibit 9: Split of agricultural land modelled for forestry activities**



2% of productive farmland is reforested along fence lines, waterways and as shade islands for livestock, in line with best practice

## Improved energy conversion in livestock

1. **Reducing livestock emissions through improved pastures and grassland management** – improved pasture and grassland management also decreases livestock emissions via better feed quality and animal management, and can reduce enteric emissions by 5%. For Gippsland, this could achieve 15,500 tonnes in emissions reductions, at a cost of \$5 per tonne.
2. **Anti-methanogenic treatments** – dietary additives, injections, water medication and vaccines reduce livestock emissions by reducing the amount of methane produced in livestock during the digestive process. This opportunity has only been modelled for dairy cattle as the higher level of animal management makes regular administration of anti-methanogenic treatments feasible. This opportunity has the potential to reduce Gippsland’s emissions by 65,600 tonnes per year at an average cost of \$7 per tonne or \$1.50 per head of cattle.

Note that opportunities to reduce livestock emissions have not been modelled cumulatively. Each has been applied to a separate proportion of the region’s cattle population, with a total of 45% of all cattle included in one or the other of these opportunities.

## Dairy energy efficiency

Milk cooling and water heating use the most energy on dairy farms. Installation of a heat recovery unit on the refrigeration compressor lowers the temperature of refrigeration gases. This saves an average of 19% of refrigeration and water heating energy use<sup>25</sup>. This opportunity could reduce emissions in the region by at least 10,000 tonnes per year by 2020, while also saving dairy farmers \$84 per tonne of emissions reduced.

## On-farm energy generation from waste

Bioenergy (converting organic waste into of electricity and heat) provides a realistic opportunity for some dairy farms, where manure and feed waste from feedpads can be collected for use in a biodigester to generate electricity and heat. This offers emissions reduction potential of 18,400 tonnes while saving farmers \$51 per tonne of emissions reduced.

### MACALISTER DEMONSTRATION FARM



The Macalister Demonstration Farm has installed a heat extraction unit on its milk vat compressor, which captures the waste heat from refrigeration for cooling milk to heat hot water. This both improves the efficiency of the refrigeration unit, cooling milk quicker while also reducing the energy needed to heat hot water, resulting in reduced electricity costs. Detailed case studies can be found at [www.climateworksaustralia.org](http://www.climateworksaustralia.org)

## Additional potential to reduce greenhouse gas emissions on the land

There are a range of additional options available to land owners to reduce greenhouse gas emissions that have not been modelled in this Plan. Highlighted below are just a few examples, although this list is not exhaustive.

1. **Alternative energy generation** - farmers in Gippsland could consider generating some or all of their electricity needs on-farm, reducing their long-term exposure to rising electricity prices while also reducing emissions. In addition to on-farm energy generation from waste, other options could include small-scale wind and solar PV.
2. **Electric on-farm vehicles** - electric vehicle technology has applicability on-farm - electric tractors and quad bikes are simple, clean and quiet to operate. While these technologies come at a cost premium, they are expected to become increasingly attractive as fuel prices continue to rise.

<sup>25</sup> Department of Agriculture, Forestry and Fisheries, 2011, Carbon Ready Dairy Demonstration Project

## BARRIERS TO EMISSIONS REDUCTION OPPORTUNITIES ON THE LAND

As cost is a primary barrier, economic incentives such as those proposed under the Carbon Farming Initiative<sup>26</sup> can be particularly effective, potentially making opportunities such as reducing cropland soil emissions, improved pasture management, anti-methanogenic treatments and reforestation of marginal land profitable for farmers.

Barrier	Response
<p><b>High transaction costs</b> The agriculture sector is highly fragmented, which increases the transaction costs involved in identifying and implementing many emissions reduction opportunities.</p>	<p>Gippsland already has extensive networks organised such as local Landcare groups, Agribusiness Gippsland, the Victorian Farmers Federation and the Gippsland Sustainable Agriculture Network. These networks can play a role in information sharing and coordination of projects to reduce transaction costs for individual farmers.</p>
<p><b>Information gaps</b> Farmers may not always have access to information about methods to reduce emissions, nor feel confident about their ability to achieve results on their land. Creating a reliable soil carbon accounting system is also a considerable challenge, as soil carbon levels vary widely between geographies and fluctuate naturally over time.</p>	<p>Farmers can alter management practices quickly, but this can only occur when a transparent accounting and investment system is in place, and the opportunities, regulations and risks are explained to them by trusted local institutions and individuals. The Carbon Farming Initiative will encourage the development of credible agricultural carbon accounting systems that can earn additional revenue for farmers.</p>
<p>Landowners remain uncertain as to how they will be able to earn income via various types of forestry. Without clarity on the options available, their different impacts, requirements and merits, it will be difficult for farmers to make long term decisions that potentially utilise their land for long periods of time.</p>	<p>Land owners will need to be provided with good information on the various forestry options available for their type of land. Trusted local organisations can play a leading role in this process and should be assisted to provide appropriate information to their members.</p>
<p><b>Access to capital</b> Many farmers are cash constrained, and the forestry activities and land management changes required will require new investment priorities. Most farmers are asset rich yet cash poor and will be unable to pursue these options without financial support from government funding or private investment. New home builders are often capital constrained, and a lack of information about the savings available from potential energy efficiency measures means these choices are not prioritised.</p>	<p>Gippsland can play a role in the creation of a clear, open and transparent system of agricultural carbon accounting and payment through the Carbon Farming Initiative. Even if not perfect, once in place it will enable farmers to make investment and management decisions and allow capital to flow to on-farm emissions reduction opportunities.</p>

## KEY ACTIONS AND NEXT STEPS

- Work with local researcher and land and farmers groups to highlight opportunities to earn carbon credits via reforestation, reducing livestock emissions and improved land management
- Raise awareness with farmers of financial savings that can be captured through improving energy efficiency and on-farm energy generation from waste
- Undertake improved forest management practices on areas of failed regeneration, dieback and multiple bush fires, to improve biodiversity and carbon storage outcomes, while also increasing the amenity of these areas for nature based tourism

<sup>26</sup> The Carbon Farming Initiative is a Federal Government initiative designed to give farmers, forest growers and landholders access to domestic voluntary and international carbon markets. Land owners will be able to earn credits for activities that either sequester carbon or reduce carbon emissions on their land and sell those credits in domestic or international carbon markets.

# Other ways to reduce Gippsland's emissions

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The focus of this Plan is on identifying a range of least cost solutions that rely on commercially available technology or best practice processes to reduce emissions. Additional emissions reductions can be achieved in the region through lifestyle or behaviour changes, investing in emerging technologies that could provide a step change in emissions reductions, or investment in higher cost opportunities such as additional low (or no) emissions power generation. However, these were not modelled in this Plan.

- **Lifestyle or behaviour changes** – switching off appliances, equipment and lights when not in use saves energy and money for no upfront investment. Reducing waste sent to landfill also reduces emissions, and can be achieved by increasing recycling, reducing food or packaging waste, or finding alternative uses for waste (e.g. using waste to generate heat or electricity, or create compost).
- **Investing in emerging technologies** – many low carbon solutions that will be mainstream in 15 to 20 years are still in their infancy today. Gippsland is already attracting investment in research and development and pilot projects for emerging technology solutions that can help to reposition the region as a clean tech centre while also providing the potential for technology step change that could significantly reduce greenhouse gas emissions in the future. The Centre for Sustainable Technologies, identified as a key regional priority<sup>27</sup>, can play a major role in facilitating the introduction of new technologies and new industries into the Gippsland region, to enable a positive transition to a low carbon economy.
- **Investment in opportunities within the Gippsland region with a higher cost of abatement** – this Plan focuses on least cost opportunities to reduce emissions within the region, but it is not an exhaustive list. The region could reduce emissions further by attracting investment in more expensive opportunities – particularly in the Power generation sector – which would also see economic benefits to the local economy and community.

## CO-BENEFITS OF REDUCING GREENHOUSE GAS EMISSIONS

In addition to greenhouse gas emissions savings, many of the emissions reduction opportunities outlined in this Plan offer additional benefits, such as improved energy price security for businesses and households, increased productivity and better health and welfare. For example, recent studies in the United States show that green buildings can deliver up to 10% increase in productivity and 40% decrease in sick days compared to average buildings<sup>28</sup>.

In addition to reducing energy costs, industrial operational improvements often improve productivity by making better use of equipment (e.g. reducing idle time or optimising freight loads for trucks)<sup>29</sup>. Similarly, increasing the carbon content of soil or reducing livestock emissions improves agricultural productivity<sup>30</sup>.

Although these co-benefits have not been reflected in the cost curve, they can provide added motivation for businesses to invest in the transition to a low carbon economy.

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<sup>27</sup> Gippsland Regional Plan, 2010

<sup>28</sup> Colliers International. *Colliers International Office Tenant Survey*. 2008; McGraw Hill Construction. *Smart Market Report*. 2006; Turner Construction. *Market Barometer*. 2004.

<sup>29</sup> *Low Carbon Growth Plan for Australia*, 2010

<sup>30</sup> *Low Carbon Growth Plan for Australia*

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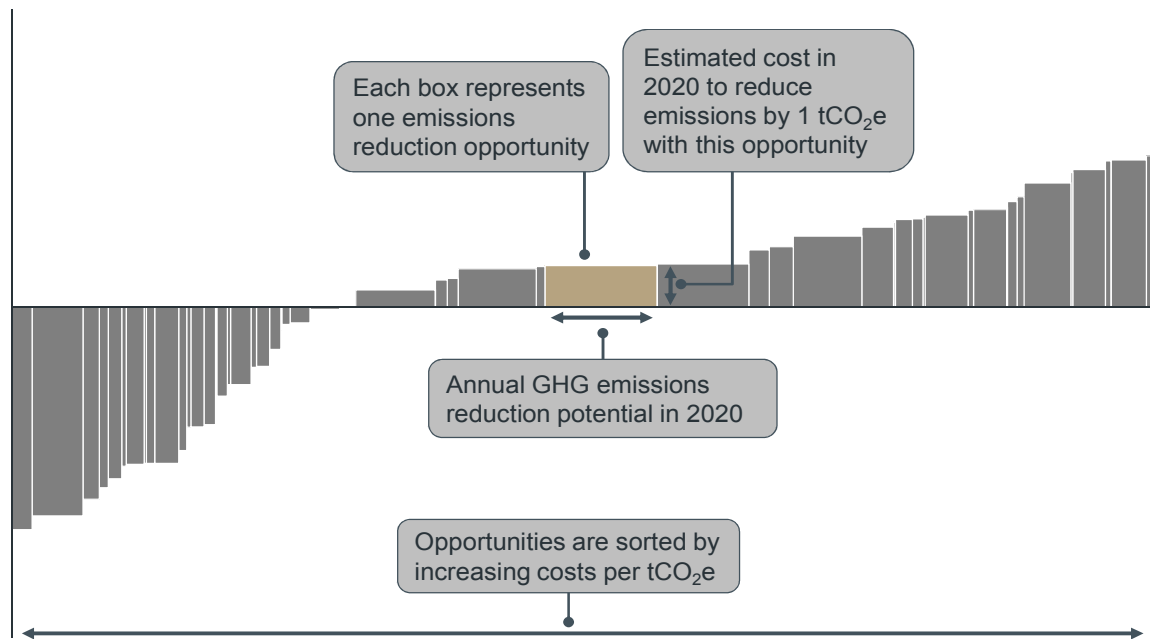
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## HOW TO READ AN EMISSIONS REDUCTION COST CURVE



### LOW CARBON GROWTH PLAN FOR GIPPSLAND

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ClimateWorks Australia  
Monash University  
Building 74, Wellington Rd, Clayton Vic 3800  
Ph: +61 3 9902 0741  
Fax: +61 3 9905 9348  
Email: [info@climateworksaustralia.org](mailto:info@climateworksaustralia.org)

For enquiries regarding the content of this Plan, please contact Meg Argyriou:  
[meg.argyriou@climateworksaustralia.org](mailto:meg.argyriou@climateworksaustralia.org)

This report, as well as the *Low Carbon Growth Plan for Australia*, the *Low Carbon Growth Plan for Greater Geelong* and the *2011 Update report* can be accessed at [www.climateworksaustralia.org](http://www.climateworksaustralia.org)



ClimateWorks Australia  
Building 74, Monash University  
Clayton Campus, Wellington Rd  
Clayton, VIC 3800, Australia  
Telephone: 61 3 9902 0741