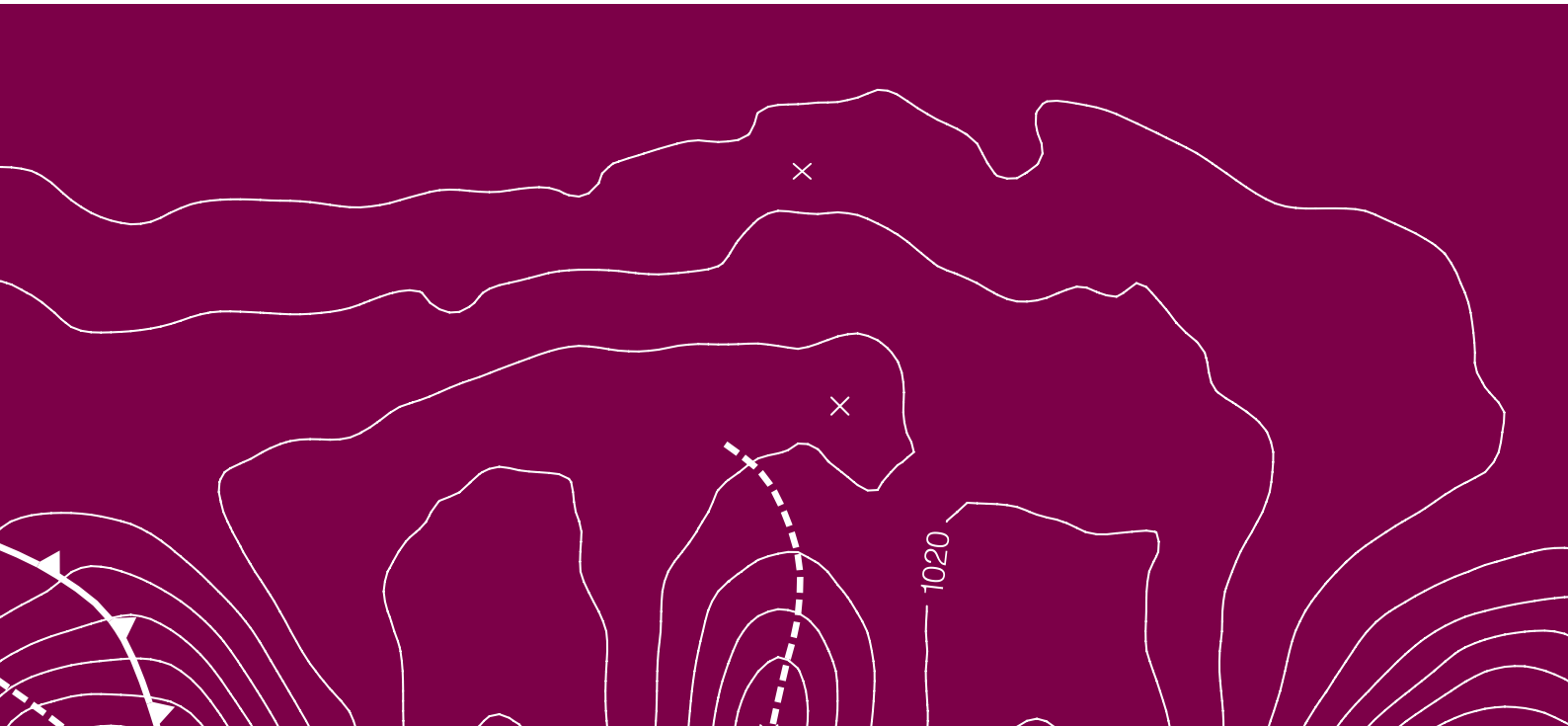
WAGA
Western Alliance for Greenhouse Action

LEADWEST
Leadership for the west

Regional Development
Regional Development Australia and Regional Development Victoria
WESTERN MELBOURNE

LOW CARBON WEST

Communities
Sector Report



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1. INTRODUCTION

Low Carbon West is a transitional strategy for the region encompassed by the municipalities in the Western Alliance for Greenhouse Action (WAGA).

This is the fastest growing region in Australia, and its councils and stakeholders are well placed to demonstrate national leadership in responding to the threat of climate change. There is an opportunity to combine continued economic growth with improved carbon productivity; that is, reducing the level of carbon emitted for each unit of output across the region. Transitioning to a low carbon economy will provide a new engine for growth, creating jobs and investment opportunities.

Low Carbon West has been developed by the Western Alliance for Greenhouse Action (WAGA) with project partners LeadWest and Regional Development Australia (RDA) Western Melbourne. AECOM and Arup were jointly commissioned as the project consultants and have the led the consultation, analysis and strategy development. Over one hundred people provided feedback and input to inform the Low Carbon West plan.

The overarching strategy establishes a vision for a Low Carbon West. It presents a current and future business as usual (BAU) emissions baseline and establishes priority actions to reduce the region's emissions against this baseline. It also sets out a clear implementation plan for identified sectors, including an approach for monitoring the success of the plan over time. It is hoped that the regional focus for Low Carbon West will facilitate collaboration and knowledge sharing between businesses, governments, and other stakeholders and act as a catalyst for direct regional and local action to reduce GHG emissions.

The strategy encompasses four sub-strategies for **business and industry, urban growth and development, transporting people and freight** and **communities**.

This sector report focuses on the role of the communities sector in this low carbon transition. Communities in this context include existing residents, their homes and actions they can take at a community level to reduce emissions. Some community actions are also covered under 'residential transport' in the transport, freight and movement sector strategy.

Section 2.0 describes the current community trends in the WAGA region, as well as the baseline and projected emissions.

Section 3.0 outlines the initiatives already underway to reduce emissions.

Section 4.0 provides an overview of the impact of proposed new actions on emissions in 2020.

Section 5.0 describes actions in detail.

Section 6.0 outlines how the sector actions can be implemented.

Section 7.0 summarises the requirements for monitoring progress towards achieving Low

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"Encouraging environmentally sustainable practices in Melbourne's west…. [while] advancing our region's liveability and supporting sustained quality lifestyle." (The Western Agenda)

2. COMMUNITIES SECTOR CONTEXT

2.1. Community trends in the WAGA region

The WAGA region is experiencing rapid growth in residential population and dwellings, with up to 180,000 new homes required by 2031. A number of suburbs in the WAGA region are amongst the fastest growing suburbs in the nation. Outside the metropolitan boundary, the City of Greater Geelong and the Shire of Moorabool both face the challenge of accommodating tens of thousands of new residents whilst upgrading regional infrastructure.

The communities of the WAGA region have direct influence on GHG emissions through energy use at home, transport patterns, and waste generation.

2.1.1 Residential buildings

The WAGA region has one of the highest rates of settlement in Australia. Between 2006 and 2011, the region's population grew by 4.3% per annum, which is around twice the Victorian average rate of population growth. Population growth is projected to grow by 20% to 1.22 million people by 2020. Figure 1 shows that the region contains some of the fastest growing municipalities in Australia. Wyndham (ranked the fastest growing) and Melton (ranked the fifth fastest growing) are in the top ten fastest growing local government areas in Australia[1].

1 ABS (2014) 3218.0 - Regional Population Growth, Australia, 2012-2013, accessible at http://www.abs.gov.au/AUSSTATS/abs@.nsf/DetailsPage/3218.02012-13?OpenDocument

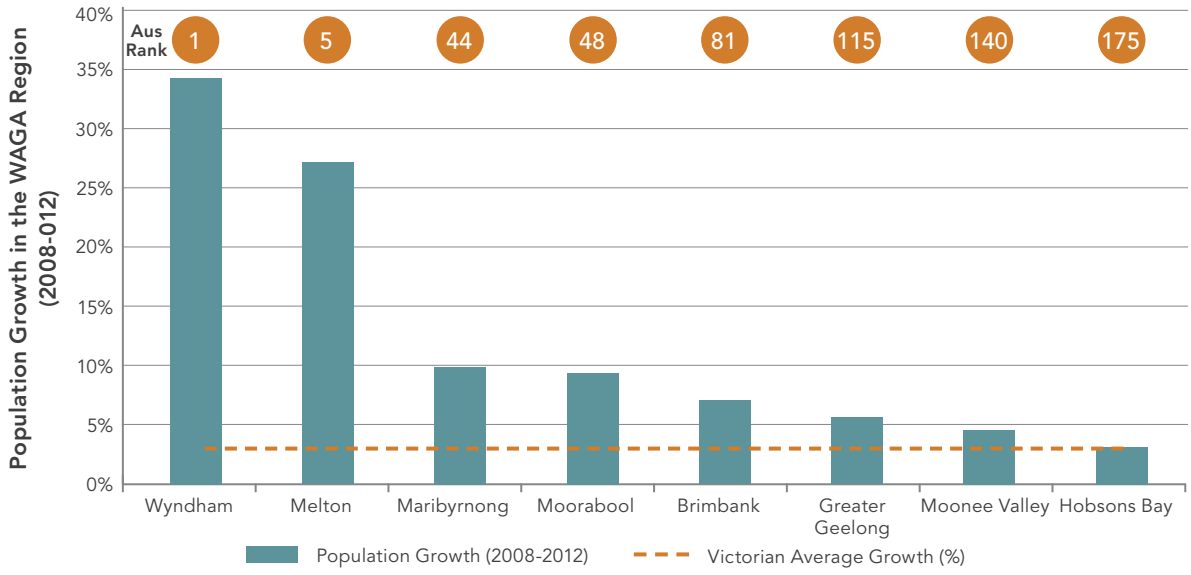

Figure 1 Population growth rates in the WAGA region, with rank of LGA by growth rates in Australia[2]

2 All local government areas with population densities below 10 persons per square kilometre have been removed from ranking

Section 2.2.1 describes a 20% increase in residential building emissions as a result of this growth. Emissions could increase further, depending on the type, quality and size of new building stock that is introduced into the region.

As shown in Figure 2, the predominant residential dwelling type is the detached house (81%). Moonee Valley and Maribyrnong have the highest proportion of high-density dwellings (apartments) at 11% and 8% respectively. Generally, larger homes require more energy per dwelling due to the increased need for space heating and cooling. Plot sizes are relatively large in the WAGA region. As shown in Figure 3, the median land consumption per dwelling (i.e. building and allotment area) is 600 square metres on average (for metropolitan councils).

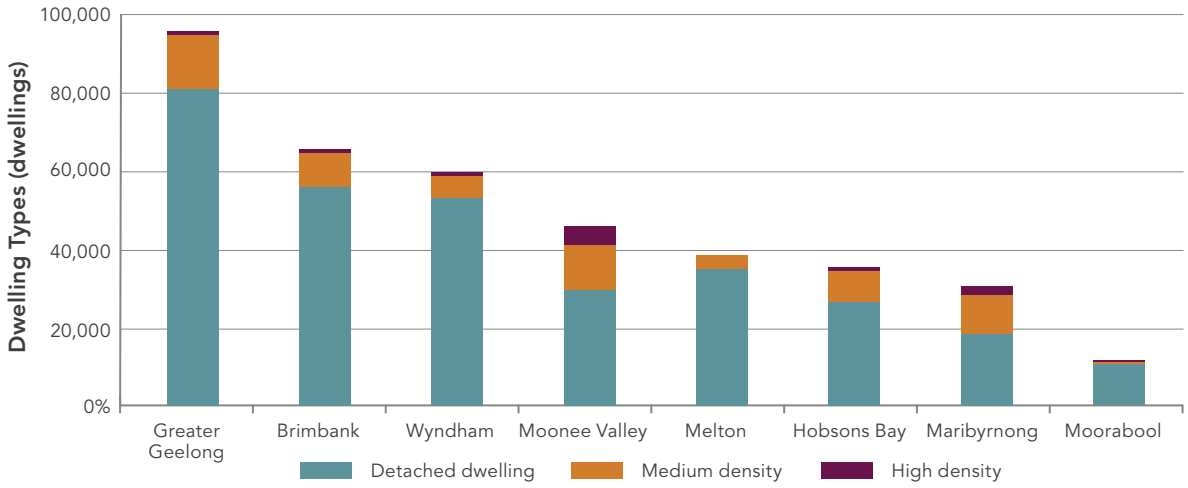

Figure 2 Dwelling types in the WAGA region, by LGA

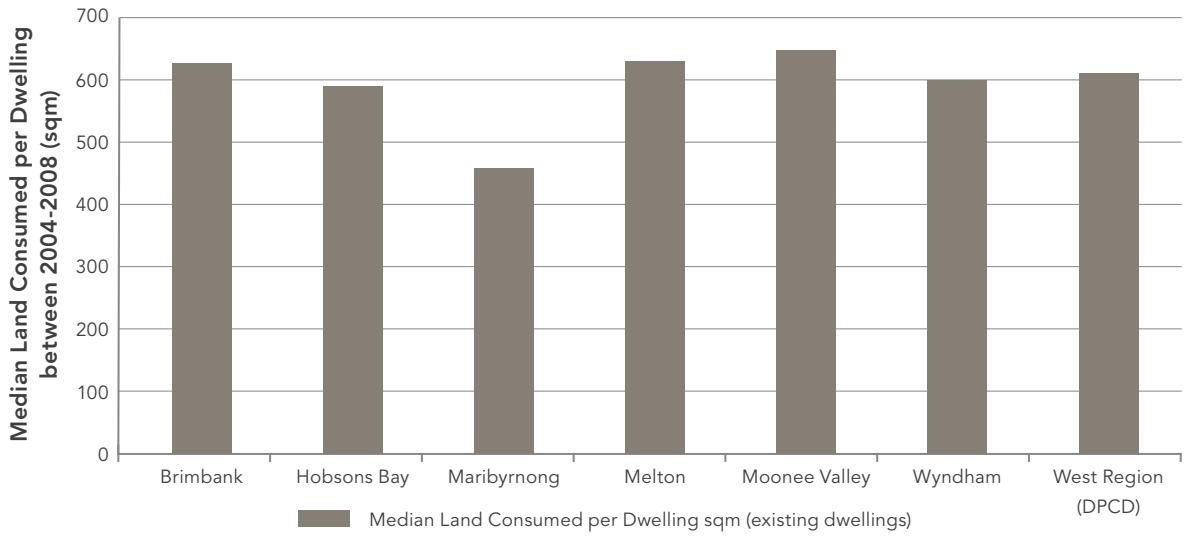

Figure 3 Median Land Consumed per Dwelling (Median 2004-2008 vs. New Dwellings 2004-2008), *Source: DTPLI (2013) Housing Development Data: 2004 to 2008, Statistical Summary Report, Metropolitan Melbourne*

Another trend of note is the amount of solar PV and hot water unit installations occurring in the WAGA region. Figure 4 indicates that the region has the highest numbers of small solar PV and hot water units per 1000 households compared to the other metropolitan regions of Melbourne. These high uptake trends may be due to the high rates of new residential dwellings, which are required to meet building standards[3], and these include solar hot water as an option.

3 Victorian Building Authority (2014) Six Star Standard, accessible at http://www.vba.vic.gov.au/consumer-resources/other/6-star-standard

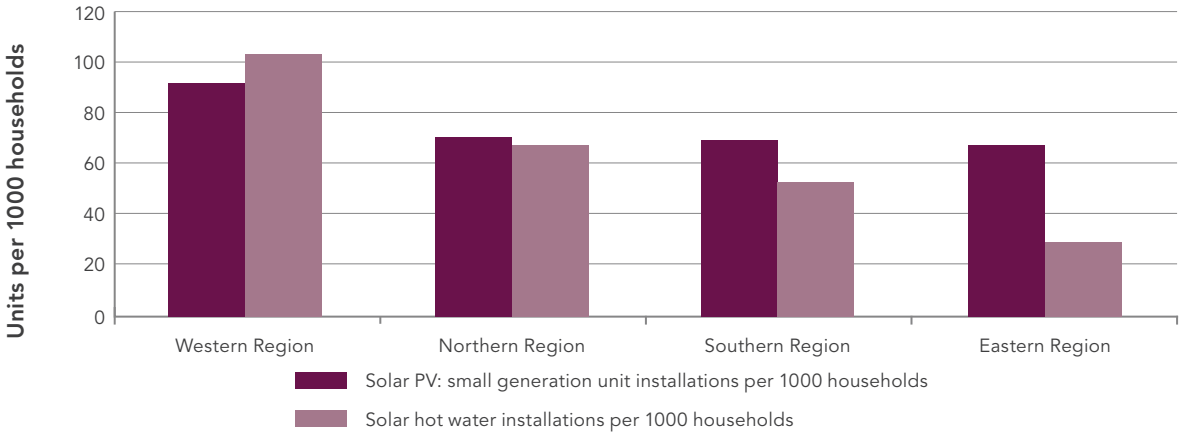

Figure 4 Solar PV and solar hot water unit installations by Melbourne Region, *Source: NORTHLink (2014) Northern Horizons – 50 Year Infrastructure Strategy for Melbourne's North*

2.1.2 Residential transport

Like many of the metropolitan areas of Melbourne, a large proportion of residential transport trips is due to travel to work. Figure 5 shows that, with the exception of Greater Geelong, on average 63% of residents work outside their home municipality.

As shown in Figure 6, a large proportion of residents rely on cars (or trucks) to travel to work. On average, 68% of residents travel to work by car, which is slightly higher than the average in Greater Melbourne (65%). This is also consistent with the high proportion of car ownership (Figure 7).

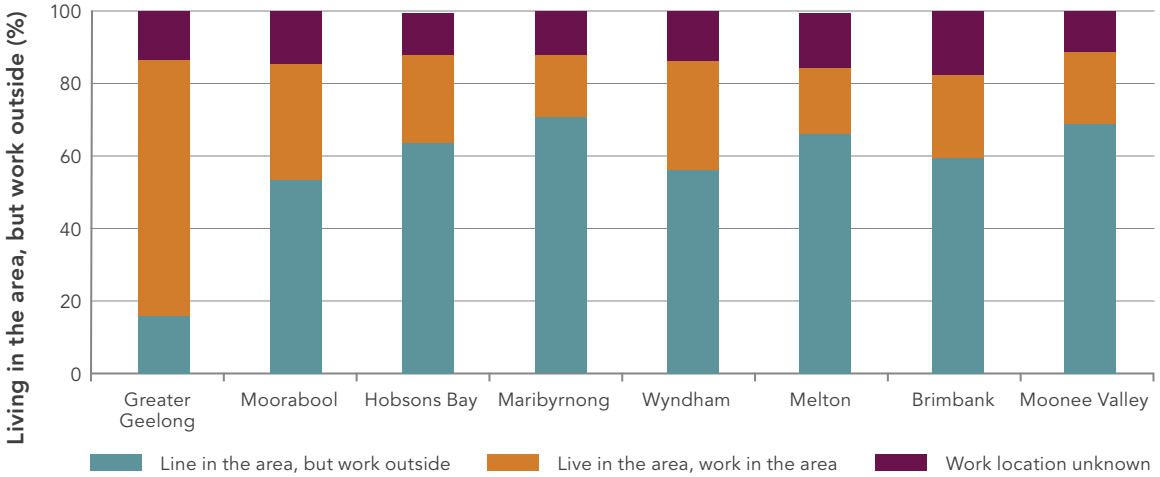

Figure 5 Worker's place of residence (living in the WAGA region), *Source: ABS (2011) Census of Population and Housing*

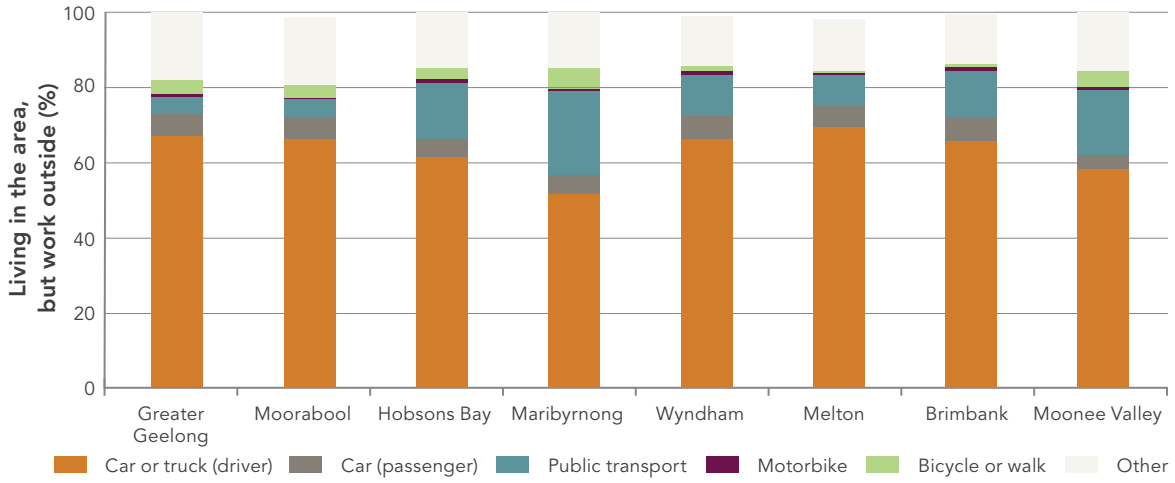

Figure 6 Method of travel to work (persons in the WAGA region), *Source: ABS (2011) Census of Population and Housing*

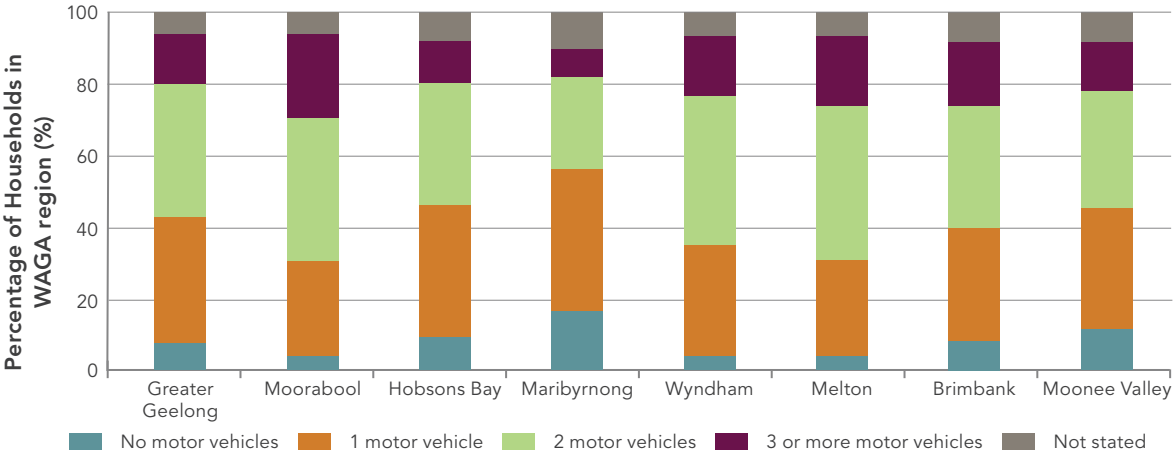

Figure 7 Car ownership in the WAGA region, *Source: ABS (2011) Census of Population and Housing*

As described in the LeadWest *Western Transport Strategy,* "The Western Region has an extensive motorway and arterial road network but the public transport network is less well developed". There are existing railway lines within the region; a number of additional stations are being constructed.

A summary of rail transport infrastructure for the region is as follows:

- Werribee railway line (15 stations) with connections via VLine to Geelong, including a new station at Williams Landing
- Williamstown railway line
- Sydenham railway line (13 stations)
- Melton railway line, including a new station at Caroline Springs
- Craigieburn railway line (15 stations), which includes a Flemington Racecourse line
- Sunbury line, including major station upgrades at West Footscray and Sunshine stations
- Regional Rail Link, including new and committed stations at Wyndham Vale and Tarneit

2.1.3 Municipal waste

As residential waste decomposes in landfills, the powerful greenhouse gas methane is released. There are a number of landfills operated by local councils in the WAGA region: Werribee (Wyndham) and Drysdale (Greater Geelong). The privately-operated Boral Western Landfill in Deer Park (Brimbank) serves a number of municipal areas in Melbourne. Waste from the WAGA region is also sent to landfills outside of the region, such as the Campbellfield and Sunbury landfills in the Hume municipality.

As population increases, so too will emissions caused from waste to landfill. Increased population puts further pressure on existing landfills, which have limited remaining capacity. These pressures lead to applications to expand landfill operations, such as those proposed for the Boral Western Landfill. In response, the Metropolitan Waste and Resource Recovery Strategic Plan (MWRRSP) for Melbourne aims to maximise the recovery of valuable resources from waste streams.

Figure 8 below provides the baseline municipal waste generation in 2012, and the projected 2020 municipal waste generation based on the projected growth in dwellings within the region.

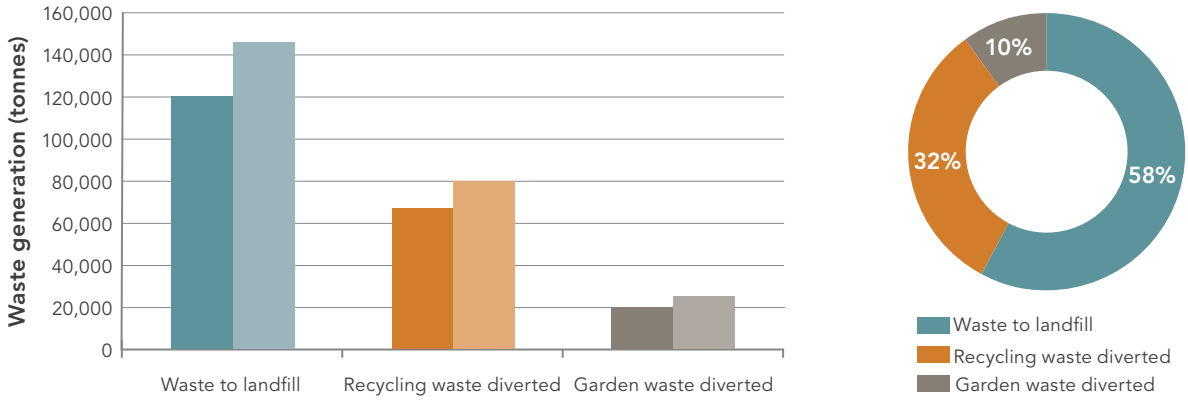

Figure 8 2012 baseline municipal waste generation and 2020 projections broken down by waste type

Waste generation is assumed to grow by approximately 20% across the WAGA region. Under 'business as usual' it is assumed that the proportion of recycling waste and garden waste being diverted will remain constant at 32% and 10%, respectively, between 2012 and 2020.

2.2. Understanding of sector emissions

The Low Carbon West Regional Emissions Baseline Report provides an overview of the baseline (2012) and projected (2020) emissions for the region and contains details on the source data and methodologies used.

The baseline report categorises the regional GHG emissions into eight categories, three of which are relevant to the Communities sector: residential buildings, residential transport and municipal waste emissions. The following section provides a summary of emissions directly related to this sector.

2.2.1 Residential buildings

Residential building emissions data has been compiled using electricity and gas consumption data provided by the electricity distribution businesses (Jemena, Powercor and SP AusNet). They include scope 1 emissions from the consumption of natural gas, and scope 2 emissions from the purchase and use of grid electricity. Figure 9 and Figure 10 provide the baseline emissions in 2012, and the projected 2020 emissions based on population growth factors in the WAGA region.

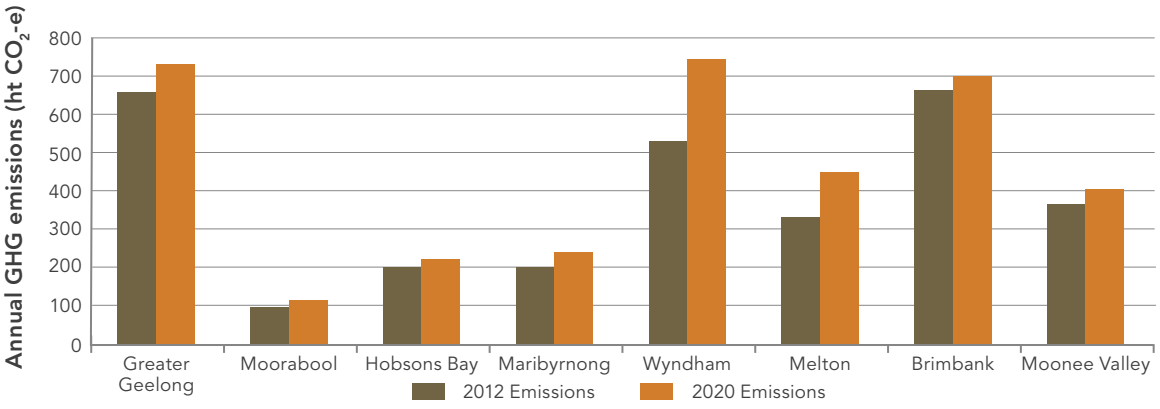

Figure 9 2012 baseline emissions and 2020 projections for each LGA within residential buildings

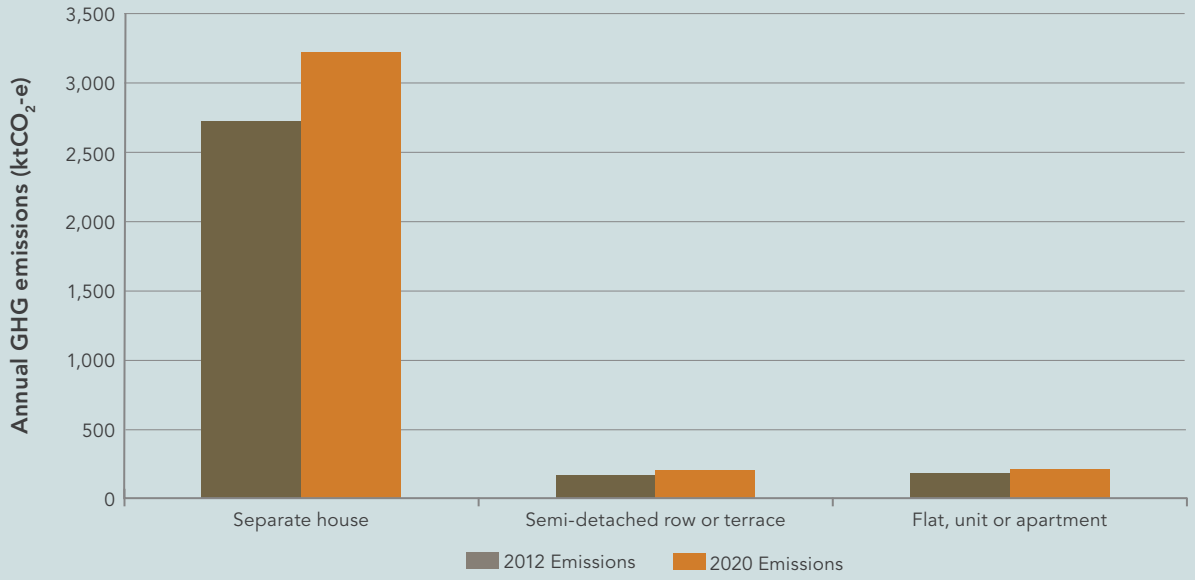

Figure 10 2012 baseline emissions and 2020 projections for residential buildings broken down by dwelling type

As shown in Figure 10, residential building emissions have also been categorised by dwelling type using household type and energy data from the Australian Bureau of Statistics (ABS). They include scope 1 emissions from the consumption of natural gas, and scope 2 emissions from the purchase and use of grid electricity. Electricity and gas consumption are assumed to grow according to growth factors by dwelling type. For example, residential building emissions from detached houses are anticipated to increase by 16% (≈ 3,200 $ktCO_2$-e per annum).

The case study opposite shows how the Armstrong Creek development aims to manage the impact of new housing stock.

CS **Case Study:** Armstrong Creek Sustainable House

The Armstrong Creek development will offer more sustainable housing choices, with the seven star Armstrong Creek Sustainable House providing residents with information on improving the sustainability of their home.

The house emphasises the benefits of sustainable building including:

- Saving money in the long term
- Reducing impact on the environment
- Improving well-being

The house showcases sustainability ideas under the key areas of energy, water, waste and garden. In terms of energy efficiency, the home features:

- A north facing building orientation
- LED down-lights
- Double glazing
- A gas boosted solar hot water system
- Evaporative air-conditioning
- Back-draft damper exhaust fans
- Motion sensors that turn lights on and off

2.2.2 Residential transport

Residential transport emissions for the WAGA region have been calculated using data from the Victorian Integrated Transport Model. The emissions are associated with all travel on networks bounded by the WAGA region. Vehicle emissions were apportioned to each local government area by population. Figure 11 provides the baseline emissions in 2012, and the projected 2020 emissions based on population growth factors in the WAGA region.

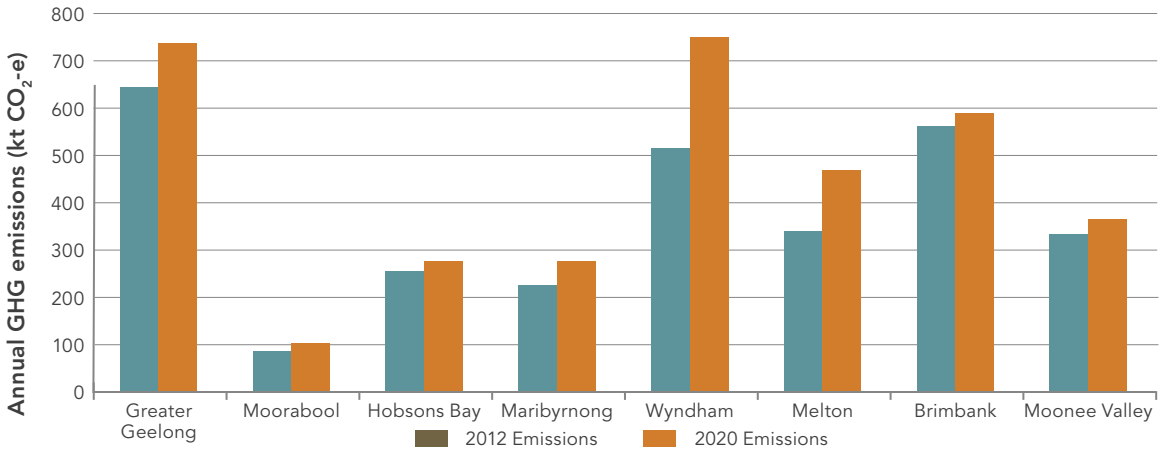

Figure 11 2012 baseline emissions and 2020 projections for each LGA within residential transport

As shown in Figure 12, residential transport emissions have been broken down by mode. An overwhelming proportion (94%) of residential transport emissions is due to car travel, highlighting the reliance on cars, as well as the relative efficiency of public transport.

Figure 12 2012 baseline emissions and 2020 projections for residential transport broken down by transport mode

Overall, residential transport emissions are projected to increase by 20% across the WAGA region by 2020 under business as usual. Emissions from cars are projected to continue growing strongly, increasing to around 3,400 ktCO_2-e per annum by 2020.

2.2.3 Municipal Waste

Municipal waste emissions have been calculated based on municipal waste sent to landfill. These emissions are accounted as scope 3 methane emissions from decomposing waste at landfills.

Figure 13 below provides the baseline emissions in 2012, and the projected 2020 emissions based on the projected growth in dwellings within the region.

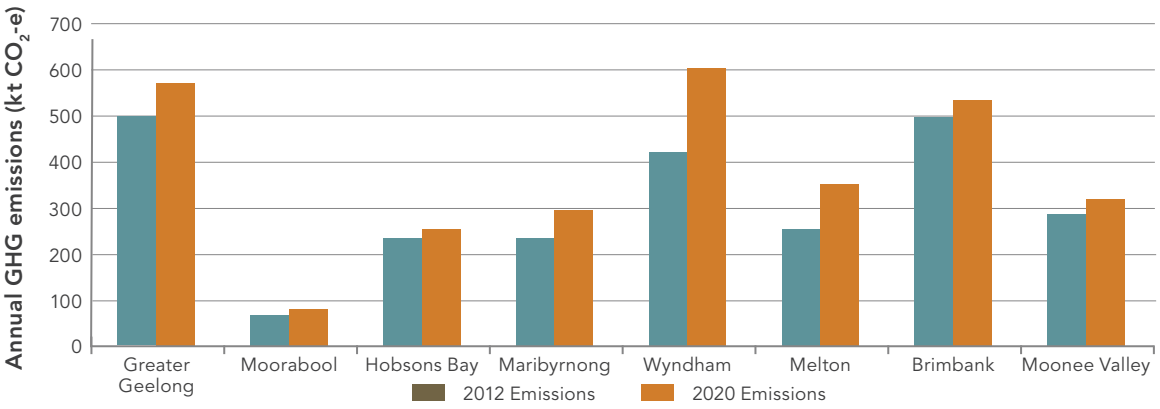

Figure 13 2012 baseline emissions and 2020 projections for each LGA from municipal waste at landfill

Emissions from municipal waste are projected to increase by 21% by 2020, if current waste generation and recycling rates are maintained. The municipalities with the largest growth in waste emissions are Wyndham and Melton, which are anticipated to increase by 43% and 39% respectively. Together, these two local government areas will increase their contribution from 27% to 32% of the WAGA region's waste emissions.

Municipal waste generation was determined by combining municipal waste data with Sustainability Victoria diversion rates. The current average waste to landfill rate for the WAGA region is 58%.

CS **Case Study:** Waste related community groups

There are a number of community groups in the WAGA region that have an interest in sustainability and minimising waste. The groups participate in and organise a range of activities including:

- Clean up days
- Tree planting events
- Clean Up Australia events
- The Smarter Living Expo in Geelong
- The provision of information on waste and recycling

Groups with an interest in waste minimisation include:

- Geelong Sustainability Group
- Clean and Green Maribyrnong
- Moorabool Environment Group

3

3. A PLATFORM FOR ACTION

3.1. Existing community sector initiatives, networks and groups

The Low Carbon West strategy builds on climate change action already underway in the WAGA region. There are a number of existing business networks, associations and programs that WAGA can draw on to drive action to reduce emissions in the communities sector. The following initiatives have particular synergies with this strategy.

Initiative type and names	Partners involved	Low Carbon West Synergies
Best practice sustainable homes		The Low Carbon West strategy encourages higher performance residential buildings. Increased energy efficiency not only reduces energy bills for the home owner, but can increase thermal comfort within the home. Currently, residential homes are required to meet a NatHERS 6 star energy rating. This mandates the installation of a solar hot water system or rainwater tank. There are a number of demonstration projects that provide inspiration for the community to improve the sustainability of their home beyond minimum requirements. These include the Armstrong Creek Sustainable House and the EcoLiving Centre for the west. In addition, Burbank's Future Collection homes achieve a minimum 7 star energy rating, demonstrating the benefits of best practice sustainable design for the community.
• Armstrong Creek Sustainable House	Greater Geelong	
• EcoLiving Centre for the west	SV,Victoria University, Brimbank	
• Burbank Future Collection 7 star energy rating homes	Burbank	
Best-practice sustainable buildings and renewable energy installations		A range of WAGA councils have demonstrated best practice sustainable design, including renewable energy installations, on their buildings. While not directly impacting on the energy efficiency of residential buildings within communities, these projects showcase what is possible and provide inspiration for residents to improve the sustainability of their own home. These case studies help advocate for more sustainable buildings, both residential and non-residential.
• Geelong Library & Heritage Centre – *registered for Green Star Public Design v1*	Greater Geelong	
• Melton Library and Learning Hub – *registered for Green Star Public Building As Built PILOT*	Melton	
• Keilor Library – 5kW solar PV	Brimbank	

Initiative type and names	Partners involved	Low Carbon West Synergies
• Kellaway Neighbourhood Centre – 39.3kWp solar PV • Civic Centre (solar hot water, solar PV, new chiller, reflective roof paint) • Clocktower (energy efficient lighting, wind turbine, solar hot water, voltage optimiser) • All child care centres, Flemington Community Centre and Essendon Traffic School are carbon neutral buildings	Moonee Valley	
• Community Centres (x3) – solar PV (1.5-5kWp)	Wyndham	
• Pavilions (x2), Community Centres (x5), senior Citizens (x1) – solar hot water • Childcare centres (x3) – solar PV (5-10kWp)	Maribyrnong	
• City Hall, National Wool Museum – 6kWp solar PV • Limeburners Point – 3kW wind turbine • Geelong ecoCHALLENGE: Renewable Energy Project - www.geelongaustralia.com.au/energy/	Greater Geelong	
• Altona Library – solar PV • Council offices – 945l solar hot water	Hobsons Bay	
Transport-focused activities		The Low Carbon West strategy encourages reduced transport emissions in the residential sector through reduced private car usage. This is achieved through the increased uptake in both carpooling and car sharing programs. Existing schemes run by Flexicar and Car Next Door can be leveraged to reduce private car usage in the WAGA region. In addition, there is a carpooling online trial operating in Eynesbury. The promotion of cycling can help reduce private car usage for short trips.
• Commercial car sharing programs	Flexicar	
• Neighbour-to-neighbour car sharing	Car Next Door	
• Eynesbury DriveShare Trial		
• Bike Clubs / Bicycle User Groups	Various	
Waste-focused activities		Communities generate significant volumes of waste. Waste produces emissions and places stress on existing waste infrastructure such as transfer stations, resource recovery centres and landfills. These are often owned or managed by council. Clean and Green Maribyrnong is an active group of volunteers coordinated by the Maribyrnong City Council. Activities include litter clean up and tree planting days. Moorabool Environment Group is a community group focused on environmental issues in the Shire of Moorabool. They are involved in activities including Clean Up Australia events. Melton Bowerbirds and Melton Freecycle™ are community groups focused on diverting materials from landfill for reuse, recycling and repurposing. In addition, there are various other environmental groups contributing to clean up, revegetation works, tree planting and weed control amongst many other initiatives. Burbank's Zero Waste Home in Melton South has demonstrated that it is possible to divert 99 % of construction waste from landfill. This has been achieved through smart design, intelligent management of logistics and cooperation from trades and suppliers.
• Clean and Green Maribyrnong • Moorabool Environment Group • Melton Bowerbirds • Melton Freecycle™ • Various Environment and Friends groups • Various Biodiversity and Environment groups	Various community groups	
• Burbank Zero Waste Home	Burbank	

CS Case Study: Car sharing programs in the west

Car sharing programs provide cars for hire by the hour to members of the schemes. Cars can be booked online and are accessed with special access cards. They can reduce the need to own a private car, with experience demonstrating that a car sharing car takes six to ten privately owned cars off the road. This reduces emissions and also relieves traffic congestion.

There are two car sharing programs operating in the WAGA region: Flexicar and Car Next Door. Currently the services are offered within the municipalities of Maribyrnong and Mooney Valley.

Flexicar is a traditional car sharing company with a fleet of cars parked in dedicated car share bays around the city. Flexicar also promotes the inclusion of share cars within new residential developments to reduce car parking requirements and provide a more sustainable transport alternative.

Car Next Door operates a neighbour-to-neighbour car sharing network. The service operates in a similar manner to traditional car sharing companies. However the vehicles are owned by other community members instead of a car sharing company.

4

4. THE ROLE OF COMMUNITIES IN TRANSITION TO A LOW CARBON ECONOMY

4.1. Business as usual

The current (2012) and projected (2020) emissions related to communities for the WAGA region are shown in Figure 14 below. These emissions make up around 36% of total emissions in 2012 and 38% of projected emissions in 2020. Total emissions are expected to increase by around 2,600 $ktCO_2$-e over this period, with emissions from the community sector increasing by approximately 1,200 $ktCO_2$-e.

These emissions are partly due to heating, lighting and powering new residential buildings. The other main source of emissions is from car use (refer to Section 2.2 for a further breakdown of emissions).

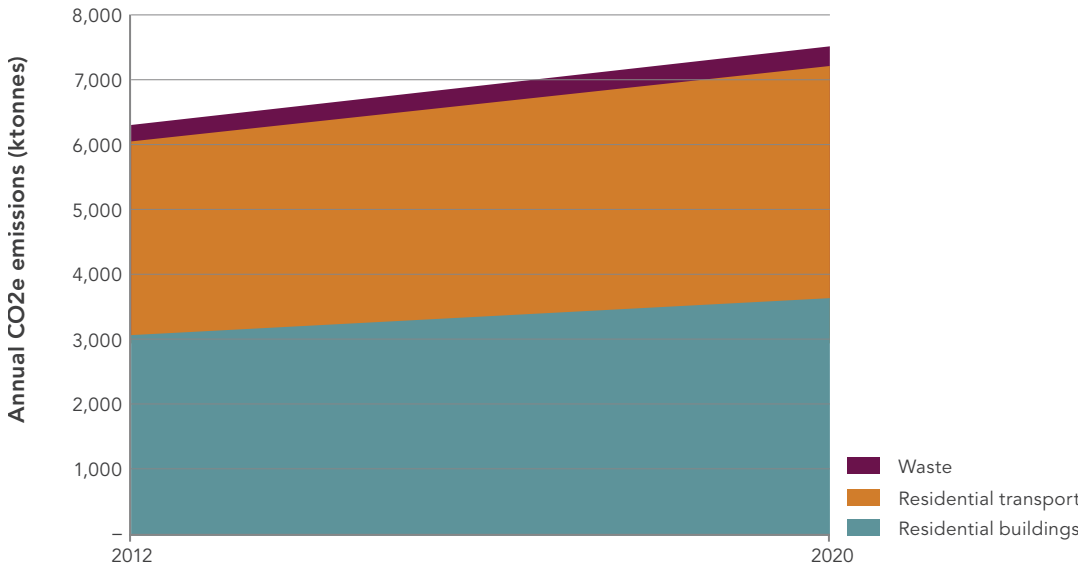

Figure 14 Communities Baseline and Projected Emissions, WAGA Region

As shown in Figure 14, population growth in the region will lead to increased communities sector emissions. Opportunities to reduce emissions from new development are discussed in the Urban Growth and Development sector report.

Currently there are around 382,000 dwellings in the WAGA region, many of these being standalone detached houses. Many of these existing homes do not operate at the same energy performance as new buildings (6-star NatHERS standard). Inefficient homes often lead to higher costs of living through high household energy bills. There is a significant opportunity to reduce the cost of living through energy retrofits for residential housing. However, access to finance for retrofits may be a barrier to household action; in 2006, 42 suburban areas within the metropolitan Western Region were below the national average of socio-economic disadvantage.[4]

4 LeadWest (2011) *The Western Agenda*, Table 34

4.2. Best case

There is a high proportion of existing homes in the WAGA region that may not be energy efficient. Recognising this, there is an opportunity to engage and support the community to retrofit houses, which offers the benefits of comfort (warmth) and lower household energy bills.

Retrofitting for improved energy efficiency includes installing energy efficient lighting, roof and wall insulation, and/or double-glazing. Other initiatives could include the generation of renewable energy through solar hot water installations and solar photovoltaic panels. The WAGA region includes municipalities that currently have the highest solar power uptake rates in Melbourne (Figure 4).

Section 2.1.2 highlights that residents within the WAGA region are highly car-dependent. As the population grows, a highly car-dependent population will face further stress from congestion on major roads. The rising cost of transport fuel also exacerbates the cost-of-living.

There is an opportunity to reduce these pressures by supporting alternative forms of transport that are not only less costly for the resident, but also reduce emissions. This may be achieved by enabling the use of public transport, or by reducing emissions from cars through sharing services or carpooling. Currently, cars travelling in the WAGA region are generally single-occupant vehicles (only an average of 5.35% of commuters are carpooling, as shown in Figure 6).

Figure 15 shows the growth in communities sector emissions. The figure also shows the contribution of each strategy action (described in Section 5.0 in this strategy) to reducing emissions. If all actions were implemented fully, this would limit the projected emissions growth by 10%. This equates to a reduction in emissions of around 120 $ktCO_2$-e.

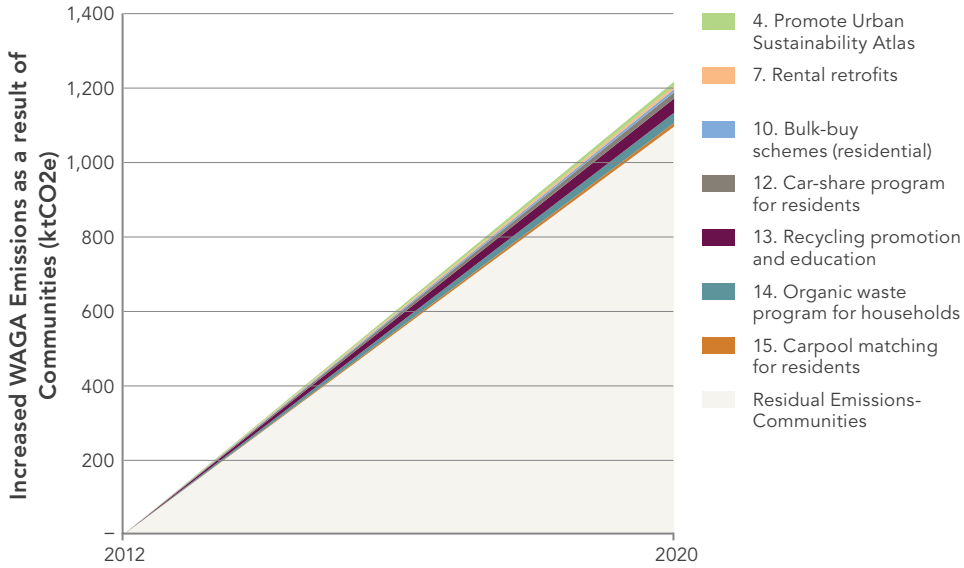

Figure 15 Actions summary for communities sector

CS **Case Study: EcoLiving centre for the west**

Students at Victoria University converted a 1950s Albion bungalow into an EcoLiving Centre for the west. The home is now a community showcase of green building design. Features of the retrofit include:

- Solar heating
- A recycled water system
- Composting toilets
- Skylights
- Water-wise gardens
- Double-glazed windows
- A storm water tank
- Insulated floors with bamboo fibres

The project serves as a practical demonstration of how members of the community can save money on water and power, reducing their costs of living while minimising their impact on the environment. In addition, the students gained valuable new renovation and sustainability retrofitting skills. These skills are not traditionally taught in their respective trades, and the students will have better job prospects as a result of working on the project.

5

5. ACTIONS THAT MAKE A DIFFERENCE

5.1. Cross sector actions

Through the development of Low Carbon West, a long list of 57 regional actions across all sectors was produced. Surveys and discussion were used to reduce this list to a shortlist of 24 actions. There are factsheets available online for each of the shortlisted 24 actions. These detail how emissions reduction and costs have been estimated and include notes from consultation sessions, such as the strengths, weaknesses, opportunities and threats for each action.

Upon further consultation, several actions were removed from the shortlist, leaving 20 key actions that form the basis of Low Carbon West. Of these, there are seven actions related to the communities sector. These 20 actions were qualitatively assessed and prioritised based on the following indicators:

- **Emissions benefit** – What is the extent of the emissions that are avoided as a result of implementation?
- **Cost effectiveness** – What is the financial investment required to achieve the emission reductions?
- **Co-benefits** – Does implementing the action lead to benefits beyond emissions reductions, such as the creation of local jobs or local economic growth?
- **Speed of implementation** – How quickly can the actions be implemented and completed, particularly before 2020?
- **Business or stakeholder support** – How supportive would businesses and other key stakeholders be in progressing the action?
- **Leadership or innovation** – Does the action help the WAGA region become a leader or show innovation in the sector?
- **Ease of implementation** – How great are the barriers to implementation of the action?

The prioritised actions related to the communities sector are summarised below, and described in detail in Section 5.2. The RA number of each action refers to their priority ranking among the twenty shortlisted actions.

RA#	Actions – Communities	Brief description	Emissions benefit (ktCO2-e)	Focus	Emissions benefit	Cost effectiveness	Co-benefits	Speed of implementation	Business or stakeholder support	Leadership or innovation	Ease of implementation
4	Promote Urban Sustainability Atlas	Promote sustainability measures to the community through the Urban Sustainability Atlas, particularly for new buildings to identify opportunities for solar PV installations at a proposed location	12.6	Residential buildings	M	H	H	M	H	H	H
7	Rental retrofits	Work with real estate agents to make properties more sustainable through retrofits	7.7	Residential buildings	M	H	H	H	M	M	H
10	Bulk-buy schemes (residential)	Create bulk-buy schemes for energy efficient and renewable technology, such as PV, solar hot water and efficient lighting to reduce the capital cost for individual consumers.	8.3	Residential buildings	M	H	H	H	M	M	M
12	Car-share program for residents	Implement a car-share program, with the potential for either electric or fuel-efficient vehicles.	16.7	Residential transport	M	M	H	H	H	M	M
13	Recycling promotion and education	Run recycling promotion and education programs, to consolidate and build upon current programs	38.4	Waste	M	M	H	M	M	M	M
14	Organic waste program for households	Implement organic waste diversion and compost distribution back to households	27.3	Waste	M	M	H	M	M	M	M
15	Carpool matching for residents	Implement a carpool matching program for residents, either online or via development of an app	10.0	Residential transport	M	M	H	M	M	M	M

H High M Medium L Low

5.2. Detailing the actions

RA 4

Promote Urban Sustainability Atlas

Specific

The Urban Sustainability Atlas is a tool that provides an assessment of the potential for rooftop solar energy generation and rainwater capture from the rooftops of selected buildings. Although the Atlas is currently not publicly available, work is being undertaken to launch the tool for use.

The Atlas can be used by residents in the WAGA region to quickly assess the financial and environmental benefits of installing solar PV and solar hot water, customised to the resident's location. A resident's decision to invest in renewable technology can be informed by the balance between the ongoing savings and capital costs.

Promotion of the Atlas is expected to result in an increase in the uptake of solar PV and solar hot water installations. This can be focused also on potential house buyers or home builders in the region.

Benefits

Emissions benefit has been estimated at **12.6 ktCO2-e** against the 2020 baseline. This represents a **0.06%** saving across the WAGA region. Other benefits would include the increased uptake of solar PV and solar hot water, growth in 'green' jobs and engagement of the community with sustainability.

Attainable

This action already has buy-in and investment from the WAGA councils, and there has been interest from other regions. The Atlas could act as an enabler for other programs and also provides the opportunity for community engagement and education. It should be noted, however, that the Atlas is useful in providing information to the industry and to the community, but it may not be the primary source of consumer decisions. The Atlas should be used in conjunction with other actions (such as bulk-buy schemes and planning scheme amendments) to encourage uptake of solar PV. The novel nature of this action gives it a high rating for innovation. In addition, it is considered to have a high level of cost effectiveness as the costs are mainly in development and administration of the tool.

Scoping

The current scope of the Urban Sustainability Atlas is limited to solar PV, solar hot water and rainwater harvesting. The greatest potential for the Low Carbon West Strategy is in solar PV. There is potential to connect this action with community programs to capture households who may not otherwise consider investing (e.g. women's groups, culturally and linguistically diverse (CALD) groups).

Collaboration

There are opportunities for partnerships and collaboration with developers, community programs for households, electricity/gas distributors, state government and other LGAs.

WAGA and the City of Port Phillip are the current custodians of the Urban Sustainability Atlas, and the program was initiated by the Victorian Department of Environment and Primary Industries. The project partners are currently undergoing a twelve-month pilot phase to test the costs and benefits of post-trial use of the Atlas in its current form. The development of the Atlas can progress in parallel with implementation of the Low Carbon West strategy.

Potential Ownership

- WAGA – potential lead, managing the Atlas and disseminating information
- Councils (within region) – potential funders
- Councils (outside region) – potential funders and expansion of tool and resources
- Business – support and links directly to manufacturers

Timing

- Confirm decision to publicly release Atlas in 2015
- Identify opportunities to promote Low Carbon West through Atlas in 2015
- Review points every three months
- Medium speed of implementation

RA 7

Rental retrofits

Specific

A significant proportion of emissions in the residential buildings sector are from rental properties. Across Australia, around one quarter of households live in a rental property. This creates a barrier for sustainable technology investment because the party who is responsible for the capital outlay (the owner) is separate from the party who benefits directly from the investment (the tenant).

This action would focus on promoting the benefits of sustainable technology investment to real estate agents and owners, with a focus on lighting upgrades to reduce electricity consumption. Implementation of this action would be linked to a broader bulk-buy scheme in the region. It is assumed that 10% of rental properties in the region would install efficient lighting.

Benefits

Emissions benefit has been estimated at **7.7 ktCO2-e** against the 2020 baseline. This represents a **0.04%** saving across the WAGA region. Other benefits would include growth in 'green' jobs, reduced energy costs to tenants, increased marketability of properties and engagement of the community with sustainability.

Attainable

This action has the potential to create a sustainable, competitive market for energy efficient rental properties. Also, there is potential to utilise existing NABERS Home / NatHERS tools to minimise implementation costs. However, barriers such as the split incentive and upfront capital cost for owners must be addressed for this action to be implemented at scale. The initial costs for this action are largely administrative, and efficiency upgrades generally have short payback periods. As such, this action is considered to have a high level of cost efficiency. This action is considered to have a medium level of innovation.

Scoping

This action is limited to rental households. It is anticipated that enthusiasm would vary across different real estate agents and owners. The action should initially focus on the most enthusiastic participants to build momentum and demonstrate success. This has potential to be expanded in the form of a special rate charge similar to that of the Solar Saver scheme implemented by Darebin City Council. A no-interest loan to purchase solar PV, to be provided by the council, would be repaid via a special rate charge tied to the home.

Collaboration

There is potential for collaboration with the Northern Alliance for Greenhouse Action (NAGA), which is currently conducting a study to work with real estate agents on upgrading rental properties, funded by the Victorian Adaptation and Sustainability Partnership.

In addition, a number of energy rating systems exist for residential properties that could be utilised by owners to gain a market advantage over other properties. This could operate in a similar way that the NABERS Energy rating has been used to gain competitive advantage for offices in the commercial sector. These include NABERS Home (detached houses only) and NatHERS. If marketed correctly, these tools could influence the way in which renters select their homes by including energy efficiency in their criteria.

Potential Ownership

- WAGA – potential lead
- Councils – implementation of program
- Real estate companies

Timing

- Decision to proceed by mid-2015
- Review points every six months
- High speed of implementation

RA 10 Bulk-buy schemes (residential)

Specific

A program to drive energy efficient retrofit for residential buildings (such as efficient lighting) and installation of renewable energy such as solar hot water and solar PV. This would be undertaken through improved procurement and delivery efficiency (bulk-buy). Creating a bulk-buy scheme for sustainable technologies across the region will reduce the capital cost of installing the technology for individual consumers. This action focuses on installing solar PV panels and efficient lighting upgrades, but could be extended to include home battery storage systems once upfront capital costs fall sufficiently.

Benefits

Emissions benefit has been estimated at **8.3 ktCO2-e** against the 2020 baseline. This represents a **0.04%** saving across the WAGA region.

Other benefits would include growth in 'green' jobs, reduced energy costs to residents, reduced peak grid electricity demand and engagement of the community with sustainability.

Attainable

This action would engage the community and raise awareness around environmental and social benefits. It has the potential to provided resilience against energy price increases. However, if energy prices decline, the savings of the program could diminish. In addition, there would need to be significant discounts compared to a commercial scheme. In the past, the rapid decline in cost of PV systems has rendered bulk-buy schemes ineffective (due to the time lag of the tender process). This issue must be addressed if this action is to be successful.

It should be noted that if Clean Energy Finance Corporation (CEFC) funding becomes available (as is currently being considered by Melbourne's regional alliances), solar PV could potentially be offered with no upfront costs to eligible households, which would significantly encourage uptake.

The initial costs for this action are largely administrative, and efficiency upgrades generally have short payback periods. As such, this action is considered to have a high level of cost efficiency. This action is considered to have a medium level of innovation.

Scoping

Bulk-buy schemes will require significant direct engagement with potential customers and in the past have delivered lower than expected uptake. Limited success has been shown in Hobsons Bay and Moonee Valley. WAGA should consider lessons learned from earlier regional bulk-buy programs before progressing with this action. A scoping study should be undertaken to estimate the likely resource requirements and costs to administer such a program and to consider the effort required to re-build the reputation of bulk-buy following previous projects in the region that have experienced limited success.

Collaboration

There are potential opportunities for partnerships and collaboration with GBCA Communities, developers (e.g. Australand or Villawood), the Centre for Urban Research at RMIT University, and Deakin University (for research).

A number of bulk-buy schemes have been implemented in the past within the region, including Sustainable Suburbs in the West (all WAGA councils except Greater Geelong) and Eco Home Makeover (Brimbank, Maribyrnong and Moonee Valley). Over two years, the Sustainable Suburbs program realised emissions reductions of 1,100 tCO2-e over seven councils.

Experience from these programs demonstrated that the bulk-buy model does provide an incentive for residents to purchase sustainable technology. However, it was found that the uptake of the programs was below projections. Only 1,000 households were retrofitted as part of Sustainable Suburbs, compared with the program's target of 18,000 households. This issue would need to be addressed if the action is incorporated into the Low Carbon West strategy.

Potential Ownership

- WAGA – potential lead
- Councils – implementation of scheme
- Business – support and links directly to manufacturers

Timing

- Decision to proceed by mid-2015
- Review points every six months
- High speed of implementation

RA 12

Car-share program for residents

Specific

The implementation of a car-share scheme in the region may result in reduced car ownership and reduced emissions through a mode shift to other, more sustainable transport modes. Results from a survey of members of the GoGet car share scheme showed that members are more likely to use other transport modes due to greater convenience for selected trips. Although the population in the WAGA region currently displays a high dependency on cars, a car-share scheme may encourage residents in higher density areas to use alternative transport for shorter trips. Emissions reductions can also be achieved by selecting electric or fuel-efficient cars for the car-share scheme.

Benefits

The consultant team has assumed that 12,000 residents (1% of the population) will sign up to a car-share scheme, that each car will have ten members and for each of these members, the distance travelled will decrease by 2.5% and be less emissions-intensive due to more fuel efficient cars being specified for the carshare scheme. Assumptions were based on a range of sources including Shaheen & Cohen 2013, Carsharing and Personal Vehicle Services and SGS City of Sydney Car Share appraisal. Based on these assumptions savings of **16.7 ktCO2-e** can be achieved compared with the 2020 baseline, which represents **0.08%** saving across the WAGA region. Other benefits would include reduced congestion and parking demand, reduced pollution and increased community interaction and engagement with sustainability.

Attainable

This action should be reasonably attainable and can largely be provided by the private sector, provided the business case is robust. It should be noted that through consultation both Greater Geelong and Wyndham questioned whether there would be sufficient demand given the low population densities in these municipalities. There are costs to initiate, promote and maintain the program as well as to construct the car-share infrastructure, such as parking designation, signage and installation of electric charging points (if using electric vehicles). Costs of $1.2 million for infrastructure (paid by car share provider) are typical based on $1000 per car spot for a population (uptake) of approximately 12,000 people. (SGS, City of Sydney Car Share Appraisal). The private sector providers typically deal with their own administration and factor these costs into their business case test. Councils can show leadership by foregoing parking fees for cars belonging to a car-share company. Overall this action is considered to demonstrate a medium level of leadership.

Scoping

The public sector should not have to do much to scope car-share schemes in the region as providers tend to do this work themselves. The business case can be supported through commitments to advocacy and promotion by local governments and agencies.

Collaboration

A number of councils in the region have existing car-share infrastructure managed by providers such as Flexicar. This includes Maribyrnong and Moonee Valley. There is an opportunity to expand the existing schemes to other LGAs and develop a consistent approach to promoting and maintaining the schemes across the region. The regional co-benefits of this action provide opportunity to pool funding from councils outside the WAGA region.

Potential Ownership

- Private sector providers
- Advocacy and promotion by local government and transport groups

Timing

- Conversations with providers can be initiated immediately
- Progress should be tracked and reported through WAGA executive meetings
- High speed of implementation

RA 13 Recycling promotion and education

Specific

The decomposition of waste sent to landfill (particularly organic waste, paper and cardboard) emits methane gas to the atmosphere over a long period of time. Methane is a greenhouse gas with 21 times the warming potential of carbon dioxide, and the gases from decomposing waste have an effect on the atmosphere for several decades after waste is initially sent to the landfill.

The diversion of recyclable waste, such as paper and cardboard, from landfill will reduce emissions from decomposing waste. Under this action, a program would be implemented to better educate residents on recycling practices and the associated benefits, and encourage residents to recycle more.

Benefits

Emissions benefit has been estimated at **38.4 ktCO2-e** against the 2020 baseline. This represents a **0.2%** saving across the WAGA region.

Other benefits would include reduction in waste sent to landfill, reduced requirements for virgin materials due to increased availability of recycled materials and increased engagement of the community with sustainability.

Attainable

Current state government policies support the increase of council waste to landfill diversion rates. In addition, there are significant financial benefits from diverting waste to landfill (rebate for recycling, and reduced costs from high landfill levies and fees). This action is considered to have a medium level of cost effectiveness.

All councils in the region have existing recycling education programs. Most councils reference the Victorian Government's Get It Right On Bin Night initiative. As such, this action is considered to have a medium level of innovation.

It should be noted that there is a growing public interest in landfill expansions or developments. In May 2014 [5], Melton City Council initially rejected Boral's application to expand landfill operations in Deer Park. However, a lack of existing recycling and reprocessing infrastructure may limit this action.

Scoping

This action should be considered as part of an overall resource recovery action for the region. WAGA councils may collaborate to implement a coordinated approach for waste recycling and recovery. This may begin with the establishment of three bin systems, including the reduction of landfill bin sizes. Linkages with waste-to-energy should also be considered.

Collaboration

There are opportunities for partnerships and collaboration with Sustainability Victoria, EPA Victoria, existing council facilities (sharing of information, resources and facility capacity) and existing waste processing businesses. In addition, potential synergies should be explored with the State and Metropolitan Waste and Resource Recovery Strategic Plans.

There are also opportunities to draw on existing community groups, such as the Clean and Green Maribyrnong and Moorabool Environment Group, which are associated with Clean Up Australia events and activities.

Potential Ownership

- Councils – potential lead
- WAGA and MWRRG – collaboration / support
- Existing community groups that focus on improved waste management
- Existing landfills or resource recovery facilities within the region

Timing

- Decision to proceed by mid-2015
- Consult on project brief
- Review points every three months
- Medium speed of implementation

5 Melton City Council (May 2014) Council rejects Boral application to expand landfill operations, accessed at www.melton.vic.gov.au/Home/News/Council_rejects_Boral_application_to_expand_landfill_operations

RA 14

Organic waste program for households

Specific

The decomposition of waste sent to landfill (particularly organic waste, paper and cardboard) emits greenhouse gases to the atmosphere over several decades. The majority of cCouncils within the WAGA region already have voluntary green waste collection, where garden waste is composted and used in agriculture and public parks.

This action focuses on increasing the rate of green waste collection and possibly providing residents with the opportunity to purchase compost for household use. The analysis assumes a green waste diversion target of 20% (measured as the proportion of green waste compared with the sum of garbage sent to landfill, recycling and green waste). Note that this action only includes garden waste, and excludes food waste.

Benefits

Emissions benefit has been estimated at **27.3 ktCO2-e** against the 2020 baseline. This represents a **0.1%** saving across the WAGA region. Other benefits would include additional jobs for collecting and processing waste and a reduction in waste sent to landfill. This could lead to financial savings from avoided landfill levies and the avoided cost of developing expensive new landfills for the WAGA region (which is already facing capacity constraints).

These programs can also be used to increase community engagement with sustainability, and be linked with existing community programs (particularly those related to Clean Up Australia).

Attainable

Infrastructure currently exists to enable the implementation of this action (i.e. Veolia processing plant). There is precedent in that Geelong already has in place a three bin system that separates organics at the household or business. This program separates approximately 35 tonnes of organic waste per year. Furthermore, the majority of the councils in WAGA participate in the Back to Earth Victoria initiative. As such, this action is considered to have a medium level of innovation.

In municipalities outside the WAGA region, communities already have reduced size landfill bins and access to subsidised organic composting equipment. This action is considered to have a medium level of cost effectiveness.

Scoping

This action should be considered as part of an overall resource recovery action for the region. WAGA councils may collaborate to implement a coordinated approach for organic waste diversion and recovery. This may begin with the establishment of three bin systems, including the reduction of landfill bin sizes. Linkages with waste-to-energy should also be considered.

Collaboration

- Green waste collected from the councils is sent to a processing facility in Bulla, which uses composting technology to process organic waste. This action assumes that the councils will continue to use this facility.
- In addition, potential synergies should be explored with the State and Metropolitan Waste and Resource Recovery Strategic Plans.
- There are also opportunities to draw on existing community groups, such as the Clean and Green Maribyrnong and Moorabool Environment Group, which are associated with Clean Up Australia events and activities.

Potential Ownership

- Councils – potential lead and to implement policy changes
- WAGA and MWRRG – collaboration / support
- Existing community groups that focus on improved waste management
- Existing landfills or resource recovery facilities within the region

Timing

- Decision to proceed by mid-2015.
- Consult on project brief
- Review points every three months
- Medium speed of implementation

RA 15

Carpool matching for residents

Specific

A carpool program allows residents with similar trip origins, destinations and travel times to share the driving burden. This increase in average vehicle occupancy results in a decrease in the overall vehicle kilometres travelled within the region. The program would be most effective between high density residential zones and work destinations, where people generally have similar working hours. The consultant team assumed that 2,000 residents (0.2% of the population) across the region would participate in the carpooling program, each of whom would be matched with one other resident to carpool on a regular basis.

Benefits

Based on the assumptions made by the consultant team this action would give rise to an emissions saving of **10 ktCO2-e** compared with the 2020 baseline. This is a **0.05%** saving across the WAGA region. Other benefits will include: reduced congestion, reduced pollution from private vehicles, reduced demand for road infrastructure and parking facilities, and increased community interaction and engagement with sustainability.

Attainable

It has been estimated that a car share program might be able to be catalysed for around $50,000 based on existing frameworks and application (apps). The primary cost will be associated with implementing and managing the program, including community promotions and administration of carpooling participants. A number of existing carpooling programs and apps can be utilised, removing the requirement for WAGA councils to develop the systems and methodology from scratch. Depending on the form of the program, it may require some administration. This may not be a full time role; it could be equivalent to a person a day or two a week to support publicity and deal with enquiries. As such, this action is considered to have a medium level of cost effectiveness. Overall, this action is considered to demonstrate a medium level of leadership.

Scoping

Further scoping would be required to develop and implement this program. Specifically some market testing and estimation of costs will be required. As part of this scoping WAGA could consult with the Victorian Department of Transport on the previous TravelSmart experience, which included a carpooling program to facilitate carpooling in communities across the state. ABS Journey to Work data can be used to assess feasibility of this scheme. Councils (including Melton and Hobsons Bay) have experience in managing their own internal schemes.

Collaboration

Successful implementation of this action requires a high level of support from community and business stakeholders that may not currently exist in the region. However, once the program is implemented and its benefits are communicated effectively, there is potential for the program to become highly successful through collaboration with existing community groups and businesses.

- Community centres / sports clubs etc.
- Potential collaboration with the Eynesbury DriveShare Trial
- Internet sites for new estates / real estate agents
- If the carpool program is successful, there is the potential to extend the program to cover more than one mode (i.e. incorporate carpooling, cycling, public transport etc. into the same program)
- Potential to tie in with NBN roll-out and associated funding. Increased internet accessibility can improve the functionality of any online tools used to facilitate the carpool program

Potential Ownership

- WAGA
- Councils (lead by example)
- Business and private enterprise

Timing

- Scoping / discussion to commence immediately
- Decision to proceed by mid-2015.
- Review points every 6 months
- High speed of implementation

6. A PLAN FOR IMPLEMENTATION

The Low Carbon West strategy sets seven actions in the communities sector to limit the increase in GHG emissions as the WAGA region grows.

These actions can be coordinated through the following three programs:

1. Supporting building retrofits and installations
2. Providing education for waste diversion from landfill
3. Equipping drivers with information to make sustainable choices

Each of these programs will require a separate implementation plan detailing the agreed program components (initiatives or projects), program objectives, partners, advocacy approaches, funding requirements, milestones and steps for program monitoring and review.

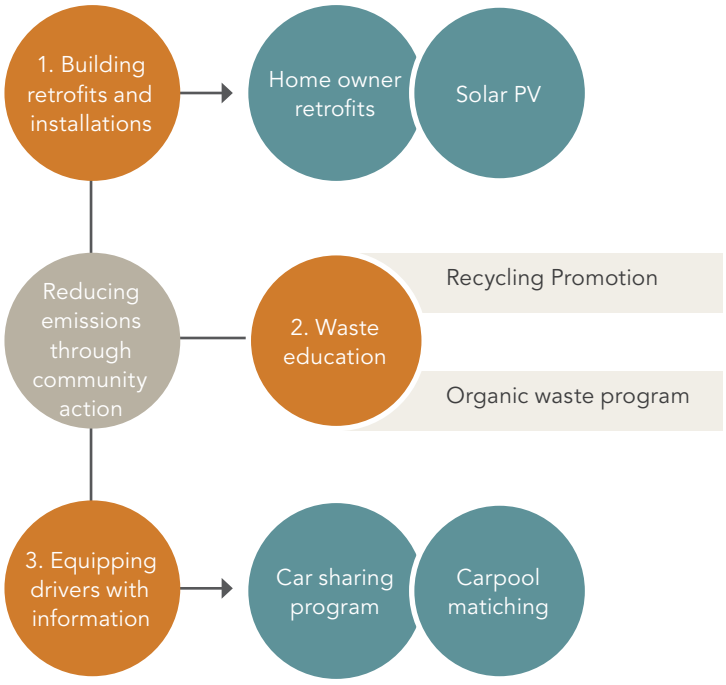

Figure 16 Figure 16: Potential elements of a program focusing on carbon emission reductions in communities

In addition, local community and environment groups could be engaged to help support the implementation of the community related actions, especially to assist with advocacy related actions. A 'Friends of WAGA' or 'Friends of Low Carbon West' group could be created to this end.

An outline implementation plan for each of the three programs is included below.

Program 1: Supporting building integrated actions			
Program objectives	*Publicly release Urban Sustainability Atlas*	Implement rental retrofits program to improve the sustainability of rental properties	Implement bulk-buy scheme for residential buildings
	Work towards delivering **29 ktCO2-e** emissions savings per year, against the current emissions baseline		
Program audience	Community groups, existing and prospective residents	Real estate agents, property owners, community groups and individual residents	Solar PV suppliers, community groups, individual residents
Program elements / initiatives	1. Further development and consultation 2. Publicly release the Urban Sustainability Atlas 3. Link with bulk-buy scheme for non-residential buildings (solar PV)	1. Undertake research regarding likely buy-in from real estate agents and property owners 2. Target key real estate agents and property owners 3. Develop coordinated approach to promote retrofitted rental properties to prospective tenants 4. Implement program regionally	1. Conduct scoping study to estimate the likely resource requirements and costs to administer program 2. Conduct market research into community interest in bulk-purchase of solar panels 3. Seek funding opportunities (e.g. CEFC) 4. Identify suitable suppliers within municipalities 5. Coordinate and implement regional (or local municipal) bulk-buy schemes
The role of WAGA	Lead facilitator, co-ordination, manage council collaboration	Program coordination, manage council collaboration	Program co-ordination, manage council collaboration
Key partners	WAGA, Urban Sustainability Atlas council members	WAGA, local councils, real estate agents and property owners	Local councils, NAGA, EAGA, MEFL, EFL, Rotary, RMIT University, Deakin University
The role of key partners	Refine the tool and support the public release of the tool	Promote and implement retrofits of residential properties, highlighting the reduced living costs	Work with local suppliers and community groups to develop scheme
Timeline	• Launch Atlas late 2014 • Report six monthly	• Undertake research and make initial contact with real estate agents and owners in 2014-2015 • Launch program in 2015	• Investigate options for bulk-buy and conduct market research • Launch program in 2015
Program funding and resourcing	• Designated council or WAGA resource (approximately one EFT position) to manage Atlas • Potential funding from CEFC	• Designated council or WAGA resource (approximately one EFT position) to manage interested real estate agents and owners, and to promote the program	• Designated council or WAGA resource (approximately one EFT position) to engage interested community groups and residents

Program 2: Enhancing waste diversion programs	
Program objectives	• Implement waste diversion programs (recycling and organic waste) across all municipalities within the WAGA region • Work towards delivering **66 $ktCO_2$-e** emissions savings per year, against the current emissions baseline
Program audience	Community
Program elements / initiatives	1. Review current recycling and organic waste diversion rates in community 2. Set regional targets for waste diversion opportunities 3. Investigate options to divert organic waste streams and liaise with councils that have successfully implemented such programs 4. Design recycling and organic waste diversion education programs 5. Implement regional program for community
The role of WAGA	Program initiation
Key partners	All local councils within region, Metropolitan Waste and Resource Recovery Group (MWRRG) established waste-related community groups
The role of key partners	Ongoing program coordination and management, research on current diversion rates, extension of community engagement programs, partnering with established community groups
Timeline	• Investigate options for waste diversion programs by January 2015, reviewing the initiatives undertaken by other councils. • Engage in waste diversion activities from June 2015.
Program funding and resourcing	• Utilise existing community engagement officers from councils • Utilise existing community groups and volunteering groups

Program 3: Tackling residential transport emissions	
Program objectives	• Promote and implement car-sharing and carpooling programs across all municipalities within the WAGA region • Work towards delivering **27 ktCO$_2$-e** emissions savings per year, against the current emissions baseline
Program audience	Community
Program elements / initiatives	1. Review existing car-sharing and carpooling programs operating in the WAGA region 2. Investigate ways in which programs can be most efficiently and effectively supported by council 3. Implement pilot programs in key, high density localities 4. Review uptake and effectiveness of approach. Revise if necessary 5. Implement regional programs
The role of WAGA	Program coordination, collaboration and gathering of learnings from other council and alliance experiences.
Key partners	Western Transport Alliance, all local councils within region, established car-sharing companies and carpooling groups
The role of key partners	Program coordination (Western Transport Alliance), program support and partnering with established car-sharing companies and carpooling groups
Timeline	• Conduct review of existing programs and scoping activities by January 2015 • Roll out pilot programs from June 2015
Program funding and resourcing	• Designated council or WAGA resource (approximately one EFT) to manage program • Leverage existing car-sharing companies and carpooling groups

7

7. MEASURING THE SUCCESS OF LOW CARBON WEST

Low Carbon West is a comprehensive plan for reducing regional GHG emissions in the WAGA region over the coming years. To understand the effectiveness of these actions in mitigating emissions, WAGA will develop a monitoring and evaluation plan towards the end of 2014. WAGA staff will be responsible for the measurement and evaluation of Low Carbon West, and progress reporting to the WAGA Executive Committee.

The monitoring plan will be delineated by sector and consist of a series of key performance indicators (KPIs) based on the actions prioritisation framework within Low Carbon West. In addition, the monitoring plan will define the reporting timeline and format. As the actions cover a breadth of sectors, the information sources to inform progress in each sector will also differ. A significant part of setting up the monitoring framework will be the identification of data sources. The data sources used to develop the 2012 current baseline provide the primary means of tracking the level of emissions reduction over the coming years.

The KPIs are likely to cover:

- Communications and advocacy with key stakeholders of Low Carbon West
- Engagement with industry through action implementation
- Co-benefits associated with implementation
- Number of projects identified, funded and implemented for each action
- Barriers or challenges associated with implementation
- Project case studies / fact sheets developed, in particular demonstrating leadership or innovation in the WAGA region
- Implementation resources and costs incurred and required over the coming year to support further implementation of Low Carbon West
- Overall energy and emissions savings by action, sector, by LGA and for the region.
- Simple reporting templates will be set up to capture this information in a consistent format.

AECOM ARUP