The Energy Innovation Co-operative\(^1\), which has 10 years of experience delivering community-based energy efficiency and renewable energy initiatives in the Southern Gippsland region, developed this document in partnership with Community Power Agency (community engagement and community-owned renewable energy specialists)\(^2\), Mondo (a community and business energy solutions specialist)\(^3\) and the Gippsland Climate Change Network\(^4\).


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**Foreword**

On behalf of the Victorian Government, I am pleased to present the Victorian Regional Renewable Energy Roadmaps.

As we transition to cleaner energy with new opportunities for jobs and greater security of supply, we are looking to empower communities, accelerate renewable energy and build a more sustainable and prosperous state.

Victoria is leading the way to meet the challenges of climate change by enshrining our Victorian Renewable Energy Targets (VRET) into law: 25 per cent by 2020, rising to 40 per cent by 2025 and 50 per cent by 2030.

Achieving the 2030 target is expected to boost the Victorian economy by $5.8 billion - driving metro, regional and rural industry and supply chain development. It will create around 4,000 full time jobs a year and cut power costs.

It will also give the renewable energy sector the confidence it needs to invest in renewable projects and help Victorians take control of their energy needs.

Communities across Barwon South West, Gippsland, Grampians and Loddon Mallee have been involved in discussions to help define how Victoria transitions to a renewable energy economy.

These Roadmaps articulate our regional communities’ vision for a renewable energy future, identify opportunities to attract investment and better understand their community’s engagement and capacity to transition to renewable energy.

Each Roadmap has developed individual regional renewable energy strategies to provide intelligence to business, industry and communities seeking to establish or expand new energy technology development, manufacturing or renewable energy generation in Victoria.

The scale of change will be significant, but so will the opportunities.

Each community has a part to play in embracing cleaner energy and the benefits it brings for a brighter future.

The Hon. Lily D’Ambrosio MP
Minister for Energy, Environment and Climate Change
Minister for Solar Homes
Regional Forward

We need to build the bridge on which Australians can walk … from policy incoherence to hope and opportunity. Hope that we might avoid the worst outcomes of climate change. Opportunity for Australia to be the world’s main trading source of metals, other energy-intensive goods and carbon chemical manufacturers in tomorrow’s zero-net-emission world; and a major contributor to the world’s efforts to absorb excessive carbon into land and plants.

- Superpower, Ross Garnaut 2019

The Southern Gippsland Renewable Energy Roadmap (hereafter, Roadmap) embraces the visionary approach of Ross Garnaut presented in his book Superpower — Australia’s low carbon opportunity. This Roadmap report demonstrates that Southern Gippsland has the renewable energy infrastructure and the community desire to harness our abundant solar, wind, biomass and geothermal capacity.

Furthermore, Southern Gippsland can make exceptional contributions to climate action by creating natural systems to store more carbon in our soils, pastures and forests. Gippsland has a good story to tell in a future low carbon scenario.

We give our sincere thanks to the people who contributed time and perspectives through the survey, meetings and workshops that inform this Roadmap — many of whom drove long distances in cold, wet and windy weather! This report carefully collates the ideas and feedback you so willingly contributed.

We also thank all our project partners and volunteers who contributed their expertise to help bring this Roadmap to fruition. Thank you especially to the team at the Energy Innovation Co-operative — in particular, Moragh Mackay who, as the initial Project Coordinator, set up the project vision, and Neroli Raff and Max Richter who brought it home, as well as Peter Wonfor who stepped in as the interim chair towards the end of the project. We thank Jarra Hicks and Franziska Mey from the Community Power Agency for being expert advisors and collaborators in designing and delivering the community engagement and in leading the authorship of the Roadmap. Special thanks to the members of the Roadmap Project Steering group, especially Robert Dimsey (Project Manager, Community and Partnership, DELWP) and Michelle Schleiger (Project Officer, Energy Demand, Programs and Safety, DELWP).

- Cr. Darren McCubbin, Chair, Gippsland Climate Change Network

Executive Summary

Energy systems globally are changing as options for energy generation, energy storage and network management are revolutionised. This transition uniquely affects Gippsland, given its long history as the powerhouse of Victoria in an era of coal-fired electricity production. The advent of renewable energy presents opportunities as well as challenges for the region.

To make the most of these opportunities in ways that bring benefits to local communities, the economy and our environment, it is useful to have a commonly-held vision that can provide guidance for future action. This document fulfils this remit for the Southern Gippsland region, incorporating the Bass Coast and South Gippsland local government areas.

The Victorian Government funded the Southern Gippsland Regional Renewable Energy Roadmap (“Roadmap”) through an initiative to direct strategic and appropriate investment in renewable energy across all regions of Victoria. The Roadmap provides guidance for achieving a desired renewable energy future for Southern Gippsland. Extensive community and stakeholder engagement in Bass Coast and South Gippsland local government areas inform the vision and approaches contained within this document. An online-survey and collaborative mapping process combined with a series of six workshops and seven small group interviews (with local governments, water authorities and large businesses) provided thoughtful inputs from over 380 individuals and stakeholders from across Southern Gippsland.

This Roadmap complements other existing strategies that the state government has funded in other regions of Gippsland to progress plans for renewable energy development. Specifically, these are the East Gippsland Shire “New Energy Technology Roadmap” and the Latrobe Valley “New Energy Jobs and Investment Prospectus” (covering Wellington, Latrobe and Baw Baw Shire regions). By identifying the alignment and synergies with these other regional documents, we hope to progress plans for renewable energy development across the region. Currently the reports differ from each other, leaving gaps in a coherent and consistent Gippsland-wide strategy. This document outlines the steps required to create a comprehensive and aligned whole-of-Gippsland Renewable Energy Roadmap.
The purpose of the Roadmap is to:

- Understand the key elements of the local context, including its energy history, its opportunities, and the current status of renewable energy generation and transmission infrastructure
- Develop a documented renewable energy vision for Southern Gippsland
- Articulate locally appropriate pathways to achieve the vision
- Identify the opportunities and constraints to achieving the vision
- Make recommendations for next steps to progress a renewable energy vision for the whole Gippsland region

Southern Gippsland region has a strong range of human, economic and natural assets to draw on in the transition to renewable energy. Endowed with an abundance of natural resources, the region has been actively taking up renewable energy for some time. It hosts three large-scale wind farms with a total capacity of 139 megawatts (MW) and has a combined generation capacity of 36MW in small and medium-scale solar photovoltaic (PV) installations generating clean energy for households, businesses and local organisations.

Community engagement and stakeholder consultation identified the following common vision:

Southern Gippsland will show strong leadership in the renewable energy transition and continue to grow and adapt in a way that empowers and activates its people. Through the development of energy partnerships, local communities will own, operate and benefit from renewable energy generation, storage and use across the region.

For future opportunities, 80 per cent of survey respondents feel it is “extremely important” to build and utilise the renewable energy assets available locally. A majority of people surveyed would like to see the region powered by 100 per cent renewable energy by 2030 or earlier, assuming it is technically feasible and cost effective.

There is strong community interest for being actively engaged in the region’s renewable energy future and widespread support for a variety of renewable energy technologies and a diversity of ways to deploy them. In particular, there is interest in a combination of household-, business- and community-level uptake of renewable energy occurring alongside larger corporate developments. A diversity of scales of development involving local people as owners and beneficiaries is seen as essential to building strong local support for future renewable energy projects.

The community recognises energy efficiency as the essential first step in a renewable and affordable energy future. Additionally, they desire to address social equity and energy justice issues through future development by creating opportunities for low socioeconomic and other marginalised groups to access the opportunities and benefits of renewable energy and energy efficiency.

Stakeholders identified specific project opportunities as key to delivering renewable energy in ways that are most suited to the region and which will help to achieve the community’s vision. These include exploring several village and town-scale energy self-sufficiency projects, a range of renewable energy generation opportunities and opportunities for collaboration between government entities and also between community energy groups.

There is a strong desire for renewable energy generation to complement existing land use practices and protect important and iconic ecosystems, while contributing to stronger local businesses and economies. In terms of the most popular technologies, participants (surveys, workshops, mapping and interviews) indicated strong support for solar PV, particularly for households and businesses, but also solar farms. Both on- and off-shore wind energy also received high levels of support. Support for wind energy was far more common than concerns over possible adverse impacts, although this comes with a need to engage, involve and benefit the local community in effective ways. Bioenergy from organic waste sources (sewage, crop, forestry, manure, food waste) is also seen as an excellent local opportunity, and one with the potential to support and complement other existing industries. There is interest in using micro-grids and embedded networks, and batteries for households and business. There are many other renewable energy technologies that the community are interested in and want to explore, such as the integration of renewable-energy-charged electric vehicles, green hydrogen, wave, tidal and geothermal energy.

At present, businesses in the region have a relatively low uptake of renewable energy, but are interested. Continuing to nurture business-community understandings of the financial and other benefits of renewable energy options (e.g., through information provision, energy audits, bulk-buys and related activities) will be important in supporting this cohort to implement renewable energy.

The distributed nature of settlement into many smaller towns and villages (rather than one regional centre) lends itself to smaller, distributed renewable energy generation and storage, in which local communities play an active role.
This, paired with the availability of a variety and abundance of natural renewable energy resources, means that local towns and villages have a strong foundation from which to explore renewable energy generation options along with possibilities for electric vehicles, micro-grids and demand management. In addition, the low population density, particularly in South Gippsland Shire, leads to a higher likelihood of finding appropriate sites for medium- and large-scale renewable energy development, such as solar and wind farms.

While the northern section of South Gippsland (including Leongatha, Korumburra and Mirboo North) is within 30km of the high voltage transmission lines and their access points in the Latrobe Valley, the rest of Southern Gippsland is a significant distance from transmission lines. Hence, renewable energy projects are likely to look at connecting to the lower-voltage distribution lines across the Southern Gippsland region. These lines have varying capacity to take on new connections, and may accommodate small- and medium-scale projects. Where generation is paired with storage, on-site electricity usage (behind-the-meter), active demand management and/or voltage control services, there is additional scope for projects to be more viable.

There was wide-scale agreement that the benefits from medium and large-scale renewable energy development should be shared with the local community in order to keep economic returns in the region, such as via opportunities for the community to co-invest or co-own projects. The specific forms that benefit-sharing takes will need to be explored further with local communities, as project proposals arise.

Implementing the vision in this Roadmap will require additional qualified personnel in the renewables sector in Southern Gippsland. This will require further expansion on efforts in the broader Gippsland region by the Latrobe Valley Authority, Gippsland TAFE, the Electrical Trade Union (Victoria) and Hi-Tech Precinct collaboration and others. It will also require a suite of allied service industries and manufacturing, including solar photovoltaic racking systems and earth-moving and concreting services, there is additional scope for projects to be more viable.

Local stakeholders of many kinds are keen to collaborate to achieve common energy goals as a means to maximise economies of scale and address resource and knowledge gaps.
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Abbreviations

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<th>Full form</th>
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<tbody>
<tr>
<td>ABS</td>
<td>Australian Bureau of Statistics</td>
</tr>
<tr>
<td>ARENA</td>
<td>Australian Renewable Energy Agency</td>
</tr>
<tr>
<td>AREMI</td>
<td>Australian Renewable Energy Mapping Infrastructure, an initiative of ARENA</td>
</tr>
<tr>
<td>CORE</td>
<td>Community-Owned Renewable Energy</td>
</tr>
<tr>
<td>CPH</td>
<td>Community Power Hubs</td>
</tr>
<tr>
<td>DELWP</td>
<td>Victorian Government Department of Energy, Land, Water and Planning</td>
</tr>
<tr>
<td>EV</td>
<td>Electric Vehicle</td>
</tr>
<tr>
<td>GCON</td>
<td>Gippsland Climate Change Network</td>
</tr>
<tr>
<td>GH, GWh</td>
<td>Giga Watt, Giga Watt Hour (1 billion watt hours)</td>
</tr>
<tr>
<td>kW, kWH</td>
<td>Kilowatt of electricity (1,000 watts), kilowatt hour (1,000 watt hours)</td>
</tr>
<tr>
<td>LGA</td>
<td>Local Government Area</td>
</tr>
<tr>
<td>MW, MWh</td>
<td>Megawatt of electricity (1,000 kilowatts), megawatt hour (1 million watt hours)</td>
</tr>
<tr>
<td>MVA</td>
<td>Mega Volt Ampere</td>
</tr>
<tr>
<td>PPA</td>
<td>Power Purchase Agreement</td>
</tr>
<tr>
<td>PV</td>
<td>Photovoltaic</td>
</tr>
<tr>
<td>REMPLAN</td>
<td>REMPLAN are specialists in providing area-specific data products. A team of economists, planners, demographers, economic development specialists, analysts and software developers create online analytical tools and information resources to provide people with access to the information needed to make important decisions.</td>
</tr>
<tr>
<td>SECCCA</td>
<td>South East Councils Climate Change Alliance</td>
</tr>
<tr>
<td>SWER</td>
<td>Single Wire Earth Return</td>
</tr>
<tr>
<td>TAFE</td>
<td>Technical and Further Education, an Australian network of post-secondary educational institutions</td>
</tr>
<tr>
<td>V</td>
<td>Volt</td>
</tr>
<tr>
<td>VRET</td>
<td>Victorian Renewable Energy Target</td>
</tr>
<tr>
<td>Z-NET</td>
<td>Zero-Net Emissions Town</td>
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1. Introduction

The national electricity system is changing as global shifts towards decentralised electricity generation from renewable energy resources accelerate. Coupled with innovations in energy efficiency, new energy storage options, electricity demand management, new retailing arrangements and the advent of electric vehicles, these trends spell dramatic changes in the ways that electricity is produced, transmitted, stored and used. Electricity prices have increased significantly over recent years (largely due to electricity network upgrades), spurring widespread attention to electricity issues.

These changes bring opportunities for the implementation of new models of energy generation that can deliver a range of benefits: greenhouse gas emissions reductions, regional development, cost savings, local self-reliance and new ways of stabilising electricity supply. Renewable energy generation can range from small-scale, behind-the-meter installations on the roofs of households and businesses, to medium-sized community-scale and/or community-owned projects, through to large-scale solar and wind farms which export electricity into the grid. As such, the transition to renewable energy brings the opportunity for communities to determine where their energy comes from, how it’s owned, how it’s used and who benefits from these arrangements.

However, this transition also presents challenges, particularly in terms of how new electricity generation is to be integrated into the existing electricity network, how this is managed and who benefits. There are also considerations to be negotiated around changes to land use and how decisions are made for where new renewable energy generation should go. In addition, it is essential to keep in mind that the transition to renewable energy is not simply a technical process, but also inherently a social process in which people need opportunities to be engaged, learn, participate and benefit.

The purpose of this document is to provide guidance to ensure that the Southern Gippsland region, comprised of the Bass Coast and South Gippsland local government areas, benefits from a renewable energy transition that makes the most of and is appropriate for the local context. This Renewable Energy Roadmap (‘Roadmap’) will contribute to a strategic approach for the development of renewable energy for the region. It is intended to inform future action on renewable energy by a range of stakeholders, including households, local businesses, community groups, land and energy project developers and education providers. It is also intended to complement the Victorian Government renewable energy strategies.

The Victorian Government is committed to establishing Victoria as a leader in renewable energy by implementing supportive policies to give the renewable energy sector the confidence needed to invest in renewable energy projects and jobs. Under the New Energy Jobs Fund, the Department of Environment, Land, Water and Planning (DELWP) has funded the development of regional renewable energy roadmaps in Barwon South West, Grampians, Loddon Mallee, Hume and Southern Gippsland. These roadmaps use a common framework to direct strategic and appropriate investment in renewable energy.

In Southern Gippsland, developing the Roadmap has involved identifying gaps and synergies with other, already-existing government-funded strategies in other areas of Gippsland, namely: the East Gippsland Shire “New Energy Technology Roadmap” and the Latrobe Valley “New Energy Jobs and Investment Prospectus” (covering Wellington, Latrobe and Baw Baw Shire regions).

This Roadmap focuses on renewable electricity generation, rather than on other forms of renewable energy such as heat and fuel.
2. Context of the Roadmap

The Southern Gippsland region in Victoria is part of the fertile crescent running down the continent’s east coast. It is characterised by fertile, low, rolling hills and abundant water supplies. It is framed by rugged coast in the South, including Phillip Island and Wilsons Promontory (mainland Australia’s southernmost point). The Latrobe Valley is to the north and the mountains of the Great Dividing Range beyond that.

The GunaiKurnai and Bunurong people inhabited Southern Gippsland for tens of thousands of years before European settlement and are estimated to have numbered around 40,000. This density of settlement was supported by the region’s plentiful natural resources and temperate conditions. Only relatively recently has the living culture of the GunaiKurnai and Bunurong people begun to receive widespread respect, including a recognition of their leadership in sustainability knowledge and practices.

Gippsland was opened up to European settlement relatively late (in the 1840s), in turn giving it distinctive social characteristics. European settlers made a living from sealing and whaling; grazing, dairying and horticulture; forestry and timber processing; coal, gold, tin and lime mining; and (later) tourism. These activities brought an influx of people, the establishment of towns and the construction of roads.

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The principal towns in Southern Gippsland include Wonthaggi, Leongatha, Inverloch, Cowes, Korumburra and Foster. The population remains highly dispersed and there is no single regional capital.

This section includes a review of the energy history in Gippsland and Southern Gippsland and goes on to provide an overview of Southern Gippsland’s demographic and economic trends and its regional assets. Finally, this section presents an overview of the key relevant policies and regulations that affect renewable energy development in the Southern Gippsland context.
2.1. A history of energy in Southern Gippsland

This Roadmap comes at a time when Gippsland as a whole is considering how to make the most of the energy system changes that are underway. Increasingly, renewable energy is being embraced by a range of actors at a variety of scales. The evolution of the energy system necessarily builds on the context of what already exists, as reviewed here.

Historically and to the present, Gippsland has played a central role in an energy sector built on coal mining and coal-fired power stations, which has made valuable contributions to the local region, the state and the country as a whole. Coal was first discovered around the mid-19th century and the Latrobe Valley became a major hub of coal mining and electricity generation. As the energy powerhouse of Victoria, the Latrobe Valley developed a strong electricity transmission network to export electricity to other areas of the state and beyond.

Latrobe Valley now hosts three operating coal-fired power stations, Loy Yang A and B and Yallourn, with a combined electricity generation capacity of 4.7GW. Recent years have seen the closure of the Hazelwood and Energy Brix coal-fired power stations near Morwell. These closures have caused significant disruptions and changes in the Latrobe Valley and broader Gippsland community and economy. Efforts are now underway to coordinate a productive and sustainable transition for the local economy that will support the local community and enable it to thrive. This includes the establishment of the Latrobe Valley Authority, to bring together local people, councils, industry, education providers and governments to secure the economic future of the Latrobe Valley. The Latrobe Valley Authority is responsible for overseeing the Government’s investment package in the region to create jobs and grow local businesses, including the establishment of the Latrobe Valley Economic Growth Zone and the Latrobe Valley Economic Development Program, designed to support local jobs and, community development and economic stimulus for almost 50 years. The environmental impacts and changes to the landscape from coal extraction remain visible today, such as abandoned railway cuttings, open cuts and tailing heaps.

Figure 2: The State Coal Mine, Wonthaggi, 1910

Source: Darge Photographic Co., State Library Victoria

Less-known, smaller coal mines developed in Southern Gippsland at times provided much of Victoria’s power before the establishment of Latrobe Valley’s Hazelwood power station. The Victorian Coal Company was formed near Cape Paterson in 1858, and the State Coal Mine at Wonthaggi operated from 1909 to 1968 (pictured above). In addition, black coal was mined at Coal Creek, near Korumburra from the 1880s to the late 1950s. With this industry came the establishment of a local rail network from Korumburra to Coal Creek, with links to Melbourne. Over its lifetime, the State Coal Mine produced almost 17 million tonnes of coal, and supported local jobs and, community development and economic stimulus for almost 50 years. The environmental impacts and changes to the landscape from coal extraction remain visible today, such as abandoned railway cuttings, open cuts and tailing heaps.

Project Example: Old Energy, New Energy

The Old Energy-New Energy project, developed through a collaboration between the Wonthaggi State Coal Mine and the Energy Innovation Co-operative, exemplifies the local changes in energy production over time. This local initiative was established in 2009 in response to climate change with the aim to “work together towards a zero emissions community”. The Old Energy-New Energy project demonstrates the opportunities of the changing energy system through building a range of demonstration and education opportunities at the State Coal Mine site. The State Coal Mine is a heritage area where visitors discover the workings of a retired 20th century coal mine. In a collaborative effort with Parks Victoria, volunteers and Friends of the State Coal Mine, the idea of bringing a ‘new energy’ theme to the ‘old’ of the existing site came to life.

The project comprises five stages:

1. Establishing a Southern Community Owned Renewable Energy (CORE) revolving Fund for renewable energy and energy efficiency projects
2. Building a Solar Powered Coal Mine: installation of a 90kW system + 41kW batteries
3. Developing an Energy Innovation Centre & Miner’s Cottage Retrofit for testing a range of technologies
4. Providing training and Learning in New Energy Technologies for schools, tourists and the wider community
5. Developing further on-site renewable energy installations

Since 2017, the Southern CORE Revolving Fund has supported the community to install renewable energy and energy efficiency systems, delivering the first stage of the project. The second stage was officially launched by Victorian Energy Minister Lily D’Ambrosio in May 2019, with funding from the New Energy Jobs Fund.

This initiative is a great example of how a local community is building on its past to create innovative solutions while addressing global challenges. In collaboration with different stakeholders, the community creates a new identity to foster the transition from fossil fuels to renewable energy.

Source: adapted from https://eico-op.org.au/
2.2. Demographics and economic context

Southern Gippsland has a population of 64,903 people distributed across 416,214 hectares of land (see Table 1 below). Bass Coast supports 10,839 jobs and has an annual economic output of $2.9 billion. Seventy-two per cent of the land is under broad-acre production, while 4.75 per cent is covered by forestry and 11.25 per cent is crown land or reserves. Slightly more jobs and economic output is supported in South Gippsland, with 11,157 jobs and $3.544 billion respectively. Southern Gippsland (as a whole) has a growing population base, having increased by 10 per cent in the last decade. This is likely due to its close proximity to Melbourne (1.5–2 hours’ drive). It is a holiday destination for city dwellers and attractive for new residents due to its natural environment. Recent years have seen an influx of people into the region, including retirees and families (‘sea’ and ‘tree’ changers) and farmers affected by droughts and looking for continuing business in more favourable conditions. Under a changing climate this is likely to continue. Population growth will affect land use patterns and increase regional energy demand and supply security.

Southern Gippsland has lower household income and lower levels of minimum education compared with the state average (see Table 1 below). Household income levels indicate a smaller proportion of high income households (those earning $2,500 per week or more) and a higher proportion of low income households (those earning less than $650 per week) than Victorian averages. There is an equal or lower proportion of people holding formal qualifications (Bachelor or higher degree; Advanced Diploma or Diploma; or vocational qualifications) in Southern Gippsland compared with the state average. In-migration is seen to increase the local demographic of educated and higher income people (e.g., retirees from Melbourne), who bring with them new ideas and resources that offer a potential asset base for developing local renewable energy capacity.

However, the region has a high proportion of the local workforce in full time employment (94 per cent employed with 50 per cent in full time, 42 per cent in part time), and a lower proportion unemployed than the state average. In South Gippsland Shire, the unemployment rate is relatively low with 4.9 per cent and in Bass Coast Shire, 6.4 per cent of people without work. The active labour force is lower than in the rest of regional Victoria, reflecting the older median age of the region.

Table 1: General statistics for Southern Gippsland

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Bass Coast</th>
<th>South Gippsland</th>
<th>Victorian average</th>
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<tbody>
<tr>
<td>Land Area</td>
<td>86,582 ha</td>
<td>329,633 ha</td>
<td>227,444 km²</td>
</tr>
<tr>
<td>Population</td>
<td>35,327</td>
<td>29,576</td>
<td>6.38 million</td>
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<tr>
<td>Population density</td>
<td>40.8 persons/km²</td>
<td>9 persons/km²</td>
<td>27 persons/km²</td>
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<tr>
<td>Median age</td>
<td>49</td>
<td>46.6</td>
<td>37</td>
</tr>
<tr>
<td>Proportion completed Year 12 or equivalent (%)</td>
<td>36</td>
<td>35.5</td>
<td>15.9</td>
</tr>
<tr>
<td>Unemployment rate (%)</td>
<td>6.4</td>
<td>4.9</td>
<td>6.0</td>
</tr>
<tr>
<td>Main employing industry</td>
<td>Health care &amp; social assistance</td>
<td>Agriculture, forestry &amp; fishing</td>
<td></td>
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<tr>
<td>Median wage</td>
<td>$985 per week</td>
<td>$1088 per week</td>
<td>$1,608 per week</td>
</tr>
</tbody>
</table>

Source: Australian Bureau of Statistics (2019c; 2019d)

Bass Coast has a high concentration of people who rent (20.9 per cent in comparison to 19.8 per cent across regional Victoria). However, in South Gippsland Shire a larger proportion of households own their dwelling compared to other regions in Victoria. This creates both opportunities and challenges for rooftop solar photovoltaic uptake.

The region’s main economic pillars are dairy and beef production and healthcare. In South Gippsland Shire, the more than 420 dairy and beef farms constitute one third of the local economy. In Bass Coast Shire, the health and social sector is a major employer. The Bass Coast economy also has a high contribution from tourism, as the region boasts pristine coastline and unique nature reserves (Phillip Island’s penguin colony, Bass Hill’s sand dunes and wetlands, Wilsons Promontory) as well as major events (e.g., Australian Motorcycle Grand Prix) attracting about 3.4 million visitors every year. Tourism employs roughly 1,800 people in the region.

Southern Gippsland also hosts a number of larger businesses. Saputo Dairy Australia Pty Ltd is an international company that produces, markets, and distributes dairy products Australia-wide and is one of the region’s largest employers. LafargeHolcim is an international construction material supplier that employs 60 workers in the region. Both have expressed awareness of potential benefits to their businesses from renewable energy development, and are actively pursuing these. Other large businesses include Burra Foods in Korumburra, and VPlus in Toora. Southern Gippsland currently has relatively few (21) electricity-related businesses.

The region holds a range of political views. In Bass Coast Shire the last state election saw an almost equal divide between votes for Liberal (40.75%) and Labor party (40.24%), with the remaining 5.69 per cent going to the Greens. In South Gippsland Shire the majority voted for the National Party (61.91%), while 28.4 per cent voted for Labour Party and 9.7 per cent voted for the Greens.
2.3. Building on Regional Assets

The Southern Gippsland region has a number of strengths and assets that provide fertile ground for renewable energy development. These are outlined below, drawing on outputs from the community workshops and interviews and supplementary desktop research.

2.3.1. Regional Strengths and Opportunities

The Southern Gippsland region has a strong range of human, economic and natural assets to draw on to create a vibrant renewable energy future.

Table 2: Strengths and opportunities of Southern Gippsland, as identified by workshop and interview participants

<table>
<thead>
<tr>
<th>Community</th>
<th>Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Community interest, awareness &amp; momentum towards renewable energy, including presence of local energy businesses and community groups</td>
<td>- Open space: low population density, available land area &amp; the ability to integrate appropriate renewable energy development with agriculture</td>
</tr>
<tr>
<td>- Community passion &amp; action on environmental &amp; sustainability issues</td>
<td>- Diversity in renewable resources &amp; natural assets: wind, solar, bioenergy &amp; tidal</td>
</tr>
<tr>
<td>- A cohesive community that willingly supports each other</td>
<td>- Geography: high energy coastline for wave &amp; wind energy</td>
</tr>
<tr>
<td>- Population stability, growth in some areas</td>
<td></td>
</tr>
<tr>
<td>- Existing community networks</td>
<td></td>
</tr>
<tr>
<td>- High levels of volunteering</td>
<td></td>
</tr>
<tr>
<td>- A community that values health &amp; well-being</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Economy</th>
<th>Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Local industries interested in renewable energy (e.g., agriculture, water authorities, tourism)</td>
<td>- Distributed communities match well with distributed energy: small communities lend themselves to localised solutions</td>
</tr>
<tr>
<td>- Proximity to Latrobe Valley means presence of energy-related skills &amp; industries</td>
<td>- New housing &amp; industrial developments offer possibility for micro-grids &amp; renewable energy</td>
</tr>
<tr>
<td>- Proximity to Melbourne (a large market &amp; population base)</td>
<td>- Existing electricity distribution network</td>
</tr>
<tr>
<td>- Possibility for jobs from re-skilling &amp; repurposing old infrastructure e.g. pumped hydro at old reservoirs</td>
<td>- Proximity to high voltage transmission lines in Latrobe Valley</td>
</tr>
<tr>
<td>- Strong local tourism industry</td>
<td>- Existing road &amp; rail network</td>
</tr>
<tr>
<td>- Local skills &amp; education opportunities</td>
<td></td>
</tr>
</tbody>
</table>

Table 3: Current local partnerships working on energy issues

<table>
<thead>
<tr>
<th>Partnership</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intelligent Water Network</td>
<td>Investigates new technologies and innovations to meet common challenges such as population growth, ageing infrastructure and climate variability in a more efficient manner</td>
</tr>
<tr>
<td>Council partnerships including Bass Coast Shire, South Gippsland, Baw Baw Shire</td>
<td>Large-scale, co-owned and co-funded solar photovoltaic development</td>
</tr>
<tr>
<td>South East Councils Climate Change Alliance</td>
<td>Investigating a direct, joint Power Purchase Agreement with a renewable energy generator</td>
</tr>
</tbody>
</table>

Source: Community visioning workshops and interview data.

Southern Gippsland residents have a strong sense of place and often identify as being part of a close-knit and cohesive community. The strong sense of community is geographically focused, and gravitates around the towns and villages of the region. There is a high level of volunteering, supported by a higher-than-average level of retirees.

The local community highly values the environmental and natural assets of the region and identifies these as a key defining feature of Southern Gippsland. These natural assets are seen as the foundation of the local economy and the keystone of community health and wellbeing. Many people in Southern Gippsland are supportive of sustainability goals and renewable energy deployment. High levels of awareness about environmental issues is a key characteristic of the region and is perceived as a strength for taking local action. The commitment of the community, local councils and businesses is demonstrated in various local sustainability actions (see Section 3).

The distributed nature of settlement into many smaller towns and villages (rather than one regional centre) lends itself to smaller, distributed renewable energy generation in which local communities could play an active role. This, paired with the availability of a variety and abundance of natural renewable energy resources, means that local towns and villages have a strong foundation from which to explore renewable energy generation options. These include possibilities for electric vehicles, micro-grids and demand management. In addition, the low population density, particularly in South Gippsland Shire, leads to a higher likelihood for finding appropriate sites for medium and large-scale renewable energy development.

Another asset is existing expertise in the local workforce relating to energy, due to the proximity to the Latrobe Valley. Many people have skills and expertise in energy generation and transmission, which have the potential for being redirected into renewable energy applications. In addition, many people who have recently settled in the area are university-educated people from Melbourne, who bring their particular expertise and knowledge into the region, thereby introducing new ideas and innovation.

The region hosts 21 energy-related businesses, including businesses specialising in energy efficiency and renewable energy design, engineering, installation and maintenance. There are also a small number of renewable energy manufacturing businesses in the Gippsland region (see Section 3.5). In addition, LafargeHolcim (based in Wonthaggi and Morwell) produce concrete, an essential component for many renewable energy farms. There are also a number of local earth-moving businesses in Southern Gippsland.
2.3.2. Regional Challenges

There are also a number of challenges that will need to be managed in order to maximise the strengths of the region. These challenges are not insurmountable, but rather will require careful planning, consultation and creativity to productively overcome.

The following list of regional challenges were collated during the community workshops and interviews.

Table 4: Challenges of the Southern Gippsland context, as identified by workshop and interview participants. Source: Community workshops and interview data.

<table>
<thead>
<tr>
<th>COMMUNITY</th>
<th>ENVIRONMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not everyone is united behind the need for renewable energy and climate action</td>
<td>Need to protect ecology and iconic landscapes</td>
</tr>
<tr>
<td>Potential for community concern over certain forms of renewable energy development (e.g., particular technologies, scales or modes of development)</td>
<td>Desire to complement existing land use practices, especially farming</td>
</tr>
<tr>
<td>Potential for poor community engagement to lead to opposition</td>
<td>Potential environmental impacts of renewable energy development</td>
</tr>
<tr>
<td>Volunteer burn-out</td>
<td>Potential conflict with high-value agricultural land</td>
</tr>
<tr>
<td>Need to educate people on energy efficiency</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ECONOMY</th>
<th>INFRASTRUCTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>High up-front costs of installing renewable energy</td>
<td>Limitations or weaknesses in the electricity transmission and distribution network</td>
</tr>
<tr>
<td>Other urgent matters taking investment priority (e.g., beach erosion)</td>
<td>Distance from the transmission network</td>
</tr>
<tr>
<td>How to include and benefit low-socioeconomic people</td>
<td>Complexity of planning processes and regulations</td>
</tr>
<tr>
<td>Determining financial viability of specific renewable energy options</td>
<td>Not managing the transition from coal-fired electricity well (a social, economic and infrastructure risk)</td>
</tr>
<tr>
<td>Global economic downturn</td>
<td></td>
</tr>
<tr>
<td>Nature of the National Electricity Market (e.g., limiting retail options and peer-to-peer trading)</td>
<td></td>
</tr>
<tr>
<td>Current lack of local renewable energy training opportunities in Southern Gippsland</td>
<td></td>
</tr>
<tr>
<td>Current lack of local supply chains relating to renewable energy</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>POLITICAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Political scepticism and vested interests</td>
</tr>
<tr>
<td>Changing/unstable policy regarding renewable energy and climate change</td>
</tr>
</tbody>
</table>

Parts of the community show scepticism and a cautious attitude towards environmental action, including scepticism towards the viability and appropriateness of renewable energy generation. As with most communities, not everyone is supportive of efforts to reduce greenhouse gas emissions. Community engagement did reveal some hesitance regarding the impact of large-scale wind and solar developments, particularly in relation to potential impacts on ecology, landscape amenity and agricultural production. Such attitudes, however, were in the minority and participants thought that all of these issues could be managed with appropriate siting, good planning and quality community engagement.

In addition, integrating low-income households and motivating them to participate in renewable energy needs attention. Local businesses and people who rent might find it difficult to participate in local action because of their housing situation (if they do not own their roof and the landlord is unwilling) and/or lack of financial means.

The changing and unstable policy environment for renewable energy and climate change action at a federal level creates an uncertain operating environment. This particularly affects the ability to secure a good price for electricity that is generated and sold into the National Electricity Market (NEM).

There are challenges arising from potentially conflicting land uses (prime agriculture land versus energy infrastructure) and the potential impact of energy projects on farming operations. However, experience indicates that wind developments can be achieved in such a way as to positively complement agriculture, and there is also scope for this with solar farms (whereby grazing can continue under the panels). Additionally, the priorities of nature protection (biodiversity and wildlife), environmental protection (renewable energy) and local tourism have to be managed by identifying areas that will and will not be appropriate for renewable energy development — remembering that different technologies at different scales will be appropriate in different places.

In some parts of the region, access to the electricity network presents a challenge for new renewable energy projects. Such challenges include distances to transmission lines, a limited ability to connect to distribution lines and the presence of highly constrained SWER lines.

There are currently very few renewable energy manufacturing and supply chain businesses in Southern Gippsland. Further local industry development is required to support local procurement of renewable energy generation or construction needs.
2.4. Government Policy and Regulatory Framework

Renewable energy development in Southern Gippsland is embedded in the national, state and regional energy policy and regulatory environment.

2.4.1. Federal Government

The NEM is regulated and governed by energy ministers and the Council of Australian Governments Energy Council which is responsible for the country’s energy reforms and oversight. National electricity law is the key source of statutory powers for the governance of the market. It promotes efficient investment, operation and use of energy services for the long-term interests of consumers with respect to price, quality, safety, reliability, and security of supply.12

The Federal Large-Scale Renewable Energy Target is the key national renewable energy legislation, and is due to expire in 2020 with no new clean energy policy in sight. The lack of ongoing renewable energy policy at a federal level leads to significant uncertainty within national electricity markets and within the renewable energy industry. This gap is being filled somewhat by leadership from state governments, particularly Victoria, the Australian Capital Territory and South Australia.

2.4.2. State Government

The Victorian State Government demonstrates great leadership in renewable energy deployment, having set a Renewable Energy Target (VRET) of 50 per cent by 2030. To realise this target the state government is taking a multifaceted approach. It includes support for both large- (Renewable Energy Auction Scheme) and small- to medium-scale projects (Solar Homes Program and Community Power Hub Program) and incentives for new job creation and investments (New Energy Jobs Fund) in clean energy sector as well as broader industry engagement (Take2 pledge program).

The Victorian Government has also regulated the policy and planning process for large-scale energy projects to foster a smooth transition to 50 per cent renewables by 2030. In line with this purpose, the Victorian Department of Environment, Land, Water and Planning has launched development guidelines for large-scale wind and solar energy project facilities (which they define as being above 1MW). The guidelines provide advice to inform policy, legislative and statutory planning arrangements and support the identification of suitable sites. In particular, the planning guidelines ensure projects are built in appropriate locations, and that developers engage properly with communities and have the least possible environmental or social impacts.

In the case of wind energy, the Minister for Planning is the responsible authority for assessing planning permit applications for wind energy facilities (which they define as a “series” of wind turbines). To support this process the Department of Environment, Land, Water and Planning has published new guidelines in March 2019. They specify the planning process and in particular a number of restrictions. These include, for example, that wind turbines must not have unacceptable environmental, social, cultural or landscape impacts. Wind farms also require written consent of the owner of any dwelling within one kilometre of any proposed turbine. The guidelines also recommend that a community and stakeholder communications and consultation plan is developed to help drive an effective and efficient community consultation program. For Southern Gippsland, restrictions require that wind energy facilities are not permitted on land within five kilometres of the high water mark of the Bass Coast or west of Wilsons Promontory.

Victorian Renewable Energy Target

Victorian State Government has set a Renewable Energy Target (VRET) to 50 per cent by 2030. The VRET is legislated through the Renewable Energy (Jobs and Investment) Amendment Bill 2019 (Vic). The aim is to provide a clear signal to industry and the whole sector that Victoria is serious about its renewable energy transition.

Renewable Energy Auction Scheme

The Victorian Renewable Energy Auction Scheme has been established to support achieving the VRET through large-scale renewable energy installations. The Auction Scheme works by calling for bids from renewable energy projects through a formal Request for Proposal. Project submissions are assessed based on value for money and satisfaction of five evaluation criteria which include financial capability and commercial viability; technical capability and viability; economic development; community engagement and shared benefits; and, impact on existing electrical network infrastructure.

Solar Homes Program

The Solar Homes Program is a key initiative to support communities and households to access renewable energy and storage. It provides a 50 per cent rebate, up to the value of half of an average 4kW solar panel system (which currently equates to $2,225) for eligible households. This resulted in the first year of program operations, in over 33,000 households taking up the program offering and installing Solar Photovoltaic panels, batteries and Solar Hot Water systems.

New Energy Jobs Fund

The $20 million New Energy Jobs Fund is designed to support Victorian-based projects that create long-term sustainable jobs, increase the uptake of renewable energy generation, reduce greenhouse gas emissions and drive innovation in new energy technologies. The projects funded embrace a variety of innovative technologies, feasibility studies and business cases to expand and extend renewable developments to create long-term market confidence.

Community Power Hub Program

The Community Power Hubs (CPH) is a pilot program set up by the State Government to help locals develop community-owned and operated renewable energy projects in regional areas of Ballarat, Bendigo and the Latrobe Valley (see also Section 3.2 on Community Energy).

Take2 Pledge Program

TAKE2 is a government-led pledge initiative launched in 2016. It’s a collective climate change program that supports individuals, business, government, educational and community organisations to take meaningful action to reduce climate change.

The Solar Energy Facilities Guidelines introduced in 2019 provides guidance on the development of solar farms. Planning approvals for solar farms over 1MW are determined by the Minister for Planning; those under 1MW are determined by the relevant local government. The Guidelines give special attention to the potential impacts of solar farms on prime agriculture land and irrigated areas. Both land uses are of strategic importance to the Victorian economy and consequently determine special conditions for installation. Southern Gippsland does not currently have any regulated irrigated areas, although Southern Gippsland is one of the few regions in Victoria that still has some water available for new allocations.

Under the Guidelines, state and local governments have a special responsibility to assess the impact of any proposed solar farm on strategically-important agricultural land, particularly within a declared irrigation district, and ensure that acceptable outcomes are produced. Consequently, it will be important to consult early with the relevant rural water corporation, to determine the appropriateness of the location; to carefully plan the solar farm layout and scale; and secure the support of the local community.

The whole of Bass Coast Shire was declared a “Distinctive Area and Landscape” in 2019 under the Planning and Environment Act (1987). The declaration came after a community engagement process, where participants identified urban expansion, overdevelopment, vegetation removal and climate change as major threats to the features of the land. It includes the development of a 50-year vision and land-use strategies to protect the unique landscape and sensitive environments of significant biodiversity value. This implies that proposals to establish new renewable energy facilities will have to adhere to best practice measures to avoid and minimise landscape and ecological impacts, and to fit in with the existing culture and identity of the local area.
2.4.3. Local Government

The statutory role of local governments is to facilitate the planning process, including decisions about proposals for new renewable energy generation. However, local governments are also proactively adopting renewable energy and energy efficiency measures to reduce their costs and carbon emissions, and to serve as role models in their communities. Local governments see renewable energy and energy efficiency as a means to lower operational costs, secure energy prices into the future, act on environmental commitments and support local business development. There is some reticence among local governments to present an overly ‘green’ image, needing to balance the choice to pursue renewable energy across multiple motivations.

Local governments in Southern Gippsland are committed to reduce carbon emissions. In August 2019 Bass Coast Shire Council declared that climate change poses a serious threat and should be treated as an emergency. To this purpose the Councillors carried a motion that will see Council develop a Bass Coast Climate Change Action Plan 2020–30. It will also include a target of zero net emissions by 2030 across Council operations as well as the wider community. Prior to this, they had set a target of 50 per cent reduction in carbon emissions by 2025 from 2009–10 baseline, and have already installed over 150kW of solar panels on Council buildings.

South Gippsland Shire Council has a target of 20 per cent reduction in carbon emissions by 2020 also based on 2009–10 levels. They do not currently have a renewable target.

Interviews with local government representatives found that they are generally supportive of large- and small-scale renewable energy and have the political appetite to take action. Both local governments have a number of renewable energy and energy efficiency projects in the pipeline and have a desire to collaborate with other councils and local stakeholders to explore project options (see Section 3.2).

Survey respondents and other interviewees highlighted the need for the region’s local governments to continue and step up the support for local renewable energy development. Local governments are uniquely positioned to support the local renewable energy transition, due to their role as leaders, existing experience, expertise and knowledge in renewable energy and the ability to access funding. People identified a role for local government in facilitating or trialling local renewable energy generation options, local energy trading and energy efficiency measures in the community, as well as driving best practice community engagement and benefit sharing in large corporate renewable energy developments.

However, local governments also face a number of challenges. Interviews with local government representatives raised the challenges of limited budgets and that they are often balancing conflicting priorities and mandates. Spending for roads and other essential infrastructure and services usually comes first. Energy generation or the provision of energy infrastructure (e.g., electric vehicle (EV) charging stations) is not considered part of their core responsibility. In addition, their primary role as land use planners, can lead to real and perceived conflicts, where planning for population growth and protecting public interest, landscapes and the natural environment has to be reconciled with business activities such as agriculture, tourism and infrastructure development.

The strengths and challenges of local government, as raised in interviews, is presented in Table 5.

Table 5: Summary of local governments’ strengths and challenges

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Commitment and appetite for emissions and energy cost reductions</td>
<td>• Lack of funding</td>
</tr>
<tr>
<td>• Expertise and knowledge of renewable energy and sustainability projects</td>
<td>• Conflicting priorities</td>
</tr>
<tr>
<td>• Desire to collaborate and to facilitate projects</td>
<td>• Changing priorities</td>
</tr>
<tr>
<td>• Leadership role in the community</td>
<td>• Perceived difficulties in collaborating with community energy projects</td>
</tr>
</tbody>
</table>

Source: Interview data

Southern Gippsland has been installing renewable energy for some time. The region has up to 176MW existing renewable energy capacity consisting of rooftop solar, solar farms and wind farms. It is host to three large-scale wind farms with a total capacity of 139MW and has a combined 37MW of small and medium solar PV installations generating clean energy (see Table 6).

Southern Gippsland’s total annual electricity consumption is 512GWh per year (see Table 6). Existing installed renewable energy generation is enough electricity to power the equivalent of 600,000 average Victorian homes. In addition, the capacity of projects in the pipeline would add another 268MW of solar and wind energy across the region.

Table 6: Annual electricity use and renewable energy generation statistics

<table>
<thead>
<tr>
<th></th>
<th>Bass Coast Shire</th>
<th>South Gippsland Shire</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total energy use</td>
<td>236.6GWh</td>
<td>275.5GWh</td>
</tr>
<tr>
<td>Total renewable energy generation (incl. small scale solar and large scale solar and wind)</td>
<td>53.5kW</td>
<td>122.5kW</td>
</tr>
</tbody>
</table>

Source: South Gippsland Shire Council (2019); http://www.cleanenergyregulator.gov.au/RET/Forms-and-resources/Postcode-data-for-small-scale-installations

Figure 3 shows current renewable energy installations across Southern Gippsland. The numbers indicate installed kW on renewable energy generation. Where they are individually named, these are individual projects over 100kW. Where it is simply a number, this represents the aggregated rooftop solar PV installations in that area, where each installation is under 100kW.
3.1. Small Scale Generation

Local engagement in renewable energy is demonstrated through the fact that 25.5% of all dwellings in South Gippsland have solar installations, and 18.8% in Bass Coast, compared with the state average of 15% rooftop solar. As shown in Tables 7 and 8 below, rates of household installation of solar PV and solar hot water has been consistently on the rise in recent years. This results in a total installed capacity of 35.3MW of small rooftop PV.

For the purposes of this Roadmap, we define small scale as 5-99kW (scaled to the needs of individual households and businesses and able to access small scale renewable energy certificates).

Table 7: Domestic solar photovoltaic panels and solar hot water uptake rates in Bass Coast Shire

<table>
<thead>
<tr>
<th>Description</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small-scale solar panel system installations (no.)</td>
<td>2,975</td>
<td>3,234</td>
<td>3,638</td>
</tr>
<tr>
<td>Increase in installations from previous year (%)</td>
<td>10.1</td>
<td>8.7</td>
<td>12.5</td>
</tr>
<tr>
<td>Solar hot water installations (no.)</td>
<td>1,730</td>
<td>1,815</td>
<td>1,910</td>
</tr>
<tr>
<td>Increase in SHW installations from previous year (%)</td>
<td>5.6</td>
<td>4.9</td>
<td>5.2</td>
</tr>
</tbody>
</table>

Table 8: Domestic solar photovoltaic panels and solar hot water uptake rates in South Gippsland Shire

<table>
<thead>
<tr>
<th>Description</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small-scale solar panel system installations (no.)</td>
<td>3,145</td>
<td>3,522</td>
<td>4,011</td>
</tr>
<tr>
<td>Increase in installations from previous year (%)</td>
<td>12.7</td>
<td>12.0</td>
<td>13.9</td>
</tr>
<tr>
<td>Solar hot water installations (no.)</td>
<td>1,717</td>
<td>1,905</td>
<td>2,106</td>
</tr>
<tr>
<td>Increase in SHW installations from previous year (%)</td>
<td>11.6</td>
<td>10.9</td>
<td>10.6</td>
</tr>
</tbody>
</table>

The DELWP Solar for Public Buildings program has installed small-scale solar PV systems on 15 public buildings across Southern Gippsland. The program seeks to increase community awareness around the benefits of solar, reduce reliance on fossil fuel energy, and enhance funds enabling the volunteer committees to further improve resources.

There are a number of small-scale wind and hydroelectric generators powering homes and businesses throughout Southern Gippsland. For example, local business Trentleck has installed a number of 800kW to 4kW run-of-river hydroelectric systems. There are 8 known 1-1.5kW turbines installed in the region, with a total capacity of 11kW.
3.2. Medium-scale generation

Medium-scale generation (defined here as installations over 100kW and under 10MW) in Southern Gippsland is being driven by community organisations, indigenous organisations, small- and medium-sized businesses, and local governments. Medium-scale projects can generate the equivalent of the electricity needs of businesses and small towns and villages.

The last decade has seen growth in community-owned renewable energy in Australia, encompassing community-led supply (energy generation, distribution and retail) and demand side (energy use, including energy efficiency) activities. Across the country, there are 105 community energy groups and four of these are based in Southern Gippsland (figure 5). Victorian government policies and programs, such as the New Energy Jobs Fund and the Community Power Hubs Pilot Program, have supported the growth of community energy.

Since the establishment of the Community Power Hub in Latrobe Valley, a survey has found that local awareness about community-owned renewable energy, its benefits and opportunities has risen (58% to 75%). The locals were increasingly familiar with new renewable energy project developments. The survey also found that support for the development of local community renewable energy projects is very high (90%), and this has increased since 2017. The community identified community energy as having the benefits of being “cleaner energy/less pollution” as well as “cheaper energy”. The positive perception of community energy can be closely linked to the work of the Community Power Hubs which more and more people know about.

Box 3: What is community energy?

The Coalition for Community Energy defines community energy as: “The wide range of ways that communities can develop, deliver and benefit from sustainable energy”. Individually- or collectively-owned energy projects offer a number of benefits at the local level and empower consumers to influence the social context of the energy transition. Communities are strongly motivated to participate in energy issues to ensure strong environmental and social outcomes. Outcomes from community energy encompass direct and indirect local economic benefits, e.g., employment opportunities; new pathways for environmental volunteering and climate action; and a new model to engage around renewable energy, benefitting the broader renewable energy sector and consequently the climate. Community energy has the potential to leverage the organisational resources — time, money, land, rooftops, etc. — of thousands of new actors in deploying renewables and other clean energy solutions and generate local benefits. It also means putting people at the centre of the energy transition and consequently ensuring that everyone can participate and benefit.

Source: C4CE (2019)

Figure 5: Community energy groups across Victoria

Source: Community Power Agency (2019)

The known community energy projects based in Southern Gippsland are showcased in Table 9 below. These projects are enabling local communities to co-own, produce and manage renewable energy at scales larger than is possible at the household level.

14 This community survey was conducted by Wallis Research on behalf of Sustainability Victoria. It run in two waves among residents of Ballarat, Bendigo and the Latrobe Valley to determine changes in local attitudes to community energy as a result of the presence of the Community Power Hubs. The survey used a random sample to select 450 interviewees and implemented by using Computer-Assisted Telephone Interviewing (CATI).
Established in 2009 to “work together towards a zero-emissions community”

- Public information, events and stalls
- Installed 650kW rooftop solar in 2009–2011 via a bulk-buy scheme
- Installed 92kW solar photovoltaic with 43kWh storage at State Coal Mine Wonthaggi
- Est. the Southern CORE Fund to fund renewable energy projects on community buildings via revolving zero-interest loans
- Supporting Totally Renewable Phillip Island
- Partner to establish Co-operative Power Australia, a community-owned energy retailer

Latrobe Valley Community Power Hub

The Victorian Government provided funding for three community power hubs across Victoria, including one in the Latrobe Valley (hosted by the Gippsland Climate Change Network). The hub supports communities to access the skills and expertise required to establish community renewable energy projects

- Gippy Bulk Buy: 320kW installed on homes, including some in Southern Gippsland
- a number of other community energy initiatives outside the Southern Gippsland region

Mirboo North Community Hub

A local, community-owned organisation established to inform on energy efficiency practices and renewable energy technologies

- Conducted energy efficiency initiatives, battery storage information nights, and renewable energy technology shows
- Installed Solar on council-owned community facilities, eg., Town Hall, library, and neighbouring church
- Future plans for mid-scale solar, wind and/or hydropower (see Section 6.5.5)

Totally Renewable Phillip Island

Established in 2018 to build local partnerships and coordinate efforts to achieve zero emissions by 2030, including electricity, transport, heat and land use

- Plans for electric vehicle charging ports
- Carbon farming initiative working with Landcare to match farmers with people wanting to ‘inset’ their emissions through sequestering carbon in plants and soil
- Plans for composting and bioenergy production from waste sources
- Investigating a renewable-energy-powered community microgrid

In addition to community renewable energy groups, there are two community climate change networks that operate in Southern Gippsland: the Gippsland Climate Change Network and the Southern Gippsland Climate Action Alliance. Both play an important role in promoting low-carbon energy options and in educating the public on related issues.

Other important proponents of medium-scale renewable energy generation are local governments and government agencies (e.g., water corporations), and large energy-using industries.

Local councils in Southern Gippsland are committed to reducing their carbon emissions, as well as supporting their local community to do so. Bass Coast Shire Council has declared a climate emergency and is in the process of developing a Bass Coast Climate Change Action Plan 2020–30, with the aim to implement a target of zero net emissions by 2030 across Council services as well as the wider community. South Gippsland Shire Council has a Greenhouse Gas Reduction Plan with a target of reducing Council’s emissions by 20 per cent on 2009/10 levels by 2020.

Steps taken by local government to achieve these targets include: solar photovoltaic installations, batteries and energy-efficiency measures on Council assets, developing electric-vehicle infrastructure, considering power purchase agreements of renewable energy for their own electricity consumption and exploring the potential for renewable energy generation projects in the region. For example, one local council has replaced inefficient streetlights with energy efficient ones and is achieving ongoing annual cost savings for Council of more than $70,000. Bass Coast Shire has recently completed the new Cowes Transit Centre which includes four electric-vehicle-charging connections with two types of chargers with two spaces allocated. South Gippsland Shire have enabled Environmental Upgrade Agreements, a mechanism that allows businesses to access loans from Council to install renewable energy and energy efficiency upgrades, with the loan repayable over time through the owner’s rates.

All Victorian water authorities, including the two operating in Southern Gippsland — Westport Water and South Gippsland Water — are mandated to reduce greenhouse gas emissions to zero by 2050. As such, they are investigating and implementing a range of energy efficiency, renewable energy generation and waste management options to meet this target. South Gippsland Water was the first water authority in Australia to install wind-powered mixers at two waste-water treatment plants (Toora and Inverloch, pictured below). Other initiatives include installing solar PV and trialling the supply of Class B water to agriculture business to reduce energy use associated with additional water processing.

Table 9: Community energy organisations active in Southern Gippsland

15 Bass Coast Shire Council (2019); 16 South Gippsland Shire Council (2016); 17 Ibid; 18 Water quality is defined from A (highest quality) to C (lowest quality). Some water corporations make lower quality water available for agricultural and horticultural customers. Westport Water is currently trialling this scheme. See: Western Water (2018).
Figure 6: Wind powered mixer at the South Gippsland Water treatment plant, Toora.

Source: South Gippsland Water Corporation

Two businesses and an independent school have installed medium-scale solar photovoltaic panels on site:
- 255kW at Select Produce in Korumburra
- 243.2kW at Newhaven College in Cowes
- 199.6kW at Aeroten in Leongatha

3.3. Large-scale generation

At present, Southern Gippsland has few large-scale renewable energy generation facilities, defined here as projects over 10MW. While there are three large-scale wind farms and one large-scale bioenergy plant, there are currently no large-scale solar or hydroelectricity plants.

3.3.1. Existing wind farms

Southern Gippsland has excellent wind conditions and has three large-scale wind farms generating a total capacity of 139MW. South Gippsland is home to two of Australia’s first MW-scale wind farms.

Bald Hills Wind Farm

The largest and most recently-completed Gippsland Renewable energy project is the Bald Hills Wind Farm, developed by Mitsui & Co. (Australia) Ltd and fully commissioned in February 2015. The wind farm is located approximately 10 km south east of Tarwin Lower in South Gippsland and is connected to the national electricity grid at Leongatha South. It comprises 52 turbines and has a total generating capacity of 106.6MW (380,000MWh annually). The wind farm has permanent operations and maintenance staff of 10 people, based on-site.


There has been some local concern about the existing Bald Hills Wind Farm causing noise disturbance for nearby neighbours. Noise complaints have led South Gippsland Shire Council to commission an independent study into the noise impacts of the wind farm. Strict noise limits are included as part of all wind farm planning approvals, and Bald Hills has been found to be within the permissible levels allowed under the Planning and Environment Act.

Wonthaggi Wind Farm

Wonthaggi Wind Farm is owned and operated by Energy Developments Limited (EDL) and started operating in 2005 and is located in the western outskirts of Wonthaggi in Bass Coast Shire. It has six wind turbines with a total generating capacity of 12MW of electricity.

Toora Wind Farm

Toora Wind Farm was one of Victoria’s first commercial wind farms, commencing operating in 2002. It is located north of Wilsons Promontory and has 12 turbines, with a total capacity of 21MW. The site is owned by five farmers who lease access to Transfield Services Infrastructure Fund Australia. The farm continues to be used for dairy and cattle farming.

3.3.2. Existing bioenergy plants

There are six bioenergy plants in Gippsland currently being used in the timber, paper and horticulture industries. The generated energy is used by the owners in their respective industries, for example, drying timber, producing paper and raising plant seeds.

Saputo Dairy Australia Pty Ltd (formerly Murray Goulburn) in Korumburra has a decommissioned 28 megalitre anaerobic bio-digester which generated 1.7GWh per year. The biogas was used to run their boilers and produce heat for factory processes.

19 Bald Hills Wind Farm Pty Ltd, 2019.


22 MATCH-Australia (2019).

23 Interview data.
3.4. Status of the electricity network

The NEM provides an interconnected electricity network across eastern Australia including Queensland, New South Wales, the Australian Capital Territory, Victoria, South Australia and Tasmania. The electricity network operates at two main levels: high voltage transmission lines (transmission network) and lower voltage distribution lines (distribution network). Because the electricity network is a dynamic system, the task of balancing electricity demand and supply needs across the network (and its sub-regions) is complex and influenced by many different factors. These factors include: the capacity of the lines and the substation; the presence of smart meters; and the ability to shed excess electricity, actively control demand, store electricity and dispatch/generate electricity on demand. The electricity network has a finite amount of capacity to transfer power, in a similar way that water pipes can transport only so much water. Higher voltage lines can transmit greater capacity. Where the grid is unable to accept any further electricity, restrictions come into play which can: a) curtail existing connected generators, thereby limiting the amount they are allowed to feed into the grid at any given moment; and b) limit the amount of new generation capacity that can be connected.

Despite the proximity to the Latrobe Valley and its substantial electricity infrastructure, the capacity to connect new distributed generators in Southern Gippsland is somewhat limited by the size (capacity) and status of the electricity network. The high voltage transmission network (500kV and 200kV lines) between Melbourne and Gippsland were designed to transfer large volumes of power from coal-fired power stations in the Latrobe Valley to load centres in and around Melbourne. As these generators reach the end of their lives and withdraw from the electricity system, there may be opportunities for renewable energy generators to leverage the existing high capacity transmission infrastructure by connecting new generation into the area. However, it is important to remember that transmission lines operate ‘point-to-point’ and electricity may only be inserted or extracted at a terminal station or substation. Even the closest areas of Southern Gippsland are at least 30km from the closest terminal station that would allow connection into a transmission line. Therefore, it is not likely to be commercially viable to connect new renewable generation projects under 100MW into the transmission network, and costs will be higher the farther the project is from a transmission substation.

Instead, new renewable energy generation in Southern Gippsland is likely to look at connecting into the lower voltage distribution network (66kV and 22kV lines) across the region. These lines have varying capacity to take on new connections, but are likely to be able to accommodate small- and medium-scale projects. Indications are also subject to change as circumstances change, options are developed and more detailed investigation is done. Where new projects are: paired with storage, matched to on-site electricity usage (behind-the-meter) and promote active demand management and/or voltage control services with the network operator, there is additional scope for larger projects to be more viable. Some developers are considering integrating such solutions into their project design in order to manage network constraints and challenges.

Southern Gippsland is part of the East Region of the AusNet Distribution Network. The main electricity infrastructure in Southern Gippsland is the 66kV distribution loop from the Morwell Terminal Station (MTS) to Leongatha (LGAS) to Foster (FTP) to Wonthaggi (WGI) to Phillip Island (PHI) (see Figure 8). This network supplies 50,672 customers via four zone (distribution) substations at Leongatha, Foster, Wonthaggi and Phillip Island. All four of these substations have medium capacity to connect new electricity generation capacity (see Figure 8).

In addition to the 66kV distribution lines shown in Figure 8, there is a network of lower voltage distribution lines (11kV and 22kV) across Southern Gippsland. It will also be possible to connect appropriately scaled distributed generation into these lines.

South Gippsland is also known for a great number of Single Wire Earth Return (SWER) distribution lines, which typically supply low-density areas of the network. SWER lines also have associated maintenance issues (e.g. tree falling across lines) and therefore supply risks to customers. Communities supplied by SWER lines typically have less reliable electricity supply.

AusNet Services, the transmission network company, has identified that this loop "has energy risk over the peak tourism season of Christmas and early January." They report that local renewable energy generation (the Bald Hills Wind Farm) "generates sufficient output to eliminate the risk of overload under single contingency, and for most of the time." Or put more simply, the presence of a local wind farm increases the energy security of the region at times of peak tourist demand. The status of the four zone (distribution) substations in the Southern Gippsland region and their likely available capacity to connect new generation is shown in Table 10. AusNet Services propose that possible solutions to further increase the strength and stability of the loop include:

- "Contracting network support via embedded generation connected to LGAS, WGI or PHI, to offset demand during risk periods";
- "Contracting for network support via demand management, to reduce demand during supply risk periods".

There is scope for new local renewable energy generation and community energy projects to play a role in providing such services to the network.
To manage network constraints the network operators can work with electricity customers and/or generation owners and developers to support the network through demand management. Demand management is where the network can ask customers to reduce load in response to network constraint, or bring dispatchable generation or storage online. In the future, the opportunity could be for batteries located in residences and businesses or large-scale (‘community’) batteries with renewable generation to support the network.

3.5. Status of renewable energy education and training

An important part of the energy transition is ensuring there are adequate numbers of appropriately qualified personnel to develop, manufacture, install and maintain the necessary components and equipment. Given the proximity to the Latrobe Valley, the existing workforce has training in a range of energy related fields. However, re-training in renewable energy-specific skills and qualifications will be required to enable this segment of the workforce to feel confident in the energy transition. In addition, attention will need to be paid to providing re-training and re-employment pathways for existing and (particularly) mature members of the workforce, alongside creating opportunities for younger workers.

Renewable energy-related training and accreditation courses are not currently provided through Southern Gippsland training institutions (e.g., Technical and Further Education (TAFE) Gippsland’s Leongatha Campus, Community College Gippsland). Unions and industry bodies are seeking to address this gap. There are, however, relevant training opportunities within a two-hour commute. Yallourn Campus of Gippsland TAFE in the Latrobe Valley offers the local workforce basic and further training in renewable energy. Through their New Energy Technology Systems course, electricians access training to become accredited renewable energy installers. The planned Gippsland Hi-Tech Precinct in Morwell will be a centre for research, business incubation, new product development, startup support, and education and training. It will involve collaborations with the Gippsland Tech School, a skills-based secondary school focusing on food and fibre, health, new energy and advanced manufacturing education.

The anticipated growing demand for qualified personnel in the renewables sector is also being addressed by the Electrical Trade Union (Victoria) which collaborates with the industry to develop training such as the Certificate IV Photovoltaic Energy Qualifications Program offered at the Holmesglen Institute in Melbourne.
3.6. Status of renewable energy supply chains

Southern Gippsland currently has 21 energy-related businesses, including businesses specialising in energy efficiency and renewable energy design, engineering, installation and maintenance. At least nine of these are renewable energy specialists, including businesses such as Gippsland Renewable Energy Technologies, Gippsland Solar, Island Energy, Burra Electrical Services and EcoSmart Solar.

Local renewable energy manufacturing and service industries can help drive economic diversification and create new jobs in local economies. While there are few businesses of this nature based in Southern Gippsland, there are a number in the broader Gippsland region. Within Southern Gippsland, LafargeHolcim supplies concrete, an essential component for many renewable energy farms, and there are a number of local earth moving businesses. More broadly, Trentleck (based in Narracan) produces solar racking systems; GridEdge (in Yarram) assembles batteries; Alternate Energy Innovations (in Morwell) produces wind turbine towers; and Earthworker Cooperative (in Morwell) produces solar hot water systems. The EnviroMicroBio Lab (in Newborough) offers services and training on anaerobic biodigester. The Latrobe Valley Authority is working with local industry partners to stimulate the growth of a Gippsland-based renewable energy manufacturing and services sector, including in Southern Gippsland.

At present, a majority of renewable energy componentry (e.g., solar panels) is imported into the region, much of it from overseas.

Box 4: Case Study - Trentleck

Trentleck is a small, family-run energy efficiency and renewable energy business based in Narracan, just outside the boundary of Southern Gippsland. Since establishment in 1991, they have supported local households and businesses to install small- and medium-scale hydro, biogas, solar and wind as well as solar hot water. Trentleck provides end-to-end service from design and engineering through installation and maintenance to help households and businesses access the simplest and most cost-effective renewable energy solution. They employ four local people full time and a number of local contractors.

As a local business, they value the importance of supporting other local businesses. In their production of ground mounts for solar PV, they use compressed recycled tyre rubber components in their roof mount framing systems, along with local labour, Australian steel and local business partners.

Training local people is important to them. They are committed to supporting young people to get their 'white card' (construction induction), as well as mentoring them to enter the workforce. This includes supporting them to create a resume, set up an Australian Business Number and superannuation, as well as helping them to understand tax and tax file numbers. They also help people understand their options for getting formal qualifications to support their renewable energy work. In Trentleck’s experience, this form of support is not readily available to people in an all-in-one package to help school-leavers transition into the workforce.

4. Roadmap methodology

The development of the Roadmap is underpinned by an in-depth Community Engagement Strategy (Appendix 1) designed to inform, engage, involve and empower local communities and stakeholders in the process. A range of engagement activities was used to gather community input and involvement to inform the development of a Roadmap which would be tailored to the unique vision and opportunities for renewable energy in the Southern Gippsland region. This included getting input from the community on:

- The vision and aspirations of the community with regards to renewable energy
- Potential roles for different stakeholders
- Desirable types, scales and locations for renewable energy development
- Desired levels of community involvement and forms of benefit
- Potential education and skills outcomes from a regionally-coordinated approach to renewable energy development

Community engagement activities involved over 380 people through small-group interviews, an online survey, a participatory online mapping process, a series of visioning workshops, a business workshop and a project opportunities workshop (see Table 10). The draft Roadmap and an opportunity to provide feedback were emailed to all participants, of whom seven responded.

Table 11: Number of participants in the community engagement activities undertaken as part of the Roadmap development

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number of participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Four community visioning workshops (Wonthaggi, Kilcunda, Korumburra, Koonwarra)</td>
<td>71</td>
</tr>
<tr>
<td>Three small-group interviews with local government representatives</td>
<td>17</td>
</tr>
<tr>
<td>Three small-group interviews with southern Gippsland water corporations</td>
<td>12</td>
</tr>
<tr>
<td>Two small group interviews with large energy-using businesses</td>
<td>10</td>
</tr>
<tr>
<td>Two small-group interviews with large energy producers</td>
<td>2</td>
</tr>
<tr>
<td>One business and tourism meeting</td>
<td>2</td>
</tr>
<tr>
<td>One Renewable Energy Project Opportunities workshop</td>
<td>44</td>
</tr>
<tr>
<td>On-line survey (Survey Monkey)</td>
<td>139</td>
</tr>
<tr>
<td>Participatory mapping exercise (Engage Victoria)</td>
<td>82</td>
</tr>
<tr>
<td>Total number of engagements</td>
<td>382</td>
</tr>
</tbody>
</table>
4.1. Community visioning workshops

The Community Visioning workshops were open to the public, widely advertised and involved information provision about the Roadmap, renewable energy, the state of the electricity network and different possible modes of renewable energy development. This series of four workshops occurred early in the Roadmap development. Each workshop went for four hours.

Participatory activities were used to elucidate participants’ visions for renewable energy in the region and their perceptions of the strengths, opportunities, risks and challenges associated with pursuing increased renewable energy locally. Participants were also asked to identify points on a map where they felt certain types of renewable energy generation would be appropriate. These were later added to the Participatory Mapping exercise.

Notes were collected during the workshop (some written by participants themselves, and some by the facilitators). Notes were analysed thematically. A summary of workshop outcomes is included in Appendix 2. All data have been de-identified.

4.2. Business and tourism workshop

Local business and tourism associations were invited to participate in a workshop to identify their unique perspectives on renewable energy. This workshop went for three hours. The workshop and analysis process was the same as in the Community Visioning workshops. Notes were analysed thematically. A summary of workshop outcomes is included in Appendix 3. All data have been de-identified.

4.3. Project opportunities workshop

This workshop was held later in the Roadmap development and was used to explore specific renewable energy development opportunities that emerged through earlier consultations. Participants were diverse and influential stakeholders from the community, including community energy groups, traditional landowners and corporations, non-government, state and local government entities, renewable energy producers and subject matter experts. The workshop provided an opportunity for them to collaboratively explore tangible renewable energy deployment opportunities suited to the Southern Gippsland region. Outcomes from this half-day workshop fed directly into Section 4.3 of the report and can be found in Appendix 4. The topic areas explored were:

- Town/village-scale renewable energy generation and storage
- Bioenergy generation
- Sharing the benefits of medium- and large-scale renewable energy projects with local communities
- Community-owned mid-scale solar
  (e.g., led by indigenous organisations)
- local government collaboration

Source: Max Richter

Figure 9: Project opportunities workshop, Leongatha

4.4. Small-group interviews: local government, water corporations, large energy-using businesses

Small-group interviews were held with representatives from Bass Coast Shire Council, South Gippsland Shire Council, South Gippsland Water, Westernport Water, Gippsland Water, LafargeHolcim and Saputo.

Interviews followed a series of semi-structured interview questions (Appendix 5) as well as following the interests of participants. In each instance, two to four representatives of the organisation or business contributed to the interview. In one instance, only one representative was available.

Notes were taken and provided to interviewees for review and approval. Notes were analysed thematically and information has been de-identified as requested.
4.5. Public online survey

An online survey was developed using the Survey Monkey platform and advertised on the website and Facebook page of the Energy Innovation Co-operative, as well as via newsletters, media articles, posters and flyers. The survey consisted of 27 questions, designed to capture how respondents regard renewable energy and what their vision is for renewable energy production in their region (see Appendix 6). Survey questions used a combination of multiple choice, Likert scale and open-ended responses. The survey was open for 12 weeks.

The survey targeted residents, holiday-home owners, farmers and other business owners from the South Gippsland and Bass Coast Shires and received 139 responses. The majority of respondents (83%, 115 people) were local residents, living in either South Gippsland or Bass Coast Shires. The other 9 per cent and 8 per cent respectively were responding on behalf of a local business/organisation or were regular visitors or holiday-home owners. The anonymity of respondents was guaranteed.

Responses were analysed and written up (see Appendix 7).

4.6. Participatory mapping exercise

A participatory mapping exercise was enabled by the online Engage Victoria platform. The map invited participants to place markers indicating preferred technology options in preferred locations across Southern Gippsland. Participants could also choose to write a description of why they put the mark where they did, including why they felt this was (or was not) an appropriate place for the chosen form of renewable energy generation. The map was open for nine weeks and attracted 82 contributions. The full responses from the participatory mapping are included in Appendix 8, and the map can be seen in Section 6.5.

4.7. Document analysis and desktop research

In addition to community engagement activities, developing the Roadmap involved document analysis and desk-top research, including researching policy context, local demographics and history, local plans and strategies and previous renewable energy studies. Maps, demographic data, economic impact modelling and renewable resource data were sourced from REMPLAN.

In particular, desktop research involved doing an analysis of the East Gippsland Bright Future’s Renewable Energy Project and Latrobe New Energy Jobs and Investment Prospectus strategies with regard to the synergies with the Roadmap and the remaining gaps. The outcomes of this analysis are covered in Section 7 and in Appendix 9.

5. Renewable energy resources in Southern Gippsland

The region is endowed with excellent natural resources and beautiful landscapes. Bass Coast and South Gippsland are part of the Gippsland Basin which covers an area around 46,000 km2. The particular local geography with hills, high coastline and its specific business activities (agriculture and water treatment) lends itself to renewable energy generation. The following information on available resources is presented in no particular order and is drawn from Australian Renewable Energy Mapping Infrastructure, a website for map-based access to Australian spatial data on renewable energy potential as well as from REMPLAN modelling.

5.1. Wind energy resources

Gippsland has access to world class wind resources. The Global Wind Atlas states that the average wind speed is over 7.58 metres per second (shown in red on Figure 12, 13 and 14 below). The windiest locations are along the coastline and following the Great Dividing Range.

Figure 10: Map of average wind speeds across the world (deep red is the highest wind speed of >8m/s)

5.2. Solar radiation resources

Victoria has excellent solar resources by global standards. Figure 15 shows the average yearly solar exposure in Victoria, with much of Southern Gippsland performing as well as most of the southern half of the state. The global solar resource maps developed by World Bank Group show that the Southern Gippsland region has 4 to 4.8 kWh of daily exposure, compared, for example, with Germany which receives only 2.8 to 3.2 kWh and has 45 GW of installed solar photovoltaic.30

As shown in Figure 16, Southern Gippsland has comparatively low available rooftop space for solar capacity (MW) and annual energy output (GWh). Therefore, solar farms are likely to play a role in harvesting Southern Gippsland’s solar resources, alongside rooftop PV. Given the region’s well-established and valuable agricultural sector, there is scope to develop renewable energy in ways to complement and augment agricultural activities. Spacing and elevation of panel arrays allows light to penetrate to the ground at a level that supports growth of crops or forage grasses, while helping to retain soil moisture.

5.3. Hydroelectricity resources

Hydroelectricity has historically been the main source of renewable energy in Victoria. Southern Gippsland does not have appropriate sites for large-scale hydroelectricity and it is recognised by the Victorian government that new large-scale hydro schemes are unlikely.31 However, there are opportunities for small run-of-river hydroelectric systems (pico and micro hydro) and possibly some appropriate sites for small pumped hydroelectric storage. Pumped hydroelectric storage systems can use excess renewable energy from wind or solar to pump water into a high reservoir, to release through a hydro generator when electricity is required. As such, it can be used to support a secure and cheap national electricity grid with 100 per cent renewable energy. Old mine sites, such as those in Southern Gippsland, may offer potential for pumped hydroelectric storage.32
5.4. Bioenergy resources

There is strong potential for bioenergy in Southern Gippsland as the high levels of agricultural production in the region are conducive for bioenergy deployment. Many agricultural waste streams (dairy effluent and manure, crop wastes, poultry litter, forestry offcuts, etc.) can be converted into biogas (a renewable energy source consisting mostly of methane and carbon dioxide), liquid fuel and/or nutrient-rich solids. The anaerobic digestion process captures emissions from the organic decomposition process that would otherwise be released into the atmosphere and uses them as an energy source. Therefore, it is a more environmentally-responsible organics processing option than composting. The methane gas produced is burned to generate heat and/or electricity.

Biogas can be burnt to generate electricity and heat or upgraded into a transport fuel (biomethane) and can yield other useful by-products, such as fertilizer. The great benefit of bioenergy is that it adds value to existing waste streams and generates dispatchable (on-demand) renewable energy. In some cases it can be cheaper to generate than solar photovoltaic electricity.

The commercial and industrial organic waste streams available for bioenergy production in Southern Gippsland have been calculated by Sustainability Victoria (see Table 12 below).

<table>
<thead>
<tr>
<th>Waste Stream</th>
<th>South Gippsland LGA</th>
<th>Bass Coast LGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dairy manure/effluent</td>
<td>19,600 tonnes/year</td>
<td>18,900 tonnes/year</td>
</tr>
<tr>
<td>C&amp;I paper &amp; cardboard</td>
<td>1,846 tonnes/year</td>
<td>7,900 tonnes/year</td>
</tr>
<tr>
<td>C&amp;I organics</td>
<td>2,000 tonnes/year</td>
<td>7,400 tonnes/year</td>
</tr>
<tr>
<td>Plantation waste (bark &amp; bark left over from processing)</td>
<td>5,100 tonnes/year</td>
<td>-</td>
</tr>
</tbody>
</table>

Source: Sustainability Victoria (2016)

5.5. Marine energy resources

Marine energy includes wave, tidal and offshore wind energy. Victoria has world-class wave, tidal and off-shore wind resources. A vast number of different technologies are under development to capture wave energy including turbines that are either fixed to the shore or sea bed or which float on the water’s surface. Southern Gippsland is being investigated as the preferred site to host Australia’s first offshore wind farm, the Star of the South. This project is still in feasibility stages.

5.6. Green hydrogen

The strengths of Southern Gippsland’s renewable energy resources far surpass local electricity needs and the electricity network’s capacity to export renewable energy to other demand centres. As such, there is an opportunity to use ‘excess’ renewable energy to power the generation of green hydrogen. Hydrogen is produced by using an energy input to split water molecules into hydrogen and oxygen. Green hydrogen is produced when the energy inputs required come from renewable energy sources. Hydrogen can be used to fuel transportation and heating, thereby contributing to a renewable energy strategy that goes beyond renewable electricity production. Hydrogen generation and storage is still a very new industry, especially in Australia.

6. Southern Gippsland’s vision for a renewable energy future

The Roadmap provides an avenue to guide future energy opportunities in the region in ways that make the most of the abundant local natural resources and which deliver local benefits. The process of developing the Roadmap revealed community passion for being engaged in the region’s renewable energy future and revealed strong levels of support for certain technology choices, scales and modes of development. In particular, specific project opportunities were identified by stakeholders as being key to delivering renewable energy in ways that are most suited to the region and which will help to achieve the community’s vision. These things are covered in turn below.

Through the collaborative and iterative process of workshops, interviews, survey and participatory mapping, a strong local vision for Southern Gippsland’s renewable energy future has emerged. The future vision presented here is developed directly from the input and feedback received from local community members and stakeholders through the community engagement process.

6.1. A collective vision for renewable energy

Box 5: Southern Gippsland’s renewable energy vision statement

Southern Gippsland will show strong leadership in the renewable energy transition and continue to grow and adapt in a way that empowers and activates its people.

Through the development of energy partnerships, local households, communities and businesses will own, operate and benefit from renewable energy generation and use across the region.

Solar, wind, small-scale hydro and bioenergy will continue to grow at various scales throughout Southern Gippsland.

Renewable energy will be deployed by a range of actors and at a range of scales. All projects will engage the local community in positive ways and deliver benefits to the local community.

Southern Gippsland will develop renewable energy opportunities in ways that continue to protect and promote its natural assets, its clean green character and its strong agricultural base.

Emerging technologies such as microgrids, batteries, green hydrogen and electric vehicles will enable and support the distribution and decentralisation of these resources. Bioenergy from waste sources will be taken up as a means to support the agricultural sector through the generation of energy and fertilizer.

The local economy will be powered by renewable energy that is supported by infrastructure which is manufactured, deployed and maintained locally, ensuring a stronger, more diverse and equitable regional economy. This will require a commitment to local industrial development and job creation, which is underpinned by accessible mentoring, education and training programs.

The visitor economy and eco-tourism industry will continue to thrive and present opportunities to showcase the inspiring renewable energy story of Southern Gippsland.

By prioritising renewable energy access and equity, Southern Gippsland will engage all sectors of the community in the transition in a way that is inclusive, inspiring and generates hope. Focused energy education efforts will empower households and businesses to increase energy efficiency and reduce consumption, as well as supporting them to generate their own renewable energy.

Source: Collated from the visions for the region’s renewable energy future as expressed by workshop, interview and survey participants.
People in Southern Gippsland are hopeful and curious about having a plan to guide future renewable energy development in the region, seeing it as an opportunity for action, collaboration, learning and local benefit. Many residents welcome the roadmap as a means of “just getting on” with the transition and of “doing it quickly”. As summarised by one survey respondent: “I wish to see a system that brings much lower carbon emissions and energy costs in a way that is fair and equitable”.

Figure 14: The benefits of developing the South Gippsland Renewable Energy Roadmap, as identified by community visioning workshop participants

Survey responses revealed that people feel it is extremely important to utilise the renewable assets available locally, and a majority of people would like to see the region powered by 100 per cent renewable energy by 2030 or earlier, assuming it is technically feasible and cost effective. People view the transition to renewable energy as a pragmatic choice, describing it as “important”, “imperative”, “inevitable”, “necessary” and “overdue”. Contributing to increased sustainability, reduced carbon emissions and cost reductions were common reasons motivating the widespread support for regional renewable energy generation. Importantly, the survey revealed that 79 per cent (110 people) of respondents think there will not be any disadvantages from increasing renewable energy generation in their local area.

The collective vision for renewable energy in Southern Gippsland includes a strong focus on a range of technologies delivered at a variety of scales, in ways that create deep and genuine opportunities for community participation, ownership and benefit. There is a strong desire for renewable energy generation to complement existing land use practices and protect important and iconic ecosystems, while contributing to stronger local businesses and economies.

Energy efficiency is widely recognised as the essential first step which must not be forgotten in the plans to transition to renewable energy. In addition, there is a common desire to address social equity and energy justice issues through future development by creating opportunities for low socioeconomic and other marginalised groups to access the opportunities and benefits of renewable energy and energy efficiency. This includes energy efficiency, as well as opportunities for apartment residents and others who do not have/own suitable roof space and low-income households to own or invest in off-site renewable energy, as with solar gardens.26

Community engagement and education activities were identified as essential components to empower local people to engage with the opportunities and benefits of renewable energy. People are keen to see increased support for local households, organisations and businesses to reduce their energy use (e.g., energy efficiency audits, monitoring of daily energy usage). There is also a desire for establishing way that people can share resources and knowledge on renewable energy and energy efficiency options (e.g., via Community Power Hubs and/or supporting existing, relevant local organisations). There is a recognised need to increase local access to mentoring, training and tertiary education to support the development of a renewable-energy-ready workforce.

6.2. Technology preferences

Community engagement revealed a local appetite for a variety of renewable energy technologies (see Section 6.3). In terms of the most popular technologies, survey respondents indicated strong support for solar PV, particularly for households and businesses, but also as solar farms. Both on- and off-shore wind power also received high levels of support. Support for wind energy was far more common than concerns over possible adverse impacts, although this came with a need for good community engagement, appropriate planning/siting and sharing the benefits of the project with the local community. For example, of the 37 references to wind turbines or wind farms in an open question in the survey, 30 viewed wind power in a positive light, four were negative and three were neutral. Interviews reflected a high degree of alignment with regards to preferred technology choices, seeing wind energy as having the greatest opportunity (41 references), while also referencing solar (12), bioenergy (eight), tidal (18) and hydro power (13) yield potential.

36 Solar Gardens are solar PV projects that specifically seek to enable the locked out, vulnerable and low-income energy users to participate in solar. They are centralised solar arrays where consumers can purchase or lease solar panels with the electricity generated credited to the customer’s energy bill. The solar panels may be located off-site but the household receives a similar outcome as having solar on their own roof. In 2018, the New South Wales Government, University of Technology Sydney and Community Power Agency ran and evaluated trials of solar gardens and found that solar gardens are both feasible and desirable in some circumstances. For more information see: Institute for Sustainable Futures, 2018.
There was also strong interest in the use of micro-grids and embedded networks, as well as batteries for households and businesses. Bioenergy produced from wastes (e.g., crop, sewage, animal) was supported, in addition to wave and tidal energy. There was also interest in exploring green hydrogen and opportunities for repurposing old infrastructure (e.g., pumped hydro at old mine sites or existing reservoirs).

Southern Gippsland is also keen to take up the potential opportunities offered by electric vehicles, including accommodating charging stations powered by local renewable energy in key strategic locations for day and weekend tourists from Melbourne. Electric vehicles will offer bi-directional charging at solar homes and businesses, increasing energy self-reliance and affordability.

The importance of protecting ecology, preserving iconic landscapes and supporting existing land use is widely recognised. There is a desire for all future renewable energy development to occur in ways that are sensitive to these needs. The natural landscape is considered one of the region’s strongest assets which underpins many local economies, such as agriculture and tourism as well as contributing to making the region attractive for immigration. It was recognised that renewable energy generation offers the potential to complement existing farming practices and offer a diversified income base to local farmers, if planned and sited well. Experience indicates that wind and solar developments can integrate with agriculture, including grazing and cropping.37

Balancing renewable energy with other local considerations will require quality community engagement and undertaking project planning to develop locally-appropriate proposals.

6.3. Preferred modes of development

Local residents, organisations and businesses are keen to be involved in renewable energy generation and energy demand management in a variety of ways. A large majority of survey respondents (84 per cent or 117 people) indicated they are keen to know more about renewable energy and energy efficiency, and 77 per cent (105 people) of respondents are interested in taking part in energy efficiency programs and other programs to lower energy bills, 24 per cent (33) are not.

In workshops held across the region, participants assessed the importance of different modes of renewable energy development. The results indicate an appetite for a range of development types — from efforts that support households and businesses to install or source renewable energy, to community-led and community-scale renewable energy generation, to large-scale development. The option of pursuing renewable energy development in a way that supports local communities to become “zero-net energy”38 was also widely supported.

In smaller settlements (such as Korumburra and Kilcunda) people were strongly attracted to community-led and community-scale options, whereas larger settlements (Wonthaggi) were more likely to promote the importance for commercial and large-scale development. The results of participant rankings are displayed below in figures 19 and 20, first collated across all four workshops, then by workshop location.

<table>
<thead>
<tr>
<th>Source: Community visioning workshop data.</th>
</tr>
</thead>
</table>

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**Figure 15:** Survey results of respondents’ preferred renewable energy technologies

<table>
<thead>
<tr>
<th>Technology</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large-scale (grid) batteries</td>
<td>4</td>
</tr>
<tr>
<td>Residential / business batteries</td>
<td>3</td>
</tr>
<tr>
<td>Bioenergy from any source</td>
<td>1</td>
</tr>
<tr>
<td>Bioenergy from waste (e.g., animal, crop)</td>
<td>2</td>
</tr>
<tr>
<td>Pumped-hydro storage</td>
<td>5</td>
</tr>
<tr>
<td>Small-scale hydropower</td>
<td>6</td>
</tr>
<tr>
<td>Wind energy (off shore)</td>
<td>7</td>
</tr>
<tr>
<td>Wind energy (on shore)</td>
<td>8</td>
</tr>
<tr>
<td>Wave and tidal energy</td>
<td>9</td>
</tr>
<tr>
<td>Solar farms</td>
<td>10</td>
</tr>
<tr>
<td>Micro-grids &amp; embedded networks</td>
<td>11</td>
</tr>
<tr>
<td>Rooftop solar PV for homes/business</td>
<td>12</td>
</tr>
</tbody>
</table>

| Source: Online survey results. |

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**Figure 16:** Preference preference for certain modes of renewable energy development amongst all workshop participants
Survey responses similarly revealed an appetite for deploying a combination of various modes of renewable energy development, starting with a strong desire for the region to be as energy efficient as possible. Respondents want to see a mix of:

- Households and businesses generating and using their own electricity
- Communities owning renewable electricity generation
- People sharing and/or trading electricity with one another across a network
- Towns and local areas having their own secure electricity supply

The least-preferred option was for "large power plants to supply electricity to everyone across the state."

These results aligned with the scale of renewable energy generation facilities respondents would most like to see locally, which identified a pragmatic orientation to scaling renewable energy facilities in a way that is locally appropriate and cost effective, while offering a clear preference for small- and medium-scale generation (see Figure 19).

In terms of preferred scales of development: "Whatever is best suited to the area and makes sense economically" was selected by 64 per cent (89); this was the most popular option by a margin of 29 per cent. The two next most popular options were: "small-scale for individual households and businesses (e.g., 5–100kW)" with 30 per cent (43) and "medium-scale that can supply the equivalent energy needs of a small town (100kW to 10MW e.g., 1–5 wind turbines or 1.5 to 15 hectares of solar photovoltaic)" with 35 per cent (49). "Medium–large-scale that can supply the equivalent energy needs of regional centre (10–100MW e.g., 5 to 50 wind turbines or 15 to 150 hectares of solar photovoltaic)" was selected by 18 per cent (25) and 11 per cent (15) felt "large-scale that can position the region as a net energy exporter (over 100MW e.g. 50+ wind turbines or 150+ hectares of solar photovoltaic)" was most appropriate for the region. Only two per cent (3) did not have a preference.

Source: Online survey results.
There is strong and established interest in community-owned renewable energy projects in the region. Building on the strengths of existing community energy organisations (Section 3.2), there is scope to increase the number of community energy projects and to catalyse new community energy organisations and partnerships in other areas.

Box 6: Southern Gippsland resident’s visions for how renewable energy is deployed

Whether it be residential, commercial or public buildings, solar rooftops will become universal across Southern Gippsland. All appropriate rooftop sites will support solar photovoltaics and battery storage will operate where fitting. On-site solar will be backed up by local small-scale grid-connected solar farms.

Wind will continue to grow across Southern Gippsland at various scales — from large commercial developments with community benefit sharing, to mid-scale cooperatively owned projects, to small and micro wind on individual farms and properties. Wind installations will take advantage of offshore and coastal wind resources, as well as the rolling hills and ridges across the region. Wind farms will be welcomed because quality community engagement has ensured the project is appropriate for its context and that the benefits are shared fairly with project hosts, neighbours and the local community.

Bioenergy will be co-located near central waste and sewage sites (e.g., agricultural hubs), generating clean power, heat and fertiliser from waste products. Bioenergy will support and augment agriculture, providing a sustainable waste processing solution and generating fertilizer as a by-product. Bioenergy from native forests is not supported.

Through the integration of local renewable energy generators and intelligent decision-making platforms that enable energy trading/sharing, the supply and demand for energy will be locally balanced, avoiding the need for costly upgrades to transmission infrastructure. This network of interconnected and responsive microgrids will utilise both small- and large-scale batteries and will link many Southern Gippsland communities to one another and to the wider network.

Source: Collated from the visions for the region’s renewable energy future as expressed by workshop, interview and survey participants

The survey explored people’s interest in investing in local renewable energy facilities, provided they offer a sound business case. This could include opportunities to invest in community-owned renewable energy projects, as well as opportunities to invest in large commercial developments. A significant majority of respondents (83 per cent) were interested in investing in local renewable energy facilities. Most people (31 per cent, 36) considered investing between $1,000 and $5,000; 20 per cent (23) between $5,000 and $10,000; 18 per cent were willing to invest over $10,000; another 18 per cent (21) between $500 and $1,000; and lastly, 13 per cent (15) would invest under $500. If each participant invested the amount nominated, this would come to between $3,365,000 and $73,800,000 invested from 115 people.

Interviews revealed an interest in collaborating to achieve energy-related goals. Collaboration is seen as a means to maximise economies of scale and address resource and knowledge gaps. Some large energy users are interested to work together with community energy groups to jointly develop local projects, or to purchase electricity from large commercial renewable energy projects.

In regards to purchasing renewable energy, one third (44) of survey respondents were prepared to pay between 28–30 cents per kWh — a little more than the current average price for electricity. Another third (43) would pay the same as the current average price of 28 cents per kWh. The other third was split between being willing to pay less than or significantly more than the current price. Six people did not respond to this question. A significant majority of participants (88 per cent) felt they would be more likely to buy local renewable electricity if it were from a community-owned electricity retailer, indicating future potential to explore community-based electricity retail (or ‘white labelling’ /franchising an existing one) and electricity trading options (e.g., via peer-to-peer trading platforms such as Enosi).

6.4. Desired community benefits

It is widely recognised that the transition to renewable energy will require large-scale projects led by corporate developers. Community engagement identified support for large-scale development of renewable energy (including solar and wind farms), although this came with a desire that such projects occur in a way that engages well with the local community, is sensitive to ecological protection, delivers benefits to the local community, is appropriately scaled and sited, and which supports existing land use practices.

Community benefit sharing involves sharing the rewards of renewable energy developments with local communities in a way that "integrates the development in the community by contributing to the future vitality and success of the region". It is based on a desire to establish and maintain positive long-term connections in the local area.

Figure 19: Mid-scale solar array at Wonthaggi Historic Mine Precinct, a project of the Energy Innovation Co-operative’s Southern CORE Fund

Source: Energy Innovation Co-operative.

39 Enosi (2019). 40 Lane and Hicks (2019).
Southern Gippsland residents see potential for medium- and large-scale energy projects to support local communities in a variety of ways, in addition to the standard lease payments made to landowners and the payments-in-lieu-of-rates made to local governments. Benefit sharing options include: neighbourhood benefit programs, grant funds, sponsorship, local training and procurement, community co-investment and co-ownership and more.

From the workshops and interviews, there was wide-scale agreement that the financial benefits should be shared more equally to keep economic returns in the region. There is also a strong appetite for medium- and large-scale generation to be community-owned or have opportunities for community co-investment or co-ownership.

The survey asked people to identify desired direct benefits from new medium- and large-scale renewable energy generation. These include:

- Offers of sponsorship to local community groups
- Community grant funds
- Direct benefits to neighbours close to project
- Greater community control over electricity supply
- More affordable electricity
- Opportunities for the community to invest in /own the project
- Local training opportunities

In addition, people recognised that it was “very important” for such projects to have good relationships with the local community, including opportunities for the community input into plans and designs.

More broadly, people also recognised the valuable contribution large renewable energy projects can make to regional economic development, reducing greenhouse gas emissions and addressing climate change, and increasing local sustainability and resilience. In an open section of the survey, people raised the following additional desired benefits:

- The importance of education, both in relation to increased secondary education and job training opportunities, as well as educating people on the benefits of renewable energy
- The local economic benefits of local procurement of services and componentry
- The importance of developing renewable energy projects in a way that protects wildlife and local ecosystems, as well as being in line with the cultural identity of the immediate vicinity in which it is located (e.g., rural)
- The potential tourism benefits of having a strong regional focus on renewable energy, particularly with efforts such as the Totally Renewable Phillip Island initiative
- The benefits of “developing a co-operative ethos in townships” and of increased community connection.

6.5. Specific project opportunities

In terms of where to locate specific projects, the public workshops and the online participatory mapping process asked people to nominate appropriate sites for various forms of renewable energy development. The outcomes from this process are included in Figure 21 below. Collated outcomes show that participants proposed 21 sites for solar photovoltaic, 19 for wind turbines, eight for electric vehicle charging stations, six for tidal energy, four for pumped hydro storage, two for wave and two for geothermal. In addition, 21 contributions were classified as “other”; these were mostly comprised of multiple forms of co-located renewable energy (e.g., wind and solar, solar and pumped hydro storage) or forms of bioenergy.

This process revealed evident support from local people to host a variety of renewable energy installations and identified sites and project suggestions that warrant further investigation.

Figure 20: Suggested locations for certain types of renewable energy generation, as proposed by community participants through a collaborative mapping process

Source: Online and community visioning workshop participatory mapping exercise outcomes
Themes for specific project opportunities emerged from the community engagement process. These project opportunities are seen as being key to delivering renewable energy in ways that are most suited to the region and which will help to achieve the community’s vision as presented above. These ideas were further developed through a targeted workshop with representatives from local stakeholder groups with an active interest in taking these ideas further. The results of this process are included in sections 6.5.1 to 6.5.5 below.

These project opportunities are areas that warrant further investigation to determine their viability, feasibility and desirability in the Southern Gippsland context. Already, a number of local stakeholders are interested in taking these ideas forward.

6.5.1. Town-scale renewable energy and storage

Town or “village” scale renewable energy projects bring local stakeholders together to collaborate on the generation, consumption and storage of energy to the mutual benefit of themselves and the local community. Such schemes involve a range of scales and technologies to generate and store renewable energy, paired with options for micro-grids or embedded networks and active demand management. The identified possible benefits of this form of project include: lower energy costs for those involved, increased revenue to those who generate more power than they consume, increased energy efficiency and electricity demand management, improved reliability of supply (e.g., reduced risk of bushfire impact on supply), funding for community projects from surplus revenue generated and community education, engagement and empowerment.

The creation of a “village” renewable energy project involves partnerships and collaboration between a range of local stakeholders, including local residents, businesses, organisations, government, network operators, retailers and support agencies. By virtue of seeking to be village or town scale, such projects seek to engage and benefit all sectors of the community, including marginalised and disadvantaged people. Such projects can tie in very well with broader visions to become zero-net energy communities.

Southern Gippsland is home to many towns and villages that could benefit from this mode of renewable energy development, including remote end-of-line communities and medium-sized towns proximate to main distribution lines. Several communities are developing plans for model cases at the differing scales, e.g., Sandy Point/Fish Creek and Phillip Island. Plans are being developed with locally available expertise and learning from other areas such as Uralia, Yackandandah and Mallacoota, but tailored to Southern Gippsland-specific factors and contexts.

6.5.2. Bioenergy opportunities from waste products

Opportunities to pursue anaerobic digestion as a means of generating bioenergy from waste products offers a holistic way of managing organic waste while also producing energy and fertiliser. Locally, there is interest and opportunity to investigate bioenergy co-located with sewage treatment plants, dairies, timber mills and other businesses that produce organic waste streams. The Latrobe Valley Authority is seeking to encourage bioenergy development across Gippsland, including in partnership with dairy and beef farms in Southern Gippsland.

Bioenergy presents opportunities for collaboration between multiple parties who need to manage a range of organic waste products. This will enable economies of scale and the ability to smoothly manage waste streams. In addition, anaerobic digestion often works best with diverse inputs, e.g., co-digestion of wastes such as dairy waste, forestry waste and other organic waste.

REMPPLAN modelling suggests that a 10MW Biomass generation facility requires an investment of $46 million. Of this expenditure, it is estimated that $18 million would be captured in the Victorian economy, including:
- $12 million in regional Victoria
- $1.9 million in Southern Gippsland

Once operational, a 10MW Biomass generation facility would typically generate gross annual revenue of $3.307 to $3.5 million and provide power for up to 14,118 homes.

The overall estimated economic uplift for Southern Gippsland would see $3.2 million in local revenue, nine local jobs and $1.2 million in local added value during construction. Once operational, it is expected that $5.9 million local revenue, 15 local jobs and $2.4 million local added value would contribute to ongoing economic development of the region.

6.5.3. Sharing the benefits through partnerships with large-scale renewable energy developers

The region has good resources for large-scale energy production, especially on- and off-wind but also solar, wave and tidal. Community consultation has revealed an interest in shared benefits between communities and renewable energy developers for future medium and large-scale renewable energy projects. Importantly, community and technical experts alike are expressing strong interest in better understanding benefit sharing across different scales of energy production, especially aggregated medium-scale and single large-scale projects, and in contributing to the formulation of a Gippsland-wide approach. Offering benefits to near-neighbours of proposed projects (as well as to project hosts) should be seen as a minimum required level of benefit sharing. In addition, forms of benefit sharing with the broader community will also help integrate the project into the local community in a way that is welcomed.
Opportunities exist to pool the financial benefits from multiple projects into a central fund to contribute to strategic, long-term regional impact. For example, such a collective fund could:

- Resource the education and training required to ensure local workers and business can participate in the local renewable energy transition
- Fund energy efficiency and general energy education to support households (especially low-income) and businesses to reduce their energy use and costs
- Support local community energy initiatives with feasibility studies and seed funding

Such a fund could be delivered in partnership with existing high-impact organisations that are working on these goals within the region, such as the Energy Innovation Co-operative and the Latrobe Valley Community Power Hub.

In addition, there are strong opportunities for community co-investment and co-ownership of future renewable energy developments. Delburn, a proposed new wind farm in South Gippsland Shire, is investigating community co-investment options, alongside neighbourhood benefit sharing and a community grant fund.

The impact of new large-scale generation would be significant in the local economy. REMPLAN modelling indicates that a 50MW wind farm would typically require an investment of $113 million. Of this expenditure, it is estimated that $31 million would be captured in the Victorian economy, including:

- $10.2 million in regional Victoria
- $1.4 to $1.5 million in Southern Gippsland

Once operational, a 50MW wind generation installation would typically generate gross annual revenue of $8.5 million and provide power for up to 28,235 average Victorian homes. In addition, a 50MW wind farm would generate $2.7 to $2.9 million in local revenue, eight local jobs and $1 million local added value in the construction phase. In the longer term, the project could add $2–2.8 million, two to four local jobs and $0.9–1.2 million added value to the local economy.

International and national studies have confirmed that community (co)ownership or (co)investment can dramatically increase the local economic benefit of a renewable energy project. For large-scale renewable energy projects, the economic benefit derived from locally-owned projects is up to seven times greater than it would otherwise have been (see Table 11). This is due to greater use of local content, including more local jobs and contractors, larger and more appropriately targeted benefit sharing programs and local investors/owners spending their profits in the local community.

<table>
<thead>
<tr>
<th>Country</th>
<th>Absentee/Corporate owned</th>
<th>Community/Locally owned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>€7 million over life of project</td>
<td>€55 million over life of project</td>
</tr>
<tr>
<td>UK</td>
<td>£1,000-5,000/MW/year</td>
<td>£200,000-250,000/MW/year</td>
</tr>
<tr>
<td>USA</td>
<td>$13,000-55,000/MW/year</td>
<td>$82,000-140,000/MW/year</td>
</tr>
<tr>
<td>Australia</td>
<td>$500-1200/MW/year to community fund</td>
<td>$5,000-8,000/MW/year to community fund</td>
</tr>
</tbody>
</table>

Source: Community Power Agency (2016)

6.5.4. Local government collaborative investments

Local governments are well placed to provide leadership in the transition to renewable energy. In particular, there are opportunities for collaboration among multiple local governments and between local government and other stakeholders in their LGA, such as with local businesses, community organisations and households.

Local governments naturally play a leadership role in the community and influence the long-term development in a region. They have strong organisational and administrative capacity, are large energy users, own large assets and have significant local presence and influence.

There are a range of collaborative projects or investments local government can lead, or get involved with, in an effort to work with others to meet local renewable energy goals. For example, members of the South East Councils Climate Change Alliance are investigating the viability of collectively tendering for a corporate Power Purchase Agreement (PPA) from renewable energy generators in order to meet their electricity needs. There is also interest in developing project structures that could enable councils to collaborate to develop jointly-owned solar projects across multiple council-owned sites. Such an arrangement could involve collaborations with other local businesses and organisations, including water authorities and initiatives such as Totally Renewable Phillip Island.

The benefits of such an approach include helping Council and others secure lower cost electricity while also delivering emissions reductions, greater uptake of renewable energy generation and securing greater socio-economic benefits for the region.
6.5.5. Mid-scale solar farms

There is significant interest from multiple local stakeholders in pursuing mid-scale solar PV farms. Opportunities exist for local indigenous organisations, farmers, local governments, large energy using businesses and community energy initiatives to install medium-scale solar PV (100kW to 10MW). Such a project would typically occupy between 0.15 and 15 hectares of roof space or land. Projects in this range can be scaled to match on-site demand (behind-the-meter), thereby attracting greater financial benefits than projects that sell electricity into the NEM at wholesale rates.

Aboriginal organisations are one stakeholder group in Southern Gippsland which is investigating mid-scale solar projects. Indigenous leaders and technical experts are exploring pathways to generate long-term positive impacts in health and education through income streams from solar farms. They are also seeking to use the solar farm as a means to offer training and employment opportunities to their communities.

Box 7: Case study - Project opportunities with Mirboo North Community Energy Hub

Mirboo North Community Energy Hub is planning a range of community energy projects for Mirboo North involving mid-scale renewable energy generation and small-scale, behind-the-meter (<100kW) generation. A feasibility study was undertaken into projects involving three different technology types — solar, wind and mini hydro. During the investigations size limitations were identified for nearly all potential mid-scale sites. AusNet Services advised that the local grid infrastructure had a capacity limit of up to 1.4MW on these sites before requiring significant and substantial financial investment to upgrade infrastructure. The organisation is now considering four potential projects:

- Solar (1.4MW) — Mirboo North
- Solar (<100kW) — South Gippsland Shire
- Wind (1MW) — Mirboo North
- Mini Hydro (200kW) — Narracan

The mini hydro project has been assessed as the most promising opportunity while satisfying many of the community’s objectives and is proposed to be pursued immediately. However, the other options are still being investigated. The solar farm (1.4MW) is under ongoing negotiations with potential sites, including Gippsland Water site. Preliminary discussions showed that Gippsland Water might lease the land at a favourable rate and that they would consider a Power Purchase Agreement with the developer.

The Mirboo Hub found that the community is fully supportive of community energy projects as they are seen as a means of returning social, environmental and economic benefits to the community.

Next steps for progressing the project ideas include setting up business cases for the development of the solar and wind projects, assessing the technical and financial feasibility of all sites offered by South Gippsland Shire for small-scale solar photovoltaic and seeking out other potential sites suitable for a mid-scale solar farm.


6.5.6. Other project opportunities

In addition to the above, the community engagement and research process revealed several other renewable energy project opportunities in Southern Gippsland. These include:

- The Latrobe Valley Authority investigating options for a regional approach to hydrogen generation and bottling, which could provide opportunities for renewable energy generators to use the electricity they generate on-site to produce hydrogen, rather than feeding it into the grid.
- Investigating the opportunities for microgrids (e.g., for adjoining farms), similar to OVIDA’s Solar Partnering Around Regional Communities/project in the Latrobe, Baw Baw and Wellington Shires or the ARENA Latrobe Valley Microgrid project41
- Building and/or assembling Redflow Batteries in Wonthaggi
- Direct Power Purchase Agreements between large energy users and local medium- to large-scale renewable energy projects
- Expanding local renewable energy manufacturing

In addition, the following large-scale projects are proposed developments that are still under investigation:

- Star of the South — A proposal to build Australia’s first off-shore wind farm is in the feasibility stage. It received an exploration licence from the Australian Government in early 2019. Feasibility investigations will assess local wind, seabed and environmental conditions and will help to confirm whether or not the project will be viable ahead of making a development application. The project is yet to undertake community consultation or apply for a development application. Already some community concerns have been raised, including concerns about the location, the onshore components of the proposed wind farm and impacts on local commercial and recreational fishing arrangements42.
- Marinus Link — a proposed project to build a second high voltage electricity interconnector (transmission cable) between Tasmania and Victoria. If the project proceeds, the cable would come ashore in South Gippsland, before traversing the Shire on its way to link up with existing transmission infrastructure in the Latrobe Valley. The feasibility study was released in February 2019.
- Delburn Wind Farm — is a 35-turbine, 200MW wind farm with 30MW of battery storage proposed by Australian renewable energy developer OSMI. The project is proposed to be co-located with a forestry plantation, overlooking the Hazelwood coal-fired power station and would traverse three shires in Gippsland — Baw Baw, Latrobe and South Gippsland.
7. Gaps and synergies with other Gippsland renewable energy plans

This Roadmap presents pathways towards a desired renewable energy future for Southern Gippsland, as informed by extensive community and stakeholder engagement in Bass Coast and South Gippsland. It is intended to complement work that has already been done in other parts of Gippsland to progress plans for renewable energy development. Essential to ultimately delivering an all-of-Gippsland approach to renewable energy development is understanding the synergies among the current plans that exist, and the gaps between them that must be addressed before a complete approach can be formulated. As such, this section reviews the gaps and synergies between this Roadmap and the existing East Gippsland Bright Futures’s Renewable Energy Project and Latrobe New Energy Jobs and Investment Prospectus strategies.

The Bright Futures Renewable Energy Project reports (2017, 2019) was developed by East Gippsland Shire Council and funded through the Commonwealth Government’s Community Energy Efficiency Program and the Victorian Department of Environment, Land, Water and Planning Climate Change Grants 2015 grants project funding. The final report, released in 2019, East Gippsland New Energy Technology Roadmap Business Case, was funded through the New Energy Jobs Fund Round 2.

The aim of the project is to “identify and investigate the opportunities for delivering long-term renewable energy solutions for the region”, motivated by a primary desire to reduce electricity costs.

The Bright Futures study is informed by a similar community engagement strategy to this Roadmap, including online and hardcopy community-wide surveys, public media articles, four forums in several locations, business interviews and stakeholder feedback. The engagement process determined that there is significant interest in the community and local businesses in pursuing renewable energy options in East Gippsland. The report predominantly targets household, business and community-led implementation of mature renewable energy technologies (mostly solar). The study assessed the status of the electricity grid in East Gippsland and modelled current electricity demand patterns. It identifies renewable energy technologies and models that would be appropriate for the local area, based on community input, and emphasises the importance of energy education and energy efficiency. The most recent report includes the outcomes of three pilot programs: a solar bulk buy, a multi-site feasibility study, and the establishment of a community energy information hub.

The Latrobe New Energy Jobs and Investment Prospectus (2018) was published by the Latrobe Valley Authority and funded by the Victorian Department of Environment, Land, Water and Planning. The Latrobe Valley Authority is a government agency established to work with local businesses and community groups to achieve positive outcomes through project activities, a Hi-Tech Precinct and seeking to tackle major questions around the rehabilitation of the open-cut mine site. The report outlines renewable energy opportunities for Latrobe Valley as identified by government, with a particular focus on large-scale generation, supply chain opportunities, job creation and trades training and education. The methodology of the report is unclear, though it appears to be based on desk-top research, rather than community consultation. The report recognises Latrobe Valley’s long-term role as the powerhouse of Victoria. It positions the region to continue this role by adopting renewable energy, building on existing workforce capability in the energy sector — established energy supply chains and strong electricity transmission infrastructure. The report emphasises opportunities to expand renewable energy generation across mature as well as new and innovative technologies, and identifies opportunities to upskill the workforce in renewable-energy-specific skill sets through the Gippsland Hi-Tech Precinct. Attracting renewable-energy-related manufacturing is also targeted.

In terms of the high-level synergies among the three reports:

- All three assess the prospect of future renewable energy development within an understanding of the existing local context and look for the strengths and opportunities of the region in relation to renewable energy.
- All three reference the importance of attracting renewable energy development for the future prosperity of the region and see renewable energy as a significant opportunity that the region is well-positioned to take up.
- All three assess the current status of the transmission network.
- All three identify appropriate renewable energy technologies for deployment, although Bright Futures only speaks to solar photovoltaic.
- All three identify a role for distributed generation, demand management, embedded networks and/or micro grids.
- This Roadmap and Bright Futures’ report emphasise household, local business and community-led renewable energy uptake, whereas the Latrobe Prospectus focuses primarily on larger scale deployment options.
- All three identify the importance of developing local industry capability to design, manufacture, install and maintain renewable energy.

42 Hynninen (2019).
However, the reports also differ from each other, and therefore, leave gaps when considering the desire to have a coherent and consistent Gippsland-wide strategy. The key differences and gaps are:

- This Roadmap and the Bright Futures’ report base their suggested approach to future renewable energy development on extensive community engagement and consultation. They are underpinned by similar methods (surveys, interviews, workshops) and similar participation rates. The approach advocated in these documents is, therefore, grounded in community appetite and interest. The Latrobe Prospectus, on the other hand, is a government-led strategy. It is unclear to what extent it is informed by local community input.

- The Latrobe Prospectus goes into depth regarding supply chain, job creation, education, training and manufacturing opportunities associated with increased investment in renewable energy. This is largely missing from both the other two reports.

- Understanding current patterns of regional energy demand is covered in the Bright Futures report, and (to a lesser extent) this Roadmap. All three reports lack modelling to align renewable energy generation and storage options with energy demand and network constraints or opportunities.

- This Roadmap and the Bright Futures’ report outline modes of renewable energy development that are most attractive and best-suited to the local context, based on community input. Both contain details on the desired models and this report details specific future energy opportunities. The Latrobe Prospectus leaves their discussion of possible renewable energy uptake very general.

- Only this Roadmap considers the importance of benefit-sharing, community co-ownership and co-investment to the creation of positive socio-economic outcomes from renewable energy development.

- In terms of phasing: the East Gippsland Shire’s Bright Futures report has already led directly to the implementation of pilot programs; several plans and initiatives underway in Latrobe are related to, but not readily linked to, the Prospectus; and this Roadmap is the first step and has not yet led to project implementation.

A more detailed analysis of each document and their similarities and differences is included in Appendix 9.

In addition to these two reports, there is likely to be a range of other studies relevant to understanding the future potential for renewable energy in other areas of Gippsland. Further desk-top and primary research is required to broaden this Roadmap from its Southern Gippsland focus to a whole-of-Gippsland approach. Ideas for how to do this are included in Section 5.2.

8. Guidance for future implementation

Local communities and stakeholders form a critical centre-piece of future renewable energy plans in Southern Gippsland. There is a clear and conscious aim within the region to foster innovative business models that enable and preference strong involvement of households, local businesses and community organisations in renewable energy generation, supply and efficient usage. Community-centred ownership, financing and procurement models will work to decentralise the energy system in Southern Gippsland and progress not only the transition to a renewable energy future, but also to a more diverse and equitable local economy. Supporting local businesses and industries to participate in the emerging renewable energy economy will be of central importance and will need to be supported through increased access to education and (re)training.

8.1. Next steps to a renewable energy future

Community engagement revealed support from local people to host a variety of renewable energy installations and identified sites and project opportunities that warrant further investigation. There are a number of key guiding principles for ensuring future renewable energy development is locally appropriate and aligned with the findings of this Roadmap:

- Quality community engagement must be ensured for each specific project, from project inception through to implementation, operation and decommissioning. Community input needs to be incorporated into designing appropriate projects.

- All modes and scales of renewable energy development should be evaluated and considered.

- Actions should be tailored to the local community and environmental context, considering local community feedback and available resources.

- While economic viability of the projects is an important prerequisite for successful project implementation, for long-term success it is equally important to ensure local communities and local economies share in the benefits of local renewable energy development.

- Collaborative approaches that draw on and enhance local skills, knowledge, networks and relationships should be actively pursued.

The following sections provide next steps for fostering a range of project types and initiatives identified in this Roadmap as being essential to the future of renewable energy in the region.
8.1.1. Small-scale projects

Small-scale projects will enable local households, organisations and businesses to take control of their electricity prices, reduce carbon emissions and (where paired with storage) may help to stabilise electricity supply.

- Support local households, organisations and businesses to understand and take up energy efficiency and renewable energy through education and support programs, as well as peer-to-peer learning opportunities. Existing local organisations are well-suited to deliver this role, with government support.
- Continue uptake of rooftop solar PV and solar hot water, along with micro hydro and micro wind.
- Encourage uptake of electric vehicles through information, bulk purchasing and increased availability of charging stations.
- Encourage and test smart demand management control systems that are paired with popular education and behaviour change campaigns.

8.1.2. Medium-scale projects

Medium-scale projects offer opportunities to supply electricity to large energy using businesses or small towns, as well as being well-matched for connection into the distribution network.

- Support community-owned renewable energy initiatives, including several already underway across Southern Gippsland. Such projects will play a significant role in involving local people, keeping benefits in the local economy and generating the conditions of social support for the renewable energy transition. Programs such as the Community Power Hubs have proven effective in supporting community-owned renewable energy. Expansion of this program to have a specific Southern Gippsland focus would be highly beneficial and could be speedily deployed by working in collaboration with existing organisations active in community-owned renewable energy.
- Supporting local agriculture and industry to implement bioenergy projects fuelled from waste streams could yield multiple benefits, including income diversification, fertiliser production and waste avoidance as well as dispatchable renewable energy generation.
- Support the development of mid-scale solar PV farms designed to integrate with grazing and/or cropping.
- Explore and test the feasibility of community-scale storage options, micro-grids and coordinated demand management approaches, in partnership with the network operator.

8.1.3. Large-scale projects

Large-scale projects will be required to meet the vision of becoming 100 per cent renewable energy and of reducing carbon emissions. Given Southern Gippsland world-class renewable energy resources, large-scale projects present a key opportunity for the local economy for projects where the grid connection into Latrobe Valley’s transmission lines is considered viable.

- Build partnerships to deliver local benefits from large-scale renewable energy development. This includes developing local supply chains and working with local communities and stakeholders to determine and implement appropriate means of benefit sharing, such as neighbour payments, grants, scholarships, co-investment, etc.
- Invest in ongoing community engagement with a focus on developing lasting local relationships. Offer opportunities for local input and dialogue.
- Work with local trade associations and business networks to build industry capacity to deliver renewable energy goods and services, and to develop opportunities for training.
- Consider hiring local people in community liaison roles and consider basing maintenance and operations staff in the local region.

8.1.4. Innovation

Renewable energy technologies are rapidly evolving as new technologies come onto the market. These innovations offer future opportunities, but their feasibility must be tested.

- Means of appropriately implementing already proven (but still relatively new) technologies needs to be explored in more detail, especially the potential opportunities for micro-grids, green hydrogen and wide-scale uptake of electric vehicles.
- Explore technology options for harnessing the region’s potential for tidal and wave energy.
- Develop and trial methods of delivering innovative partnerships between renewable energy developers, local government, local business and communities. This includes supply chain and local procurement innovation, as well as innovation around ways to share benefits locally, such as via co-investment and co-ownership models.
8.1.5. Education

Education efforts aimed at the general public, businesses, school-leavers and the existing workforce will support local ability to engage with and participate in the potential benefits of a renewable energy transition.

- Local households, organisations and businesses need to be supported to understand the options and benefits of various renewable energy and energy efficiency options.

- School leavers need to be made aware of possible renewable energy employment pathways and be supported to position themselves to access the qualifications and practicalities required.

- Develop re-training and re-employment pathways and programs for the existing workforce transitioning from fossil fueled to renewable energy jobs.

- Work with local tertiary training bodies to increase local training offerings pertaining to renewable energy engineering, construction, operation and maintenance, as well as skills related to the social aspects of the transition (including community engagement, communications and other social sciences). Also develop partnerships to make training programs out of Southern Gippsland more accessible to local residents (e.g. support with transport or scholarships).

- Create opportunities for climate change, energy efficiency and renewable energy to be included in the curriculum of local primary and secondary schools, including options to tour local renewable energy facilities.

8.1.6. Supply chain and jobs creation

Developing local supply chain of goods and services appropriate to the renewable energy industry will greatly enhance the local economic benefit of future renewable energy development. This will enable Southern Gippsland to also benefit from renewable energy development in nearby regions. Given the proximity to Victoria’s central hub of transmission infrastructure in the Latrobe Valley, an emphasis on supply chain development could prove to be highly beneficial.

In addition, the phase out of coal fired power and coal mining in the broader Gippsland area will need to be accompanied by new sources of employment, as well as new sources of energy. Much government attention regarding this transition is focused on the Latrobe Valley, for good reason. However, there are opportunities to expand this focus involve opportunities for workers and industries in Southern Gippsland.

8.1.7. Policy

Delivery of the Roadmap will need a united and integrated approach across different levels of government to effectively facilitate the regulation of energy efficiency and renewable energy efforts.

Policies that present opportunities for supporting industry and regional actors to implement the priorities identified in the Roadmap will be highly beneficial to future renewable energy development.

Exploring and implementing well-tested policy approaches, such as Community Power Hubs, that support communities to participate in the renewable energy transition will be important to winning (and maintaining) public support and ensuring that local communities are involved.
8.2. Refining a whole-of-Gippsland approach

This Roadmap complements and is largely aligned with East Gippsland’s Bright Energy Futures Project and the Latrobe Valley New Energy Jobs and Investment Prospectus. However, there remain gaps in bringing them together in a whole-of-Gippsland approach to renewable energy development. In order to develop a coherent, consistent and coordinated approach, work needs to be done to fill in the gaps among the three existing reports.

In particular this will involve:

- Latrobe Valley undertaking a community-informed aspect to the Prospectus that would provide guidance from the community on local aspirations and community attitudes regarding renewable energy development. It may be that this has already been carried out by another project or organisation (such as the Community Power Hub) and the material simply needs to be aligned. Further research is required to identify an appropriate approach to addressing this gap.

- East Gippsland and Southern Gippsland require further analysis of supply chain, manufacturing, employment and education/training opportunities associated with renewable energy. This needs to include strategies to build local capacity in these areas, and be conducted in such a way as to maximise complementarities and potential synergies between the three Gippsland regions.

- Latrobe Valley and Southern Gippsland require analysis of current electricity demand trends.

All three would benefit from detailed assessment on how renewable energy and storage options can meet local demand drawing on a range of technologies, scales and modes of deployment. Such a study would include more technical details than are currently included any of the reports and would need to involve a more detailed assessment of the capacity to connect new renewable energy generation into both the transmission and distribution networks.

Continuing to build and consolidate knowledge-sharing networks will greatly strengthen pathways forward and the ability to implement the strategies, initially through consolidating knowledge of plans and activities among the three regions. Given the significant work already done to date by multiple local agencies and organisations, this is all the more important. Specific areas for collaboration between Latrobe Valley and Southern Gippsland have already been identified, such as bioenergy feasibility studies and aspirations to establish a Gippsland-wide approach to bioenergy. Focused explorations of common areas of interest, studies and aspirations to establish a Gippsland-wide approach to bioenergy have already been identified, such as bioenergy feasibility studies and aspirations to establish a Gippsland-wide approach to bioenergy.

References


References cont.


Appendices

Appendices will be available online once the document is publicly launched, or by contacting energyinnovationco-op84@gmail.com.

Appendix 1: SGRER Community Engagement Strategy

Appendix 2: SGRER Community Visioning Workshop Outcomes

Appendix 3: SGRER Business and Tourism Workshop Outcomes

Appendix 4: SGRER Project Opportunities Workshop Outcomes

Appendix 5: SGRER Small-group Semi-structured Interview Questions

Appendix 6: SGRER Public Online Survey Questions (via Survey Monkey)

Appendix 7: SGRER Public Online Survey Results

Appendix 8: SGRER Community Online Participatory Mapping Outcomes (via Engage Victoria)

Appendix 9: Gaps and Synergies with Other Renewable Energy Strategies from the Gippsland Region